

Deploying in Microsoft Azure

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Prerequisites and guidelines for deploying the Nexus Dashboard cluster in Microsoft Azure

Before you proceed with deploying the Nexus Dashboard cluster in Microsoft Azure, you must:

- Ensure that the Azure form factor supports your scale and services requirements.

  Scale and services support and co-hosting vary based on the cluster form factor. You can use the Nexus Dashboard Capacity Planning tool to verify that the cloud form factor satisfies your deployment requirements.

- Review and complete the general prerequisites described in the Deployment Overview.
- Review and complete any additional prerequisites described in the *Release Notes* for the services you plan to deploy.
- Have appropriate access privileges for your Azure account and subscription.
- Have created a resource group for your Nexus Dashboard cluster resources.

Note The resource group must be empty and not contain any existing objects. Resource groups with existing objects cannot be used for Nexus Dashboard deployment.

To create a resource group:

- In the Azure portal, navigate to **All Resources** > **Resource Groups**.
- Click **+Add** to create a new resource group.
- In the **Create a resource group** screen, provide the name of the subscription you will use for your Nexus Dashboard cluster, the name for the resource group (for example, `nd-cluster`), and the region.

- Ensure that the CPU family used for the Nexus Dashboard VMs supports AVX instruction set.

- Create an SSH key pair.

  A key pair consists of a private key and a public key, you will be asked to provide the public key when creating the Nexus Dashboard nodes.

Note You will need to use the same machine where you create the public key for a one-time login into each node to enable general SSH login during cluster deployment procedure.

Creating SSH keys is described in Generating an SSH Key Pair in Linux or MacOS, on page 2 and Generating an SSH Key Pair in Windows, on page 3 sections below.

Generating an SSH Key Pair in Linux or MacOS

These procedures describe how to generate an SSH public and private key pair in Linux or MacOS. For instructions on generate an SSH public and private key pair in Windows, see Generating an SSH Key Pair in Windows, on page 3.

Procedure

Step 1 On your Linux virtual machine or Mac, create a public and private key pair using ssh-keygen, directing the output to a file.

```
# ssh-keygen -f filename
```

For example:

```
# ssh-keygen -f azure_key
```

Output similar to the following appears. Press the Enter key without entering any text when you are asked to enter a passphrase (leave the field empty so that there is no passphrase).

```
Generating public/private rsa key pair.
Enter passphrase (empty for no passphrase):
Enter same passphrase again:
Your identification has been saved in azure_key.
Your public key has been saved in azure_key.pub.
The key fingerprint is:
SHA256:gTsQIIAadjgNsgcguifIloh4XGpVWMdcXVV6U0dyBNs
...
```

Step 2 Locate the public and private key files that you saved.

```
# ls
```

Two files should be displayed, where:

- The file with the .pub suffix contains the public key information
- The file with the same name, but with no suffix, contains the private key information

For example, if you directed the output to a file named `azure_key`, you should see the following output:

```
# ls
azure_key
azure_key.pub
```

In this case:

- The `azure_key.pub` file contains the public key information
- The `azure_key` file contains the private key information

Step 3 Open the public key file and copy the public key information from that file, without the `username@hostname` information at the end.

Note
The private key file is not used in the installation process. However, you might need it for other reasons, such as logging into your Nexus Dashboard nodes through SSH.

Generating an SSH Key Pair in Windows

These procedures describe how to generate an SSH public and private key pair in Windows. For instructions on generate an SSH public and private key pair in Linux, see Generating an SSH Key Pair in Linux or MacOS, on page 2.

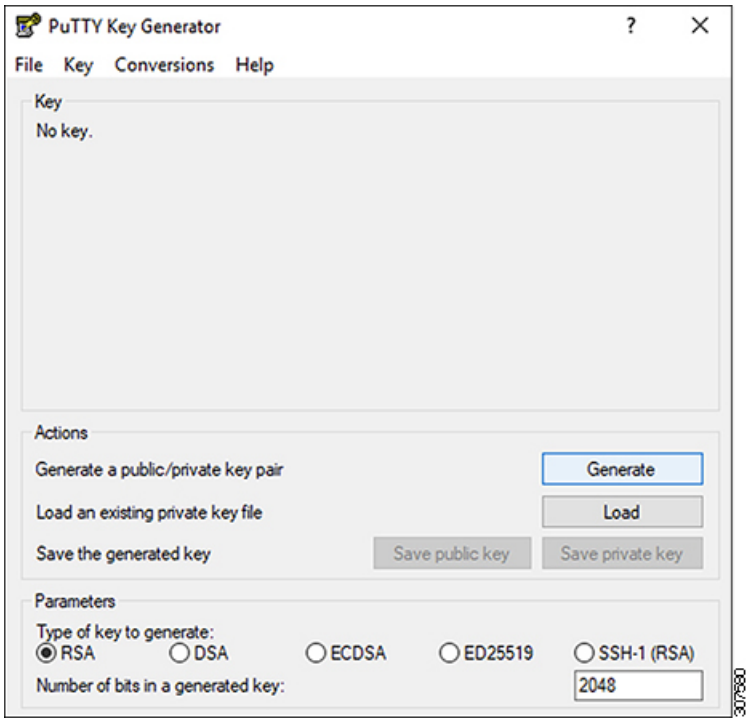
Procedure

Step 1 Download and install the PuTTY Key Generator (puttygen):

https://www.puttygen.com/download-putty

Step 2 Run the PuTTY Key Generator by navigating to **Windows** > **Start Menu** > **All Programs** > **PuTTY** > **PuTTYgen**.

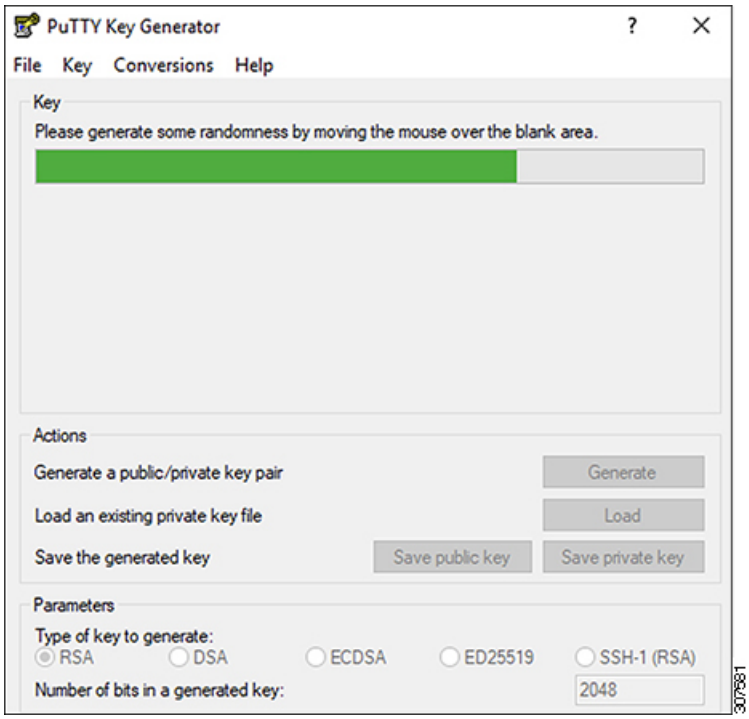
You will see a window for the PuTTY Key Generator on your screen.



Step 3 Click **Generate**.

A screen appears, asking you to move the mouse over the blank area to generate a public key.

Step 4 Move your cursor around the blank area to generate random characters for a public key.



Step 5 Save the public key.

a) Navigate to a folder on your laptop where you want to save the public key file and create a text file for this public key.

b) Copy the information in the PuTTY Key Generator.

Copy the public key information in the window, with these inclusions and exclusions:

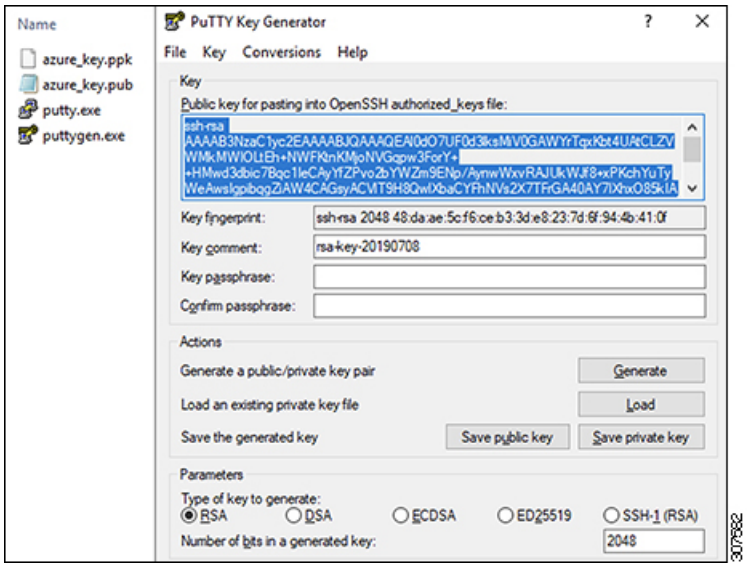
- Including the **ssh-rsa** text at the beginning of the public key.
- Excluding the following text string at the end:

```
== rsa-key-<date-stamp>
```

Truncate the key so that it does not include the == **rsa-key-<date-stamp>** text string at the end.

Note
In the next set of procedures, you will paste the public key information into the Azure ARM template. If the form does not accept the key in this format, add == back to the end of the key, as this format is required in some regions.

If the key is not in the correct format, the Nexus Dashboard will not complete its installation.



c) Paste the information in the public key text file that you created in 5.a, on page 5 and save the file, giving it a unique file name.

This public key text file will now contain a key that is on a single line of text. You will need the information in this public key text file in the next set of procedures.

Note
Do not save the public key using the **Save public key** option in the PuTTY Key Generator. Doing so saves the key in a format that has multiple lines of text, which is not compatible with the Nexus Dashboard deployment process.

Step 6 Save the private key.

a) Click **Save private key**.

A screen appears, asking if you want to save the file without a passphrase. Click **Yes** on this screen.

b) Navigate to a folder on your laptop and save the private key file, giving it a unique file name.

Note
The private key file is not used in the installation process. However, you might need it for other reasons, such as logging into your Nexus Dashboard nodes through SSH.

Deploying Nexus Dashboard in Azure

This section describes how to deploy Cisco Nexus Dashboard cluster in Microsoft Azure.

Before you begin

- Ensure that you meet the requirements and guidelines described in Prerequisites and guidelines for deploying the Nexus Dashboard cluster in Microsoft Azure, on page 1.

Procedure

Step 1 Subscribe to Cisco Nexus Dashboard product in Azure Marketplace.

a) Log into your Azure account and browse to https://marketplace.microsoft.com/en-us/.
b) In the search field, type `Cisco Nexus Dashboard` and select the option that is presented.

You will be re-directed to the Nexus Dashboard Azure Marketplace page.

c) Click **Get it now**.
d) In the **Select a plan** dropdown, select the version and click **Create**.

Step 2 Provide **Basic** information.

a) From the **Subscription** dropdown, select the subscription you want to use for this.
b) From the **Resource group** dropdown, select the resource group you created for this as part of Prerequisites and guidelines for deploying the Nexus Dashboard cluster in Microsoft Azure, on page 1.
c) From the **Region** dropdown, select the region where the template will be deployed.
d) In the **Password** and **Confirm Password** fields, provide the admin password for the nodes.

This password will be used for the Nexus Dashboard's `rescue-user` login, as well as the initial password for the GUI's `admin` user.

Note
You must provide the same password for all nodes or the cluster creation will fail.

e) In the **SSH public key** field, paste the public key from the key pair you generated as part of the Prerequisites and guidelines for deploying the Nexus Dashboard cluster in Microsoft Azure, on page 1 section.
f) Click **Next** to proceed to the next screen.

Step 3 Provide **ND Settings** information.

a) Provide the **Cluster Name**.
b) In the **Image Version** dropdown, verify that the correct version is selected.
c) In the **Virtual Network Name** field, provide the name for a VNET that will be created for your cluster.

The VNET must not already exist and will be created for you during deployment. If you provide an already existing VNET, the deployment cannot proceed.

d) In the **Subnet Address Prefix** field, provide a subnet within the VNET.

The subnet must be a `/24` subnet and it must be different from the default VNET subnet you defined when creating the VNET.

e) In the **External Subnets** field, provide the external network allowed to access the cluster.

For example, `0.0.0.0/0` to be able to access the cluster from anywhere.

f) Click **Next** to proceed to the next screen.

Step 4 In the **Review + create** page, review information and click **Create** to deploy the cluster.

Step 5 Wait for the deployment to complete, then start the VMs.

Step 6 Note down all nodes' public IP addresses.

After all instances are deployed, navigate to the Azure console, select each VM, and note down all nodes' public IP addresses. You will provide this information to the GUI bootstrap wizard in the following steps.

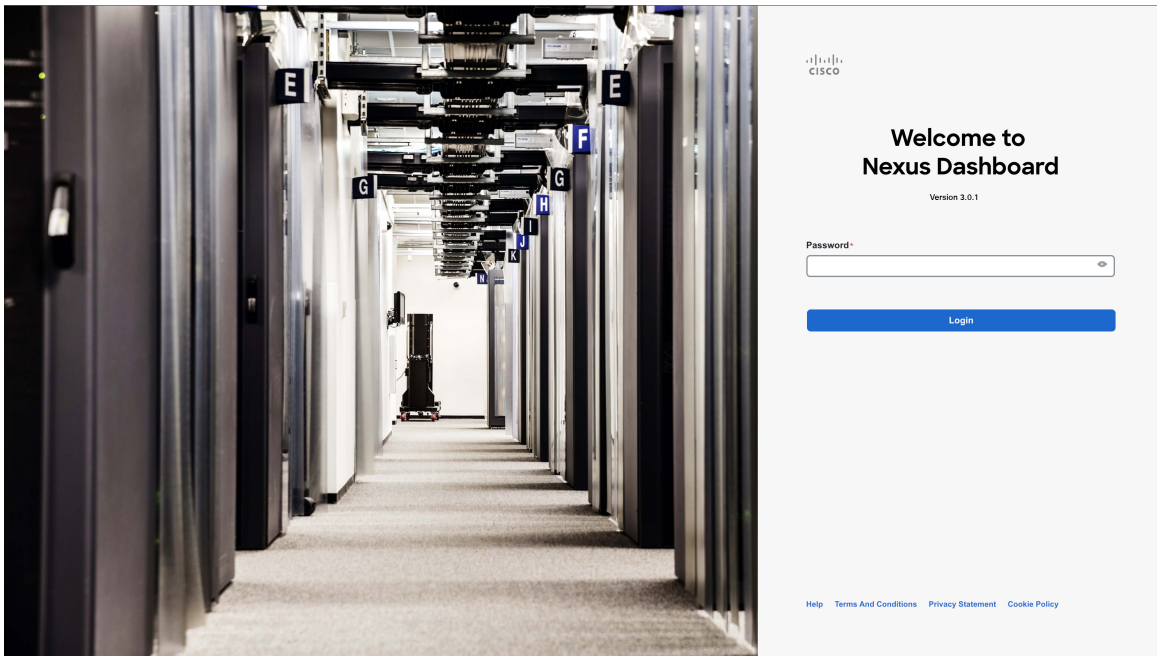
Also note which is the "first" node, which will be indicated by the node's VM name `vm-node1-<cluster-name>`. You will use this node's public IP address to complete cluster configuration.

Step 7 Open your browser and navigate to `https://<first-node-public-ip>` to open the GUI.

Note
You must use the public IP address of the first node (`vm-node1-<cluster-name>`) or cluster configuration cannot be completed.

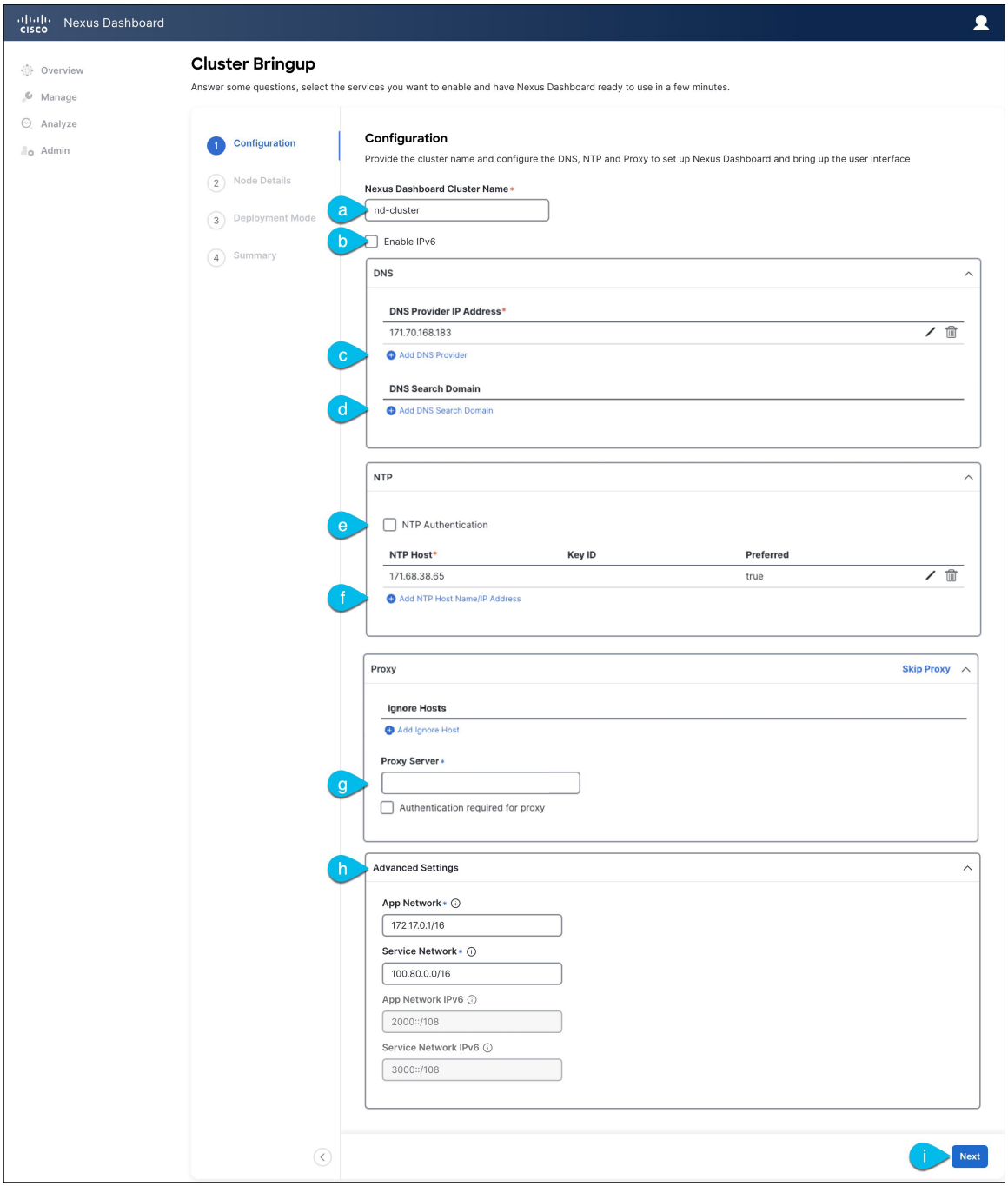
The rest of the configuration workflow takes place from the first node's GUI. You do not need to log in to or configure the other two nodes directly.

Enter the password you provided for the first node and click **Login**



Step 8 Provide the **Cluster Details**.

In the **Cluster Details** screen of the **Cluster Bringup** wizard, provide the following information:



a) Provide the **Cluster Name** for this Nexus Dashboard cluster.

- The cluster name must follow the RFC-1123 requirements.
- If you use multi-cluster connectivity to establish connectivity between multiple Nexus Dashboard clusters, the names of the clusters that you plan to connect together must be unique.

b) (Optional) If you want to enable IPv6 functionality for the cluster, check the **Enable IPv6** checkbox.

c) Click **+Add DNS Provider** to add one or more DNS servers.

After you've entered the information, click the checkmark icon to save it.

d) (Optional) Click **+Add DNS Search Domain** to add a search domain.

After you've entered the information, click the checkmark icon to save it.

e) (Optional) If you want to enable NTP server authentication, enable the **NTP Authentication** checkbox and click **Add NTP Key**.

In the additional fields, provide the following information:

- **NTP Key** – a cryptographic key that is used to authenticate the NTP traffic between the Nexus Dashboard and the NTP server(s). You will define the NTP servers in the following step, and multiple NTP servers can use the same NTP key.
- **Key ID** – each NTP key must be assigned a unique key ID, which is used to identify the appropriate key to use when verifying the NTP packet.
- **Auth Type** – this release supports `MD5`, `SHA`, and `AES128CMAC` authentication types.
- Choose whether this key is **Trusted**. Untrusted keys cannot be used for NTP authentication.

Note
After you've entered the information, click the checkmark icon to save it.

For the complete list of NTP authentication requirements and guidelines, see Prerequisites and guidelines for all enabled services.

f) Click **+Add NTP Host Name/IP Address** to add one or more NTP servers.

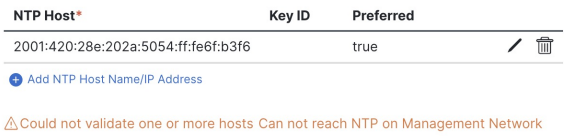
In the additional fields, provide the following information:

- **NTP Host** – you must provide an IP address; fully qualified domain name (FQDN) are not supported.
- **Key ID** – if you want to enable NTP authentication for this server, provide the key ID of the NTP key you defined in the previous step.

  If NTP authentication is disabled, this field is grayed out.
- Choose whether this NTP server is **Preferred**.

After you've entered the information, click the checkmark icon to save it.

Note
If the node into which you are logged in is configured with only an IPv4 address, but you have checked **Enable IPv6** in a previous step and provided an IPv6 address for an NTP server, you will get the following validation error:



This is because the node does not have an IPv6 address yet (you will provide it in the next step) and is unable to connect to an IPv6 address of the NTP server.

In this case, simply finish providing the other required information as described in the following steps and click **Next** to proceed to the next screen where you will provide IPv6 addresses for the nodes.

If you want to provide additional NTP servers, click **+Add NTP Host** again and repeat this substep.

g) Provide a **Proxy Server**, then click **Validate** it.

For clusters that do not have direct connectivity to Cisco cloud, we recommend configuring a proxy server to establish the connectivity. This allows you to mitigate risk from exposure to non-conformant hardware and software in your fabrics.

You can also choose to provide one or more IP addresses communication with which should skip proxy by clicking **+Add Ignore Host**.

The proxy server must have the following URLs enabled:

```
dcappcenter.cisco.com
svc.intersight.com
svc.ucs-connect.com
svc-static1.intersight.com
svc-static1.ucs-connect.com
```

If you want to skip proxy configuration, click **Skip Proxy**.

h) (Optional) If your proxy server required authentication, enable **Authentication required for Proxy**, provide the login credentials, then click **Validate**.

i) (Optional) Expand the **Advanced Settings** category and change the settings if required.

Under advanced settings, you can configure the following:

- Provide custom **App Network** and **Service Network**.

  The application overlay network defines the address space used by the application's services running in the Nexus Dashboard. The field is pre-populated with the default `172.17.0.1/16` value.

  The services network is an internal network used by the Nexus Dashboard and its processes. The field is pre-populated with the default `100.80.0.0/16` value.

  If you have checked the **Enable IPv6** option earlier, you can also define the IPv6 subnets for the App and Service networks.

  Application and Services networks are described in the Prerequisites and guidelines for all enabled services section earlier in this document.

j) Click **Next** to continue.

Step 9 In the **Node Details** screen, provide the node's information.

a) Click the **Edit** button next to the first node.

b) Provide the node's **Name**.

The **Management Network** and **Data Network** information will be already populated from the VNET subnet you have configured before deploying the cluster.

The cluster creates six subnets from the given VNET, from which the data and management networks will be allocated for the cluster's three nodes.

c) Leave IPv6 addresses and VLAN fields blank.

Cloud Nexus Dashboard clusters do not support these options.

d) Click **Save** to save the changes.

Step 10 Click **Add Node** to add the second node to the cluster.

The **Node Details** window opens.

a) Provide the node's **Name**.

b) In the **Credentials** section, provide the node's **Public IP Address** and the password you provided during template deployment, then click **Verify**.

The IP address and password are used to pull that node's **Management Network** and **Data Network** information, which will be populated in the fields below.

c) Ensure that you select `Primary` for the node type.

Only 3-node clusters are supported for cloud deployments, so all nodes must be `Primary`.

d) Click **Save** to save the changes.

Step 11 Repeat the previous step to add the 3rd node.

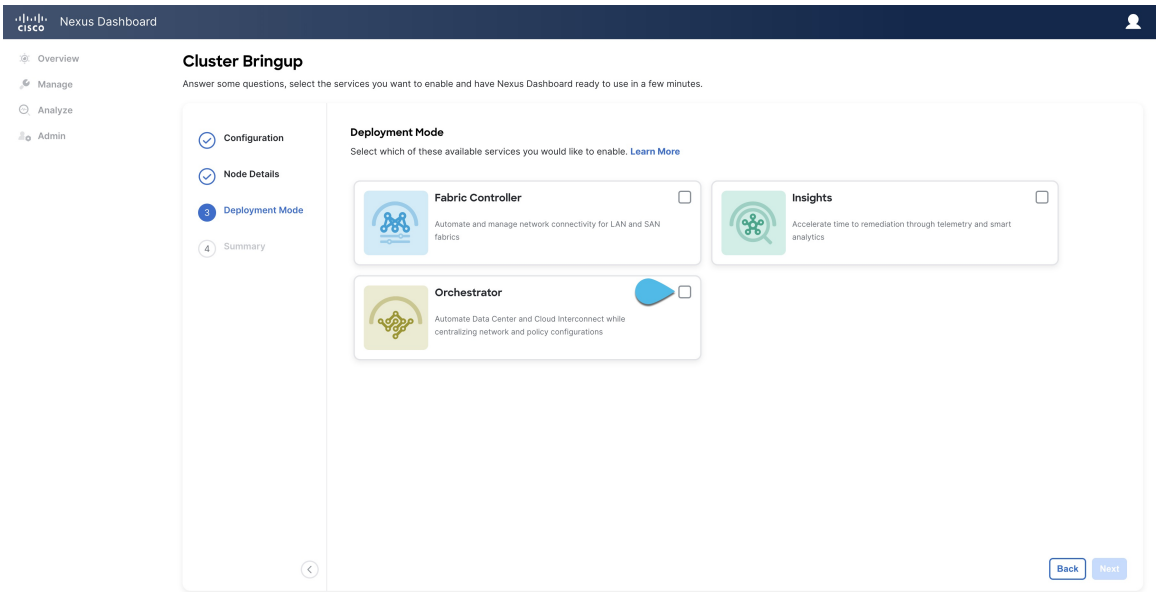
Step 12 In the **Node Details** page, click **Next** to continue.

Step 13 Choose the **Deployment Mode** for the cluster.

a) Choose the services you want to enable.

Prior to release 3.1(1), you had to download and install individual services after the initial cluster deployment was completed. Now you can choose to enable the services during the initial installation.

Note
Cloud deployments support the Orchestrator service, so you must not select any other deployment modes.



b) Click **Add Persistent Service IPs/Pools** to provide one or more persistent IPs required by Insights or Fabric Controller services.

For more information about persistent IPs, see the Prerequisites and guidelines for all enabled services section.

c) Click **Next** to proceed.

Step 14 In the **Summary** screen, review and verify the configuration information, click **Save**, and click **Continue** to confirm the correct deployment mode and proceed with building the cluster.

During the node bootstrap and cluster bring-up, the overall progress as well as each node's individual progress will be displayed in the UI. If you do not see the bootstrap progress advance, manually refresh the page in your browser to update the status.

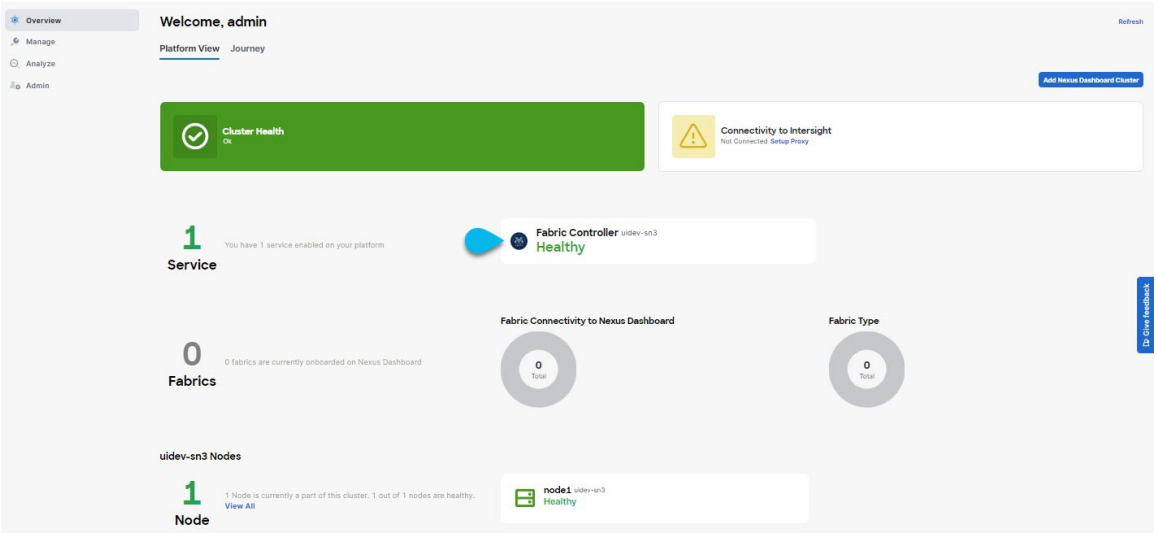
It may take up to 30 minutes for the cluster to form and all the services to start. When cluster configuration is complete, the page will reload to the Nexus Dashboard GUI.

Step 15 Verify that the cluster is healthy.

Depending of the deployment mode, it may take more than 30 minutes for the cluster to form and all the services to start.

After the cluster becomes available, you can access it by browsing to any one of your nodes' management IP addresses. The default password for the `admin` user is the same as the `rescue-user` password you chose for the first node. During this time, the UI will display a banner at the top stating "Service Installation is in progress, Nexus Dashboard configuration tasks are currently disabled":

After all the cluster is deployed and all services are started, you can check the **Overview** page to ensure the cluster is healthy:



Alternatively, you can log in to any one node via SSH as the `rescue-user` using the password you provided during node deployment and using the `acs health` command to check the status:

- While the cluster is converging, you may see the following outputs:

```
$ acs health
k8s install is in-progress
```

```
$ acs health
k8s services not in desired state - [...]
```

```
$ acs health
k8s: Etcd cluster is not ready
```

- When the cluster is up and running, the following output will be displayed:

```
$ acs health
All components are healthy
```

Note

In some situations, you might power cycle a node (power it off and then back on) and find it stuck in this stage:

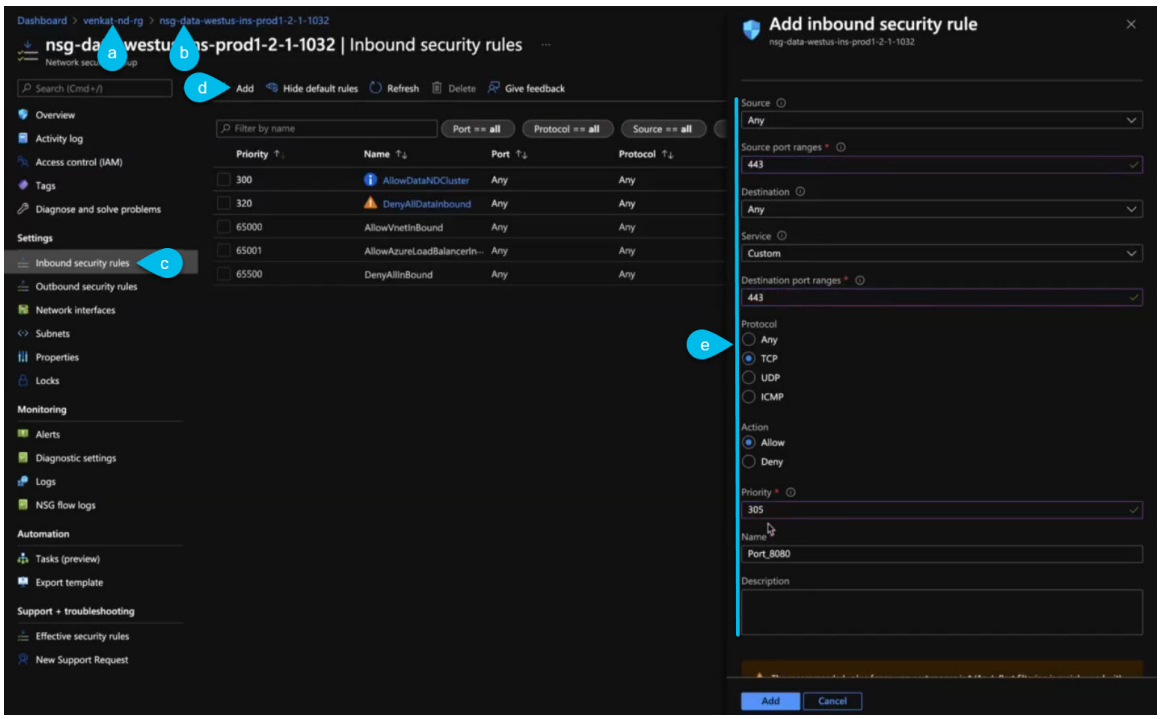
`deploy base system services`

This is due to an issue with `etcd` on the node after a reboot of the pND (Physical Nexus Dashboard) cluster.

To resolve the issue, enter the `acs reboot clean` command on the affected node.

Step 16 Update the nodes' security group with required ports.

This step describes how to update the Nexus Dashboard nodes' instances with the required port configuration for on-boarding Cisco NDFC fabrics. If you do not plan on on-boarding any NDFC fabrics to your Nexus Dashboard cluster, you can skip this step.



a) In the Azure portal, navigate to the resource group where you deployed your Nexus Dashboard.

This is the same resource group you selected in Step 2.

b) Select the security group attached to the nodes' data interfaces.

The name of the security group will begin with `nsg-data-<region>-...`.

c) In the security group's setting navigation bar, select **Inbound security rules**.

d) Click **+Add** to add a new inbound security rule, then provide the details to allow inbound communication on port 443.

Provide the following information for the new rule:

- For **Source**, select `Any`.
- For **Source port ranges**, enter `443`.
- For **Destination**, select `Any`.

- For **Destination port ranges**, enter `443`.
- For **Protocol**, choose `TCP`.
- For **Action**, choose `Allow`.
- For **Priority**, choose a priority between `300` and `320`.

  For example, `305`.
- Provide a **Name** for the rule.

e) Click **+Add** to add a new inbound security rule, then provide the details to allow inbound communication on port 9092.

Repeat the previous substep to add another rule with the following details:

- For **Source**, select `Any`.
- For **Source port ranges**, enter `9092`.
- For **Destination**, select `Any`.
- For **Destination port ranges**, enter `9092`.
- For **Protocol**, choose `TCP`.
- For **Action**, choose `Allow`.
- For **Priority**, choose a priority between `300` and `320`.

  For example, `310`.
- Provide a **Name** for the rule.