Deploying in Existing Red Hat Enterprise Linux Installation

Prerequisites and Guidelines

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

- Review and complete the general prerequisites described in the Deployment Overview.

  The guide is available from the Nexus Dashboard UI or online at *Cisco Nexus Dashboard User Guide*

- Review and complete any additional prerequisites described in the *Release Notes* for the services you plan to deploy.

- Ensure that your server is running Red Hat Enterprise Linux (RHEL) release 8.4 or 8.6.

  This release of Nexus Dashboard support both physical and virtual deployments of RHEL.

Note For non-production deployments, such as labs or testing, you can deploy in other Linux distributions by passing an additional parameter to the installer in **Step 4** of the Deploying Nexus Dashboard in Existing Red Hat Enterprise Linux Installation, on page 3 section:

```
./nd-installer setup ./examples/nd-linux-input.yaml
skip-os-version-check
```

- Ensure that your server has at least 20GB of available disk space in the `/var` partition.

  The installation process requires the additional disk space to extract temporary installation files.

- You can deploy only a single-node or three-node (all `master` nodes) cluster in RHEL.

  Adding `worker` or `standby` node is not supported for this cluster form factor.

- Clusters deployed in RHEL support only Nexus Dashboard Fabric Controller (NDFC), Release 12.1(1) or later service with **SAN Controller** deployment type.

  You must deploy one of the other form factors if you want to run any other Nexus Dashboard services or another deployment type of NDFC. For more information about services supported one each Nexus Dashboard cluster form factor, see Cisco Nexus Dashboard Cluster Sizing and Nexus Dashboard and Services Compatibility Matrix.

Note Standby and worker nodes are not supported with this cluster form factor.

- Ensure that the following system-level requirements are satisfied:
  - An existing Linux user on each cluster node, which you will provide to the installer and which can be used to manage and troubleshoot the node.

    Only one system user can connect to the Nexus Dashboard node's system. For more information, see Troubleshooting Nexus Dashboard Deployments in RHEL, on page 12 after the deployment.

  - System clocks across all nodes must be synchronized.

    You can use a system utility such as `chrony` to ensure proper time synchronization between the nodes.

Note By default, the Nexus Dashboard installer for RHEL verifies that the system clock is synchronized using `chrony`. If you use a different system to synchronize the clock, you can use `./nd-installer setup input.yaml` **`skip-ntp-check`** during installation to bypass the default verification.

  - Skopeo package is installed.

    Skopeo is outside the scope of this document, but in short you can use `yum install skopeo` command to install the package.

  - Swap file is disabled.

    You can disable swap by removing its entry from the `/etc/fstab` file and restarting the server.

  - The `firewalld` and `libvirt` services must be installed but stopped and disabled prior to deploying Nexus Dashboard software.

Note The following additional system-level changes will be applied when you deploy Nexus Dashboard software to allow executables from additional directories and the cluster's own SSH server:

```
/usr/bin/chcon -R -t bin_t /mnt/atom
/usr/bin/chcon -R -t bin_t /mnt/linux
/usr/bin/chcon -R -t bin_t /opt/apic-sn

/usr/bin/chcon -t ssh_home_t -R /data/services/issh/ssh_host_rsa_key
/usr/bin/chcon -t ssh_home_t -R /data/services/issh/intssh
/usr/sbin/semanage port -a -t ssh_port_t -p tcp 1022
```

- Ensure you have enough system resources.

  When deploying in RHEL, you can deploy two types of nodes:

  Table 1: Deployment Requirements

Default Node Profile	Large Node Profile
• 16 vCPUs • 64 GB of RAM • 500GB SSD storage for the data volume and an additional 100GB for the system volume. All nodes must be deployed on SSD or faster storage. • Two network interfaces in addition to the RHEL's management interface.	• 32 vCPUs • 128 GB of RAM • 3TB SSD storage for the data volume and an additional 100GB for the system volume. The data volume may be a combination of multiple drives (such as in RAID configuration) as long as the drive is presented as a single device to the operating system. All nodes must be deployed on SSD or faster storage. • Two network interfaces in addition to the RHEL's management interface.

Deploying Nexus Dashboard in Existing Red Hat Enterprise Linux Installation

This section describes how to configure and bring up a Nexus Dashboard cluster in RHEL.

Before you begin

- Ensure that you meet the requirements and guidelines described in Prerequisites and Guidelines, on page 1.

Procedure

Step 1 Obtain the Cisco Nexus Dashboard software archive package (tarball).

a) Browse to the Software Download page.

https://www.cisco.com/c/en/us/support/data-center-analytics/nexus-dashboard/series.html

b) Click the **Downloads** tab.

c) Choose the Nexus Dashboard release version you want to download.

d) Click the **Download** icon next to the Nexus Dashboard tarball (`nd-rhel-<version>.tar`).

Step 2 Extract the downloaded archive.

```
tar -xvf nd-rhel-<version>.tar
```

Step 3 Modify the installation `yaml` file.

The distribution tarball includes a sample YAML file (`./nd-linux/examples/nd-linux-input.yaml`), which you can modify to provide the values appropriate to your deployment.

For example, the following sample node configuration YAML file highlights the specific fields which you must provide:

- For `blkdev`, provide the SSD device(s) for the node's system and data volumes.

  You must provide at least one SSD device for ND installation. The total size of this device must meet the system and data volume requirements listed in Prerequisites and Guidelines, on page 1. You can choose to provide two or more devices to satisfy system and data volumes' size requirements. The order of the devices in the YAML file does not matter – the smaller disk will be used for the system volume and the rest of device(s) combined will be used for the data volume.

  Note
  All provided devices will be erased and consumed for the Nexus Dashboard node

  For more information on the node device requirements, see Prerequisites and Guidelines, on page 1.

- For `oobNetwork`, provide the management network information:
  - For `uplinks`, provide the names of the network interfaces connected to the Nexus Dashboard management network.

    These interfaces must be dedicated exclusively to the Nexus Dashboard.
  - For `ipNet`, provide the node's management network IPv4 address and netmask in the `172.23.152.214/24` format.
  - For `gatewayIP`, provide the node's management network IPv4 gateway.
- For `inbandNetwork`, provide the names of the network interfaces connected to the Nexus Dashboard data network.

  You must provide only the interface(s) in the `uplinks` section (and not the network or gateway information) as the rest of the configuration is defined during the GUI bootstrap process.
- For `firstMaster`, ensure that only one of the node is set to `true` and the other 2 nodes are set to `false`.

  You will use the `firstMaster` node to complete the cluster bootstrap process using the GUI.
- For `clusterName`, provide the name of the cluster.
- For `installProfile`, choose either `Default` or `Large`.

  For more information on the node profile requirements, see Prerequisites and Guidelines, on page 1.
- For `serviceUser`, provide an existing Linux account name which will be used for managing and troubleshooting the Nexus Dashboard node.

  Note
  The `serviceUser` must be different from the system's `root` user, which you must have created before starting the installation as mentioned in Prerequisites and Guidelines, on page 1.

```
# Node role. This release supports 'Master' nodes only.
nodeRole: Master

# Block devices. One or more un-partitioned devices that meet profile requirements for data and
system volumes.
blkdev:
```

```
  - type: SSD
    name: "/dev/sdb"
  - type: SSD
    name: "/dev/sdc"

# Networking. You must provide 2 interfaces exclusively to ND that are separate from the Linux
management interface.
oobNetwork:
  uplinks:
  - ens924
  ipNet: 172.23.152.214/24
  gatewayIP: 172.23.152.1

# Data network interface only, the rest of the data network configuration is provided during UI
bootstrap
inbandNetwork:
  uplinks:
  - ens956

# Set to 'true' for one of the nodes in the cluster.
firstMaster: true

# Cluster name.
clusterName: nd-cluster

# Installation profile: 'Default' or 'Large'.
installProfile: Default

# Linux user account name. This must not be the 'root' user.
# Only this user will have privileges to execute certain ND diagnostics commands.
serviceUser: nduser
```

Step 4 Install Nexus Dashboard node software.

```
cd nd-linux
./nd-installer setup ./examples/nd-linux-input.yaml
```

You will be asked to provide the password, which will be used for the Nexus Dashboard cluster `admin` account.

Note
By default, the installer verifies that the system clock is synchronized using `chrony`. If you use a different system to synchronize the clock, you can use `./nd-installer setup ./examples/nd-linux-input.yaml` **`skip-ntp-check`** to bypass the default verification.

Step 5 Repeat the previous steps to deploy the 2nd and 3rd nodes.

If you are deploying a single-node cluster, you can skip this step.

You do not need to wait for the first node's installation to complete, you can begin deploying the other two nodes simultaneously.

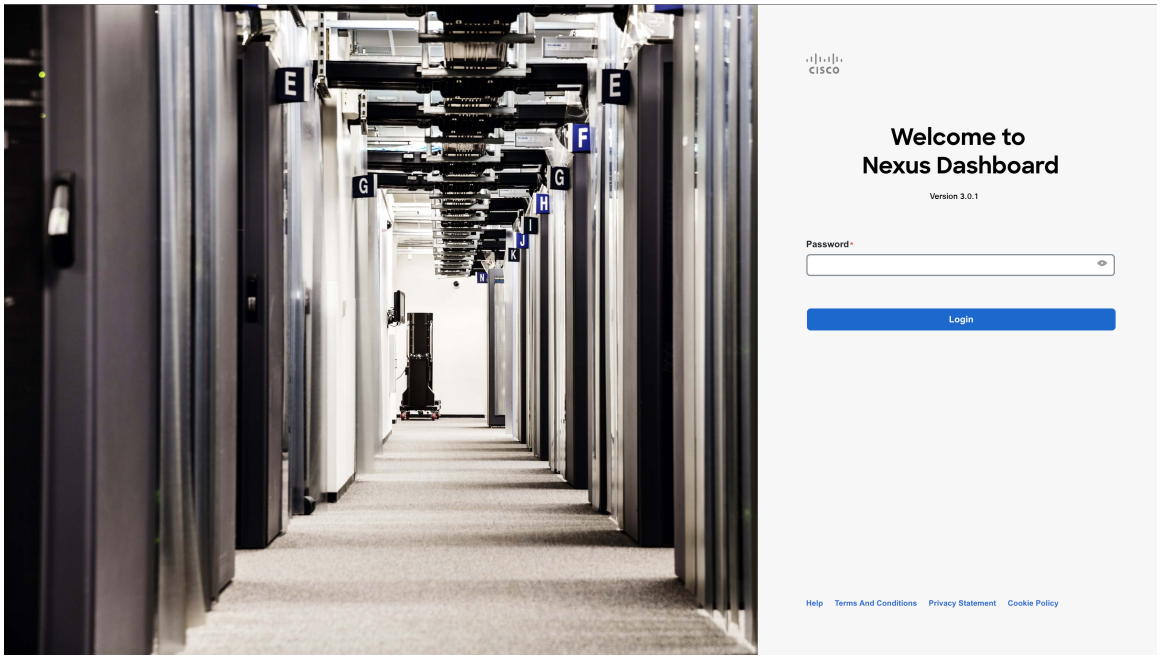
Note
When providing the node details in the configuration YAML file for the 2nd and 3rd nodes, ensure that `firstMaster` parameter is set to `false`.

Step 6 Wait for all three nodes to finish deploying.

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

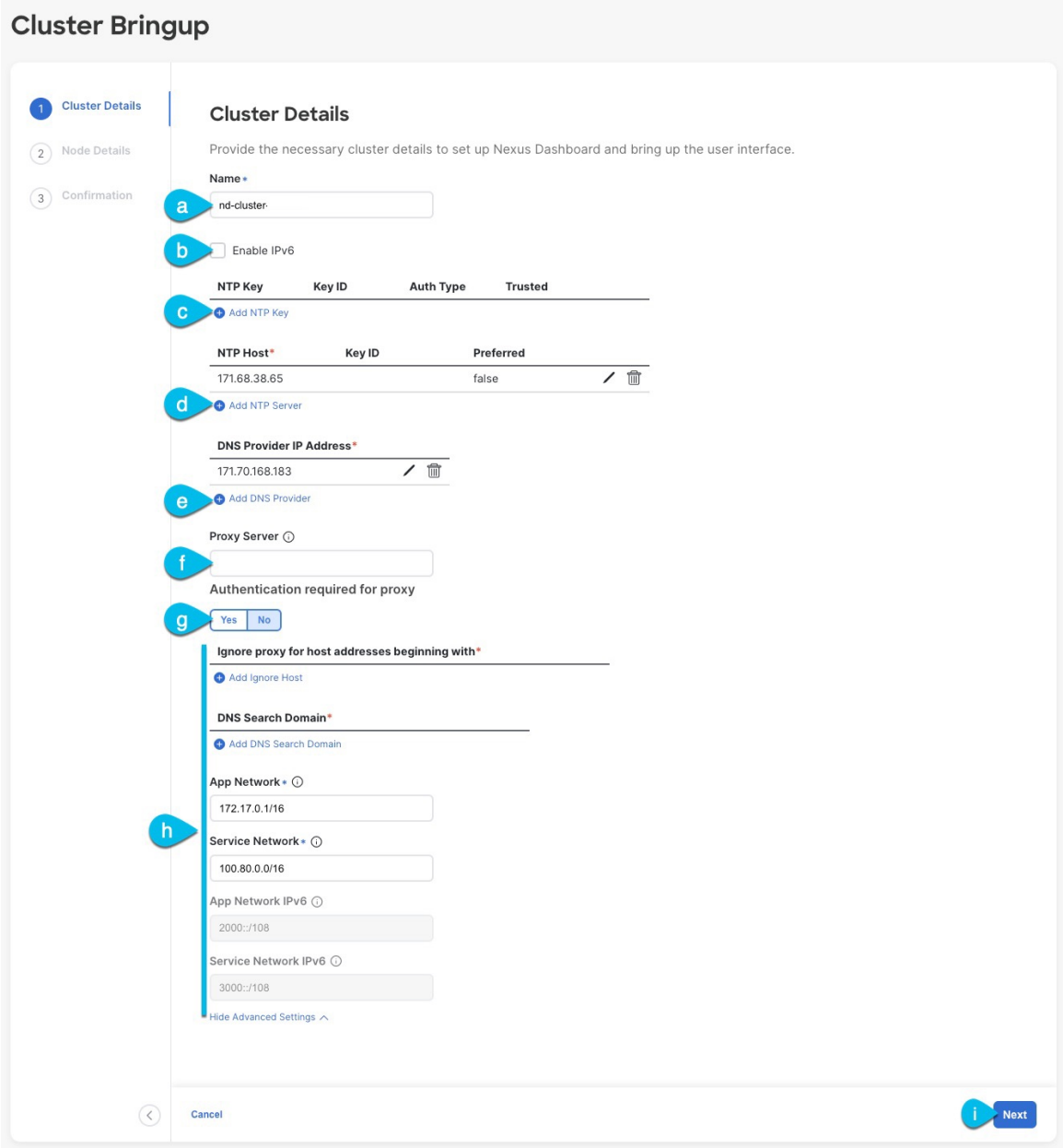
The rest of the configuration workflow takes place from one of the node's GUI. You must use the IP address you provided for the node which you designated as `firstMaster`.

Enter the password you provided in a previous step and click **Begin Setup**



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.

b) Do not **Enable IPv6**.

Note
This form factor does not support IPv6 functionality.

c) (Optional) If you want to enable NTP server authentication, 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
For the complete list of NTP authentication requirements and guidelines, see Prerequisites and Guidelines.

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

d) Click **+Add NTP Host** 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.
- Choose whether this NTP server is **Preferred**.

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

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

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

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

f) Provide a **Proxy Server**.

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.

If you want to skip proxy configuration, click the information (**i**) icon next to the field, then click **Skip**.

g) (Optional) If your proxy server required authentication, change **Authentication required for Proxy** to `Yes` and provide the login credentials.

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

Under advanced settings, you can configure the following:

- Provide one or more search domains by clicking **+Add DNS Search Domain**.

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

- 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 section earlier in this document.

i) 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) In the **Password** field, enter the password for this node and click **Validate**.

This will auto-populate the **Name**, **Serial Number**, and **Management Network** information for the node.

The hostname of the RHEL server where the node software is installed is used for the node's **Name**.

c) Provide the node's **Data Network** information.

The **Management Network** information is already pre-populated with the information you provided for the first node.

You must provide the data network IP address/netmask (for example, `172.31.140.58/24`) and gateway (for example, `172.31.140.1`). Optionally, you can also provide the VLAN ID for the network. For most deployments, you can leave the VLAN ID field blank.

d) (Optional) Provide IPv6 addresses for the management and data networks.

Nexus Dashboard supports either IPv4 or dual stack IPv4/IPv6 for the management and data networks.

Note
If you want to provide IPv6 information, you must do that now during cluster bootstrap process. If you deploy the cluster using only IPv4 stack and want to add IPv6 information later, you would need to redeploy the cluster.

All nodes in the cluster must be configured with either only IPv4 or dual IPv4/IPv6 stack.

e) (Optional) If required, **Enable BGP** for the data network.

BGP configuration is required for the Persistent IPs feature required by some services, such as Nexus Dashboard Insights with NDFC fabrics. This feature is described in detail in the "Persistent IP Addresses" sections of the *Nexus Dashboard User's Guide*.

Note
You can enable BGP at this time or in the Nexus Dashboard GUI after the cluster is deployed.

When you enable BGP, you must also provide the following information:

- **ASN** (BGP Autonomous System Number) of this node.

  You can configure the same ASN for all nodes or a different ASN per node.

- **BGP Peer Details**, which includes the peer's IPv4 or IPv6 address and peer's ASN.

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

Step 10 In the **Node Details** screen, click **Add Node** to add the second node to the cluster.

The **Node Details** window opens.

a) In the **Deployment Details** section, provide the node's **Management IP Address** and **Password**, then click **Verify**.

This is the password you provided to the `./nd-installer setup` command during installation in Step 4.

Verifying the IP and password will auto-populate the **Name**, **Serial Number**, and **Management Network** information for the node.

The hostname of the RHEL server where the node software is installed is used for the node's **Name**.

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

c) Provide the node's **Data Network** IP address and gateway.

The **Management Network** information will be pre-populated with the information pulled from the node based on the management IP address and credentials you provided in the previous sub-step.

You must provide the data network IP address/netmask (for example, `172.31.141.58/24`) and gateway (for example, `172.31.141.1`). Optionally, you can also provide the VLAN ID for the network. For most deployments, you can leave the VLAN ID field blank.

d) (Optional) Provide IPv6 information for the management and data networks.

Nexus Dashboard supports either IPv4 or dual stack IPv4/IPv6 for the management and data networks.

Note
If you want to provide IPv6 information, you must do it during cluster bootstrap process. If you deploy the cluster using only IPv4 stack and want to add IPv6 information later, you would need to redeploy the cluster.

All nodes in the cluster must be configured with either only IPv4 or dual IPv4/IPv6 stack.

e) (Optional) If required, **Enable BGP** for the data network.

BGP configuration is required for the Persistent IPs feature used by some services, such as Nexus Dashboard Insights with NDFC fabrics. This feature is described in more detail in Prerequisites and Guidelines and the "Persistent IP Addresses" sections of the *Cisco Nexus Dashboard User Guide*.

Note
You can enable BGP at this time or in the Nexus Dashboard GUI after the cluster is deployed.

When you enable BGP, you must also provide the following information:

- **ASN** (BGP Autonomous System Number) of this node.

  You can configure the same ASN for all nodes or a different ASN per node.

- **BGP Peer Details**, which includes the peer's IPv4 or IPv6 address and peer's ASN.

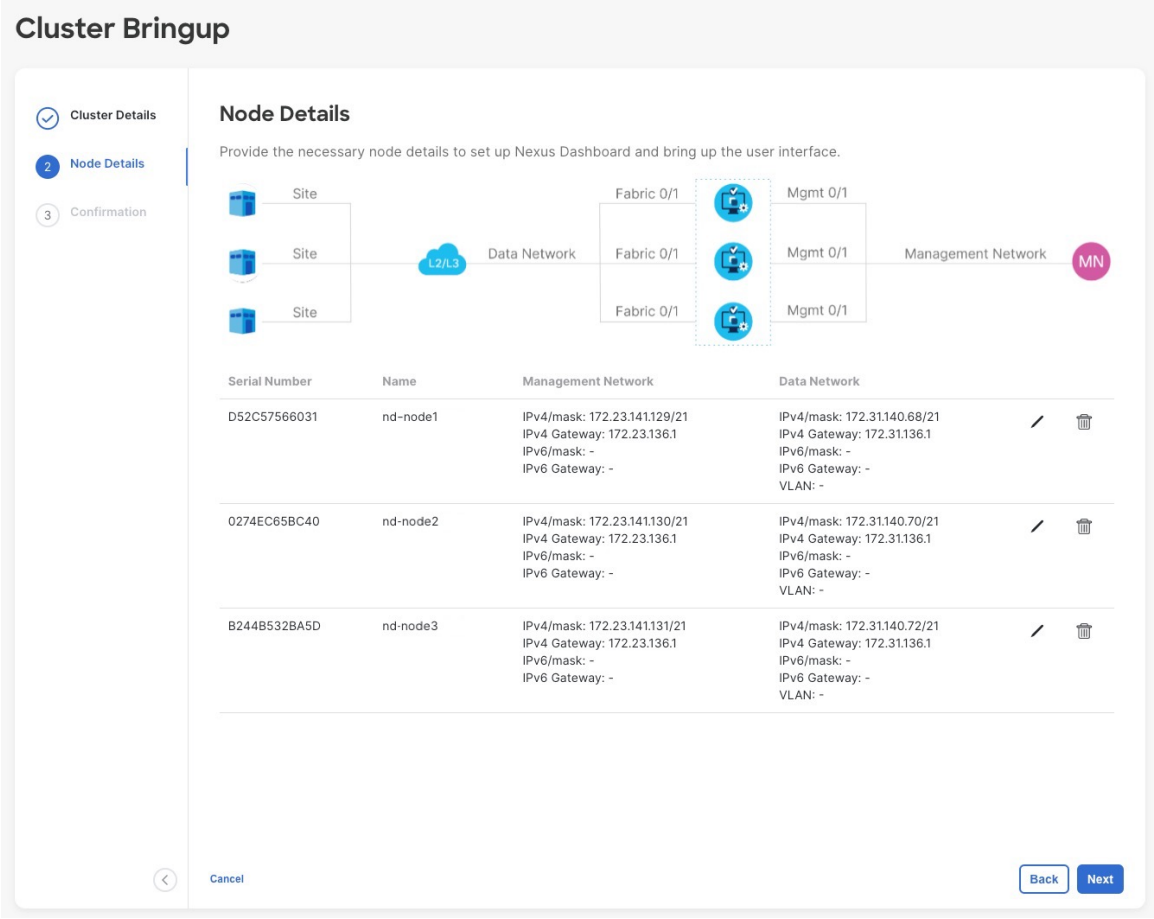
f) Click **Add** to save the changes.

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

If you are deploying a single-node cluster, skip this step.

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

After you have provided the management and data network information for all nodes, you can proceed to the final **Confirmation** screen.



Step 13 In the **Confirmation** screen, review and verify the configuration information and click **Configure** to create 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 14 Verify that the cluster is healthy.

It may take up to 30 minutes for the cluster to form and all the services to start.

After all three nodes are ready, you can log in to any one node via SSH using the `serviceUser` you provided in the configuration YAML and run the following command to verify cluster health:

a) After logging in to the Linux system, connect to the node using the `/usr/bin/attach-nd` command.

This command can be used only by the `serviceUser` user.

b) Verify that the cluster is up and running.

You can check the current status of cluster deployment by logging in to any of the nodes and running the `acs health` command.

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
```

c) Log in to the Nexus Dashboard GUI.

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 password you provided to the `./nd-installer setup` command during installation in Step 4.

Uninstalling Nexus Dashboard Software

When the Nexus Dashboard node software is deployed, the uninstaller is copied into the `/usr/bin` directory.

If at any point you want to uninstall the software, simply run the following command as the `root` user:

```
/usr/bin/nd-installer uninstall
```

Note If you log in to the RHEL system using SSH, you must connect to the system's management IP address to uninstall; you must not use the Nexus Dashboard's management IP addresses.

This will remove the software and undo the file system changes done during the installation process.

Troubleshooting Nexus Dashboard Deployments in RHEL

This section describes common troubleshooting steps for Nexus Dashboard software deployed in RHEL.

Procedure

Step 1 Check installation logs.

Nexus Dashboard installation logs are available in the following directory:

```
/logs/ndlinux/
```

Step 2 Access the Nexus Dashboard environment after installation.

a) Log in to your RHEL system using the Nexus Dashboard user you provided in the YAML configuration file during installation.

b) Access the Nexus Dashboard environment.

```
/usr/bin/attach-nd
```

c) Use the common Nexus Dashboard troubleshooting commands.

After you access the Nexus Dashboard environment, you can use all the common Nexus Dashboard commands described in the "Troubleshooting" section of the *Cisco Nexus Dashboard User Guide*.