# HP Helion Openstack(R) Carrier Grade 1.1: KVM Installation Guide

# Chapter 1

# Overview

The HP Helion OpenStack Carrier Grade is a high-performance, high-availability, cloud operating system that enables telecommunications operators to use off-the-shelf (COTS) hardware to manage Virtualized Network Functions (VNF) within a carrier grade Network Function Virtualization (NFV) architecture.

Installing the HP Helion OpenStack Carrier Grade involves loading and configuring the software on the controller nodes, and then using the controller nodes to initialize compute and storage nodes. For details, see *KVM Software Installation* on page 3.

Before installation, ensure that you are familiar with the HP Helion OpenStack Carrier Grade architecture, and that your hardware meets the minimum requirements. For architecture details, refer to the *HP Helion OpenStack Carrier Grade Administration Guide*. For minimum hardware requirements, see *Hardware Requirements*.

Review the *HP Helion OpenStack Carrier Grade Release Notes* for any additional information pertaining to installation.

During installation, have ready the following items:

- the HP Helion OpenStack Carrier Grade ISO image on bootable media.
- a configuration plan for use during the installation process
- a license file
- (optional) a CA-signed certificate, if secure HTTPS access is required for REST API applications

For help creating a bootable USB drive, see *Preparing a Bootable USB Flash Drive* on page 5.

You should be familiar with the following terms used in this guide:

***host***

A unit of computing hardware in the rack. Hosts can be assigned or *commissioned* as controller, compute, or storage nodes.

***personality***

The role assigned to a host when it is commissioned. Available personalities include *controller*, *compute*, and *storage*.

***HP Helion OpenStack Carrier Grade Cluster***

An ensemble of HP Helion OpenStack Carrier Grade hosts. A HP Helion OpenStack Carrier Grade cluster consists of compute nodes and optionally two storage nodes managed by a pair of controller nodes.

# Chapter 2

# KVM Software Installation

**Topics:**



Installing the HP Helion OpenStack Carrier Grade involves initializing and configuring a controller node, and then using the controller node to initialize and configure other hosts.

To start, you must *initialize* a single host using an ISO image from an external source, such as a USB flash drive or a DVD. Initialization installs an operating system on the host's disk drive, and automatically boots the host from the drive.

Then you must *configure* the host as a controller using a command-line script. The configured host becomes **controller-0**.

**Note:**

For the configuration to run successfully, the management interface on **controller-0** must be connected and operational.

You use **controller-0** to initialize and configure the remaining hosts (compute and storage nodes, as well as the second controller node). Both a web administration interface and a command-line interface (CLI) are available for this purpose. The instructions in this section assume you are using the web administration interface. For CLI instructions, see *Command-line Installation* on page 18.

Each host after the initial **controller-0** installation must be booted over the management network to install an operating system, and then booted from the disk drive for further configuration.

The following procedure is recommended:

1. Install the first controller node.
2. Install the second controller node.
3. Install the storage nodes (if the system is configured to use Ceph storage).
4. Install the compute nodes.
5. Configure provider networks (required in order to add data interfaces on the compute nodes).
6. Configure the compute nodes with data interfaces.
7. Configure the compute nodes and storage nodes with infrastructure interfaces (if the system is configured to use an infrastructure network.

**Note:**

To ensure you can correctly identify hosts as you install them, power on and configure each new host one at a time.

To prevent a host from repeatedly booting over the network, some means of redirecting the boot device to the hard disk is needed. Normally you can arrange this by setting the boot order for the host (see *Boot sequence*

*considerations* on page 6). Terminal-server access to the hosts may be required to adjust the BIOS or UEFI boot settings

After the hosts are configured, you can unlock them to make them operational.

To unlock a compute node, you must do the following, in order:

1. Define at least one provider network. You must do this before you can configure the compute node data interfaces. For details, see *Configuring Provider Networks* on page 33.
2. Configure the data interfaces. For details, see *Network Interface Provisioning* on page 33.
3. Optionally, configure the infrastructure interface. This is required only if an infrastructure network is defined. For details, see *Network Interface Provisioning* on page 33.

To unlock a storage node, you must do the following:

1. Configure the storage volumes. For details, see *Creating Storage Volumes* on page 49.
2. Optionally, configure the infrastructure interface. This is required only if an infrastructure network is defined. For details, see *Network Interface Provisioning* on page 33.

# Preparing a Bootable USB Flash Drive

You can prepare a bootable USB flash drive from the boot image file included on the product DVD.

The product DVD includes an image file (`.iso` extension), which is used to create bootable media (for example, a bootable DVD or USB flash drive).

For convenience, instructions are provided for creating a bootable USB flash drive. If you prefer, you can prepare and use a bootable DVD or other bootable media, using any suitable open-source or commercially available software.

## Preparing a Bootable USB Flash Drive on a Linux System

On a Linux system, you can use built-in utilities to prepare a bootable USB flash drive.

1. Copy the ISO image from the DVD to a Linux workstation.

   This example assumes that the copied image file is `/tmp/TS-host-installer-1.0.iso`
2. Identify the USB Linux device on which to write the image.

   You can do this by monitoring the system log and then attaching the USB flash drive.

   ```
   $ tail -f /var/log/syslog
   ```

   Attach the USB flash drive, and then use the displayed log to identify the assigned device.
3. Unmount all partitions on the USB flash drive.

   a) Identify the mount points for the partitions.

   In the following command, *usb_device* represents the actual device identifier (for example, `/dev/scd`).

   ```
   $ sudo mount | grep usb_device
   /dev/scd1 on /media/sdc type vfat (rw,relatime,...)
   ```

   In this example, only one partition, `/dev/sdc1`, is identified. Its mount point is `/media/sdc`.

   b) Unmount the partitions by referencing the mount points.

   In the following command, *mount_point* represents the actual mount point (for example, */media/sdc*).

   ```
   $ sudo umount mount_point
   ```

   Repeat this command to unmount any additional partitions that may have been identified above.
4. Write the ISO image to the USB flash drive.

   **Caution:**

   The following command overwrites any existing content on the USB flash drive.

   ```
   $ sudo dd if=/tmp/TS-host-installer-1.0.iso of=/dev/sdc bs=1M; sync
   1825+0 records in
   1825+0 records out
   1913651200 bytes (1.9 GB) copied, 499.681 s, 3.8 MB/s
   ```

   You can use other block sizes with the bs option, or omit it entirely and let the Linux kernel determine an optimal size.

The USB flash drive is ready now. It can be safely removed from the workstation.

## Preparing a Bootable USB Flash Drive on a Windows System

On a Windows system, you can prepare a bootable USB flash drive using a variety of downloadable tools.

The selection of tools varies depending on your Windows version.

1. Download and install a tool designed for your version of Windows.

   Use a tool that can burn media from an ISO 9660 image.
2. Follow the instructions provided with the tool.

## Boot sequence considerations

During HP Helion OpenStack Carrier Grade software installation, the hosts must boot from different devices at different times. In some cases, you may need to adjust the boot order.

The first controller node must be booted initially from a removable storage device to install an operating system. The host then reboots from the hard drive.

Each remaining host must be booted initially from the network using PXE to install an operating system. The host then reboots from the hard drive.

To facilitate this process, ensure that the hard drive does not already contain a bootable operating system, and set the following boot order in the BIOS.

1. removable storage device (USB flash drive or DVD drive)
2. hard drive
3. network (PXE), over an interface connected to the internal management network

For BIOS configuration details, refer to the OEM documentation supplied with the computing node.

**Note:**

If a host contains a bootable hard drive, either erase the drive beforehand, or ensure that the host is set to boot from the correct source for initial configuration. If necessary, you can change the boot device at boot time by pressing a dedicated key. For more information, refer to the OEM documentation for the computing node.

## Initializing Controller-0

You can initialize **controller-0** using the HP Helion OpenStack Carrier Grade bootable ISO image.

Before installing the ISO image, ensure the following:

- The host meets the hardware requirements for a controller.
- You have terminal-server access to the host, so that you can monitor messages during initialization.
- The management, OAM, and optional infrastructure networks are planned, set up, and connected.
- All other hosts on the system are powered off.
- You have reviewed the Release Notes for any additional information pertaining to installation.

1. Power on the host to be configured as **controller-0**.
2. Configure the host BIOS boot sequence to boot from a USB removable storage device.
3. Insert the USB flash drive and boot the host.

   The installer welcome screen appears.

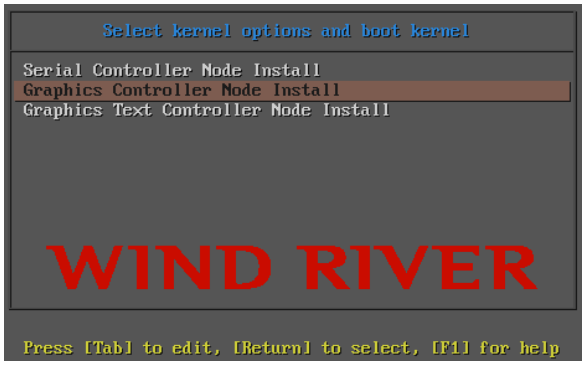



**Figure 1: HP Helion OpenStack Carrier Grade Installer Welcome Screen**

4. Select the type of installation and the display device to be used during initialization, and then press `Enter`.

   **Serial Controller Node Install (default)**

   Installs the controller function on the host, using the serial port to display messages. You can monitor the port using the terminal server.

   **Graphics Controller Node Install**

   Installs the controller function on the host, using graphics mode to display messages. This selection works with most console displays.

   **Graphics Text Controller Node Install**

   Installs the controller function on the host, using text mode to display messages. This is a safe option for nodes that do not support graphics mode.

5. Monitor the initialization until it is complete.

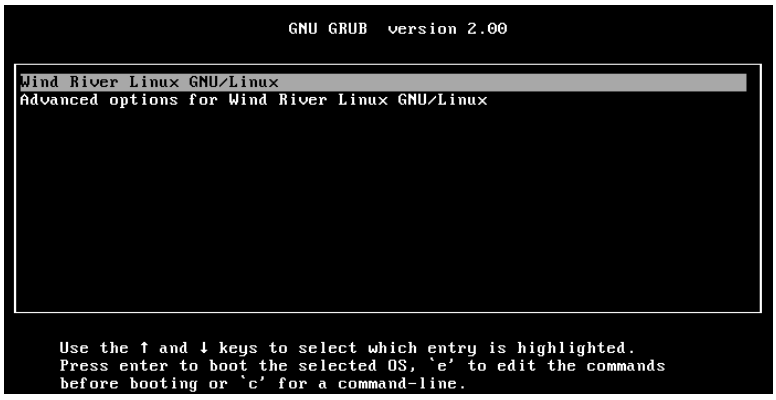
   The installer initializes the target hard drive with the HP Helion OpenStack Carrier Grade image. When initialization is complete, a reboot is initiated on the host.

6. Immediately remove the USB flash drive from the host to ensure that the host reboots from the hard drive.

   **Caution:**

   If the USB flash drive is still attached when the host reboots, then unless the boot sequence has been configured to prevent it, the host will boot from the USB flash drive again instead of the hard drive.

   After a few minutes, the host reboots from the hard drive and displays the **GNU GRUB** welcome screen.




   After a brief delay, the system boots automatically into the HP Helion OpenStack Carrier Grade image.

7. Log into the host as `wrsroot`, with password `wrsroot`.

   **Note:**

   Typed responses to password prompts are suppressed and do not appear on the display.

The first time you log in as `wrsroot`, you are required to change your password.

```
Changing password for wrsroot.
(current) UNIX Password:
```

Enter the current password (**wrsroot**).

```
New password:
```

Enter a new password for the **wrsroot** account.

```
Retype new password:
```

Enter the new password again to confirm it.

The host is now ready for configuration as **controller-0**.

## Configuring Controller-0

You can configure **controller-0** by running a script from the Linux command line.

Before running the configuration script:

- Ensure that **controller-0** has been initialized, as described in *Initializing Controller-0* on page 6.
- Ensure that the management interface on **controller-0** is connected and operational.
- Install system software patches if there are any available.
- Prepare a configuration plan to use as a reference. For details, see the *HP Helion OpenStack Carrier Grade Administration Guide: Storage Planning*.

1. Copy the license file to the controller node.
   a) Connect the controller to the OAM network.

      On the controller, assign the correct OAM network address to the appropriate port.

      ```
      $ sudo ip addr add OAM_IP_address/mask dev port
      $ sudo ip link set port up
      $ sudo route add default gw gateway_addr
      ```

      **Note:**

      To identify the controller-0 port and IP address, refer to your OAM network plan.

      For example:

      ```
      $ sudo ip addr add 10.10.10.3/24 dev eth0
      $ sudo ip link set eth0 up
      $ sudo route add default gw 10.10.10.1
      ```

   b) Connect a server containing the license file to the OAM network.
   c) Copy the HP Helion OpenStack Carrier Grade license file to `/home/wrsroot/license.lic` on the controller.

      This is the default path offered during controller configuration. If you prefer, you can copy the file to a different path, and specify the path during configuration.

      ```
      $ scp username@sourcehost:sourcepath/license.lic /home/wrsroot/
      license.lic
      ```

2. Optional: Copy a digital certificate file to the controller node.

If you require secure REST API access using HTTPS, copy a CA-signed digital certificate (PEM file) to a directory on the controller. The recommended path is `/home/wrsroot`.

```
$ scp username@sourcehost:sourcepath/pem_file /home/wrsroot/pem_file
```

3. Install any applicable system software patches.

   For efficient installation, apply patches before starting the configuration process. For details, see the *HP Helion OpenStack Carrier Grade Administration Guide: Managing Software Patches: Installing Patches Locally*.

4. Start the controller configuration script.

```
$ sudo config_controller
HP Helion OpenStack Carrier Grade Configuration
=======================================
Enter Q at any prompt to abort...
```

5. Configure the controller options as requested by the configuration script.

   **Note:**

   The configuration is applied only after all options have been specified. You can safely abort the configuration process at any time by pressing the **Q** key.

   The following configuration groups are presented. For detailed information, refer to *The Controller Configuration Script*.

**Table 1: Controller Configuration Groups**

| Configuration Group | Comments |
|---|---|
| System date and time | The date and time as read from the local system clock. |
| Storage | The disk space allocations for database, image, and volume storage. For details, see the *HP Helion OpenStack Carrier Grade Administration Guide*. |
| Management network | The configuration associated with the internal management network. |
| Board Management Control Network | The configuration associated with the board management control network. |
| Infrastructure network | The configuration associated with the infrastructure network. |
| External OAM network | The configuration associated with the OAM Network. |
| Domain Name System (DNS) | The IP addresses to use for DNS servers. The servers must be accessible from the OAM Network. |
| Network Time Protocol (NTP) | The IP addresses to use for NTP servers. The servers must be accessible from the OAM Network. |
| Licensing | The path to the HP Helion OpenStack Carrier Grade license file. |
| Authentication | A temporary password for the HP Helion OpenStack Carrier Grade cloud **admin** account. |

| Configuration Group | Comments |
|---|---|
| | **Note:**<br>This is the password for the cloud **admin** account, not the Linux **wrsroot** account. |
| Apply the configuration settings | This is the final question before the configuration selections are applied. Once you enter `y` to accept the selected options, the installation script commits the configuration settings. |

After a few minutes, the message **Configuration was applied** appears.

6. Change to the Keystone **admin** account.

   Use the `source` command to become the Keystone **admin** user.

```
$ source /etc/nova/openrc
~(keystone_admin)$
```

7. Verify that the HP Helion OpenStack Carrier Grade controller services are running.

```
~(keystone_admin)$ nova service-list
+------------------+-------------+--------+---------+------------+-------
+ ...
| Binary           | Host        | Zone   | Status  | Maint Mode | State
 | ...
+------------------+-------------+--------+---------+------------+-------
+ ...
| nova-conductor   | controller-0 | int... | enabled | disabled   | up
 | ...
| nova-cert        | controller-0 | int... | enabled | disabled   | up
 | ...
| nova-consoleauth | controller-0 | int... | enabled | disabled   | up
 | ...
| nova-scheduler   | controller-0 | int... | enabled | disabled   | up
 | ...
+------------------+-------------+--------+---------+------------+-------
+ ...
```

8. Verify that **controller-0** is in the state **unlocked-enabled-available**.

```
~(keystone_admin)$ system host-list
+----+-------------+------------+---------------+-------------
+--------------+
| id | hostname     | personality | administrative | operational |
 availability |
+----+-------------+------------+---------------+-------------
+--------------+
| 1  | controller-0 | controller  | unlocked       | enabled     |
 available    |
+----+-------------+------------+---------------+-------------
+--------------+
```

9. Optional: Synchronize the RAID array.

   Normally, the RAID array is already synchronized. If you need to synchronize the RAID array manually, do so now. You may be able to do this by pressing a button on the unit, or using a special key combination on the console keyboard. For details, consult the OEM documentation for the RAID.

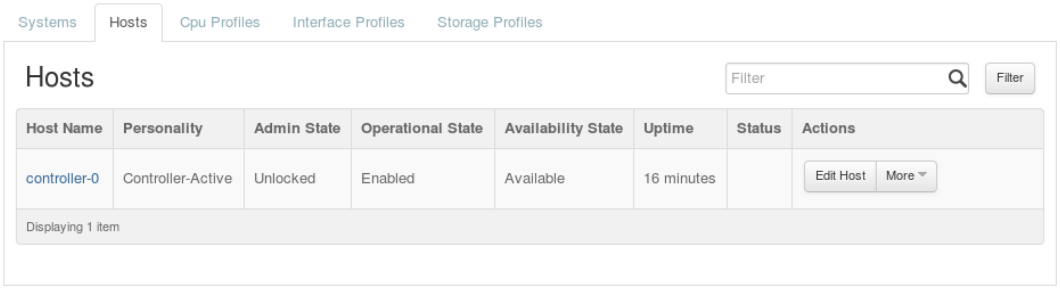
10. Using a Web browser, navigate to the OAM floating IP address to verify that the HP Helion OpenStack Carrier Grade web administration interface is available.

    To identify the OAM floating IP address, consult the configuration plan.

    The **HP Helion OpenStack Carrier Grade** login screen appears.
11. Log in using the cloud **admin** account.

    The **HP Helion OpenStack Carrier Grade** web administration interface appears.
12. In the left-hand pane, on the **Admin** tab, click **Inventory**, and then select the **Hosts** tab.

    **Controller-0** is reported in the hosts inventory list.




The host **controller-0** is now fully operational. It can be used to initialize all other hosts in the HP Helion OpenStack Carrier Grade cluster.

## Initializing and Configuring Controller-1

You must assign a host as a second controller to provide redundancy for **controller-0**.

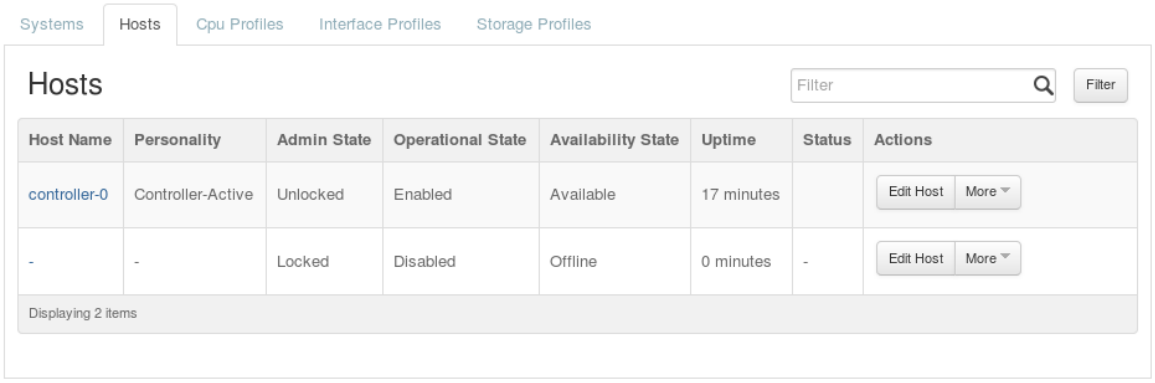
Before initializing a node, ensure that the following conditions are satisfied:

- The node must meet the hardware requirements for the personality to be assigned.
- Controller-0 must be installed and configured.
- The node must be connected to the internal management network using an Ethernet interface configured for PXE boot.
- The node must be configured in the BIOS to boot from the internal management network.

1. Power on the node to be configured as **controller-1**.
2. Using the web administration interface, assign the node as a controller host.
   a) Select the **Hosts** list.

      On the **Admin** tab, in the **System Panel** section, click **Inventory**, and then select the **Hosts** tab.

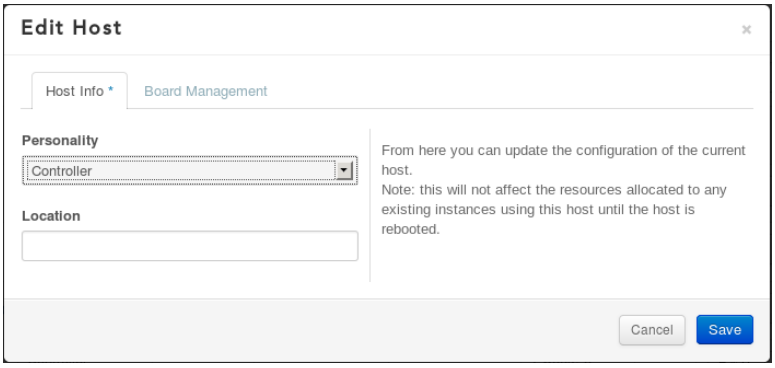
      The new node is listed with an empty **Host Name** and **Personality**.




   b) Assign the node's personality.

Click **Edit Host** for the new host.

The **Edit Host** window appears.

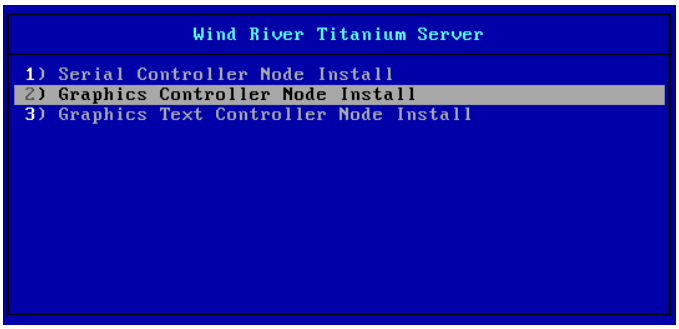



c) Select **Personality** > **Controller**.

d) Optional: Type a physical **Location** for the node to help identify it.

e) Click **Save** to initialize and configure the new node.

The node is restarted automatically, and a display-device menu appears on the node console.




f) Optional: Select the display device to use during initialization.

The personality (**Controller**, **Compute**, or **Storage**) is confirmed in the menu.

**1) Serial <personality> Node Install (default)**

Use the serial port to display messages. You can monitor the port using the terminal server.

**2) Graphics <personality> Node Install**

Use the console port in graphics mode to display messages. This selection works with most console displays.

**3) Graphics Text <personality> Node Install**

Use the console port in text mode to display messages. This is a safe option for nodes that do not support graphics mode.

If you do not change the selection, the default is applied automatically after a few seconds.

g) Wait while the node is configured and rebooted.

After a few minutes, the node is reported as **Locked**, **Disabled**, and **Online** in the **Hosts** list.

**Caution:**

To ensure a successful installation, wait for the node to be reported as **Locked**, **Disabled**, and **Online**, and ensure that the login prompt appears on the host console. If the process is interrupted prematurely, the host installation can fail.

The time required to configure and reboot **controller-1** depends on the secondary disk partition size. Larger partitions require more time for synchronization with **controller-0**.

The host is now configured with a personality.

3. Unlock the node to make it available for use.

   In the **Hosts** list, on the row associated with the node, click **More** > **Unlock Host**.

   The node is rebooted, and its **Availability State** is reported as **In-Test**. After a few minutes, it is reported as **Unlocked**, **Enabled**, and **Available**.

## Initializing and Configuring Storage Nodes

You can assign a new host as a storage node to provide object storage.

**Note:**

Storage nodes are required only if the system is configured to use Ceph storage. For more information, see *Storage Requirements*.

Before initializing a node, ensure that the following conditions are satisfied:

- The node must meet the hardware requirements for the personality to be assigned.
- Controller-0 must be installed and configured.
- The node must be connected to the internal management network using an Ethernet interface configured for PXE boot.
- The node must be configured in the BIOS to boot from the internal management network.

1. Power on the node to be configured as a storage host.

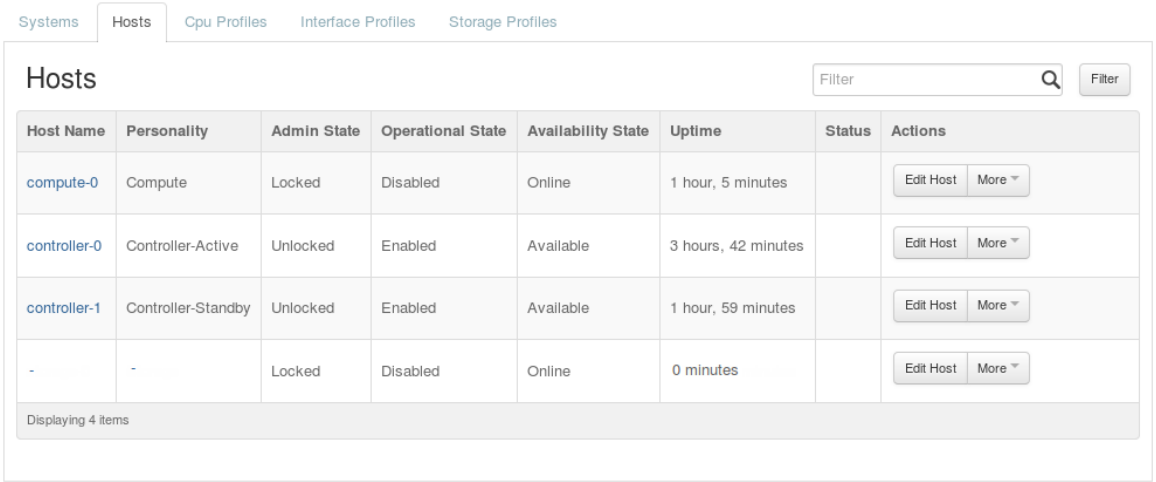
   **Note:**

   To ensure you can correctly identify hosts as you install them, power on and configure each new node one at a time.

2. Using the web administration interface, assign the node as a storage host.

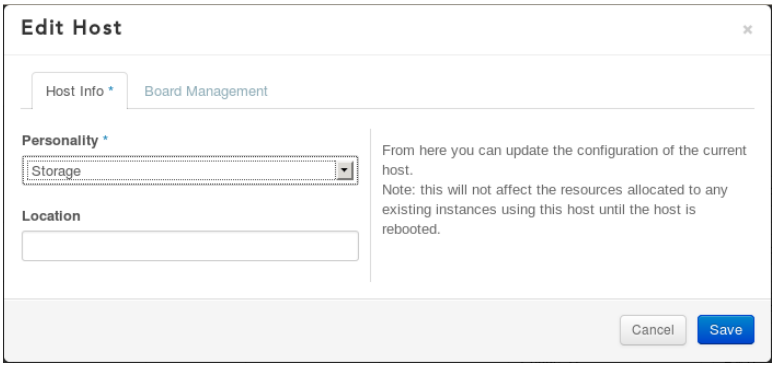
   a) Select the **Hosts** list.

   The new node is listed with an empty **Host Name** and **Personality**.




   b) Assign the node's personality.

   Click **Edit Host** for the new host.

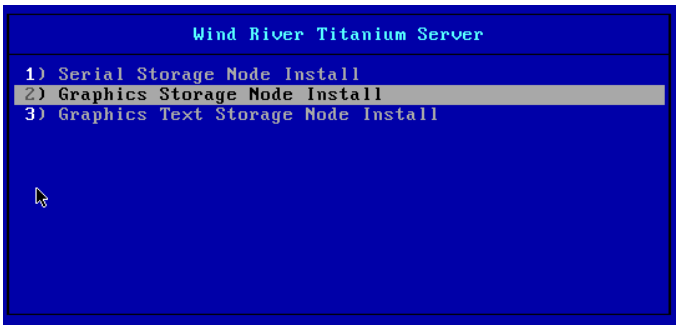



c) Select **Personality** > **Storage**.

d) Optional: Type a physical **Location** for the node to help identify it.

e) Click **Save** to initialize and configure the new node.

The node is restarted automatically, and a display-device menu appears on the node console.




f) Optional: Select the display device to use during initialization.

The personality (**Controller**, **Compute**, or **Storage**) is confirmed in the menu.

**1) Serial <personality> Node Install (default)**

Use the serial port to display messages. You can monitor the port using the terminal server.

**2) Graphics <personality> Node Install**

Use the console port in graphics mode to display messages. This selection works with most console displays.

**3) Graphics Text <personality> Node Install**

Use the console port in text mode to display messages. This is a safe option for nodes that do not support graphics mode.

If you do not change the selection, the default is applied automatically after a few seconds.

g) Wait while the node is configured and rebooted.

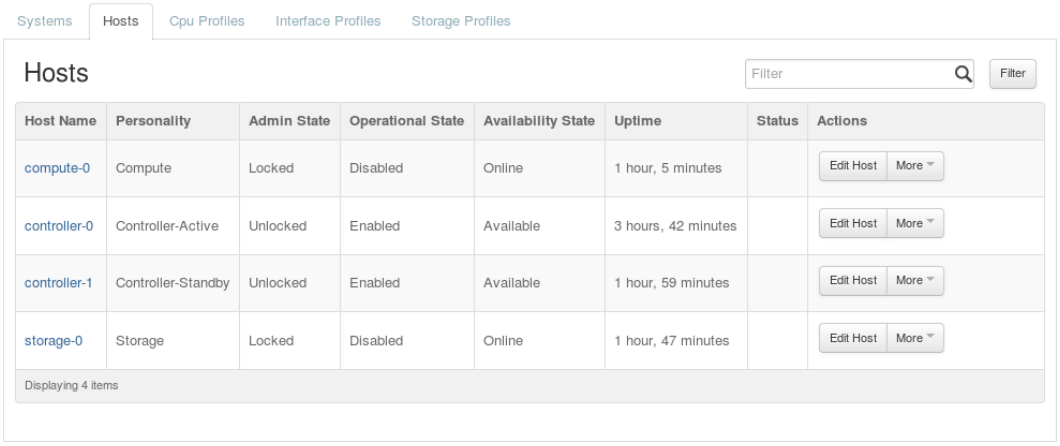
After a few minutes, the node is reported as **Locked**, **Disabled**, and **Online** in the **Hosts** list.

**Caution:**

To ensure a successful installation, wait for the node to be reported as **Locked**, **Disabled**, and **Online**, and ensure that the login prompt appears on the host console. If the process is interrupted prematurely, the host installation can fail.

The new host is initialized with an operating system, rebooted, and configured as a storage node. It is automatically assigned the next available consecutive name (**storage-0** or **storage-1**).

After a few minutes, the host is shown as **Locked**, **Disabled**, and **Online** in the **Hosts** list.




3. Configure the host so that it can be unlocked.

   Before you can unlock a storage node, you must do the following:

   a) Create storage volumes. For details, see *Creating Storage Volumes* on page 49.
   b) If using LAG to attach to the management network, change the **Interface Type** for the management network interface to **aggregated ethernet** For more information, see *Editing Interface Settings* on page 43.
   c) Configure the interface to the infrastructure network. For details, see *Network Interface Provisioning* on page 33.

4. Unlock the node to make it available for use.

   In the **Hosts** list, on the row associated with the node, click **More** > **Unlock Host**.

   The node is rebooted, and its **Availability State** is reported as **In-Test**. After a few minutes, it is reported as **Unlocked**, **Enabled**, and **Available**.

**Note:**

Ensure that you install two storage nodes, as required by the HP Helion OpenStack Carrier Grade architecture.

## Initializing and Configuring Compute Nodes

You can assign a new host as a compute node to support virtual machines.

Before initializing a node, ensure that the following conditions are satisfied:

- The node must meet the hardware requirements for the personality to be assigned.
- Controller-0 must be installed and configured.
- The node must be connected to the internal management network using an Ethernet interface configured for PXE boot.
- The node must be configured in the BIOS to boot from the internal management network.

1. Power on the node to be configured as a compute host.

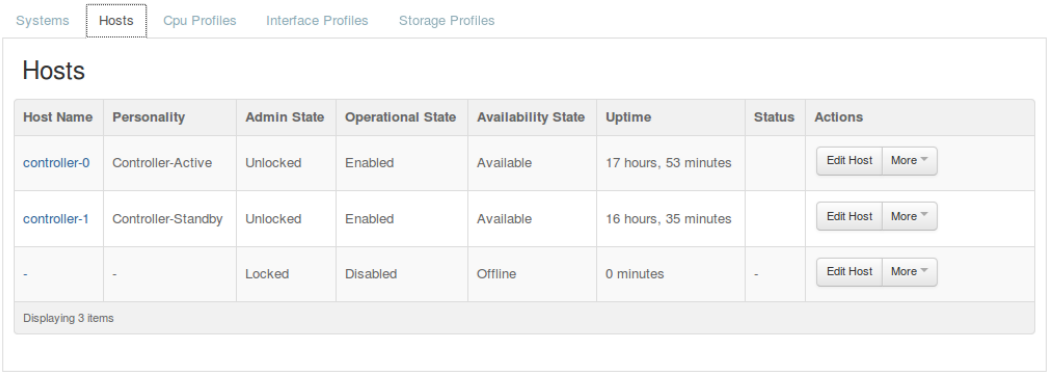
   **Note:**

   To ensure you can correctly identify hosts as you install them, power on and configure each new node one at a time.

2. Using the web administration interface, assign the node as a compute host.

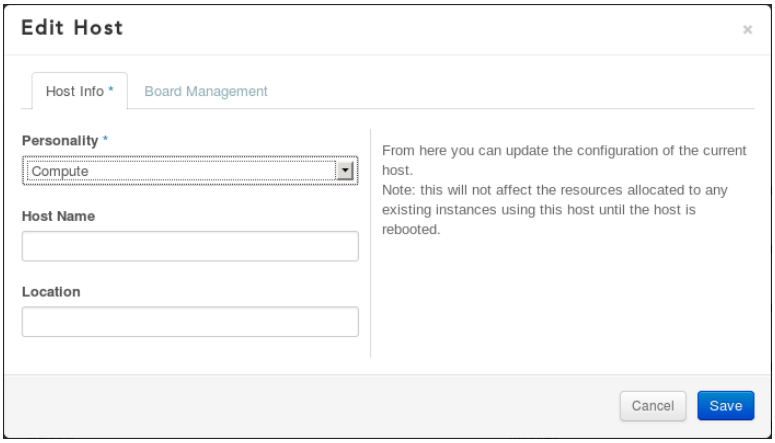
   a) Select the **Hosts** list.

   The new node is listed with an empty **Host Name** and **Personality**.




b) Assign the node's personality.

Click **Edit Host** for the new host.



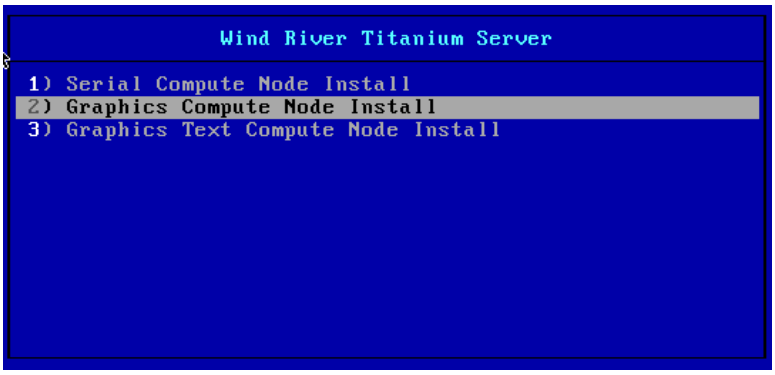

c) Select **Personality** > **Compute**.

d) Provide a **Host Name** (for example, **compute-0**).

e) Optional: Type a physical **Location** for the node to help identify it.

f) Click **Save** to initialize and configure the new node.

The node is restarted automatically, and a display-device menu appears on the node console.




g) Optional: Select the display device to use during initialization.

The personality (**Controller**, **Compute**, or **Storage**) is confirmed in the menu.

**1) Serial <personality> Node Install (default)**

Use the serial port to display messages. You can monitor the port using the terminal server.

**2) Graphics <personality> Node Install**

Use the console port in graphics mode to display messages. This selection works with most console displays.

**3) Graphics Text <personality> Node Install**

Use the console port in text mode to display messages. This is a safe option for nodes that do not support graphics mode.

If you do not change the selection, the default is applied automatically after a few seconds.

h) Wait while the node is configured and rebooted.

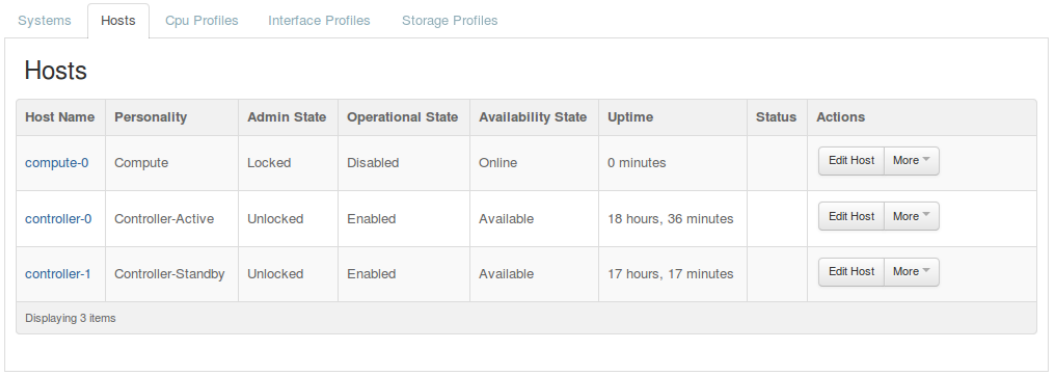
After a few minutes, the node is reported as **Locked**, **Disabled**, and **Online** in the **Hosts** list.

**Caution:**

To ensure a successful installation, wait for the node to be reported as **Locked**, **Disabled**, and **Online**, and ensure that the login prompt appears on the host console. If the process is interrupted prematurely, the host installation can fail.

The new host is initialized with an operating system, rebooted, and configured as a compute node.

After a few minutes, the host is shown as **Locked**, **Disabled**, and **Online** in the **Hosts** list.




3. Configure the host so that it can be unlocked.

Before you can unlock a compute node, you must do the following:

a) Configure provider networks. This is required in order to provision data interfaces on the compute node.
b) Provision a data interface on the host.
c) If using LAG to attach to the management network, change the **Interface Type** for the management network interface to **aggregated ethernet**
d) If an infrastructure network is in use, provision an interface to the infrastructure network.

4. Unlock the node to make it available for use.

In the **Hosts** list, on the row associated with the node, click **More** > **Unlock Host**.

The node is rebooted, and its **Availability State** is reported as **In-Test**. After a few minutes, it is reported as **Unlocked**, **Enabled**, and **Available**.

# Chapter 3

# Command-line Installation

**Topics:**



After initializing and configuring **controller-0**, you can add and configure the remaining hosts using the command-line interface (CLI).

**Controller-0** provides both a web administration interface and a command-line interface for completing the HP Helion OpenStack Carrier Grade installation. To use the web administration interface, see *KVM Software Installation* on page 3.

For information on initializing and configuring **controller-0**, see *KVM Software Installation* on page 3.

## Initializing and Configuring Controller-1 Using the CLI

You can initialize and configure a redundant controller (**controller-1**) using the **controller-0** command-line interface.

Initialize and configuring **controller-1** involves:

- booting a new host over the internal management network using PXE
- configuring the host as a controller using **controller-0**, which prepares the host's hard drive and then reboots it automatically from the drive
- moving **controller-1** into an enabled operational state

Before initializing a node, ensure that the following conditions are satisfied:

- The node must meet the hardware requirements for the personality to be assigned.
- Controller-0 must be installed and configured.
- The node must be connected to the internal management network using an Ethernet interface configured for PXE boot.
- The node must be configured in the BIOS to boot from the internal management network.

1. Add the host to the system inventory.

   **Note:**

   The host must be added to the system inventory before it is powered on.

   On **controller-0**, acquire Keystone administrative privileges:

   ```
   $source /etc/nova/openrc
   ```

   Use the system host-add command to add the host to the system inventory:

   ```
   ~(keystone_admin)$ system host-add -n hostname -p personality -m mgmt_mac
    \
   [-T bm_type -M bm_mac -I bm_ip -U bm_username -P bm_password]
   ```

   where

   ***hostname***

   is a name to assign to the host

   ***personality***

   is the host type (controller or compute)

   ***mgmt_mac***

   is the MAC address of the port connected to the management network

   ***bm_type***

   is the board management controller type (ilo3 or ilo4)

   ***bm_mac***

   is the board management controller MAC address

   ***bm_ip***

   is the board management controller IP address

   ***bm_username***

   is the username for board management controller access

***bm_username***

is the password for board management controller access

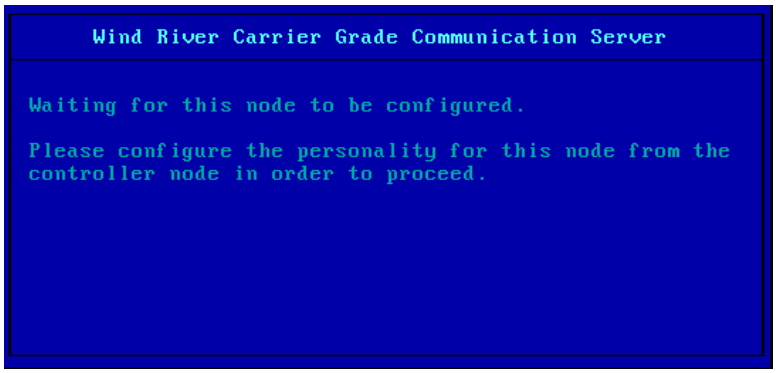
For example:

```
~(keystone_admin)$ system host-add -n controller-1 -p controller -m
 08:00:27:23:BD:18
```

2. Boot the new node using PXE.

   With **controller-0** running, start the node.

   The node boots from the network.




3. Log in to the active controller as the Keystone **admin** user.

```
$ source /etc/nova/openrc
```

4. On the **controller-0** console, verify the status of the host.

```
~(keystone_admin)$ system host-list
+----+--------------+------------+---------------+-------------
+--------------+
| id | hostname     | personality | administrative | operational |
 availability |
+----+--------------+------------+---------------+-------------
+--------------+
| 1  | controller-0 | controller  | unlocked       | enabled     |
 available    |
| 2  | None         | None        | locked         | disabled    | offline
      |
+----+--------------+------------+---------------+-------------
+--------------+
```

   The host is reported as id `2`, availability `offline`, with no hostname or personality.

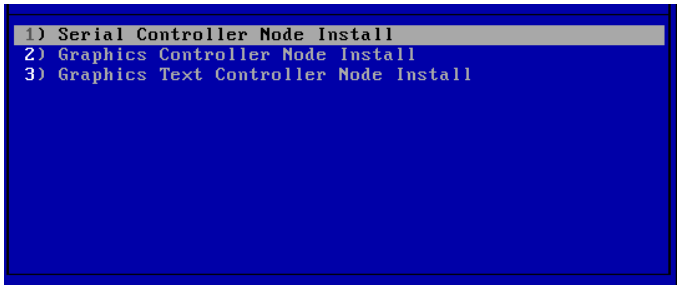
5. On the **controller-0** console, set the personality of the host to be a controller.

```
~(keystone_admin)$ system host-update 2 personality=controller
+----------------+--------------------------------------+
| Property       | Value                                |
+----------------+--------------------------------------+
| administrative | locked                               |
| availability   | offline                              |
| created_at     | 2014-01-06T15:54:40.313688+00:00     |
| hostname       | controller-1                         |
| id             | 2                                    |
| invProvision   | None                                 |
| location       | {}                                   |
| mgmt_ip        | 192.168.204.4                        |
```

```
| mgmt_mac        | 08:00:27:1f:5e:e4                    |
| operational     | disabled                             |
| personality     | controller                           |
| serialId        | None                                 |
| updated_at      | None                                 |
| uuid            | 4e83bc2f-57d4-4508-9550-564d74dc32d4 |
+-----------------+--------------------------------------+
```

**Controller-0** configures the required parameters for **controller-1** and displays them as illustrated above. **Controller-1** is still reported as offline, since the HP Helion OpenStack Carrier Grade software has yet to be installed in its hard drive.

**Controller-0** automatically pushes the HP Helion OpenStack Carrier Grade installer image over the internal management network for the host to boot. The console of the host displays the HP Helion OpenStack Carrier Grade welcome screen.




6. Optional: On the **controller-1** console, select the installation mode.

   **1) Serial <personality> Node Install (default)**

   Use the serial port to display messages. You can monitor the port using the terminal server.

   **2) Graphics <personality> Node Install**

   Use the console port in graphics mode to display messages. This selection works with most console displays.

   **3) Graphics Text <personality> Node Install**

   Use the console port in text mode to display messages. This is a safe option for nodes that do not support graphics mode.

   **Note:**

   If you do not change the selection, the default is applied automatically after a few seconds.

   The installer initializes the target hard drive with the HP Helion OpenStack Carrier Grade image. The time required to configure and reboot **controller-1** depends on the secondary disk partition size. Larger partitions require more time for synchronization with **controller-0**.

7. Wait for **controller-1** to reboot.

   **Note:**

   It may be necessary to reconfigure the system's BIOS or UEFI manually to force the host to boot from the hard drive.

   The host boots from the hard drive into the HP Helion OpenStack Carrier Grade image and displays the GNU GRUB welcome screen.


After a brief delay, the system boots automatically into the HP Helion OpenStack Carrier Grade image, providing you with a login prompt.

8. On the **controller-0** console, verify the status of the host.

```
~(keystone_admin)$ system host-list
+----+--------------+-------------+----------------+-------------
+--------------+
| id | hostname     | personality | administrative | operational |
 availability |
+----+--------------+-------------+----------------+-------------
+--------------+
| 1  | controller-0 | controller  | unlocked       | enabled     |
 available    |
| 2  | controller-1 | controller  | locked         | disabled    | offline
      |
+----+--------------+-------------+----------------+-------------
+--------------+
```

The host is still offline, but it is now reported as a controller node with name **controller-1**, in the **locked** administrative state.

9. On the **controller-0** console, unlock **controller-1**.

```
~(keystone_admin)$ system host-unlock controller-1
+----------------+--------------------------------------+
| Property       | Value                                |
+----------------+--------------------------------------+
| administrative | unlocked                             |
| availability   | offline                              |
| created_at     | 2014-01-06T15:54:40.313688+00:00     |
| hostname       | controller-1                         |
| id             | 2                                    |
| invProvision   | provisioned                          |
| location       | {}                                   |
| mgmt_ip        | 192.168.204.4                        |
| mgmt_mac       | 08:00:27:1f:5e:e4                    |
| operational    | disabled                             |
| personality    | controller                           |
| serialId       | None                                 |
| updated_at     | 2014-01-06T17:07:10.987257+00:00     |
| uuid           | 4e83bc2f-57d4-4508-9550-564d74dc32d4 |
+----------------+--------------------------------------+
```

**controller-1** moves into the **intest** availability state, and then into the **available** state. This may take several minutes.

a) On the **controller-0** console, verify that **controller-1** is in the **intest** availability state.

```
~(keystone_admin)$ system host-list
+----+--------------+-------------+----------------+-------------
+--------------+
| id | hostname     | personality | administrative | operational |
 availability |
+----+--------------+-------------+----------------+-------------
+--------------+
| 1  | controller-0 | controller  | unlocked       | enabled     |
 available    |
| 2  | controller-1 | controller  | unlocked       | disabled    |
 intest       |
+----+--------------+-------------+----------------+-------------
+--------------+
```

**Controller-1** moves into the **intest** availability state within 30 seconds following the unlocking command.

b) On the **controller-0** console, verify that **controller-1** moves to the **available** state.

```
~(keystone_admin)$ system host-list
+----+--------------+-------------+----------------+-------------
+--------------+
| id | hostname     | personality | administrative | operational |
 availability |
+----+--------------+-------------+----------------+-------------
+--------------+
| 1  | controller-0 | controller  | unlocked       | enabled     |
 available    |
| 2  | controller-1 | controller  | unlocked       | enabled     |
 available    |
+----+--------------+-------------+----------------+-------------
+--------------+
```

**Controller-1** moves into the **available** state within the 2 to 3 minutes following the unlock command.

**Controller-1** is enabled. It works with **controller-0** to form a single high-availability cluster.

## Initializing and Configuring Storage Nodes Using the CLI

You can use the **controller-0** command-line interface to set up storage nodes to provide object storage.

Installing the HP Helion OpenStack Carrier Grade software on the storage nodes is similar to installing the software on the **controller-1** host, described in detail in *Initializing and Configuring Controller-1 Using the CLI* on page 19. The differences are as follows:

- assigning the personality and name of the host
- configuring the infrastructure interface

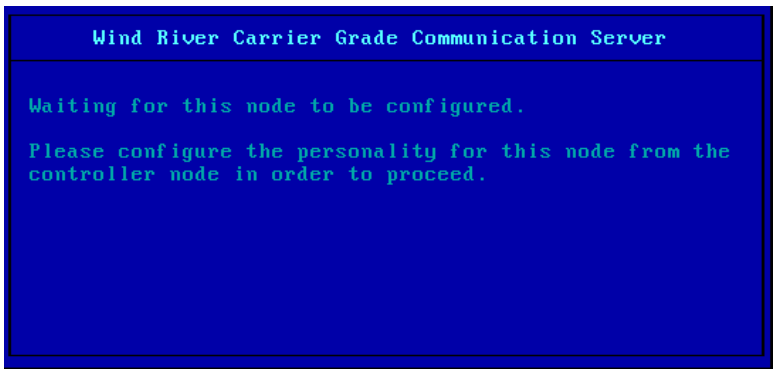
This section uses the **storage-0** host as the installation target. Except where noted, all commands must be executed from the console of **controller-0**.

This procedure requires **controller-0** and **controller-1** to be already operational, as described in *KVM Software Installation* on page 3 and *Initializing and Configuring Controller-1 Using the CLI* on page 19.

1. Boot the new node using PXE.

   With **controller-0** running, start the node.

   The node boots from the network.




2. Log in to the active controller as the Keystone **admin** user.

```
$ source /etc/nova/openrc
```

3. Verify the status of the host.

```
~(keystone_admin)$ system host-list
+----+--------------+------------+---------------+-------------
+--------------+
| id | hostname     | personality | administrative | operational |
 availability |
+----+--------------+------------+---------------+-------------
+--------------+
| 1  | controller-0 | controller  | unlocked       | enabled     |
 available    |
| 2  | controller-1 | controller  | unlocked       | enabled     |
 available    |
| 3  | compute-0    | compute     | unlocked       | enabled     |
 available    |
| 4  | None         | None        | locked         | disabled    | offline
      |
+----+--------------+------------+---------------+-------------
+--------------+
```

The host is reported as host number 4, operating offline, with no host name or personality.

4. Set up the host to have the host name **storage-0**, and the personality of a storage node.

```
~(keystone_admin)$ system host-update 4 hostname=storage-0
 personality=storage
+----------------+--------------------------------------+
| Property       | Value                                |
+----------------+--------------------------------------+
| administrative | locked                               |
| availability   | offline                              |
| created_at     | 2014-06-19T18:22:09.561079+00:00     |
| hostname       | storage-0                            |
| id             | 4                                    |
| invProvision   | None                                 |
| location       | {}                                   |
| mgmt_ip        | 192.168.204.5                        |
| mgmt_mac       | 08:00:27:dc:b8:4b                    |
| operational    | disabled                             |
| personality    | storage                              |
| serialId       | None                                 |
| updated_at     | None                                 |
| uuid           | eb9fffd7-c859-419e-951b-30950dd8505c |
+----------------+--------------------------------------+
```

**Controller-0** configures the required parameters for **storage-0** and displays them as illustrated above. Note that **storage-0** is still offline since the HP Helion OpenStack Carrier Grade software has yet to be installed in its hard drive.

Additionally, **controller-0** automatically pushes the HP Helion OpenStack Carrier Grade installer image over the internal management network for the host to boot.

5. On the **storage-0** console, select the installation mode.

   **1) Serial <personality> Node Install (default)**

   Use the serial port to display messages. You can monitor the port using the terminal server.

   **2) Graphics <personality> Node Install**

   Use the console port in graphics mode to display messages. This selection works with most console displays.

   **3) Graphics Text <personality> Node Install**

   Use the console port in text mode to display messages. This is a safe option for nodes that do not support graphics mode.

   The installer initializes the target hard drive with the HP Helion OpenStack Carrier Grade image. This step may take several minutes.

6. Wait for **storage-0** to reboot.

   **Note:**

   It may be necessary to reconfigure the system's BIOS or UEFI manually to force the host to boot from the hard drive.

   The host boots from the hard drive into the HP Helion OpenStack Carrier Grade image and displays the GNU GRUB welcome screen.

   After a brief delay, the system boots automatically into the HP Helion OpenStack Carrier Grade image, providing you with a login prompt.

7. Verify the status of the host.

```
~(keystone_admin)$ system host-list
+----+--------------+-------------+----------------+-------------
+--------------+
| id | hostname     | personality | administrative | operational |
 availability |
+----+--------------+-------------+----------------+-------------
+--------------+
| 1  | controller-0 | controller  | unlocked       | enabled     |
 available    |
| 2  | controller-1 | controller  | unlocked       | enabled     |
 available    |
| 3  | compute-0    | compute     | unlocked       | enabled     |
 available    |
| 3  | storage-0    | storage     | locked         | disabled    | offline
      |
+----+--------------+-------------+----------------+-------------
+--------------+
```

   The host is still offline, but it is now reported as a storage node with name **storage-0**, in the **locked** administrative state.

8. Attach the infrastructure interface.

   For more information, see *Network Interface Provisioning Using the CLI* on page 44.

9. Unlock the **storage-0** host.

```
~(keystone_admin)$ system host-unlock storage-0
```

```
+----------------+--------------------------------------+
| Property       | Value                                |
+----------------+--------------------------------------+
| administrative | unlocked                             |
| availability   | offline                              |
| created_at     | 2014-06-19T18:22:09.561079+00:00     |
| hostname       | storage-0                            |
| id             | 4                                    |
| invProvision   | provisioned                          |
| location       | {}                                   |
| mgmt_ip        | 192.168.204.5                        |
| mgmt_mac       | 08:00:27:dc:b8:4b                    |
| operational    | disabled                             |
| personality    | storage                              |
| serialId       | None                                 |
| updated_at     | 2014-06-19T19:10:21.622719+00:00     |
| uuid           | eb9fffd7-c859-419e-951b-30950dd8505c |
+----------------+--------------------------------------+
```

The unlocking operation moves **storage-0** into the intermediate **in-test** availability state first, and then into the final **available** state.

**Note:**

The unlock operation will fail if the storage volumes (and the infrastructure interface, if an infrastructure network is present) have not been configured beforehand.

**10.** Verify that the **storage-0** host is operational.

```
~(keystone_admin)$ system host-list
+----+--------------+-------------+----------------+-------------
+--------------+
| id | hostname     | personality | administrative | operational |
 availability |
+----+--------------+-------------+----------------+-------------
+--------------+
| 1  | controller-0 | controller  | unlocked       | enabled     |
 available    |
| 2  | controller-1 | controller  | unlocked       | enabled     |
 available    |
| 3  | compute-0    | compute     | unlocked       | enabled     |
 available    |
| 4  | storage-0    | compute     | unlocked       | enabled     |
 available    |
+----+--------------+-------------+----------------+-------------
+--------------+
```

**Storage-0** moves into the **available** state within a few minutes following the unlock command.

**Storage-0** is now operational.

## Initializing and Configuring Compute Nodes Using the CLI

You can use the **controller-0** command-line interface to set up compute nodes in order to support virtual machines.

Installing the HP Helion OpenStack Carrier Grade software on the compute nodes is similar to installing the software on the **controller-1** host. The differences are as follows:

- assigning the personality and name of the host
- configuring the data interfaces

This section uses the **compute-0** host as the example installation target. Except where noted, all the commands must be executed from the console of **controller-0**.

**Tip:**

To save time, you can install multiple compute nodes in parallel.

This procedure requires the **controller-0** to be already operational.

1. Add the host to the system inventory.

   **Note:**

   The host must be added to the system inventory before it is powered on.

   On **controller-0**, acquire Keystone administrative privileges:

   ```
   $source /etc/nova/openrc
   ```

   Use the system host-add command to add the host to the system inventory:

   ```
   ~(keystone_admin)$ system host-add -n hostname -p personality -m mgmt_mac
    -i mgmt_ip \
   [-T bm_type -M bm_mac -I bm_ip -U bm_username -P bm_password]
   ```

   where

   ***hostname***

   is a name to assign to the host

   ***personality***

   is the host type (controller or compute)

   ***mgmt_mac***

   is the MAC address of the port connected to the management network

   ***mgmt_ip***

   is the IP address to assign on the management network

   ***bm_type***

   is the board management controller type (ilo3 or ilo4)

   ***bm_mac***

   is the board management controller MAC address

   ***bm_ip***

   is the board management controller IP address

   ***bm_username***

   is the username for board management controller access

   ***bm_username***

   is the password for board management controller access

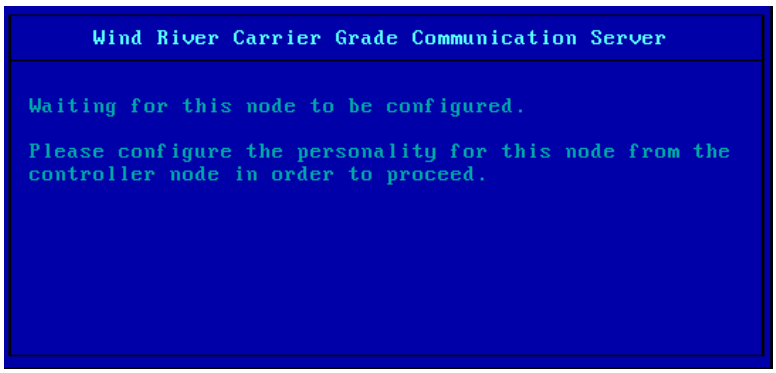
   For example:

   ```
   ~(keystone_admin)$ system host-add -n compute-0 -p compute -m
    08:00:27:25:FC:36 \
   -i 192.168.204.111
   ```

2. Boot the new node using PXE.

   With **controller-0** running, start the node.

   The node boots from the network.




3. Log in to the active controller as the Keystone **admin** user.

```
$ source /etc/nova/openrc
```

4. Verify the status of the host.

```
~(keystone_admin)$ system host-list
+----+--------------+-------------+----------------+-------------
+--------------+
| id | hostname     | personality | administrative | operational |
 availability |
+----+--------------+-------------+----------------+-------------
+--------------+
| 1  | controller-0 | controller  | unlocked       | enabled     |
 available    |
| 2  | controller-1 | controller  | unlocked       | enabled     |
 available    |
| 3  | None         | None        | locked         | disabled    | offline
      |
+----+--------------+-------------+----------------+-------------
+--------------+
```

The host is reported as host number 3, operating offline, with no host name or personality.

5. Set up the host to have the host name **compute-0**, and the personality of a compute node.

```
~(keystone_admin)$ system host-update 3 hostname=compute-0
 personality=compute
+----------------+--------------------------------------+
| Property       | Value                                |
+----------------+--------------------------------------+
| administrative | locked                               |
| availability   | offline                              |
| created_at     | 2014-01-06T17:20:09.561079+00:00     |
| hostname       | compute-0                            |
| id             | 3                                    |
| invProvision   | None                                 |
| location       | {}                                   |
| mgmt_ip        | 192.168.204.156                      |
| mgmt_mac       | 08:00:27:47:33:e9                    |
| operational    | disabled                             |
| personality    | compute                              |
| serialId       | None                                 |
| updated_at     | None                                 |
| uuid           | 2f5d3522-209c-4bea-9a67-7200bcbaddbc |
+----------------+--------------------------------------+
```

**Controller-0** configures the required parameters for **compute-0** and displays them as illustrated above. Note that **compute-0** is still offline since the HP Helion OpenStack Carrier Grade software has yet to be installed in its hard drive.

Additionally, **controller-0** automatically pushes the HP Helion OpenStack Carrier Grade installer image over the internal management network for the host to boot.

6. On the **compute-0** console, select the installation mode.

   **1) Serial <personality> Node Install (default)**

   Use the serial port to display messages. You can monitor the port using the terminal server.

   **2) Graphics <personality> Node Install**

   Use the console port in graphics mode to display messages. This selection works with most console displays.

   **3) Graphics Text <personality> Node Install**

   Use the console port in text mode to display messages. This is a safe option for nodes that do not support graphics mode.

   The installer initializes the target hard drive with the HP Helion OpenStack Carrier Grade image. This step may take several minutes.

7. Wait for the compute host to reboot.

   **Note:**

   It may be necessary to reconfigure the system's BIOS or UEFI manually to force the host to boot from the hard drive.

   The host boots from the hard drive into the HP Helion OpenStack Carrier Grade image and displays the GNU GRUB welcome screen.

   After a brief delay, the system boots automatically into the HP Helion OpenStack Carrier Grade image, providing you with a login prompt.

8. Verify the status of the host.

```
~(keystone_admin)$ system host-list
+----+--------------+-------------+----------------+-------------
+--------------+
| id | hostname     | personality | administrative | operational |
 availability |
+----+--------------+-------------+----------------+-------------
+--------------+
| 1  | controller-0 | controller  | unlocked       | enabled     |
 available    |
| 2  | controller-1 | controller  | unlocked       | enabled     |
 available    |
| 3  | compute-0    | compute     | locked         | disabled    | offline
      |
+----+--------------+-------------+----------------+-------------
+--------------+
```

   The host is still offline, but it is now reported as a compute node with name **compute-0**, in the **locked** administrative state.

9. Provision data interfaces.

   For more information, see the *HP Helion OpenStack Carrier Grade Software Installation Guide: Network Interface Provisioning*.

10. If the cluster uses an infrastructure network, provision an infrastructure interface.

    For more information, see the *HP Helion OpenStack Carrier Grade Software Installation Guide: Network Interface Provisioning*.

**11.** Unlock the **compute-0** host.

```
~(keystone_admin)$ system host-unlock compute-0
+----------------+--------------------------------------+
| Property       | Value                                |
+----------------+--------------------------------------+
| administrative | unlocked                             |
| availability   | offline                              |
| created_at     | 2014-01-06T17:20:09.561079+00:00     |
| hostname       | compute-0                            |
| id             | 3                                    |
| invProvision   | provisioned                          |
| location       | {}                                   |
| mgmt_ip        | 192.168.204.156                      |
| mgmt_mac       | 08:00:27:47:33:e9                    |
| operational    | disabled                             |
| personality    | compute                              |
| serialId       | None                                 |
| updated_at     | 2014-01-06T17:31:45.829503+00:00     |
| uuid           | 2f5d3522-209c-4bea-9a67-7200bcbaddbc |
+----------------+--------------------------------------+
```

The unlocking operation moves **compute-0** into the intermediate **in-test** availability state first, and then into the final **available** state.

**Note:**

The unlock operation will fail if the data interfaces have not been configured.

**12.** Verify that the **compute-0** host is operational.

```
~(keystone_admin)$ system host-list
+----+--------------+-------------+----------------+-------------
+--------------+
| id | hostname     | personality | administrative | operational |
 availability |
+----+--------------+-------------+----------------+-------------
+--------------+
| 1  | controller-0 | controller  | unlocked       | enabled     |
 available    |
| 2  | controller-1 | controller  | unlocked       | enabled     |
 available    |
| 3  | compute-0    | compute     | unlocked       | enabled     |
 available    |
+----+--------------+-------------+----------------+-------------
+--------------+
```

**Compute-0** moves into the **available** state within a few minutes following the unlock command.

**Compute-0** is now operational and ready to host new virtual machines.

## Configuring a Host for Board Management Using the CLI

To use board management on a host, you must provision the host with information about the attached board management module. If you prefer, you can do this from the command-line interface.

For more information about using board management, see the *HP Helion OpenStack Carrier Grade Administration Guide: The Board Management Network*.

To complete this task, you need the board type (ilo3 or ilo4), MAC address, username, and password of the board management module. The module must also be configured to use DHCP for a board management network that uses

internal access, or static IP addressing for a network that uses external access. For more information, consult the user documentation for the module.

If the board management is configured for external access, you also need an IP address to assign to the module. For this information, consult your configuration plan.

1. Provision the host with the MAC address and module type of the attached iLO module.

   ```
   ~(keystone_admin)$ system host-update hostname bm_mac=MAC_address
    bm_type=module_type
   ```

   For example:

   ```
   ~(keystone_admin)$ system host-update compute-0 bm_mac=b4:b5:2f:ee:ae:90
    bm_type=ilo4
   ```

2. Provision the host with the username and password of the iLO module.

   ```
   ~(keystone_admin)$ system host-update hostname bm_username=user_name \
   bm_password=password
   ```

3. If the board management network is configured for external access, provision the host with the IP address of the iLO module.

   ```
   ~(keystone_admin)$ system host-update hostname bm_ip=ip_address \
   ```

# Chapter 4

# System Provisioning

**Topics:**



Before you can unlock the nodes and use HP Helion OpenStack Carrier Grade, you must perform basic system provisioning.

- You must provision data interfaces for the compute nodes. Before you can do this, you must create provider networks to which the interfaces can be attached.
- If an infrastructure network is installed, you must provision the compute nodes and storage nodes to attach to the infrastructure network.
- If using storage nodes, you must provision storage volumes for the storage nodes.
- If a board management network is installed, you must provision the hosts to use it.

# Network Interface Provisioning

Interfaces on compute and storage nodes require initial provisioning to attach them to networks.

On compute and storage nodes, some interfaces require manual provisioning before the nodes can be unlocked.

- For a storage node, you must attach an interface to the infrastructure network before you can unlock the node.
- For a compute node, you must attach interfaces to provider networks before you can unlock the node. The provider networks must be set up beforehand; for more information, see *Configuring Provider Networks* on page 33.

  If the cluster uses an infrastructure network, you must also attach an interface to the infrastructure network before you can unlock the node.

The procedure for attaching an interface depends on whether the interface is an Ethernet, aggregated Ethernet, or shared (VLAN) interface.

- To attach an Ethernet interface, see *Attaching to Networks Using an Ethernet Interface* on page 35.
- To attach an aggregated Ethernet interface, see *Attaching to Networks Using an Aggregated Ethernet Interface* on page 36.
- To attach a VLAN interface, see *Attaching to Networks Using a VLAN Interface* on page 38.

**Note:**

To attach a data network to an existing management or infrastructure network interface, see *Editing Interface Settings* on page 43.

As an alternative, you can use the CLI to attach interfaces. See *Network Interface Provisioning Using the CLI* on page 44.

For more information about interfaces, see the *HP Helion OpenStack Carrier Grade Administration Guide: Ethernet Interfaces*.

**Note:**

On compute and storage nodes, the Ethernet interface for the management network is attached automatically, to support installation using PXE booting.

On controller nodes, interfaces are attached to the management, OAM, and optional infrastructure networks automatically according to the settings specified during the controller configuration script. They do not require further provisioning before system deployment. For more information, see *The Controller Configuration Script*.

## Configuring Provider Networks

You can use the HP Helion OpenStack Carrier Grade CLI or web administration interface to set up provider networks over physical networks.

A *provider network* is a layer-2 virtual network associated with a physical network. Provider networks are used to provide connectivity for tenant networks.

You can choose from three types of provider network:

- A flat network mapped directly to the physical network.
- A VLAN network, which can support multiple tenant networks using designated ranges of VLAN IDs for communication between hosts on the same Layer 2 network.
- A VXLAN network, which can support multiple tenant networks using designated ranges of VNIs for communication between hosts on different Layer 2 segments separated by one or more L3 routers.

For more about provider networks and tenant networks, see the *HP Helion OpenStack Carrier Grade Administration Guide: Network Requirements*.

To create an association with a physical network, the provider network must be mapped to an Ethernet interface on a compute node. At least one such interface must be set up before the compute node can be unlocked. For more information, see *Network Interface Provisioning* on page 33.

**Note:**

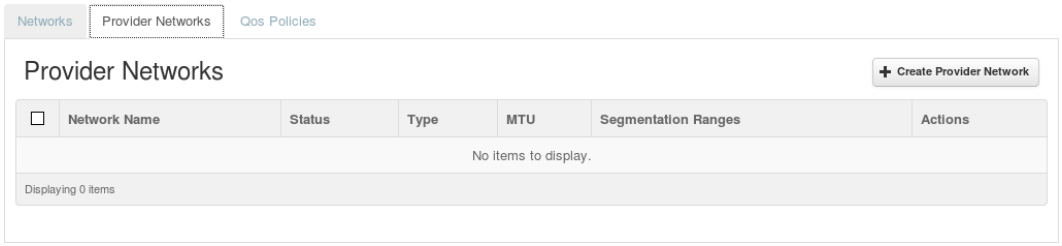
If you plan to follow the exercises in the *HP Helion OpenStack Carrier Grade Reference Deployment Scenarios*, set up two provider networks of the **vlan** type, named **provider-net-a** and **provider-net-b**.

1. Open the HP Helion OpenStack Carrier Grade web administration interface.

   Using a browser, navigate to the OAM floating IP address, and log in as **admin**.

2. In the left-hand pane, on the **Admin** tab, click **Networks**, and then select the **Provider Networks** tab.

   The Provider Networks list is displayed.




3. Create a provider network.

   Click **Create Provider Network**.

   In the **Create Provider Network** window, complete the fields as required.

   **Name**

   The name of the provider network.

   **Description**

   A free-text field for reference.

   **Type**

   The type of provider network to be created.

   **flat**

   mapped directly to the physical network

   **vlan**

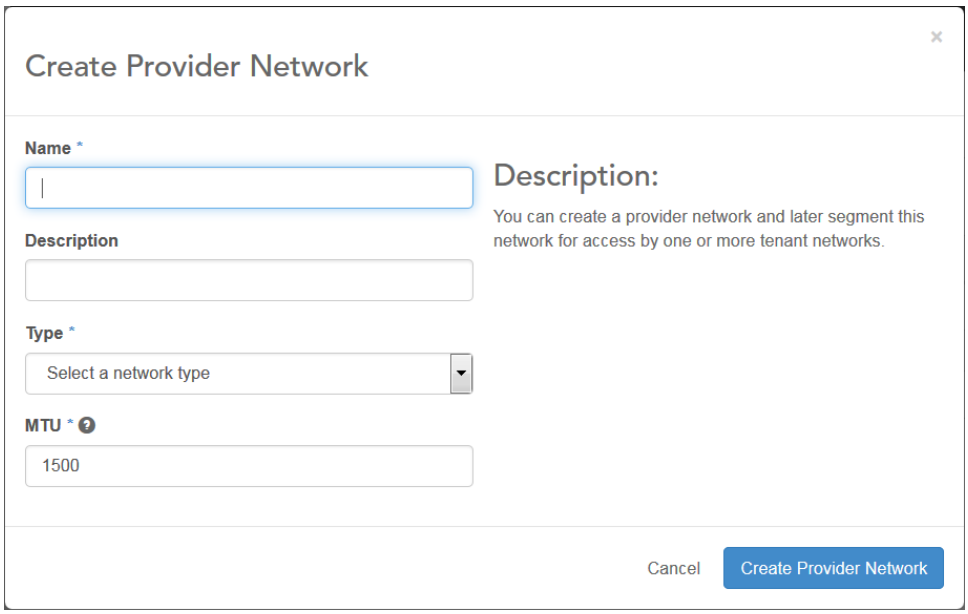
   supports multiple tenant networks using VLAN IDs.

   **vxlan**

   supports multiple tenant networks using VXLAN VNIs.

   **MTU**

   The maximum transmission unit for the Ethernet segment used to access the network.




4. Commit the changes.

   Click **Create Provider Network**.

   The new provider network is added to the **Provider Networks** list.

After creating a provider network of the VLAN or VXLAN type, you can assign one or more *segmentation ranges* consisting of a set of consecutive VLAN IDs (for VLANs) or VNIs (for VXLANs). Segmentation ranges are required in order to set up tenant networks.

Segmentation ranges are not required in order to attach interfaces and unlock compute nodes.

For general information about segmentation ranges, see the *HP Helion OpenStack Carrier Grade Administration Guide: Provider Networks*. For more information about creating segmentation ranges or setting up tenant networks, see the *HP Helion OpenStack Carrier Grade Reference Deployment Scenarios*.

## Attaching to Networks Using an Ethernet Interface

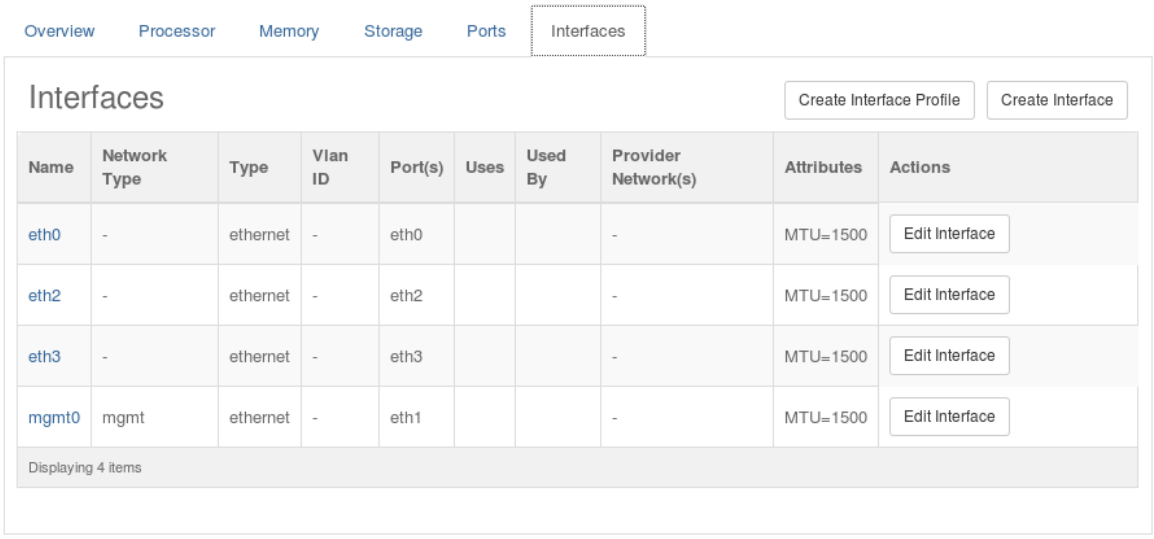
You can attach an Ethernet interface to a network by editing the interface.

When a compute or storage node is added to HP Helion OpenStack Carrier Grade and initialized, Ethernet interfaces are created automatically for each physical port detected. To support installation using PXE booting, one interface is attached automatically to the management network. You must attach additional interfaces manually before you can unlock the node. For more about this requirement, see *Network Interface Provisioning* on page 33.

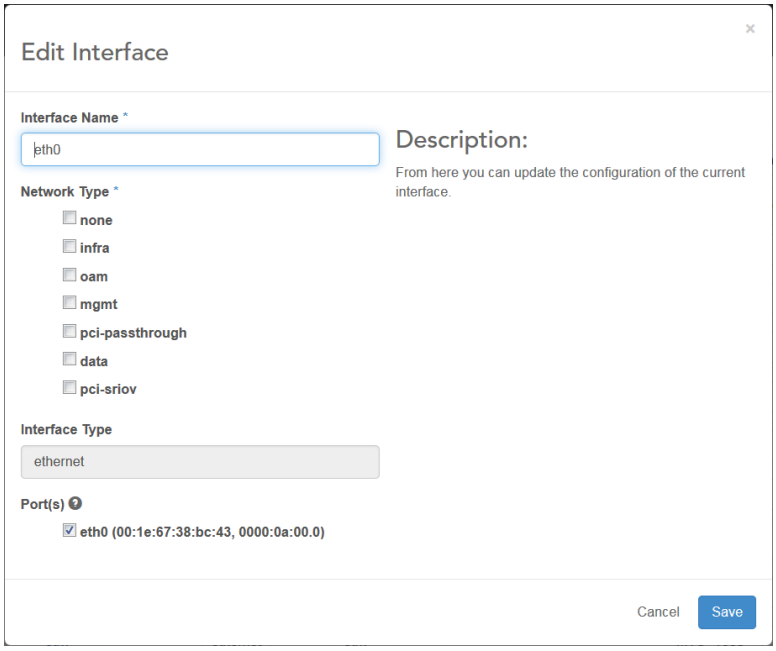
For a network that uses Ethernet interfaces, you can edit an existing Ethernet interface on the node to attach it, as described in this topic. You can also do this from the CLI; for more information, see *Network Interface Provisioning Using the CLI* on page 44.

For a network that uses aggregated Ethernet or VLAN interfaces, you must create an interface in order to attach it; see *Attaching to Networks Using an Aggregated Ethernet Interface* on page 36 or *Attaching to Networks Using a VLAN Interface* on page 38.

1. Open the **Inventory Detail** page for the host.
   a) On the **Admin** pane of the web administration interface, in the **System Panel** section, select **Inventory**.
   b) Select the **Hosts** tab, and then in the **Host Name** column, click the name of the host.
2. Select the **Interfaces** tab.




3. Click **Edit Interface** for the interface you want to attach to a network.




   For an Ethernet interface, the **Port** is already selected.

4. Select the type of network for the interface.

   For details, see *Interface Settings* on page 41.

5. Complete the required information for the type of interface.

   For more information, see *Interface Settings* on page 41.

6. Click **Save** to save your changes and close the dialog box.

The interface is attached to the network.

## Attaching to Networks Using an Aggregated Ethernet Interface

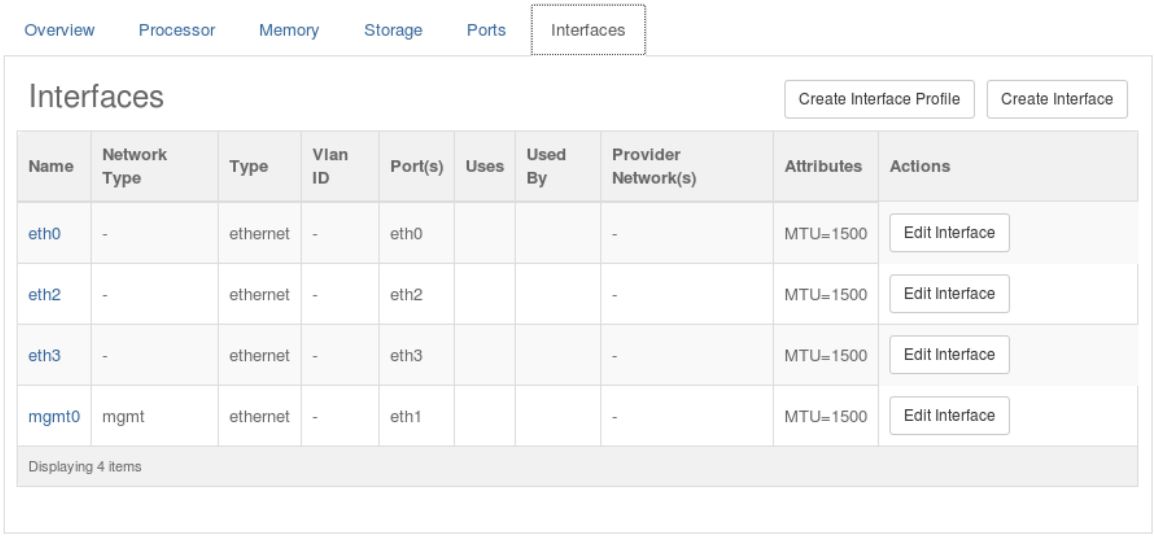
You can add and remove interfaces from a LAG group on a host using the web administration interface or the CLI.

For CLI instructions, see *Network Interface Provisioning Using the CLI* on page 44.

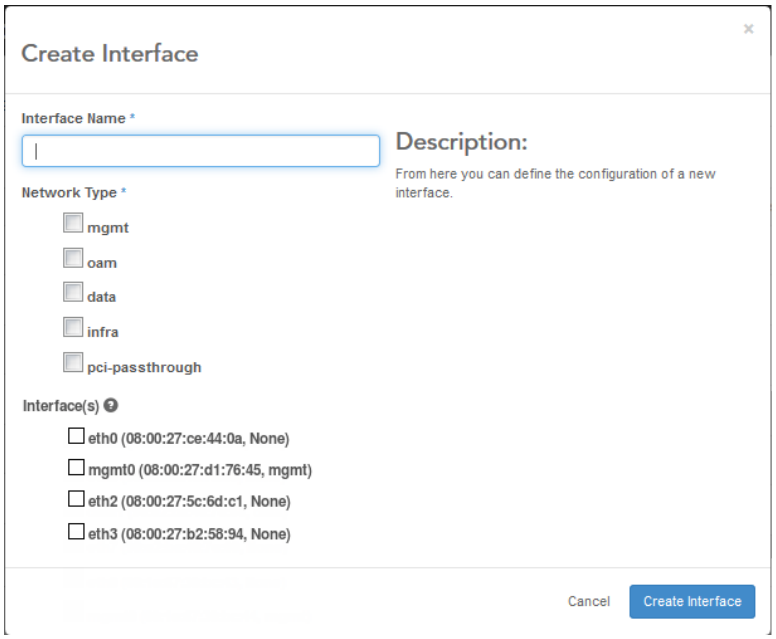
1. Open the **Inventory Detail** page for the host.
   a) On the **Admin** pane of the web administration interface, in the **System Panel** section, select **Inventory**.

b) Select the **Hosts** tab, and then in the **Host Name** column, click the name of the host.

2. Select the **Interfaces** tab.




3. Click **Create Interface**.




4. Select the type of network for the interface.

   For details, see *Interface Settings* on page 41.

5. If required, open the **Interface Type** drop-down menu, and select **aggregated ethernet**.

   The **Interface Type** control appears when the **Network Type** is set to **mgmt**, **oam**, **data**, or **infra**.

6. Set the **Aggregated Ethernet - Mode**. For more information, see *Link Aggregation Settings*.
7. From the **Interfaces** list, select the Ethernet interfaces used to attach this interface to the network.
8. Complete any other settings required for the Network Type. For more information, see *Interface Settings* on page 41.
9. Click **Create Interface** to save your changes and close the dialog box.

The interface is created and attached to the network.

## Attaching to Networks Using a VLAN Interface

You can attach an interface to multiple networks using VLAN tagging.

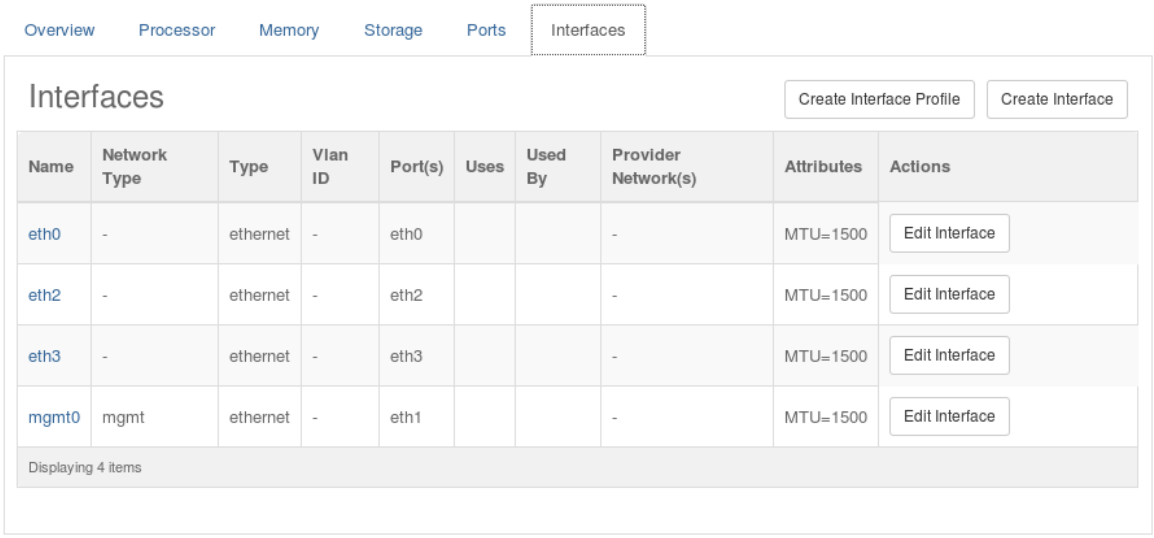
If the cluster is configured with VLAN-tagged networks, you can share an Ethernet interface by attaching it to one or more VLAN-tagged networks. You can do this using the web administration interface or the CLI. For CLI instructions, see *Network Interface Provisioning Using the CLI* on page 44.

**Note:**

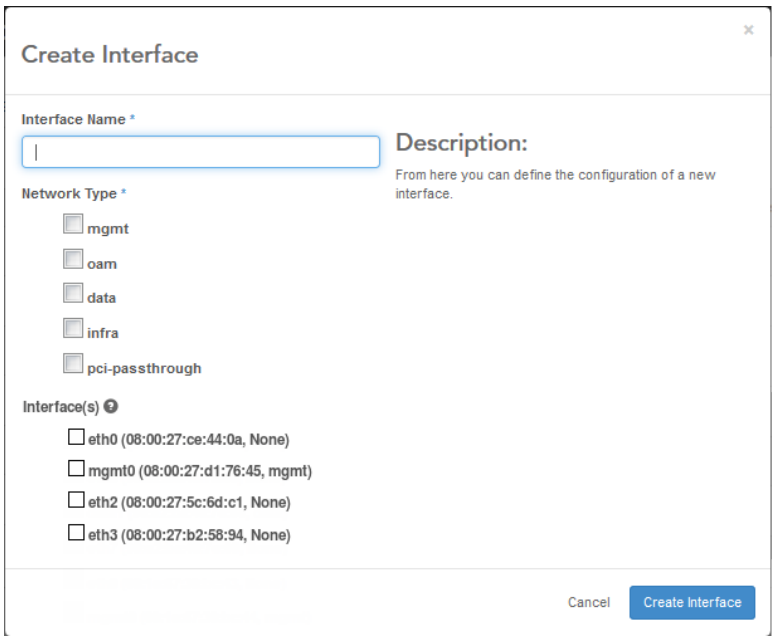
When attaching to a data network using a VLAN interface, you can select a flat or VXLAN provider network. However, you cannot connect to a VLAN provider network (stacked VLANs are not supported). As an alternative that supports VLAN provider networks, you can edit a management or infrastructure interface to attach to a data network. For more information, see *Editing Interface Settings* on page 43.

For more information about shared interfaces, see the *HP Helion OpenStack Carrier Grade Administration Guide: Shared (VLAN) Ethernet Interfaces*.

1. Open the **Inventory Detail** page for the host.
   a) On the **Admin** pane of the web administration interface, in the **System Panel** section, select **Inventory**.
   b) Select the **Hosts** tab, and then in the **Host Name** column, click the name of the host.
2. Select the **Interfaces** tab.




3. Click **Create Interface**.




4. Select the type of network for the interface.

   For details, see *Interface Settings* on page 41.
5. Open the **Interface Type** drop-down menu, and select **vlan**.

   The **Interface Type** control appears when the **Network Type** is set to **mgmt**, **oam**, **data**, or **infra**.
6. In the **Vlan ID** field, type a unique VLAN identifier for the network.
7. From the **Interfaces** list, select the Ethernet interfaces used to attach this interface to the network.

   The Ethernet interfaces correspond to ports on the node. For more information, see *Network Interface Provisioning* on page 33.
8. Complete any other settings required for the Network Type. For more information, see *Interface Settings* on page 41.
9. Click **Create Interface** to save your changes and close the dialog box.

The interface is created and attached to the network.

## Creating an Interface Profile

You can optionally save the interface configuration for a host as a *profile*, and apply the profile to other hosts.

You can also use the CLI to create and apply interface profiles. The following command creates a new interface configuration profile named **hp360-server**.

```
~(keystone_admin)$ system ifprofile-add hp360-server compute-0
```

You can use this profile when configuring additional compute nodes to simplify the interface configuration process. Available interface profiles can be listed with the following command:

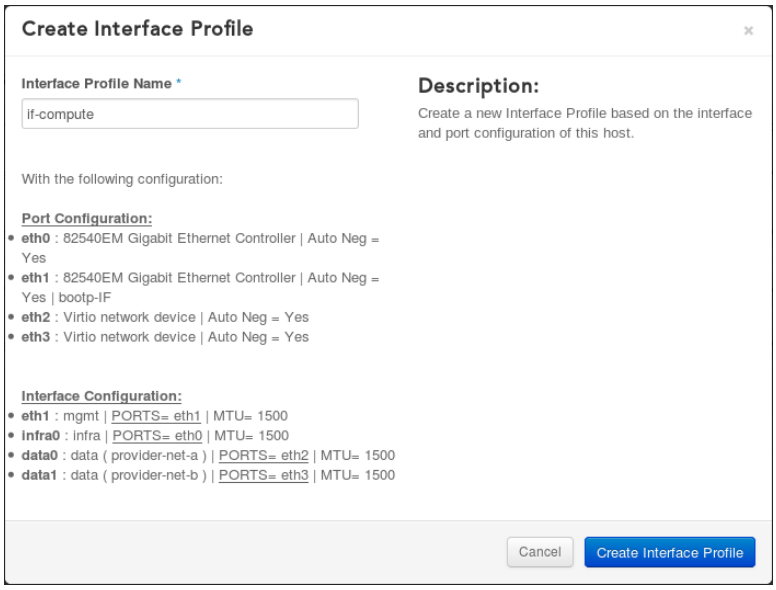
```
~(keystone_admin)$ system ifprofile-list

+--------------+--------------+--------------------
+--------------------------------+
| uuid         | name         | port config         | interface config
        |
+--------------+--------------+--------------------
+--------------------------------+
| b8444eb0-... | hp360-server | eth1: 82540EM  ...  | eth1: mgmt | ethernet
 |   ... |
```

```
|                |                | eth2: 82540OEM ...   | data-0:
 data( provider-net-a )|
|                |                | eth3: 82540OEM ...   | data-1:
 data( provider-net-b )|
|                |                | infra0: 82540EM ... | eth0: infra | ethernet
 |   ... |
+--------------+--------------+--------------------
 +--------------------------------+
```

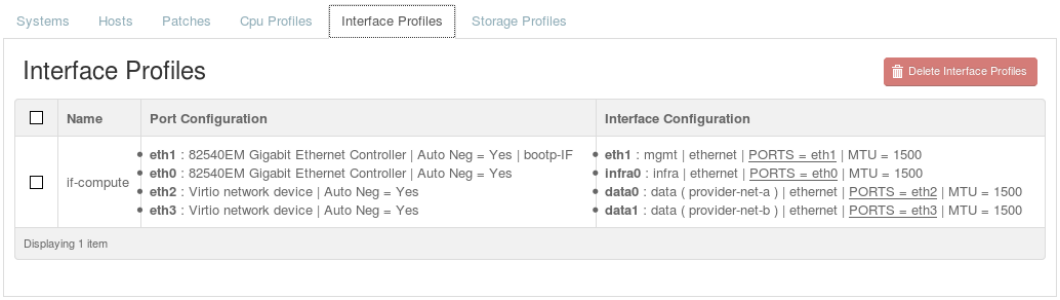
1. Open the **Inventory Detail** page for the host.
   a) On the **Admin** pane of the web administration interface, in the **System Panel** section, select **Inventory**.
   b) Select the **Hosts** tab, and then in the **Host Name** column, click the name of the host.
2. On the **Interfaces** tab, click **Create Interface Profile**.

   The **Create Interface Profile** window appears.

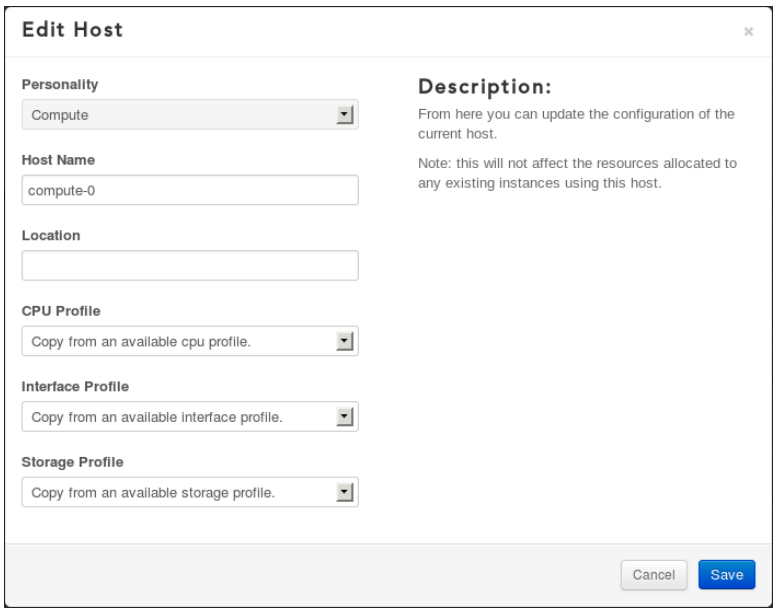



3. Enter an interface profile name, and then click **Create Interface Profile**.

   The interface profile is created. To view it, select **System Panel** > **Inventory** on the **Admin** page, and then select the **Interface Profiles** tab.




   You can use this interface profile when installing additional compute nodes. For example, when assigning the host **compute-1**, you can eliminate the steps to attach interfaces by clicking **Edit Host**, and then selecting a profile from the **Interface Profile** drop-down list.




**Note:**

To list existing interface profiles, select the **Interface Profiles** tab on the **Inventory** page.

## Interface Settings

The settings for creating or editing an interface on a node depend on the type of network to which the interface is connected (for example, **infra** or **data**), as well as the type of interface (for example, **aggregated ethernet** or **vlan**).

For more about creating and editing interfaces, see *Network Interface Provisioning* on page 33.

**Interface Name**

A name used to identify the interface.

**Network Type**

The type of network to which the interface is attached.

**Note:**

This selection supports multiple network types on the same *logical* interface. HP Helion OpenStack Carrier Grade also supports multiple network types on the same *physical* interface, using VLAN interfaces.

You can select multiple check boxes, but the only valid multiple selection is **data** in addition to either **mgmt** or **infra** on the interface connected to the management or infrastructure network.

Depending on the interface, the check box options may include:

**none**

Clears the Network Type setting.

**infra**

Attaches the interface to an infrastructure network.

When a compute or storage node is added to HP Helion OpenStack Carrier Grade, an interface must be attached to the infrastructure network before the node can be unlocked.

You can edit the infrastructure interface to add a **data** network and provider network. This allows both infrastructure and data traffic to be carried on the interface.

**oam**

Attaches the interface to the OAM network.

The OAM network is used by controller nodes for administrator remote access. It is not applicable to compute or storage nodes.

**mgmt**

Attaches the interface to the management network.

When a compute or storage node is added to HP Helion OpenStack Carrier Grade, the interface used for PXE boot is assigned automatically to the management network. In the settings for this interface, **mgmt** is already selected. For other interfaces, this selection is not used.

You can edit the management interface to add a **data** network and provider network. This allows both management and data traffic to be carried on the interface.

**pci-passthrough**

Provides for a direct connection to physical interface hardware and the attached provider network from a virtual machine. A single VM can directly access the physical interface. For more information, see the *HP Helion OpenStack Carrier Grade Administration Guide: PCI Passthrough Ethernet Devices.*

**data**

Attaches the interface to a provider network.

You can add a data interface to a management or infrastructure interface by editing the interface and selecting **data** in addition to **mgmt** or **infra**.

**pci-sriov**

Provides for a direct connection to a virtual unit of physical interface hardware, and the attached provider network, from a virtual machine. Multiple VMs can directly access and share the same physical interface. For more information, see the *HP Helion OpenStack Carrier Grade Administration Guide: SR-IOV Ethernet Interfaces*.

**Interface Type**

(Shown only when the **Network Type** is set to **mgmt**, **oam**, **data**, or **infra**) The type of interface (Ethernet, Aggregated Ethernet, or VLAN).

**Aggregated Ethernet - Mode**

(Shown only when the **Interface Type** is set to **aggregated ethernet**) The operational mode for link aggregation.

**Aggregated Ethernet - Tx Policy**

(Shown only when the **Aggregated Ethernet - Mode** is set to **balanced** or **802.3ad**) The transmit policy for link aggregation.

**Vlan ID**

(Shown only when the **Interface Type** is set to **vlan**) A unique VLAN identifier for the network.

**Port(s)**

The physical port or ports used for the interface.

**Provider Networks**

(Shown only when the Network Type is set to **data**, **pci-passthrough**, or **pci-sriov**) The available provider networks. To attach the interface to a provider network, select the provider network.

**Note:**

You cannot attach to a VLAN provider network using a VLAN data interface.

**MTU**

The maximum transmission unit for the interface. For more information, see the *HP Helion OpenStack Carrier Grade Administration Guide: The Ethernet MTU*.

**IPv4 Addressing Mode**

(Shown only when the Network Type is set to **data**) The method for assigning an IP address to the interface for use with VXLAN networks. For more information about VXLAN networks, see the *HP Helion OpenStack Carrier Grade Administration Guide: Using VXLANs*. The available options are **static** or **disabled**.

**Disabled**

Do not assign an IPv4 address.

**Static**

Use a static IPv4 address.

**IPv6 Addressing Mode**

(Shown only when the Network Type is set to **data**) The method for assigning an IP address to the interface for use with VXLAN networks. For more information about VXLAN networks, see the *HP Helion OpenStack Carrier Grade Administration Guide: Using VXLANs*.

**Disabled**

Do not assign an IPv6 address.

**Static**

Use a static IPv6 address.

**Automatic Assignment**

Use an automatically assigned IPv6 address.

**Link Local**

Use a link local IPv6 address.

**Virtual Functions**

(Shown only when the Network Type is set to **pci-sriov**) The number of virtual interfaces to use. For more information, see the *HP Helion OpenStack Carrier Grade Administration Guide: SR-IOV Ethernet Interfaces*.

**Maximum Virtual Functions**

(Shown only when the Network Type is set to **pci-sriov**)

the maximum number of virtual interfaces available.

For more information about adding provider networks, see *Configuring Provider Networks* on page 33.

For more information about link aggregation, see *Link Aggregation Settings*.

### Editing Interface Settings

You can change the settings for a host interface.

The ability to change the interface settings is especially useful for updating the management interface. When a compute node is first created, its management interface is automatically set up using the default **Interface Type** (**ethernet**). If you are using LAG on the management network, you must update this manually to **aggregated ethernet**.

You can also edit a management or infrastructure interface to attach to a data network by selecting **data** as an additional Network Type for the interface, or using the CLI. For CLI instructions, see *Network Interface Provisioning Using the CLI* on page 44.

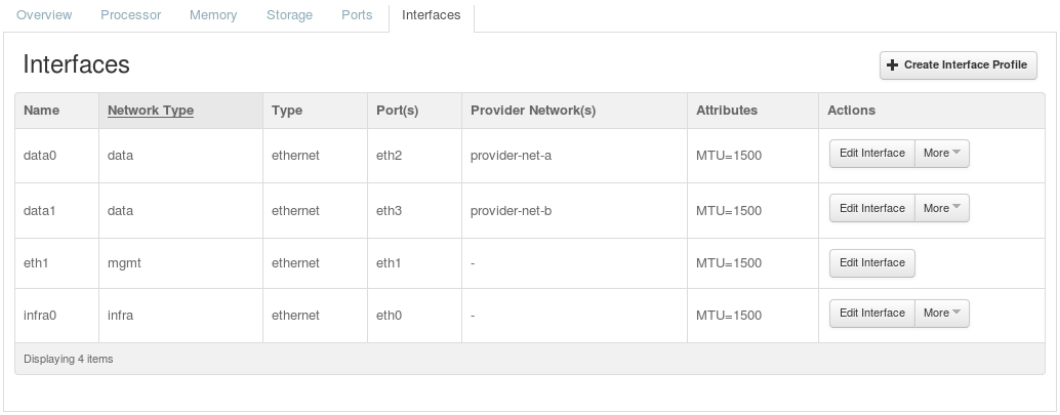
1. Lock the host to make changes.

a) On the **Admin** pane of the web administration interface, in the **System Panel** section, select **Inventory**.
b) Select the **Hosts** tab.
c) Open the **More** drop-down list for the host, and then select **Lock Host**.
d) Wait for the host to be reported as **Locked**.

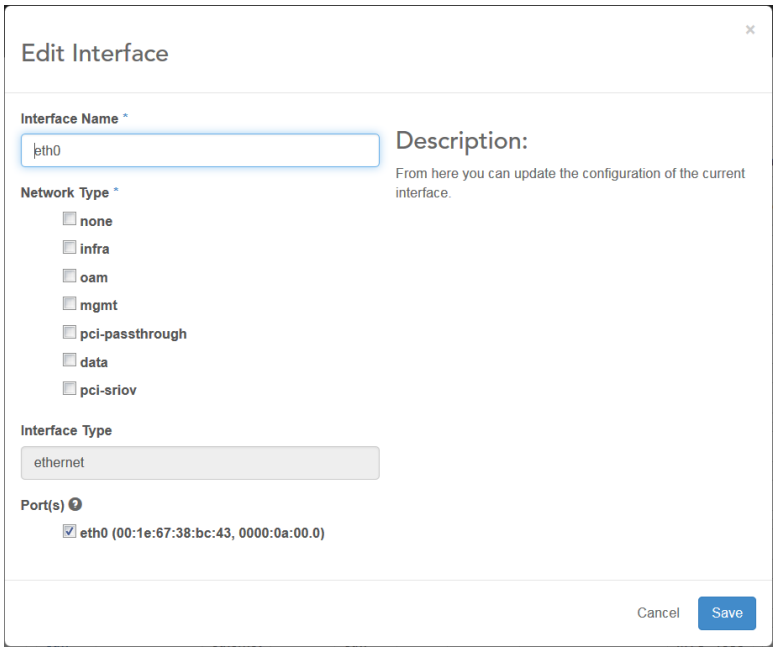
2. Open the **Inventory Detail** page for the locked host.

   In the **Host Name** column, click the name of the host.

3. Select the **Interfaces** tab to display the existing interfaces.




4. Click **Edit Interface** for the interface you want to change.




5. Make the required changes, and then click **Save**.

   For information about the available settings, see *Interface Settings* on page 41.

6. Unlock the host.

## Network Interface Provisioning Using the CLI

You can use CLI commands to create and attach network interfaces.

For more information about interface provisioning, or help using the web administration interface, see *Network Interface Provisioning* on page 33.

To list attached interfaces, use the **system host-if-list** command.

```
~(keystone_admin)$ system host-if-list controller-0
...+--------+------...+----------+---------+-----------+------------
+-------------+...
...| name   | netwo...| type     | vlan id | ports     | uses i/f   | used
 by i/f |...
...+--------+------...+----------+---------+-----------+------------
+-------------+...
...| infra0 | infra...| vlan     | 22      | []        | [u'mgmt0'] | []
      |...
...| oam0   | oam  ...| ethernet | None    | [u'eth0'] | []         | []
      |...
...| mgmt0  | mgmt ...| ethernet | None    | [u'eth1'] | []         |
 [u'infra0'] |...
...+--------+------...+----------+---------+-----------+------------
+-------------+...
```

To see all available interfaces, add the -a flag.

```
~(keystone_admin)$ system host-if-list -a controller-0
...+--------+------...+----------+---------+-----------+------------
+-------------+...
...| name   | netwo...| type     | vlan id | ports     | uses i/f   | used
 by i/f |...
...+--------+------...+----------+---------+-----------+------------
+-------------+...
...| eth3   | None ...| ethernet | None    | [u'eth3'] | []         | []
      |...
...| infra0 | infra...| vlan     | 22      | []        | [u'mgmt0'] | []
      |...
...| eth2   | None ...| ethernet | None    | [u'eth2'] | []         | []
      |...
...| oam0   | oam  ...| ethernet | None    | [u'eth0'] | []         | []
      |...
...| mgmt0  | mgmt ...| ethernet | None    | [u'eth1'] | []         |
 [u'infra0'] |...
...+--------+------...+----------+---------+-----------+------------
+-------------+...
```

### Ethernet Interfaces

Ethernet interfaces are created automatically. To attach one to a network, use a command of the following form:

```
~(keystone_admin)$ system host-if-modify -n ifname -m mtu \
-nt networktype hostname ethname [-p providernetworklist]
```

where

**ifname**

is a name for the interface

**mtu**

is the MTU for the interface

**networktype**

is the type of network to attach to

**hostname**

is the name or UUID of the host

**ethname**

is the name or UUID of the Ethernet interface to use

**providernetworklist**

is a list of provider networks, delimited by quotes and separated by spaces; for example, "`provider-net-a provider-net-b`". To specify a single provider network, omit the quotes. This parameter is required only if the *networktype* is set to data.

For example, to attach an interface named **infra0** to the infrastructure network, using Ethernet interface **eth0** on **compute-0**:

```
~(keystone_admin)$ system host-if-modify -n infra0 \
-nt infra compute0 eth0
```

### Aggregated Ethernet Interfaces

To create an aggregated Ethernet interface and attach it to a network, use a command of the following form:

```
~(keystone_admin)$ system host-if-add ifname -m mtu \
-a aemode -x policy hostname \
 ae "providernetworklist" ethname1 ethname2
```

where

**ifname**

is a name for the interface

**mtu**

is the MTU for the interface

**aemode**

is the link aggregation mode

**policy**

is the balanced tx distribution hash policy

**hostname**

is the name or UUID of the host

**providernetworklist**

is a list of provider networks to attach to, separated by spaces

**Note:**

For networks other than data networks, the value **none** is required.

**ethname1, ethname2**

are the names or UUIDs of the member interfaces

For example, to attach an aggregated Ethernet interface named **ae0** to provider networks **provider-net-a** and **provider-net-b**, using member interfaces **eth2** and **eth3** on **compute-0**:

```
~(keystone_admin)$ system host-if-add ae0 -a balanced \
-x layer2 compute-0 ae "provider-net-a provider-net-b" eth2 eth3
```

For more about link aggregation modes and policies, see *Link Aggregation Settings*.

### VLAN Interfaces

To create a VLAN interface and attach it to a network, use a command of the following form:

```
~(keystone_admin)$ system host-if-add ifname -V vlan_id \
-nt networktype hostname ethname [-p providernetworklist]
```

where

**ifname**

is a name for the interface

**vlan_id**

is the VLAN identifier for the network

**hostname**

is the name or UUID of the host

**networktype**

is the type of network to attach to

**ethname**

is the name or UUID of the Ethernet interface to use

**providernetworklist**

is a list of provider networks, delimited by quotes and separated by spaces; for example, "`provider-net-a provider-net-b`". To specify a single provider network, omit the quotes. This parameter is required only if the *networktype* is set to data.

For example, to attach a VLAN interface named **infra0** with VLAN ID **22** to the infrastructure network, using Ethernet interface **eth1** on **storage-0**:

```
~(keystone_admin)$ system host-if-add infra0 -V 22 -nt infra storage-0 vlan
 eth1
+------------------+--------------------------------------+
| Property         | Value                                |
+------------------+--------------------------------------+
| ifname           | infra0                               |
| networktype      | infra                                |
| iftype           | vlan                                 |
| ports            | []                                   |
| providernetworks | None                                 |
| imac             | 08:00:27:f2:0d:68                    |
| imtu             | 1500                                 |
| aemode           | None                                 |
| schedpolicy      | None                                 |
| txhashpolicy     | None                                 |
| uuid             | 8ca9854e-a18e-4a3c-8afe-f050da702fdf |
| ihost_uuid       | 3d207384-7d30-4bc0-affe-d68ab6a00a5b |
| vlan_id          | 22                                   |
| uses             | [u'eth1']                            |
| used_by          | []                                   |
| created_at       | 2015-02-04T16:23:28.917084+00:00     |
| updated_at       | None                                 |
+------------------+--------------------------------------+
```

where

**ifname**

is a name for the interface

**mtu**

is the MTU for the interface

**aemode**

is the link aggregation mode

**policy**

is the balanced tx distribution hash policy

**hostname**

is the name or UUID of the host

**ethname1, ethname2**

are the names or UUIDs of the member interfaces

For more about VLAN interfaces, see the *HP Helion OpenStack Carrier Grade Administration Guide: Shared Ethernet Interfaces*.

### Combined Data and Management or Infrastructure Interfaces

You can add a data interface to a management or infrastructure interface using a command of the following form:

```
~(keystone_admin)$ system host-if-modify -nt "mgmt,data" -p group0-data0
 compute-0 mgmt0
```

This example adds a data network to the **mgmt0** interface on **compute-0**, for the provider network **group0-data0**.

### Configuring Provider Networks Using the CLI

You can set up provider networks over physical networks using the **controller-0** command-line interface. The provider networks provide connectivity for tenant networks.

You must configure at least one provider network in order to assign data interfaces to compute nodes and unlock the hosts.

**Note:**

If you plan to follow the exercises in the *HP Helion OpenStack Carrier Grade Reference Deployment Scenarios*, set up two provider networks of the **vlan** type, named **provider-net-a** and **provider-net-b**.

Controller-0 must be installed and configured.

To create a provider network using the CLI, use the following command:

```
~(keystone_admin)$ neutron providernet-create name \
--type=type --description=description mtu mtu_size
```

where

**name**

is a name for the provider network

**type**

is the type of provider network (**flat**, **vlan**, or **vxlan**)

**description**

is a brief description for reference purposes

**mtu_size**

is the maximum transmission unit size

You can obtain information about provider networks and segmentation ranges using the following commands.

```
~(keystone_admin)$ neutron net-list-on-providernet providernet
```

```
~(keystone_admin)$ neutron providernet-range-show providernet-range
```

# Storage Node Provisioning

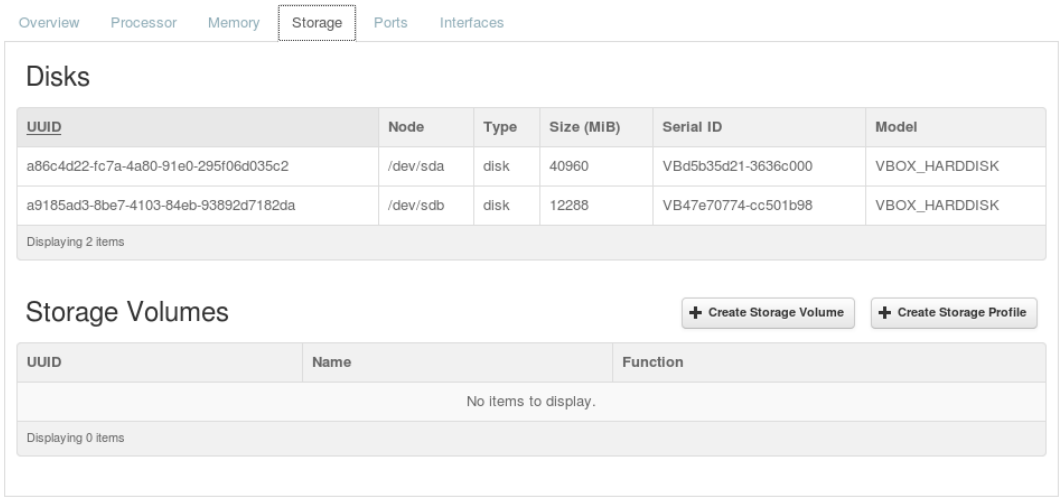
Storage nodes require initial provisioning to assign storage volumes.

## Creating Storage Volumes

You can define storage volumes (Object Storage Devices or OSDs) on storage nodes.

To create storage volumes, you must have at least two unlocked hosts with Ceph monitors (that is, at least two unlocked controller or storage nodes).

1. Open the **Inventory Detail** page for the host.
   a) On the **Admin** pane of the web administration interface, in the **System Panel** section, select **Inventory**.
   b) Select the **Hosts** tab, and then in the **Host Name** column, click the name of the host.
2. Select the **Storage** tab to view the **Disks** and **Storage Volumes** for the node.




3. Create a new storage volume for the node.
   a) Click **Create Storage Volume** to open the **Create Storage Volume** dialog box.

b) Using the **Disks** drop-down list, select the disk to use for the volume.

**Note:**

You cannot use the rootfs disk (**dev/sda**) for storage volumes.

c) Click **Create Storage Volume** to commit your selection.

The storage volume is added to the system, and displayed in the list.


You can re-use the same settings with other storage nodes by creating and applying a storage profile. See *Creating a Storage Profile* on page 51.

## Creating Storage Volumes Using the CLI

(steps moved from initializing and configuring storage nodes using the CLI)

1. Create a storage volume (an Object Storage Device or OSD).

   First list the available disks.

```
~(keystone_admin)$ system host-disk-list storage-0

+--------------+-------------+-----------+-------------+----------
+----------+
| uuid         | device_node | device_num | device_type | size_mib |
 seria... |
+--------------+-------------+-----------+-------------+----------
+----------+
| a86c4d22-... | /dev/sda    | 2048       | disk        | 40960    |
 VBd5b... |
| a9185ad3-... | /dev/sdb    | 2064       | disk        | 12288    |
 VB471... |
+--------------+-------------+-----------+-------------+----------
+----------+
```

   Add a storage volume to the desired physical disk.

**Note:**

You cannot add a storage volume to the root disk (`/dev/sda` in this example).

```
~(keystone_admin)$ system host-stor-add storage-0
 a9185ad3-8be7-4103-84eb-93892d7182da

+------------+--------------------------------------+
| Property   | Value                                |
+------------+--------------------------------------+
| osdid      | 2                                    |
| name       | stor0-0                              |
| state      | None                                 |
| function   | osd                                  |
| uuid       | a52201fc-c2ee-4814-80ad-304ef6983707 |
| ihost_uuid | eb9fffd7-c859-419e-951b-30950dd8505c |
| created_at | 2014-06-19T18:53:35.256716+00:00     |
| updated_at | none                                 |
```

```
+------------+--------------------------------------+
```

2. Optional: Create a named profile for the storage volume configuration.

```
~(keystone_admin)$ system ifprofile-add hp360-storage storage-0
```

This command creates a new storage volume configuration profile named **hp360-storage**. You can use this profile when configuring additional storage nodes to simplify the volume configuration process. Available storage profiles can be listed with the following command:

```
~(keystone_admin)$ system storprofile-list

+--------------+-------------------+-----------------+-------------+
| uuid         | profilename       | disk config     | stor config |
+--------------+-------------------+-----------------+-------------+
| 47c24b87-... | hp360-storage     | /dev/sdb: 12288 | : osd       |
+--------------+-------------------+-----------------+-------------+
```

For example, when configuring **storage-1**, use the following command to apply the profile just created.

```
~(keystone_admin)$ system host-apply-storprofile storage-1 hp360-storage
```

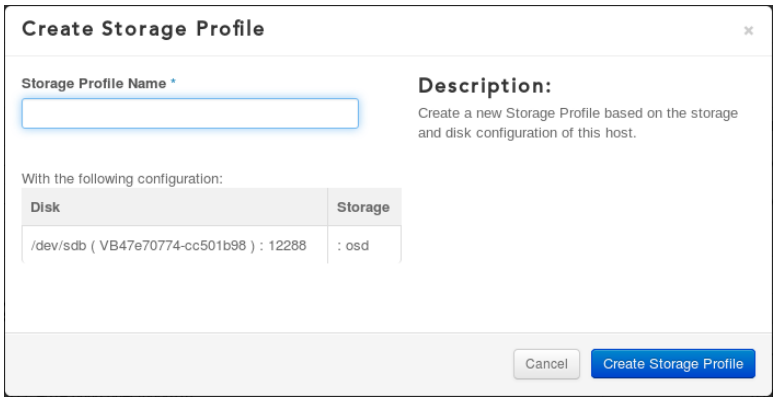
## Creating a Storage Profile

You can save the storage configuration for a storage node as a *profile*, and apply the profile to other storage nodes.

1. Open the **Create Storage Profile** dialog box.

   On the **Storage** tab of the **Inventory** page, click **Create Storage Profile**.

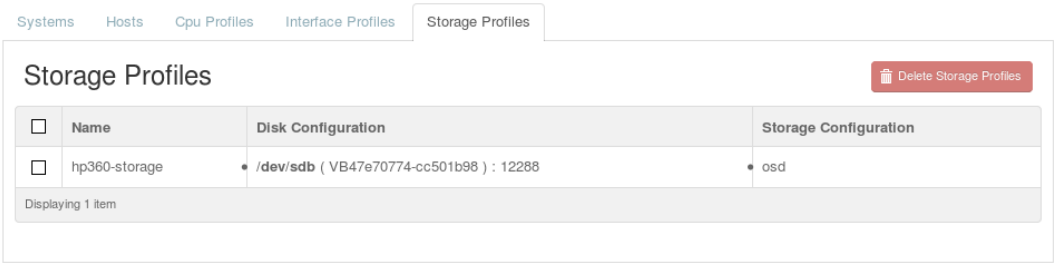
   The **Create Storage Profile** dialog box appears.



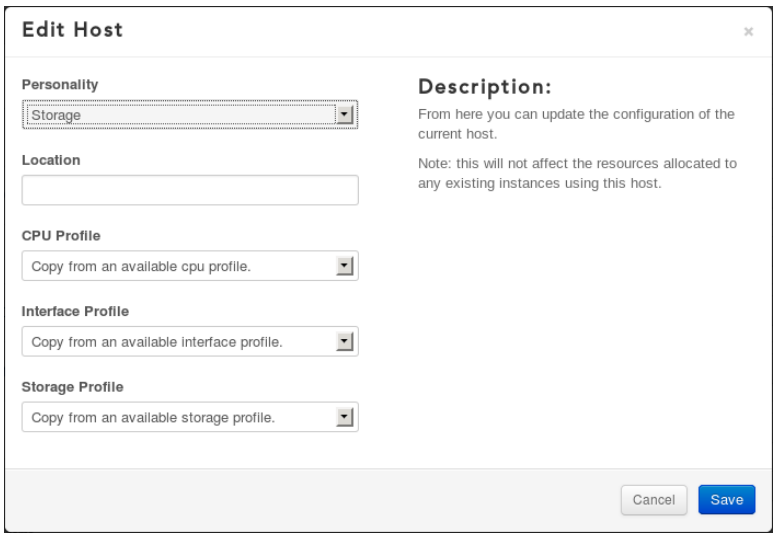

2. Create the storage profile.

   Enter a storage profile name, and then click **Create Storage Profile**.

   The storage profile is created. To view it, select **System Panel** > **Inventory** on the **Admin** pane, and then select the **Storage Profiles** tab.




You can use this storage profile when installing additional storage nodes. For example, when assigning the node **storage-1**, you can select a profile from the **Storage Profile** drop-down list.




**Note:**

To list existing storage profiles, select the **Storage Profiles** tab on the **Inventory** page.

## Configuring Hosts with Board Management

You can activate board management on a host by provisioning the host with information about the attached board management module.

To use board management on a host, the host must be equipped with a supported HP integrated Lights Out (iLO) module (iLO3 or iLO4). To provision a host with board management, you need the MAC address, username, and password for the board management module. The module must also be configured to use DHCP for a board management network that uses internal access, or static IP addressing for a network that uses external access. For more information, consult the user documentation for the module.

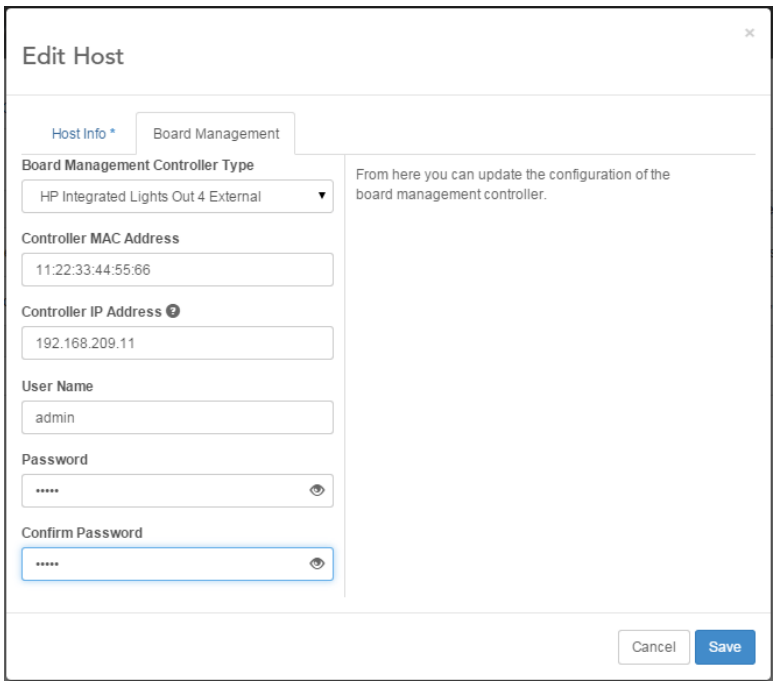
If the board management is configured for external access, you also need an IP address to assign to the module. For this information, consult your configuration plan.

You can use the web administration interface or the CLI to provision the host. For CLI instructions, see *Configuring a Host for Board Management Using the CLI* on page 30.

For more information about board management, see the *HP Helion OpenStack Carrier Grade Administration Guide: The Board Management Network*.

1. Open the **Hosts** list.

   On the **Admin** tab, in the **System Panel** section, click **Inventory**, and then select the **Hosts** tab.
2. Click **Edit Host** for the host.
3. Select the **Board Management** tab.




4. Complete the form as follows.

| Field | Comments |
|---|---|
| Controller Type | Select the type of iLO module attached to the host. |
| Controller MAC Address | Provide the MAC address of the iLO module. |
| Controller IP Address | This field is present if the board management network is configured for external access. Provide the IP address of the iLO module. |
| User Name<br>Password<br>Confirm Password | Provide the user name and password configured for the iLO module. |

5. Click **Save**.