Hewlett Packard Enterprise

Helion OpenStack Carrier Grade 4.0

INSTALLATION FOR SYSTEMS WITH CONTROLLER STORAGE

4.0

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Installation For Systems With controller Storage

Contents

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Helion OpenStack Carrier Grade 4.0 Installation

Helion OpenStack Carrier Grade 4.0 Installation Overview

Installing Helion OpenStack Carrier Grade 4.0 (HCG4.0) involves loading and configuring the software on a controller node, and then using this node to load the software on a second controller node, and two or more compute nodes.

Before installation, ensure that you are familiar with the Helion OpenStack Carrier Grade 4.0 architecture, and that your hardware meets the minimum requirements. For more information, refer to the *Helion OpenStack Carrier Grade 4.0 Planning Guide*.

Review the *Helion OpenStack Carrier Grade 4.0 Release Notes* for any additional information pertaining to installation.

During installation, have ready the following items:

- the HCG 4.0 ISO image on bootable media, or a PXE boot server
- a configuration plan for use during the installation process
- a license file
- (optional) a CA-signed certificate, for secure HTTPS access for REST API applications and the web server
- (optional) A firewall rules file, if you need to override or augment the HCG 4.0 default firewall settings. Normally this is not required. For more information, refer to the *Helion OpenStack Carrier Grade 4.0 Planning Guide: Firewall Options*.
- (optional) a controller configuration input file, if you want to use automated initial configuration

For help configuring a PXE boot server, see Configuring a PXE Boot Server on page 5.

Networks for a Standard System with Controller Storage

For a system that uses controller storage, HCG 4.0 recommends an intermediate network configuration.

Helion OpenStack Carrier Grade 4.0 with controller storage use controller and compute hosts only. Network loading is low to moderate, depending on the number of compute hosts and VMs. The following network configuration typically meets the requirements of such a system:

- An internal management network
- An OAM network, optionally consolidated on the management interface
- Several data networks, which may optionally be consolidated on the management interface or the OAM interface or both, depending on the number of compute hosts and VMs to be supported
- An optional infrastructure interface, if required to offload the management network for a large number of compute hosts
- Optionally, a PXE Boot Server to support controller-0 initialization

NOTE: You can enable secure HTTPS connectivity on the OAM network during system installation. For more information, see *Helion OpenStack Carrier Grade 4.0 System Administration: Secure HTTPS External Connectivity*.

Software Installation Workflow

Installing the HCG 4.0 software involves initializing and configuring a controller node, and then using this node to initialize and configure other hosts.

Normally, the controller is initialized using a local device, and the remaining hosts are initialized from the controller using PXE boot. If you prefer, you can also initialize the controller using PXE boot. For more information, see Configuring a PXE Boot Server on page 5.

For a standard system with Controller storage, the following procedure is recommended:

1. Power off all nodes in the cluster.
2. Install the first controller node.
3. Install the second controller node, and then configure its interfaces and Cinder storage.
4. Configure provider networks (required in order to add data interfaces on the compute nodes).
5. Install each compute node, and configure its interfaces and local storage.

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, you may need to adjust the boot order for the host. For more information, see Boot Sequence Considerations on page 69. Terminal-server access to the hosts may be required to adjust the BIOS boot settings

After each host is configured, you can unlock it to make it operational.

To unlock a controller/compute controller node, you must do the following:

1. Manually configure the OAM network interface, and the infrastructure network interface if used. This is required for the secondary controller only.
2. Manually configure the Cinder storage. This is required for the secondary controller only.

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

1. Define at least one provider network. You must do this before you can configure the compute node data interfaces.
2. Configure the data interfaces.
3. Optionally, configure the infrastructure interface. This is required only if an infrastructure network is defined.
4. Configure local storage on the compute node.

For complete installation instructions, refer to the *Helion OpenStack Carrier Grade 4.0 Installation Guide* that pertains to your configuration, either for a CPE system, a standard system with controller storage, or a standard system with dedicated storage.

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Configuring a PXE Boot Server

Configuring a PXE Boot Server

You can optionally set up a PXE Boot Server to support **controller-0** initialization.

Helion OpenStack Carrier Grade 4.0 includes a setup script to simplify configuring a PXE boot server. If you prefer, you can manually apply a custom configuration; for more information, see Accessing PXE Boot Server Files for a Custom Configuration on page 7.

The PXE boot server serves a *bootloader* file (**pxelinux.o**) to the requesting client from a TFTP directory. Typically the TFTP root directory is used as the TFTP directory. Access to the root directory requires admin privileges; if security is a concern for network booting, you can to use a subdirectory of the root directory as the TFTP directory.

The bootloader runs on the client, and reads boot parameters, including the location of the kernel and initial ramdisk image files, from a *bootfile*. The bootfile is called **pxeboot.cfg**. It is located in the **pxelinux.cfg** subdirectory of the TFTP directory.

To find the bootfile, the bootloader searches symbolic links contained in the **pxelinux.cfg** directory. You can optionally shorten the search by creating an appropriate symlink for the requesting client.

Prerequisites

Use a Linux workstation as the PXE Boot server.

- On the workstation, install the packages required to support DHCP, TFTP, and Apache.
- Configure DHCP, TFTP, and Apache. For details, refer to the documentation included with the packages.

- Start the DHCP, TFTP, and Apache services.
- Connect the PXE boot server to the HCG 4.0 management or PXE boot network.

Procedure

1. Copy the ISO image from the source (product DVD, USB device, or HCG 4.0) to a temporary location on the PXE boot server.

   This example assumes that the copied image file is **tmp/TS-host-installer-1.0.iso**.

2. Mount the ISO image and make it executable.

   ```
   $ mount -o loop /tmp/TS-host-installer-1.0.iso /media/iso
    $ mount -o remount,exec,dev /media/iso
   ```

3. Set up the PXE boot configuration.

   The ISO image includes a setup script, which you can run to complete the configuration.

   ```
   $ /media/iso/pxeboot_setup.sh -u http://ip-addr/symlink -t tftp-boot-dir
   ```

   where

   ip-addr

   is the Apache listening address.

   symlink

   is the name of a user-created symbolic link under the Apache document root directory, pointing to the directory specified by *tftp-boot-dir*.

   tftp-boot-dir

   is the path from which the bootloader is served. This is formed from the configured TFTP root directory, plus an optional subdirectory.

   

   NOTE: You must provide the full bootloader path, including the optional subdirectory, in the DHCP "filename" option.

   For example:

   ```
   $ /media/iso/pxeboot_setup.sh -u http://128.24.41.18/lab /export/pxeboot/ottawa/
   site-1
   ```

   The script creates the directory specified by *tftp-boot-dir*.

4. Optional: To shorten the bootloader search for the bootfile, create a symbolic link under the pxelinux.cfg subdirectory of the PXE boot directory, referencing the MAC address of the controller PXE boot interface.

   To locate the bootfile, the bootloader searches symbolic links in the **pxelinux.cfg** subdirectory. It starts by looking for a name that corresponds to the MAC address of the requesting client. To speed the search process, define this symlink using a command of the following form:

   ```
   $ ln -s ../pxeboot.cfg ${TFTP_DIR}/pxelinux.cfg/mac-address
   ```

where *mac-address* is the MAC address of the client PXE boot interface, represented in lower case hexadecimal digits with dash separators. For example, to represent the MAC address **01:00:1e:67:54:aa:ee**, use **01-00-1e-67-54-aa-ee**.

If this symlink is not present, the bootloader continues the search using a standard algorithm. If no better match is found, it looks for a symlink with the name **default**.

After running the script, you can boot the first controller over the PXE boot network. For more information, see Initializing Controller-0 from a PXE Boot Server on page 12.

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Accessing PXE Boot Server Files for a Custom Configuration

If you prefer, you can create a custom PXE boot configuration using the installation files provided with HCG 4.0.

You can use the setup script included with the ISO image to copy the boot configuration files and distribution content to a working directory. You can use the contents of the working directory to construct a PXE boot environment according to your own requirements or preferences.

For more information about using a PXE boot server, see Configuring a PXE Boot Server on page 5.

Procedure

1. Copy the ISO image from the source (product DVD, USB device, or HCG 4.0) to a temporary location on the PXE boot server.

   This example assumes that the copied image file is **tmp/TS-host-installer-1.0.iso**.

2. Mount the ISO image and make it executable.

   ```
   $ mount -o loop /tmp/TS-host-installer-1.0.iso /media/iso
    $ mount -o remount,exec,dev /media/iso
   ```

3. Create and populate a working directory.

   Use a command of the following form:

   ```
   $ /media/iso/pxeboot_setup.sh -u http://ip-addr/symlink -t working-dir
   ```

   where:

   ip-addr

   is the Apache listening address.

   symlink

   is a name for a symbolic link to be created under the Apache document root directory, pointing to the directory specified by *working-dir*.

working-dir

is the path to the working directory.

4. Copy the required files from the working directory to your custom PXE boot server directory.

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Controller-0 Installation and Provisioning

Methods for Adding and Configuring the First Controller

Helion OpenStack Carrier Grade 4.0 supports more than one way of initializing and configuring **controller-0**. You can initialize the first controller as follows:

- From a local device such as a DVD or USB flash drive. For more information, see Initializing Controller-0 from a Local Device on page 10.
- From a PXE boot server. For more information, see Initializing Controller-0 from a PXE Boot Server on page 12

After the first controller is initialized, you can configure it as follows:

- Interactively using a command-line script. For more information, see Applying the Controller Configuration on page 17.
- Using a prepared configuration file. For more information, see Using a Controller Configuration Input File on page 70.

Installing the First Controller

The first step in installing HCG 4.0 is to install and configure the first controller.

For an overview of methods, see Methods for Adding and Configuring the First Controller on page 9.

The configured host becomes **controller-0**.

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

Procedure

1. Using an ISO image of the HCG 4.0 software from an external source, such as a USB flash drive or a DVD, or a PXE boot server, initialize the controller host.

   Initialization installs an operating system on the host's disk drive, and automatically boots the host from the drive.

2. Copy the instalation files and any other required files to **controller-0**.

3. Apply any required software patches to **controller-0**.

4. Configure the host as a controller using the **config_controller** command-line script.

   You can respond to the script interactively, or you can prepare and use a controller configuration input file. For more information, see Using a Controller Configuration Input File on page 70.

Postrequisites

Use **controller-0** to initialize and configure the remaining hosts (the second controller node and the compute nodes).

Initializing Controller-0 from a Local Device

You can initialize **controller-0** from a USB port, DVD, or other local device using the HCG 4.0 bootable ISO image.

Prerequisites

Before installing the software on the first controller, 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.

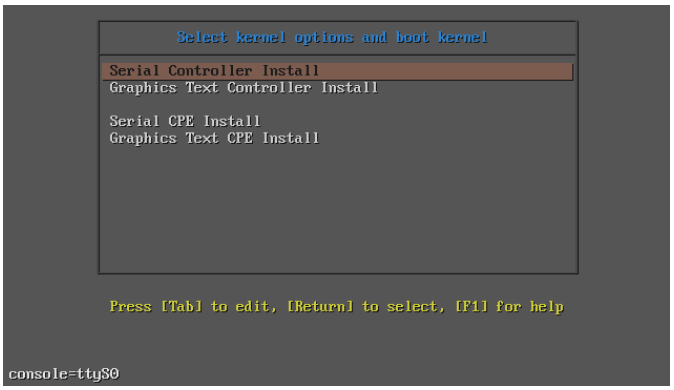
- The management, OAM, and optional PXE boot and infrastructure networks are planned, set up, and connected.
- All other hosts on the system are powered off.
- You have reviewed the Release Notes for any additional information pertaining to installation.

Procedure

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 is loaded, and the installer welcome screen appears.

   Figure 1: HCG 4.0 Installer Welcome Screen

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

   Serial Controller 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 Text Controller 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.

   Serial CPE Install (default)

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

   Graphics Text CPE Install

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

NOTE: The default rootfs device is **/dev/sda**. You can optionally change this (or other parameters) by selecting the installation mode, pressing the **Tab** key, modifying the command that appears, and then pressing **Enter**. A sample command is shown here; the actual parameters vary depending on the system configuration.

```
vmlinux rootwait console=ttyS0, 115200 root=LABEL=oe_iso_boot \
ngpt textinst serial ks=/mnt/install/source/ks.cfg boot_device=sda \
rootfs_device=sda initrd=initrd
```

5. Monitor the initialization until it is complete.

   The installer initializes the target hard drive with the HCG 4.0 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, briefly displays a GNU GRUB screen, and then boots automatically into the HCG 4.0 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**.

Initializing Controller-0 from a PXE Boot Server

You can initialize controller-0 from a configured PXE boot server.

To set up a PXE boot server, see Configuring a PXE Boot Server on page 5.

Prerequisites

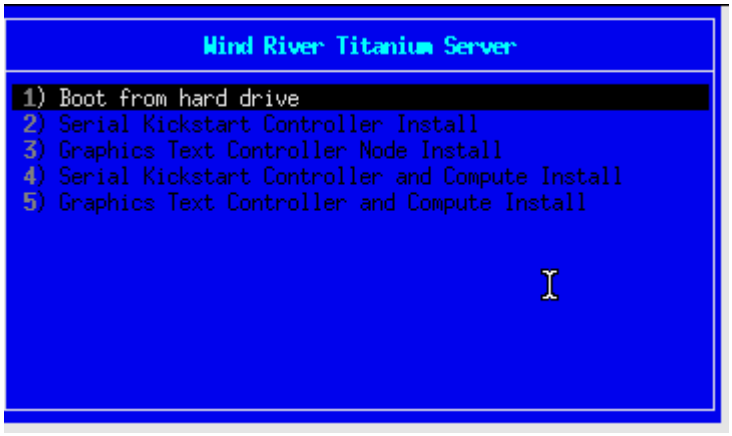
Before installing the software on the first controller, ensure the following:

- 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 PXE boot and 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.

Procedure

1. Start the controller node.

   The installer welcome screen appears.



2. Select the type of installation and the display device to be used during installation, and then press **Enter**.

   Boot from hard drive (default)

   Starts the controller from a local hard drive. You can use this option to install the HCG 4.0 software from a prepared local hard drive.

   Serial Kickstart Controller Install

   Installs the controller from the network, using the serial port to display messages.

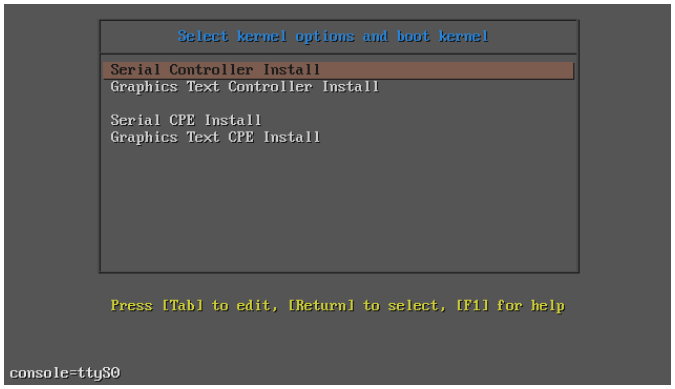
   Graphics Text Controller Node Install

   Installs the controller from the network, using text mode to display messages.

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

   The installer is loaded, and the installer welcome screen appears.

Figure 2: HCG 4.0 Installer Welcome Screen



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

   Serial Controller 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 Text Controller 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.

   Serial CPE Install (default)

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

   Graphics Text CPE Install

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

NOTE: The default rootfs device is **/dev/sda**. You can optionally change this (or other parameters) by selecting the installation mode, pressing the **Tab** key, modifying the command that appears, and then pressing **Enter**. A sample command is shown here; the actual parameters vary depending on the system configuration.

```
vmlinux rootwait console=ttyS0, 115200 root=LABEL=oe_iso_boot \
ngpt textinst serial ks=/mnt/install/source/ks.cfg boot_device=sda \
rootfs_device=sda initrd=initrd
```

4. Monitor the installation until it is complete.

   After a few minutes, the host reboots from the hard drive, briefly displays a GNU GRUB screen, and then boots automatically into the HCG 4.0 image.

5. 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.

Controller-0 is initialized with the HCG 4.0 software, and is ready for configuration.

Postrequisites

CAUTION: After controller-0 is initialized, you must disconnect the PXE boot server from the HCG 4.0 internal management network or PXE Boot network. This is required to prevent boot server conflicts for the remaining nodes.

Copying the License and Optional Files to Controller-0

To configure **controller-0** for use, a license file and other optional files are required. You must copy these files to the host over the OAM network.

Procedure

1. Connect the controller to the OAM network.

   ```
   $ sudo ip addr add OAM_IP_address/mask dev port
   $ sudo ip link set port up
   $ sudo ip route add default via 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 ip route add default via 10.10.10.1
   ```

2. Plug a USB flash drive with content relevant to the software installation.

   You may want to use a USB flash drive instead, or in addition to the connection to the OAM network, in order to retrieve needed files.

   a) Plug in the USB flash drive to one of the available USB ports on the controller.

   b) Determine the USB mount point.

The controller automounts the USB flash drive if it is properly formatted. Use the following command to determine the mount point in the file system:

```
$ mount | grep /media
/dev/sdc on /media/sdc type iso9660 (ro,relatime)
```

In this example the USB drive is mounted on **/media/sdc**. The path may be different on your controller.

3. Copy the license file to the controller node.
   a) Connect a server containing the license file to the OAM network.
   b) Copy the HCG 4.0 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
      ```

      Use the following command, adjusting the media mount point as needed, if you are using a USB flash drive instead:

      ```
      $ cp /media/sdc/license.lic /home/wrsroot
      ```

4. 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
   ```

   Use the following command, adjusting the media mount point as needed, if you are using a USB flash drive instead:

   ```
   $ cp sourcepath/pem_file /home/wrsroot
   ```

Applying Patches at HCG 4.0 Installation

To ensure that the HCG 4.0 software is fully up to date, apply any patches immediately after installing the software.

Patches are located on HCG 4.0 (http://www.hpe.com/downloads/software) under **Products** > **HCG 4.0 2** > **Browse HCG 4.0 Downloads** > **Patches** and are labeled ***.patch**.

For more information about obtaining and using patches, refer to the *HCG 4.0 Patching and Upgrading Platform Software Guide: Managing Software Patches*.

Procedure

1. Copy the patches from a connected server.

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

Use the following command, adjusting the media mount point as needed, if you are using a USB flash drive instead:

```
$ cp /media/sdc/patchfile /home/wrsroot
```

2. Upload the patches to the patch storage area.

```
$ sudo sw-patch upload ./patchfile
```

3. Apply the patches.

```
$ sudo sw-patch apply --all
```

4. Install the patches locally.

```
$ sudo sw-patch install-local
```

This command applies and installs all applied patches on **controller-0**.

NOTE: You must reboot the controller to ensure that it is running with the software fully patched.

5. Execute the following command to reboot **controller-0**.

```
$ sudo shutdown -r now
```

Patch installation is complete.

Applying the Controller Configuration

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

You can perform the configuration interactively, as described in this section, or you can use a prepared configuration file.

Prerequisites

Before running the configuration script:

- Ensure that **controller-0** has been initialized. For more information, see Initializing Controller-0 from a Local Device on page 10.
- Ensure that the management interface is connected and operational.
- Copy the license file and other optional files to **controller-0**.
- Install system software patches if there are any available from HCG 4.0.
- Prepare a configuration plan to use as a reference. For more information, see *Helion OpenStack Carrier Grade 4.0 Planning: Storage Planning*.

Procedure

1. Start the controller configuration script.

```
$ sudo config_controller
HCG 4.0 Configuration
====================================
Enter Q at any prompt to abort...
```

   You can optionally supply the name of a configuration file as a parameter.

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

   If you are using a configuration file, this step is not applicable.

   For information about the options, see The Controller Configuration Script on page 20.

   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.

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

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

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

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

4. Verify that the HCG 4.0 controller services are running.

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

5. 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    |
+----+--------------+-------------+----------------+-------------+--------------+
```

6. Optional: Synchronize the RAID array.

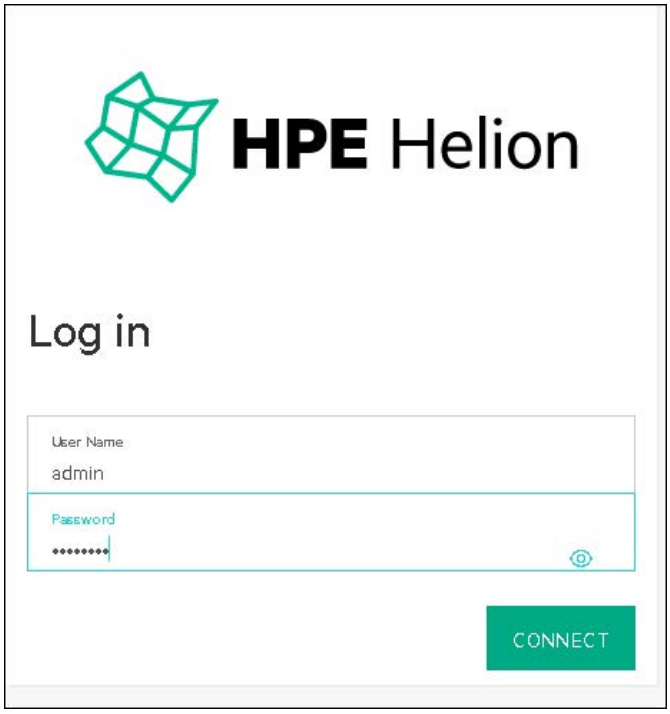
   Normally, the RAID array is already synchronized. If you need to synchronize the RAID array manually, do so now. You may be able to do this by pressing a button on the unit, or using a special key combination on the console keyboard. For details, consult the OEM documentation for the RAID.

7. Using a Web browser, navigate to the OAM floating IP address to verify that the HCG 4.0 web administration interface is available.

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

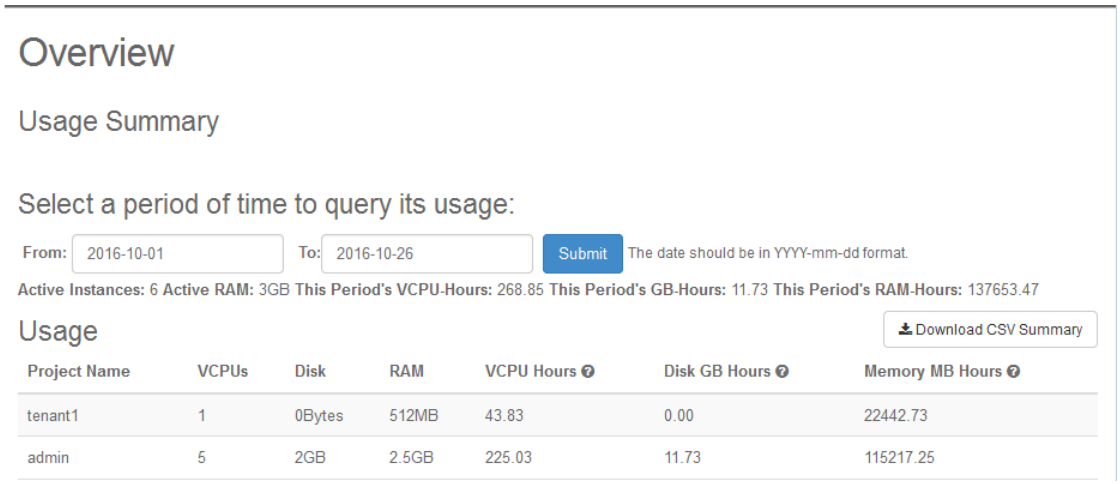
   The HCG 4.0 login screen appears.

Figure 3: HCG 4.0 login screen



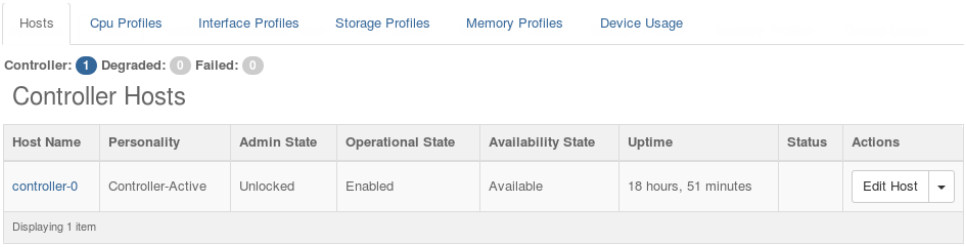
8. Log in using the cloud **admin** account.

   The HCG 4.0 web administration interface appears. **Figure 4: HCG 4.0 web administration interface**



9. In the left-hand pane, select **Admin** > **Platform** > **Host Inventory**, and then select the **Hosts** tab.

   Controller-0 is reported in the hosts inventory list.



The host **controller-0** is now installed.

Postrequisites

The config_controller file is no longer required. For improved security, delete it.

After running **config_controller**, you must obtain the ssh fingerprint of the server in order to verify its identity when connecting via ssh. For more information, see *Helion OpenStack Carrier Grade 4.0* System *Administration: Verifying the Controller Identity for Secure SSH Access*.

The Controller Configuration Script

The config_controller script presents a series of prompts for initial configuration of the HCG 4.0 system.

The script is used to configure the first controller in the HCG 4.0 cluster as **controller-0**. The prompts are grouped by configuration area. Details for each area are described in the following tables. Review them carefully before committing configuration changes to the controller. For configuration planning information, see the *HCG 4.0 Engineering Guidelines*.

NOTE: In many cases, you can accept the default values. Prompts requiring special attention are marked with an asterisk (*).

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.

NOTE: As an alternative to interacting with the script, you can prepare and use a controller configuration input file. For more information, see Using a Controller Configuration Input File on page 70.

Prompt	Comment
System date and time:	
Is the current date and time correct? [y/n]:	Confirmation for the system date and time. The controller periodically synchronizes the local system date and time with reference time servers configured later in the script. If the local time is not within about 15 minutes of the reference UTC time, the controller does not make the synchronization.

Prompt	Comment
Enter new system date and time (UTC) in YYYY-MM-DDD HH:MM:SS format:	The date and time to apply locally, if the current system setting needs updating. incorrect.
Storage:	
Cinder storage backend [lvm]*:	The storage resource type for VMs and VM data. **CAUTION:** The Cinder storage type cannot be changed after the system is installed. • For a system with storage nodes, type **ceph**. • For a system without storage nodes, type **lvm**. (This uses shares on the controller secondary disk). lvm Provides a small-scale storage solution using LVM/iSCSI shares on the controller node. Note that this option does not use or support storage nodes in the HCG 4.0 cluster. ceph Provides a large-scale storage solution using a Ceph storage system. This option uses dedicated storage nodes in the HCG 4.0 cluster. **NOTE:** For Ceph storage, an infrastructure network is required. After the system is installed, you can selectively implement local compute node storage for VM data. For more information, see *Helion OpenStack Carrier Grade 4.0 System Administration: Storage on Compute Hosts*.
Database storage in GiB [20]*:	The storage allotment for the OpenStack database. As a reference point, a system with six hosts, 40 VMs and 120 tenant networks requires about 9 GiB. For more details, see the *HCG 4.0 Engineering Guidelines*.

Prompt	Comment
Image storage in GiB [19]*:	(For LVM storage only) The size of the partition to use for image storage. Consider the expected number of images and their storage requirements. A minimum of 10 GiB is recommended. The prompt shows the current available disk space.
Image conversion space in GiB [8]*:	The size of the partition to use for image caching and temporary image conversions.
Backup storage in GiB [20]*:	The storage allotment for backup operations. For details, see the *HCG 4.0 Engineering Guidelines*.
Volume storage location [0]:	(For LVM storage only) The disk to use for a storage volume on **controller-0**. A numbered list of available disks is displayed. Type the number for the disk you want to assign. Note that the primary disk is not included in this list. **NOTE:** The disk to use on **controller-1** is assigned independently during **controller-1** setup
Volume storage in GiB [500]:	(For LVM storage only) The storage allotment for all volumes used by the guest instances. The prompt shows the current available disk space.
Configure LVM Provisioning type: thick or thin	
Cinder LVM Type [thin]:	The method for provisioning Cinder volumes. **thin** Use a dynamically sized volume. This offers support for secure deletion, but slower volume creation. You can improve volume creation times by using SSDs for the underlying physical disks. **thick** Use a fixed-size volume. This offers faster volume creation than thin provisioning. Secure deletion is not supported.

Prompt	Comment
	CAUTION: This selection cannot be changed after installation.
Enable SDN Network configuration [y/N]:	An option to use software defined networking as the Neutron network backend instead of locally managed traditional networking. For support details, see the *HCG 4.0 Release Notes*. For additional documentation, see the *HCG 4.0 Software Defined Networking* guide. If SDN is enabled, then an SDN controller connection must be defined before you can unlock compute nodes.
	CAUTION: This selection cannot be changed after installation.
PXEBoot Network:	
Configure a separate PXEBoot network [y/N]:	An option to configure a dedicated subnet for PXE booting over the internal management interface. This is for use where the internal network is VLAN-tagged. This is required when using IPv6 addressing on the management network.
PXEBoot subnet [192.168.202.0/24]:	The subnet to use for the PXE boot network.
Management Network:	
Management interface link aggregation [y/N]*:	An option to use LAG for the internal management network. If using LAG, you are asked for the name of the bonding interface, the bonding policy, and the name of an additional physical interface. If using LAG, you are asked for the name of the bonding interface to be created, the name of an additional physical interface to use for bonding, and the link aggregation mode to use. For more information, see Link Aggregation Settings on page 119.
Management Interface [enp0s8]:	The controller interface used for the internal management network. The name of the physical interface to use to connect to the internal management network in non-LAG mode.

Prompt	Comment
Management Interface MTU [1500]:	The maximum transmission unit for the internal management network. The default value is 1500.
Management Interface link capacity Mbps [1000]:	The bandwidth supported by the interface hardware. This is used to calculate the DRBD sync rate. The default is 10000 Mbps; adjust this setting if using hardware with a different link capacity. **NOTE:** If an infrastructure network is present, the DRBD sync rate is calculated based on the infrastructure interface link capacity, configured later in the script.
Management VLAN Identifier []:	(For PXE boot network only) The VLAN ID for the internal management network. This is required if a PXE boot network has been configured.
Management subnet [192.168.204.0/24]:	The subnet to use for the internal management network. The network does not need to be publicly routed, and therefore can be allocated from a private address range.
Use entire management subnet [Y/n]:	An option to reserve all or part of the management subnet for allocation by HCG 4.0. By default, the entire subnet is available.
Management network start address [192.168.204.2]:	(shown only if **Use entire management subnet** is set to **n**) The start of the internal management IP address range owned by HCG 4.0.
Management network end address [192.168.204.254]:	(shown only if **Use entire management subnet** is set to **n**) The end of the internal management IP address range owned by HCG 4.0.
Dynamic IP address allocation [Y/n]:	An option to use dynamic or static IP addressing on the management and infrastructure networks. By default, dynamic addressing is used. If static assignment is used, new hosts are *not* automatically added to the inventory when they are powered on. You must use the **system host-add** command to add them, and to assign IP addresses manually.

Prompt	Comment
	NOTE: The infrastructure network is automatically assigned the same type of address assignment as the internal management network.
Management Network Multicast subnet (239.1.1.0/28):	The range of addresses that the system can use for multicast messaging on the management network. You can use this to prevent multicast leaks in multi-region environments. Addresses for the affected services are allocated automatically from the range. **NOTE:** This value is also used for the range of addresses the system can use on the infrastructure network.
Board Management Control Network:	
Configure board management control network [y/N]:*	An option to use an internal baseboard management network for hosts equipped with iLO3, iLO4 or Quanta modules. Select whether to configure an internal baseboard management network. This option is for use with hosts equipped with iLO (Integrated Lights-Out) modules. **NOTE:** To use an external baseboard management network (accessible from the OAM network), type **N**. For more information, see *HCG 4.0 Planning: The Board Management Network*
Board management control VLAN Identifier []:*	The VLAN ID designated for the board management control network. The VLAN number designated for board management control traffic on the internal management network. For more information, see *HCG 4.0 Planning: Shared (VLAN) Ethernet Interfaces*.

Prompt	Comment
Board management control interface MTU [1496]:	The maximum transmission unit for the board management control network. This must be at least 4 bytes less than the internal management network MTU. If the internal management network MTU is greater than 1504, then the board management control MTU default value is 1500. Otherwise, the default value is 1496.
Board management control subnet [192.168.203.0/24]:	The subnet to use for the board management control network. You can safely accept the default value assigned to this internal network. The suggested value belongs to the 16-bit block of private networks specified in RFC 1918. Use the suggested value, or any other 16-bit private address block.
Infrastructure Network:	
Configure an infrastructure interface [y/N]:*	An option to use an infrastructure network. Select whether to configure an Ethernet interface for access to an infrastructure network. For a system using Ceph storage, an infrastructure network is required. **CAUTION:** This choice cannot be changed after the system is installed.
Infrastructure interface link aggregation [y/N]:*	An option to use LAG for the infrastructure network. If using LAG, you are asked for the name of the bonding interface, the bonding policy, and the name of an additional physical interface.. If using LAG, you are asked for the name of the bonding interface to be created, the name of an additional physical interface to use for bonding, and the link aggregation mode to use. For more information, see Link Aggregation Settings on page 119.
Infrastructure interface []:*	The controller interface used for the infrastructure network. You can optionally share the interface assigned for the management or OAM network. The name of the physical interface to use to connect to the infrastructure network in non-LAG mode. You can use a dedicated

Prompt	Comment
	interface, or share the interface used for the management or OAM network. For a shared interface, a VLAN ID is required.
Configure an infrastructure VLAN [y/N]:	An option to implement this network on the selected interface using VLAN tagging. If the same interface has already been selected for an untagged network, you must answer 'y' or abort the configuration.
Infrastructure VLAN identifier []:	The VLAN ID, if VLAN tagging is used.
Infrastructure interface MTU [1500]:	The maximum transmission unit for the infrastructure network. The default value is 1500.
Infrastructure interface link capacity Mbps [10000]:	The bandwidth supported by the interface hardware. This is used to calculate the DRBD sync rate. The default is 10000 Mbps; adjust this setting if using hardware with a different link capacity.
Infrastructure subnet [192.168.205.0/24]:	The subnet to use for the infrastructure network. The network does not need to be publicly routed, and therefore can be allocated from a private address range.
Use entire infrastructure subnet [Y/n]:	An option to reserve all or part of the infrastructure subnet for allocation by HCG 4.0. By default, the entire subnet is available.
Infrastructure network start address [192.168.205.2]:	The start of the infrastructure IP address range owned by HCG 4.0.
Infrastructure network end address [192.168.205.254]:	The end of the infrastructure IP address range owned by HCG 4.0.
External OAM Network:	
External OAM interface Link aggregation [y/N]:*	An option to use LAG for the external OAM network. If using LAG, you are asked for the name of the bonding interface, the names of two physical interfaces to use, and the bonding policy. If using LAG, you are asked for the name of the bonding interface to be created, the name of an additional physical interface to use for bonding, and the link aggregation mode to use. For more information, see Link Aggregation Settings on page 119.
External OAM interface [enp0s3]:*	The controller interface used for the external OAM network. You can optionally share the

Prompt	Comment
	interface assigned for the management or infrastructure network. The name of the physical interface to use to connect to the OAM network in non-LAG mode. You can use a dedicated interface, or share the interface used for the management or infrastructure network. For a shared interface, a VLAN ID is required.
Configure an external OAM VLAN [y/N]:	An option to implement this network on the selected interface using VLAN tagging. If the same interface has already been selected for an untagged network, you must answer 'y' or abort the configuration.
External OAM VLAN identifier []:	The VLAN ID, if VLAN tagging is used.
External OAM interface MTU [1500]:	The maximum transmission unit for the OAM network. The default value is 1500.
External OAM subnet [10.10.10.0/24]:*	The subnet to use for the OAM network. You must provide a value for this external network, in accordance with your OAM network addressing plan. Note that the default value provided by the script is probably not appropriate. Provide a valid subnet value as per your OAM Network's IP address plan.
External OAM gateway address [10.10.10.1]:*	The IP address for the OAM subnet's default gateway. You must provide a value in accordance with your OAM network address plan.
External OAM floating address [10.10.10.2]*	The floating IP address for the OAM network. This is the address used to access the web administration interface or the controller console. You must provide a value in accordance with your OAM network address plan.
External OAM address for first controller node [10.10.10.3]:*	The IP address for the first controller on the OAM network. You must provide a value in accordance with your OAM network address plan. The IP address to be assigned to the first controller on the OAM network. You must provide a value in accordance with your OAM network address plan.
External OAM address for second controller node [10.10.10.4]:*	The IP address for the second controller on the OAM network. You must provide a

Prompt	Comment
	value in accordance with your OAM network address plan. The IP address to be assigned to the second controller on the OAM network. You must provide a value in accordance with your OAM network address plan.
External OAM Network Multicast subnet (239.1.1.0/28):	The range of addresses that the system can use for multicast messaging on the OAM network. You can use this to prevent multicast leaks in multi-region environments.
Domain Name System (DNS):	
Nameserver 1 [8.8.8.8]: Nameserver 2 [8.8.4.4]: Nameserver 3 []:	The IP addresses of up to three DNS servers. The default values are addresses of public DNS servers available from Google. To continue without configuring DNS servers, press the **C** key.
Network Time Protocol (NTP):	
NTP server 1 [0.pool.ntp.org]: NTP server 2 [1.pool.ntp.org]: NTP server 3 [2.pool.ntp.org]:	The IP addresses of up to three NTP servers used to synchronize the HCG 4.0 cluster. The default values are addresses of public NTP servers available from the NTP Pool Project. The use of an NTP server is recommended. If no NTP server is available, the controller clock is used to synchronize the cluster. If necessary, you can continue without configuring NTP servers by pressing the **C** key. **NOTE:** To resynchronize individual hosts to an NTP server if necessary, see *Helion OpenStack Carrier Grade 4.0* System *Administration: Resynchronizing a Host to the NTP Server*.
Licensing:	
License File [/home/wrsroot/license.lic]:	The path to a valid HCG 4.0 license file. The file name may differ from the default.
Security:	

Prompt	Comment
Enter wrsroot password age (in days) [45]:	The number of days before the **wrsroot** password expires.
Use secure (https) external connection [y/N]:	An option to enable secure access for external REST APIs and the web server.
Install custom firewall rules [y/N]:	An option to change the firewall rules for the OAM network. The default rules included with HCG 4.0 are recommended for most applications. If required, you can override or augment them. For more information, see the *Helion OpenStack Carrier Grade 4.0 System Administration: Firewall Options*.
Firewall rules file:	The path to a file that defines custom firewall rules for the OAM network.
Use WRS provided self-signed certificate [y/N]:	An option to use a self-signed certificate included with HCG 4.0 for secure REST API and web server access. This certificate is provided for evaluation purposes, and is not recommended for deployed systems. **CAUTION:** For the current release, the certificate selected during controller configuration cannot be updated after installation.
CA-Signed Certificate and Key file:	The full path to a PEM file containing a certificate (signed by a Certificate Authority) and a Private Key (optionally password-protected) for secure REST API and web server access; for example, **/home/wrsroot/pp-combo.pem**.
Password for the CA-Signed certificate file [Enter <CR> for no password]:	The password for the CA-signed certificate, if a password-protected private key is used.
Authentication:	
Create admin user password:	The password for the cloud **admin** user. This account is used to log into the web administration interface.
Repeat admin user password:	Password confirmation.

4

Controller-1 / Compute Host Installation

Methods for Adding and Configuring Hosts

HCG 4.0 supports more than one way of adding and configuring hosts.

After initializing and configuring an active controller, you can add and configure a backup controller and additional compute or storage hosts as follows:

- Using the web administration interface (Horizon).

  With this method, you power on a new host, causing it to be auto-discovered and added to the system inventory, and then you use the Host Inventory in the web administration interface to assign a personality. For detailed instructions, see Installing Software on Controller-1 or a Compute Host on page 32.

- Using the **system host-update** command.

  With this method, you power on a new host, causing it to be auto-discovered and added to the system inventory, and then you use **system host-update** to assign a personality. For detailed instructions, see Installing Software on Controller-1 or a Compute Host Using the CLI on page 37.

- Using the **system host-add** command.

  With this method, you add one or more host entries to the system inventory, assigning a personality, MAC address, IP address, and so on for each host, and then you power on the hosts, causing them to to be recognized and configured according to the system inventory entry. For more information, see Adding Hosts Using the host-add Command on page 75.

- Using the **system host-bulk-add** command

With this method, you define multiple hosts in an XML manifest, specifying personality, MAC address, IP address, and so on for each host, and then you use use **system host-bulk-add** to add them to the system inventory and optionally power them on. For more information, see Adding Hosts in Bulk on page 77.

After adding a compute host or storage host, you can apply *hardware profiles* to complete the host configuration. For more information, see Hardware Profiles on page 85.

Installing Software on Controller-1 or a Compute Host

You must use **controller-0** to install software on other hosts.

Prerequisites

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

- The node must meet the hardware requirements for the personality to be assigned. For more information, see *HCG 4.0 Planning: HCG 4.0 Hardware Requirements*

CAUTION: Software RAID is not supported.

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

Procedure

1. Power on the host.

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

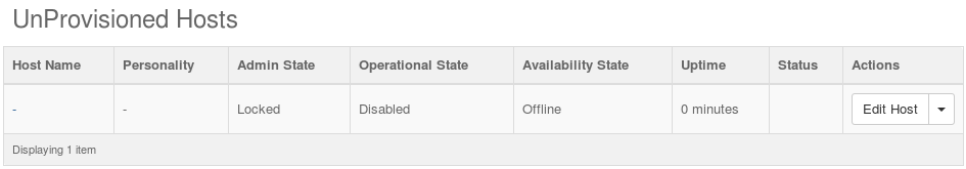
With **controller-0** running, start the host.

The host boots from the network and then displays a message that it is waiting to be configured.

2. Open the Edit Host dialog box to begin provisioning the new host.
   a) Display the available hosts in the system.

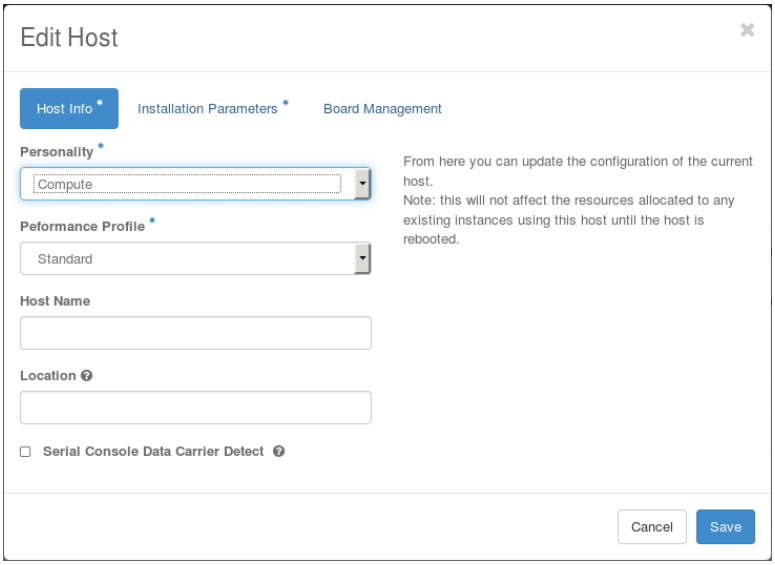
      Select the Hosts tab on the Host Inventory page, available from **Admin** > **Platform** > **Host Inventory** on the left-hand pane.

      The new node is listed in the **UnProvisioned Hosts** list.



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

      The Edit Host window appears.



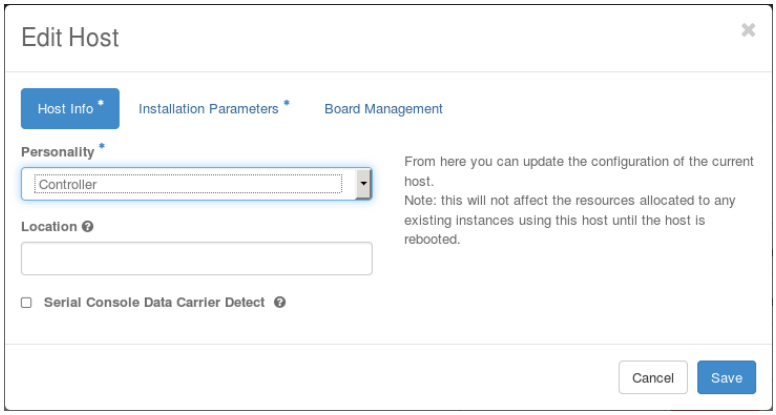
3. Assign the appropriate personality to the host.

   By default, the **Compute** personality is selected. Use the **Personality** drop-down menu to specify the type of host you are installing (**Controller** or **Storage**).

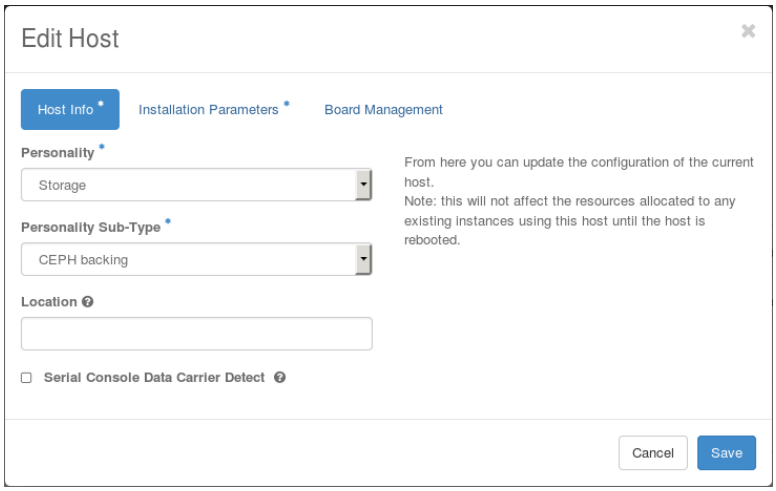
NOTE: The **Storage** option is available only if an infrastructure network is present.

The window is updated for the personality.

For a controller host:



For a storage host:



4. Complete the remaining fields on the **Host Info** tab.

Performance Profile

(shown only for a **Compute** personality) The performance characteristic of the host.

Accept the default value (**Standard**). Other values are reserved for future use.

Host Name

(shown only for a **Compute** personality) An optional custom name for the compute host. The name appears in the Host Inventory and other places where the host is listed, and can be used in most CLI commands to specify the host.

Personality Sub-Type

(shown only for a **Storage** personality) The role of the host in a storage cluster. The following sub-types are available:

Ceph backing

Use this for a standard storage configuration.

Ceph tiering

Use this when implementing a cache tier.

NOTE: You cannot add a **Ceph tiering** host until cache tiering is configured on the system. For more information, see *Helion OpenStack Carrier Grade 4.0 System Administration: Cache Tiering*. In addition, the system must already have a **Ceph backing** host.

Location

An optional description of the host location (for example, its site or rack position) to help manage large systems.

5. Set the installation parameters for the node.

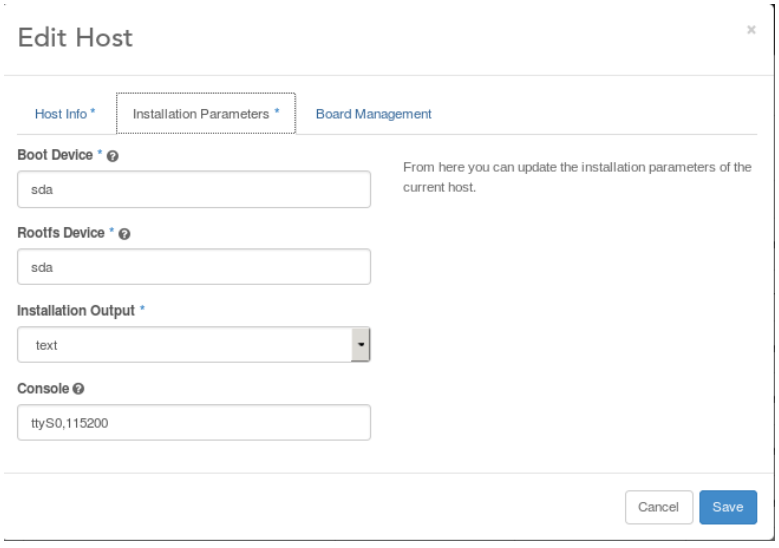
CAUTION: If the host uses any console port other than **ttys0** for output display, you must change settings on the **Installation Parameters** tab to ensure that the host uses the correct port.

On the **Host Info** tab:

- Type a physical **Location** for the node to help identify it.
- Specify whether to enable **Serial Console Data Carrier Detect**.

  Select this option to have any active console session automatically logged out when the serial console cable is disconnected. The server must support data carrier detect on the serial console port.

On the **Installation Parameters** tab:



Boot Device

is the host device for boot partition, relative to **/dev**. The default is **sda**.

Rootfs Device

is the host device for rootfs partition, relative to **/dev**. The default is **sda**.

Installation Output

is the format for console output on the host (**text** or **graphical**). The default is **text**.

NOTE: The **graphical** option currently has no effect. Text-based installation is used regardless of this setting.

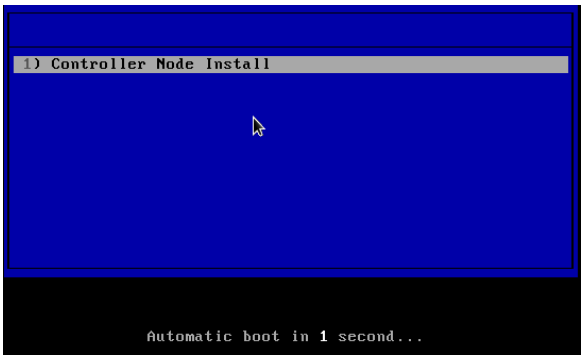
Console

is the output device to use for message display on the host (for example, **tty0**). The default is **ttys0, 115200**.

NOTE: This setting is *not* updated automatically to reflect changes to the **Installation Output** setting.

6. Save the settings.
   a) Click **Save** to initialize and configure the new node.

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



   b) Wait while the node is configured and rebooted.

      Up to 20 minutes may be required for a reboot.

      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. Fore more information on DRBD synchronization and tuning, see DRBD Sync Settings on page 81.

      When the reboot is complete, the node is reported as **Locked**, **Disabled**, and **Online**.

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.

On the host console, a login screen is displayed.

NOTE: You must change your password immediately. To begin, provide the default password **wrsroot**. Then type a new password and confirm it.

The host is now configured with a personality.

Installing Software on Controller-1 or a Compute Host Using the CLI

You can use the **controller-0** command-line interface to install the HCG 4.0 software on other hosts.

Except where noted, all the commands must be executed from the console of the active controller (here assumed to be **controller-0**).

Prerequisites

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

- The node must meet the hardware requirements for the personality to be assigned..

⚠ **CAUTION:** Software RAID is not supported.

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

Procedure

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 a host and specify its personality. You can also specify the device used to display messages during boot.

NOTE: The **hostname** parameter is required for compute hosts. For controller and storage hosts, it is ignored.

```
~(keystone_admin)$ system host-add  -n hostname \
-p personality  [-s subtype] \
[-l location] [-o install_output[-c console]] [-b boot_device] \
[-r rootfs_device] [-m mgmt_mac] [-i mgmt_ip] [-D ttys_dcd] \
[-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 (used for compute nodes only)

personality

is the host type. The following are valid options:

- **controller**
- **compute** (not used for CPE systems)
- **storage** (not used for CPE systems or systems with controller storage)

subtype

is the host personality subtype (used only for a compute host or storage host).

- For a compute host, the only current valid value is **standard**.
- For a storage host, valid values are **ceph-backing** or **ceph-caching**.

NOTE: You cannot add a **ceph-caching** host until cache tiering is configured on the system. For more information, see *Helion OpenStack Carrier Grade 4.0 System Administration: Cache Tiering*. In addition, the system must already have a **ceph-backing** host.

location

is a string describing the location of the host

console

is the output device to use for message display on the host (for example, **tty0**). The default is **ttys0, 115200**.

install_output

is the format for console output on the host (**text** or **graphical**). The default is **text**.

NOTE: The **graphical** option currently has no effect. Text-based installation is used regardless of this setting.

boot_device

is the host device for boot partition, relative to **/dev**. The default is **sda**.

rootfs_device

is the host device for rootfs partition, relative to **/dev**. The default is **sda**.

mgmt_mac

is the MAC address of the port connected to the internal management or PXE boot network.

mgmt_ip

is the IP address of the port connected to the internal management or PXE boot network, if static IP address allocation is used.

ttys_dcd

is set to **True** to have any active console session automatically logged out when the serial console cable is disconnected, or **False** to disable this behavior. The server must support data carrier detect on the serial console port.

bm_type

is the board management controller type (**iLO3**, **iOL4** or **Quanta**)

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_password

is the password for board management controller access

For example:

```
~(keystone_admin)$ system host-add -n compute-1 -p compute -m 08:00:27:5C:97:DB
+---------------------+--------------------------------------+
| Property            | Value                                |
+---------------------+--------------------------------------+
| action              | none                                 |
| administrative      | locked                               |
| availability        | offline                              |
| bm_ip               | None                                 |
| bm_mac              | None                                 |
| bm_type             | None                                 |
| bm_username         | None                                 |
| boot_device         | sda                                  |
| capabilities        | {}                                   |
| config_applied      | None                                 |
| config_status       | None                                 |
| config_target       | None                                 |
| console             | ttyS0,115200                         |
| created_at          | 2016-10-24T20:33:50.998923+00:00     |
| hostname            | compute-1                            |
| id                  | 18                                   |
| install_output      | text                                 |
| invprovision        | None                                 |
| location            | {}                                   |
| mgmt_ip             | 192.168.204.33                       |
| mgmt_mac            | 08:00:27:da:8b:59                    |
| operational         | disabled                             |
| personality         | compute                              |
| reserved            | False                                |
| rootfs_device       | sda                                  |
| serialid            | None                                 |
| software_load       | 16.00                                |
| task                | None                                 |
| ttys_dcd            | None                                 |
| updated_at          | None                                 |
| uptime              | 0                                    |
| uuid                | c3582323-2318-4c96-864a-6c2b525d4cea |
| vim_progress_status | None                                 |
+---------------------+--------------------------------------+
```

2. Power on the host.

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

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

The host boots from the network and then displays a message that it is waiting to be configured.

3. Obtain the host id.

   The active controller assigns an **id** when the host is detected. To update the host with a personality from the command line, the **id** is required.

   The **id** is shown in the first field of the **system host-list** command output:

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

   This example shows the output when the first host is powered on after **controller-0** has been configured.

4. On the **controller-0** console, set the attributes of the host.

   Use a command of the following form to specify the personality of the host, as well as the settings for displaying messages during boot:

   NOTE: The **hostname** parameter is valid for compute hosts only. For controller and storage hosts, it is ignored.

```
~(keystone_admin)$ system host-update hostid hostname=hostname \
personality=personality sub-type=subtype [location=location] \
[console=console] [install_output=install_output] \
[ttys_dcd=ttys_dcd] [boot_device=boot_device] \
[rootfs_device=rootfs_device]
```

   where

   hostid

   is the numeric id of the host obtained using the **system host-list** command

   hostname

   is a name to assign to the host (used for compute nodes only)

   personality

   is the host type. The following are valid options:

- **controller**
- **compute** (not used for CPE systems)
- **storage** (not used for CPE systems or systems with controller storage)

subtype

is the host personality subtype (used only for a compute host or storage host)

- For a compute host, valid values are **standard** or **low-latency**.
- For a storage host, valid values are **ceph-backing** or **ceph-caching**.

NOTE: You cannot add a **ceph-caching** host until cache tiering is configured on the system. For more information, see *Helion OpenStack Carrier Grade 4.0 System Administration: Cache Tiering*. In addition, the system must already have a **ceph-backing** host.

location

is a string describing the location of the host

console

is the output device to use for message display on the host (for example, **tty0**). The default is **ttys0, 115200**)

install_output

is the format for console output on the host (**text** or **graphical**). The default is **text**.

NOTE: The **graphical** option currently has no effect. Text-based installation is used regardless of this setting.

ttys_dcd

is set to **True** to have any active console session automatically logged out when the serial console cable is disconnected, or **False** to disable this behavior. The server must support data carrier detect on the serial console port.

serial

is set to true to **True** to have any active console session automatically logged out when the serial console cable is disconnected, or **False** to disable this behavior. The server must support data carrier detect on the serial console port.

boot_device

is the host device for boot partition, relative to **/dev**. The default is **sda**.

rootfs_device

is the host device for rootfs partition, relative to **/dev**. The default is **sda**.

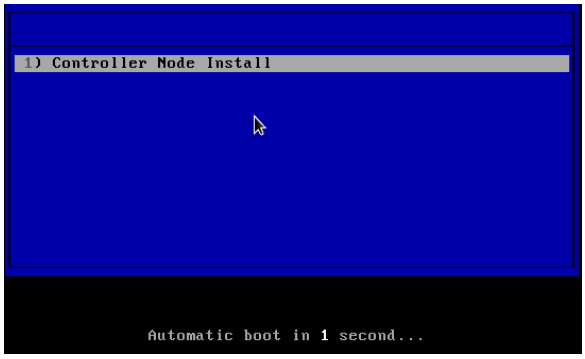
For example:

```
~(keystone_admin)$ system host-update 2 personality=controller
+------------------+--------------------------------------+
| Property         | Value                                |
+------------------+--------------------------------------+
| action           | none                                 |
| administrative   | locked                               |
| availability     | offline                              |
| bm_ip            |                                      |
| bm_mac           | None                                 |
| bm_type          | None                                 |
```

```
| bm_username     |                                      |
| boot_device     | sda                                  |
| capabilities    | {}                                   |
| console         | ttyS0, 115200                        |
| created_at      | 2015-01-09T15:54:40.313688+00:00     |
| cstatus         | None                                 |
| hostname        | controller-1                         |
| iconfig_applied |                                      |
| iconfig_fini    |                                      |
| iconfig_target  |                                      |
| id              | 2                                    |
| install_output  | text                                 |
| invProvision    | unprovisioned                        |
| location        | {}                                   |
| mgmt_ip         | 192.168.204.4                        |
| mgmt_mac        | 08:00:27:1f:5e:e4                    |
| operational     | disabled                             |
| personality     | controller                           |
| reserved        | False                                |
| rootfs_device   | sda                                  |
| serialid        | None                                 |
| task            | None                                 |
| ttys_dcd        | False                                |
| updated_at      | 2015-09-28T13:13:36.337484+00:00     |
| uptime          | 242757                               |
| uuid            | 4e83bc2f-57d4-4508-9550-564d74dc32d4 |
+-----------------+--------------------------------------+
```

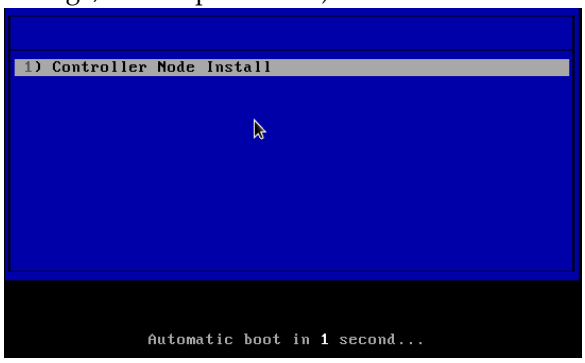
Controller-0 configures the required parameters and displays them as illustrated above. The host is still reported as offline, since the HCG 4.0 software has yet to be installed in its hard drive.

Controller-0 automatically pushes the HCG 4.0 installer image over the network for the host to boot. The console of the host displays the HCG 4.0 welcome screen.



5. Install the personality.

   The node is assigned the personality specified in the **system host-add** parameters. A display-device menu appears on the console, with text customized for the personality (Controller, Storage, or Compute Node).



You can start the installation manually by pressing **Enter**. Otherwise, it is started automatically after a few seconds.

6. Wait for the host to reboot.

   Up to 20 minutes may be required for a reboot.

   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. Fore more information on DRBD synchronization and tuning, see DRBD Sync Settings on page 81.

NOTE: It may be necessary to reconfigure the BIOS manually to force the host to boot from the hard drive.

   The host boots from the hard drive into the HCG 4.0 image and displays the GNU GRUB welcome screen.

   After a brief delay, the system boots automatically into the HCG 4.0 image and presents a login prompt.

7. On the **controller-0** console, use the **system host-list** command to verify the status of the host.

   - For the second controller:

```
~(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.

     Verify that the HCG 4.0 controller services are running on controller-1.

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

   - For a compute 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    | online       |
+----+--------------+-------------+----------------+-------------+--------------+
```

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

Postrequisites

Before you can unlock a host, you must configure its network interfaces and storage resources.

5

Controller-1 Provisioning

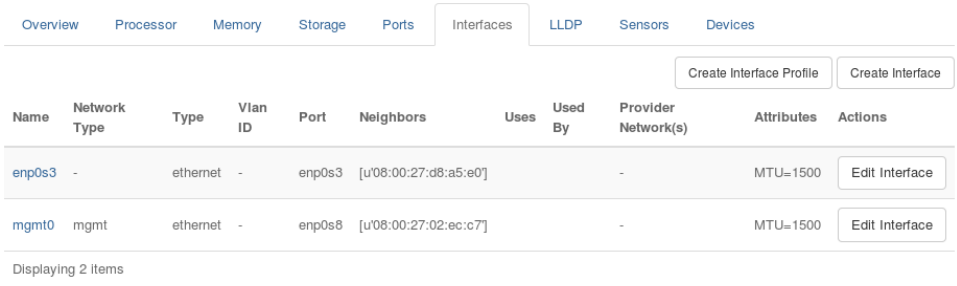
Provisioning Network Interfaces on Controller-1

You must configure the network interfaces on a host before you can unlock it.

NOTE: You can use hardware profiles to save a configuration from one host and apply it to others. For more information, see Hardware Profiles on page 85.

Procedure

1. Open the **Inventory Detail** page for the host.
   a) Open the Host Inventory page, available from **Admin** > **Platform** > **Host Inventory** in the left-hand pane.
   b) Select the **Hosts** tab, and then in the **Host Name** column, click the name of the host.
2. Select the **Interfaces** tab.



3. Attach the OAM network interface.

You must manually configure the **controller-1** interface for the OAM network. .

NOTE: You must also configure any LAG interfaces in use, including those for the internal management network and PXE boot network. For more information, see Configuring Aggregated Ethernet Interfaces on page 115.

a) Click **Edit Interface** for the port connected to the OAM network.

The Edit Interface dialog box appears.

b) In the **Network Type** list, select **oam**.

NOTE: Ensure that **none** is *not* selected. Clear it if necessary.

c) Specify the **Interface Type**.

For an OAM network interface, you can select an **Ethernet**, **Aggregated Ethernet**, or **VLAN interface**.

d) Click **Save** to save the selection and close the dialog box.

4. Optional: Configure the infrastructure interface.

This step is required only for systems with an infrastructure network. For systems with controller storage, this is optional.

a) Click **Edit Interface** for the port connected to the infrastructure network.

The Edit Interface dialog box appears.

b) In the **Network Type** list, select **infra**.

NOTE: Ensure that **none** is *not* selected. Clear it if necessary.

c) Specify the **Interface Type**.

For an infrastructure interface, you can select an **Ethernet**, **Aggregated Ethernet**, or **VLAN interface**.

d) Click **Save** to save the selection and close the dialog box.

Provisioning Network Interfaces on Controller-1 Using the CLI

You can use the **controller-0** command-line interface to configure network interfaces on a host.

Procedure

1. Attach the OAM network interface.

For example, to attach an interface named **enp0s3** to the OAM network, using Ethernet interface **enp0s3** on **controller-1**:

```
~(keystone_admin)$ system host-if-modify -n enp0s3 \
-nt oam controller-1 enp0s3
+------------------+----------------------------------------+
| Property         | Value                                  |
+------------------+----------------------------------------+
| ifname           | enp0s3                                 |
| networktype      | oam                                    |
| iftype           | ethernet                               |
| ports            | [u'enp0s3']                            |
```

```
| providernetworks | None                                     |
| imac             | 08:00:27:58:0c:e5                        |
| imtu             | 1500                                     |
| aemode           | None                                     |
| schedpolicy      | None                                     |
| txhashpolicy     | None                                     |
| uuid             | 14300770-13bf-48fd-b9af-756ec7d8adc1     |
| ihost_uuid       | e1c47086-3230-4b92-91d0-208c55130a52     |
| vlan_id          | None                                     |
| uses             | []                                       |
| used_by          | []                                       |
| created_at       | 2015-12-10T14:24:25.967362+00:00         |
| updated_at       | 2015-12-10T17:01:08.761323+00:00         |
| sriov_numvfs     | 0                                        |
| accelerated      | [u'True']                                |
+------------------+------------------------------------------+
```

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

   For example, to attach a VLAN interface named **infra0** with VLAN ID **22** to the infrastructure network, using Ethernet interface **enp0s8** on **storage-0**:

```
~(keystone_admin)$ system host-if-add controller-1 -V 22 -nt infra infra0 vlan
enp0s8
+------------------+------------------------------------------+
| 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'enp0s8']                              |
| used_by          | []                                       |
| created_at       | 2015-02-04T16:23:28.917084+00:00         |
| updated_at       | None                                     |
+------------------+------------------------------------------+
```

Provisioning Storage on Controller-1

You must configure the storage disks on a host before you can unlock it.

NOTE: You can use hardware profiles to save a configuration from one host and apply it to others. For more information, see Hardware Profiles on page 85.

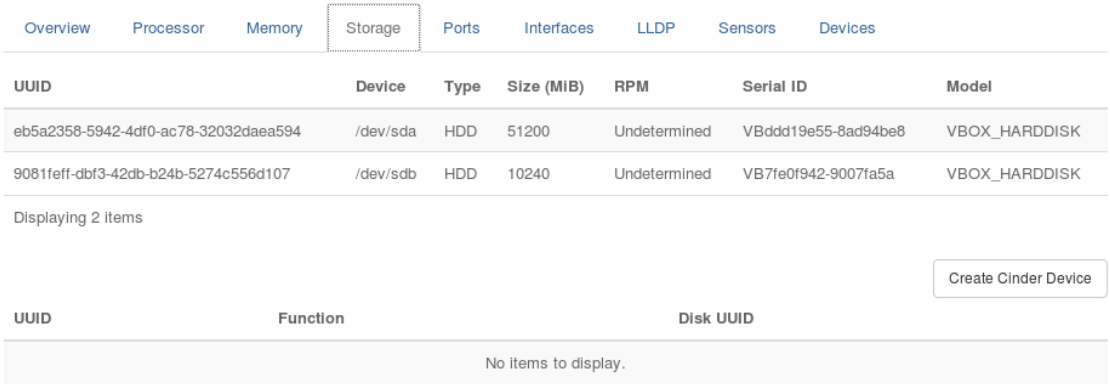
Procedure

1. Open the **Inventory Detail** page for the host.

a) Open the Host Inventory page, available from **Admin** > **Platform** > **Host Inventory** in the left-hand pane.

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

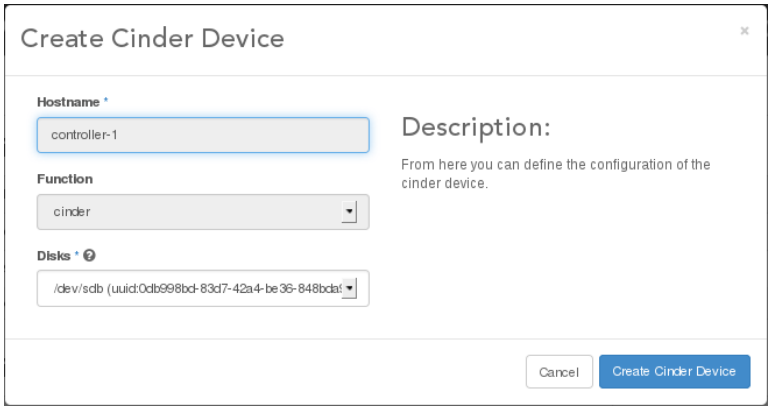
2. Select the **Storage** tab.



3. Configure the Cinder storage on **controller-1**.

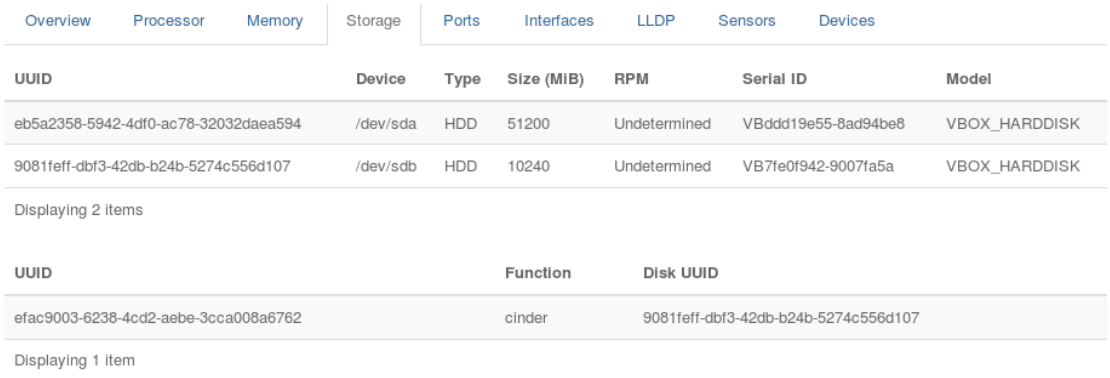
a) Click **Create Cinder Device**..

The Create Cinder Device dialog box appears.



b) Using the **Disks** drop-down menu, select a disk to provide cinder storage.

The disk is added to the Cinder Device list.



Provisioning Storage on Controller-1 Using the CLI

You can use the command-line interface to configure storage resources on a host.

Procedure

Configure the Cinder storage on **controller-1**.

Obtain the uuid of the physical disk to use for Cinder storage:

```
~(keystone_admin)$ system host-disk-list controller-1
+--------------------------------------+-------------+------------+...
| uuid                                 | device_node | device_num |...
+--------------------------------------+-------------+------------+...
| e0bf6865-1080-4bb5-8f0c-9167a620da25 | /dev/sda    | 2048       |...
| 12da99c4-8a33-4b5c-8ae6-8ab88504a1ac | /dev/sdb    | 2064       |...
+--------------------------------------+-------------+------------+...
```

Assign Cinder storage to the physical disk using a command of the following form:

```
~(keystone_admin)$ system host-stor-add controller-1 cinder uuid
```

For example, to assign Cinder storage on **/dev/sdb** in the example above:

```
~(keystone_admin)$ system host-stor-add controller-1 cinder
12da99c4-8a33-4b5c-8ae6-8ab88504a1ac
+------------+--------------------------------------+
| Property   | Value                                |
+------------+--------------------------------------+
| osdid      | None                                 |
| state      | None                                 |
| function   | cinder                               |
| uuid       | 2d362546-1be5-4c6f-95d3-d0731250986a |
| ihost_uuid | e1c47086-3230-4b92-91d0-208c55130a52 |
| idisk_uuid | 12da99c4-8a33-4b5c-8ae6-8ab88504a1ac |
| created_at | 2015-12-10T15:58:27.713557+00:00     |
| updated_at | None                                 |
+------------+--------------------------------------+
```

NOTE: You cannot assign Cinder storage on the **rootfs** disk (**/dev/sda**).

Unlocking Controller-1

You must unlock both controller nodes to provide redundancy.

The network interfaces and storage disks must be configured before **controller-1** can be unlocked.

Procedure

Unlock the host to make it available for use.

On the **Hosts** tab of the Host Inventory page, open the drop-down list for the host, and then select **Unlock Host**.

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

Both controllers are now available, with one active and one redundant.

NOTE: Controller-0 and controller-1 use IP multicast messaging for synchronization. If loss of synchronization occurs a few minutes after controller-1 becomes available, ensure that the switches and other devices on the management, infrastructure, and OAM networks are configured with appropriate settings. For example, consider that IGMP snooping may interfere with IP multicast messaging in some scenarios.

Unlocking Controller-1 Using the CLI

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

The network interfaces and storage disks must be configured before **controller-1** can be unlocked.

Procedure

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 two to three minutes following the unlock command.

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

NOTE: Controller-0 and controller-1 use IP multicast messaging for synchronization. If loss of synchronization occurs a few minutes after controller-1 becomes available, ensure that the switches and other devices on the management, infrastructure, and OAM networks are configured with appropriate settings. For example, consider that IGMP snooping may interfere with IP multicast messaging in some scenarios.

6

Provider Network Configuration

Configuring Provider Networks at Installation

You must set up provider networks at installation so that you can attach data interfaces and unlock the compute nodes.

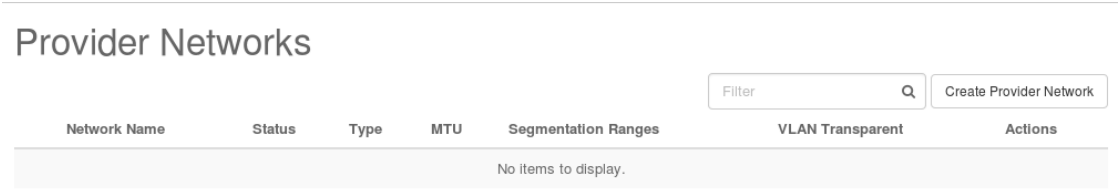
Procedure

1. Open the HCG 4.0 Web administration interface.

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

2. In the left-hand pane, select **Admin** > **Platform** > **Provider Networks**.

   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

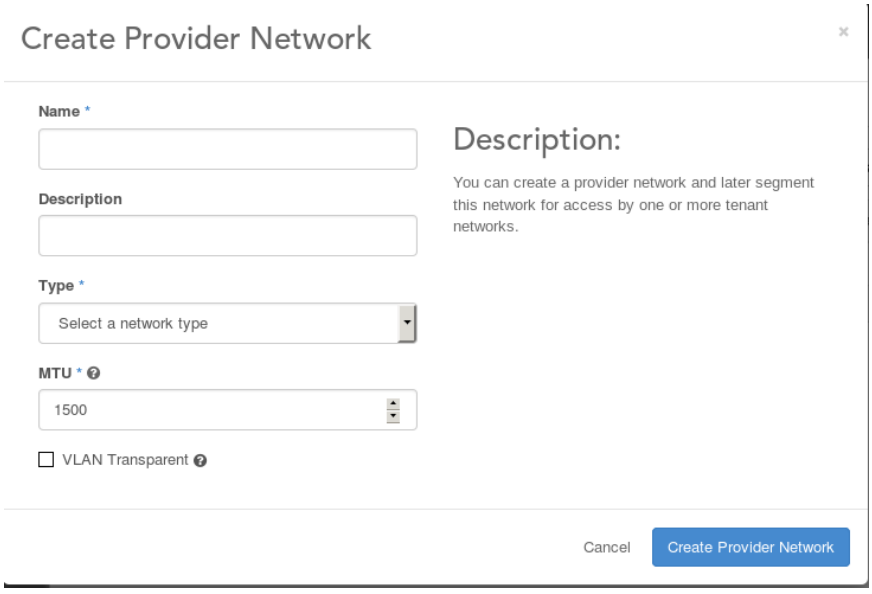
supports multiple tenant networks using VXLAN VNIs.

MTU

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

VLAN Transparent

Allow VLAN tagged packets to be encapsulated within a VXLAN segment without removing or modifying the guest VLAN tag.



4. Commit the changes.

   Click **Create Provider Network**.

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

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.

Prerequisites

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 \
--vlan-transparent={True,False}
```

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

For example, to add a VLAN provider network named providernet-a:

```
~(keystone_admin)$ neutron providernet-create providernet-a --type=vlan
Created a new providernet:
+------------------+--------------------------------------+
| Field            | Value                                |
+------------------+--------------------------------------+
| description      |                                      |
| id               | a5938194-a296-4d92-af5f-c3a064b56f7f |
| mtu              | 1500                                 |
| name             | providernet-a                        |
| ranges           |                                      |
| status           | DOWN                                 |
| type             | vlan                                 |
| vlan_transparent | False                                |
+------------------+--------------------------------------+
```

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
```

7

Compute Host Provisioning

Provisioning Network Interfaces on a Compute Host

You must configure the network interfaces on a host before you can unlock it.

HCG 4.0 automatically creates an Ethernet interface for each port it detects on the compute node during software installation. You must manually create any required interfaces of other types, including Aggregated Ethernet and VLAN, and then edit them to attach them to networks.

For a compute host, you must manually attach interfaces for the following networks:

- data networks
- the infrastructure network, if present

You must also configure LAG for any interfaces that use it. For more information, see Configuring Aggregated Ethernet Interfaces on page 115.

The details for attaching an interface depend on the network configuration (for example, whether shared interfaces are used). A simple example is provided here for convenience. For more information, see Network Interface Provisioning on page 102.

NOTE: You can use hardware profiles to save a configuration from one host and apply it to others. For more information, see Hardware Profiles on page 85

Prerequisites

The HCG 4.0 software must be installed on the host.

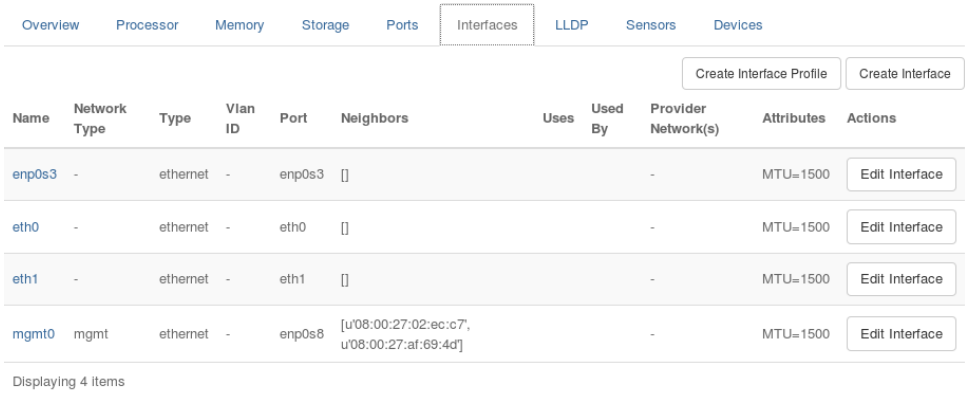
To configure the data interfaces on a compute host, provider networks are required.

Procedure

1. Ensure that provider networks are available for the data interfaces. To create them, see Configuring Provider Networks at Installation on page 53.

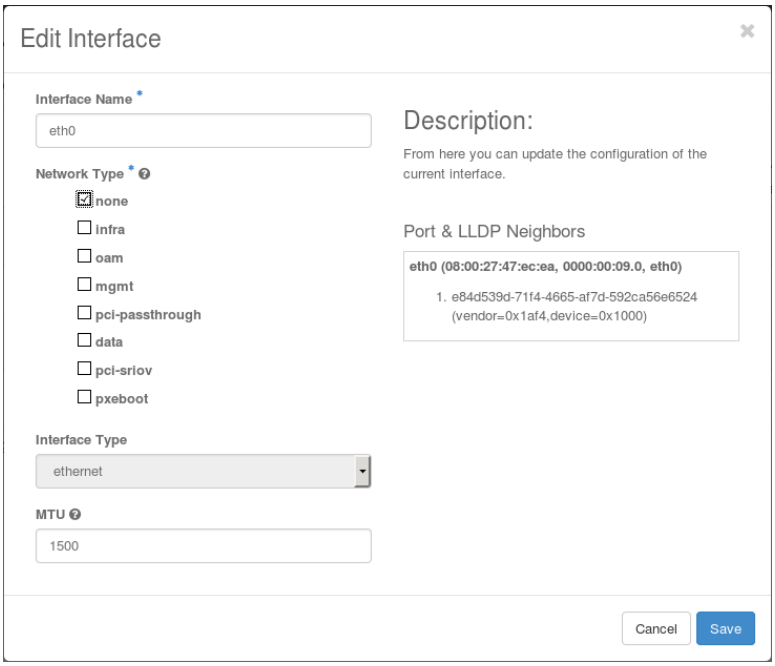
2. Open the **Inventory Detail** page for the host.
   a) Open the Host Inventory page, available from **Admin** > **Platform** > **Host Inventory** in the left-hand pane.
   b) Select the **Hosts** tab, and then in the **Host Name** column, click the name of the host.

3. Select the **Interfaces** tab.



4. Configure the data interfaces.
   a) Click **Edit Interface** for a port connected to a data network.

      The Edit Interface dialog box appears.



   b) In the **Network Type** list, select **data**.

NOTE: Ensure that **none** is *not* selected. Clear it if necessary.

When data is selected, additional controls appear in the dialog box, so that you can select a provider network and enable or disable IPv4 and IPv6 addressing modes:

- a **Provider Networks** list
- **IPv4 Addressing Mode** options
- **IPv6 Addressing Mode** options

c) Optional: Specify the **Interface Type**.

This selection is set to **Ethernet** by default, and is active only if other choices are valid for the configuration. You can select **Ethernet**, **Aggregated Ethernet**, or **VLAN**.

d) Select a **Provider Network** to use with the data interface.

e) Optional: Set the **IPv4 Addressing Mode** and **IPv6 Addressing Mode** for the interface.

These selections are active only if the interface is attached to a VXLAN provider network.

f) Click **Save** to save the selection and close the dialog box.

5. Optional: Configure the infrastructure interface.

This step is required only for systems with an optional infrastructure network.

a) Click **Edit Interface** for the port connected to the infrastructure network.

The Edit Interface dialog box appears.

b) In the **Network Type** list, select **infra**.

NOTE: Ensure that **none** is *not* selected. Clear it if necessary.

c) Specify the **Interface Type**.

For an infrastructure interface, you can select an **Ethernet**, **Aggregated Ethernet**, or **VLAN interface**.

d) Click **Save** to save the selection and close the dialog box.

Provisioning Interfaces on a Compute Host Using the CLI

You can use the **controller-0** command-line interface to configure network interfaces on a host.

The details for attaching an interface depend on the network configuration (for example, whether shared interfaces are used). A simple example is provided here. For more information, see Network Interface Provisioning Using the CLI on page 103.

Prerequisites

The HCG 4.0 software must be installed on the host.

To configure the data interfaces on a compute host, provider networks are required.

Procedure

1. Ensure that provider networks are available for the data interfaces. For more information, see Configuring Provider Networks Using the CLI on page 55.

2. Provision the data interfaces.

   For example, to attach an interface named **enp0s9** to a VLAN provider network named **providernet-a**, using Ethernet interface **enp0s9** on **compute-0**:

```
~(keystone_admin)$ system host-if-modify -n enp0s9 \
-nt data compute-0 enp0s9 -p providernet-a
+------------------+----------------------------------------+
| Property         | Value                                  |
+------------------+----------------------------------------+
| ifname           | enp0s9                                 |
| networktype      | data                                   |
| iftype           | ethernet                               |
| ports            | [u'enp0s9']                            |
| providernetworks | providernet-a                          |
| imac             | 08:00:27:66:38:c6                      |
| imtu             | 1500                                   |
| aemode           | None                                   |
| schedpolicy      | None                                   |
| txhashpolicy     | None                                   |
| uuid             | 4ff97cc5-8e59-4763-9a85-c4be3996ddbe   |
| ihost_uuid       | 327b2136-ffb6-4cd5-8fed-d2ec545302aa   |
| vlan_id          | None                                   |
| uses             | []                                     |
| used_by          | []                                     |
| created_at       | 2015-12-23T13:04:49.768322+00:00       |
| updated_at       | 2015-12-23T16:16:19.540661+00:00       |
| sriov_numvfs     | 0                                      |
| ipv4_mode        | disabled                               |
| ipv6_mode        | disabled                               |
| accelerated      | [u'True']                              |
+------------------+----------------------------------------+
```

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

   For example, to attach a VLAN interface named **infra0** with VLAN ID **22** to the infrastructure network, using Ethernet interface **enp0s8** on **storage-0**:

```
~(keystone_admin)$ system host-if-add storage-0 -V 22 -nt infra infra0 vlan enp0s8
+------------------+----------------------------------------+
| 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'enp0s8']                            |
| used_by          | []                                     |
| created_at       | 2015-02-04T16:23:28.917084+00:00       |
| updated_at       | None                                   |
+------------------+----------------------------------------+
```

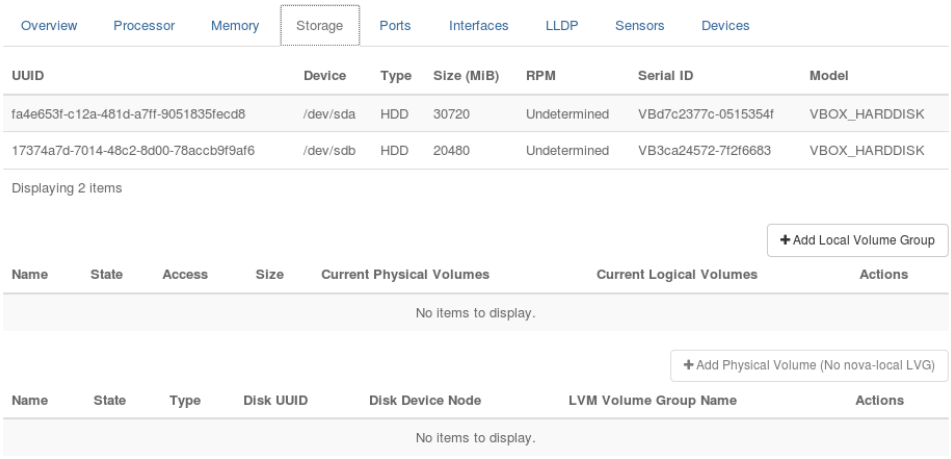
Provisioning Storage on a Compute Host

You must configure the storage disks on a host before you can unlock it.

NOTE: You can use hardware profiles to save a configuration from one host and apply it to others. For more information, see Hardware Profiles on page 85

Procedure

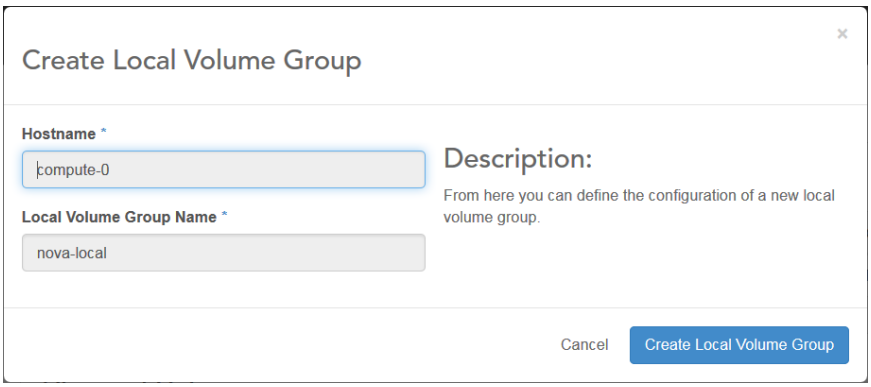
1. Open the **Inventory Detail** page for the host.
   a) Open the Host Inventory page, available from **Admin** > **Platform** > **Host Inventory** in the left-hand pane.
   b) Select the **Hosts** tab, and then in the **Host Name** column, click the name of the host.
2. Select the **Storage** tab.



3. Add a local volume group to provide local storage.
   a) On the Storage page, add a **nova-local** Volume Group.

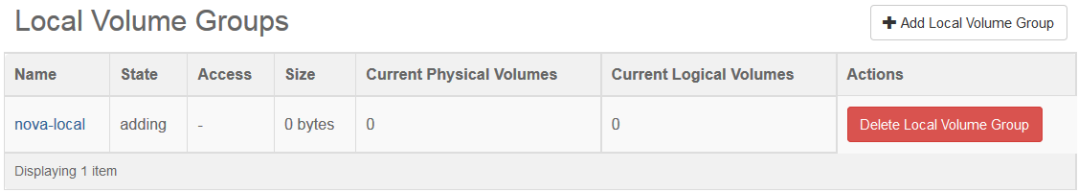
      Click **Add Local Volume Group**.

      The Create Local Volume Group dialog box appears, set by default to add a **nova-local** group.



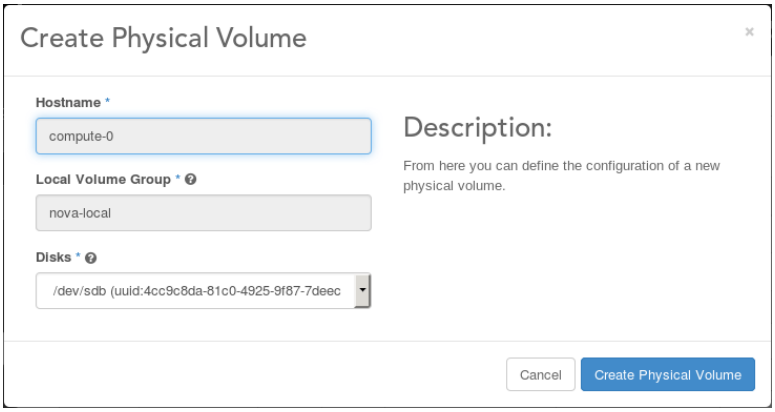
Click **Create Local Volume Group**.

The **nova-local** group is shown in the list.



4. Assign a physical volume for the local volume group.
   a) Click **Add Physical Volume**.

      The Create Physical Volume dialog box appears, with the **Local Volume Group** automatically set to **nova-local**.



   b) Using the **Disks** drop-down menu, select a non-root disk to provide storage.

      You can add any number of non-root disks to the **nova-local** group, limited only by the number of disks available.

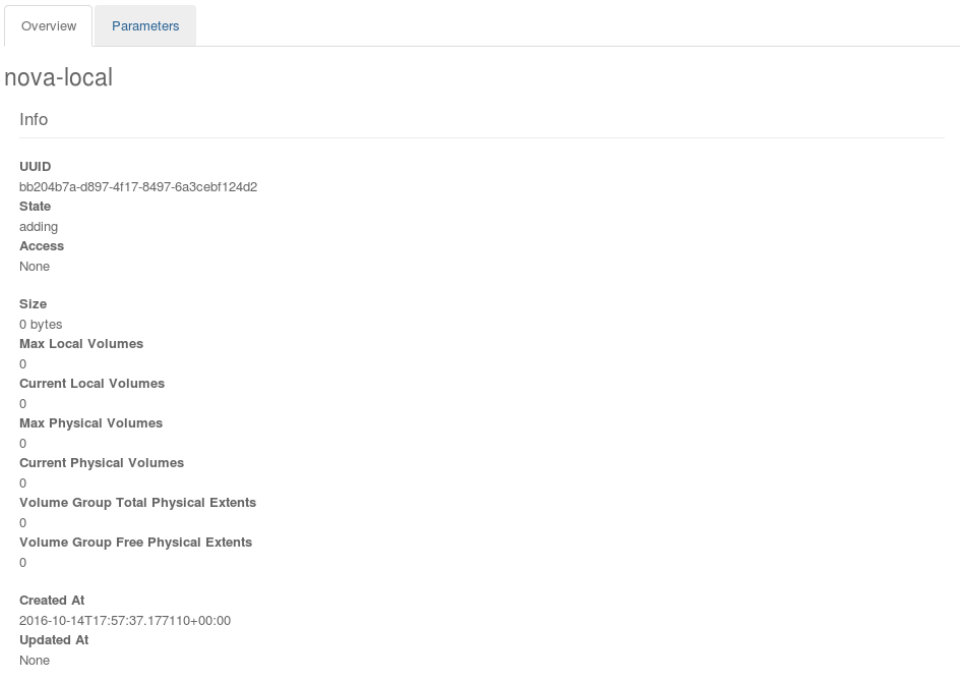
⚠ **CAUTION:** Always use non-root disks for **nova-local** storage. Use of the root disk for this purpose is not a supported configuration.

   c) Click **Create Physical Volume**.

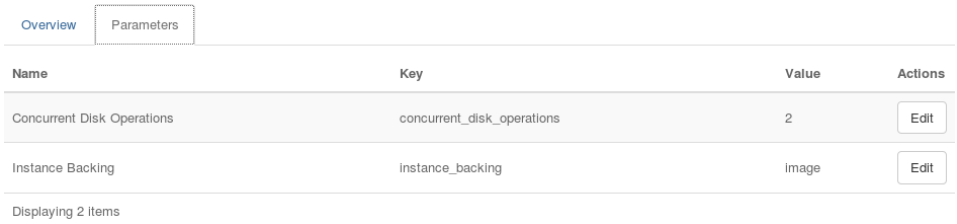
      The disk assignment is added to the **Physical Volumes** list.

5. Allocate resources on the physical volume for the local volume group.

a) In the **Local Volume Groups** list, click **nova-local** to open the Local Volume Group Detail page.

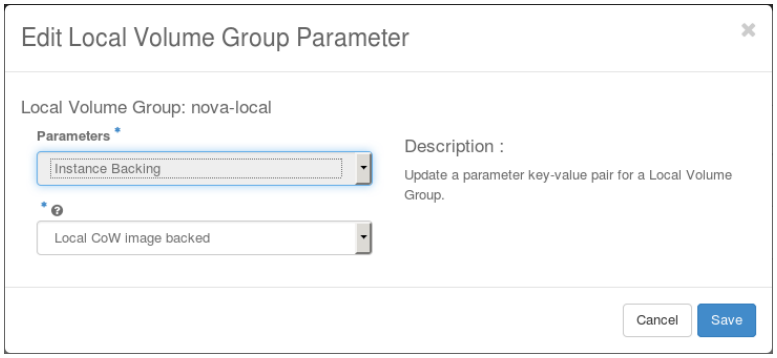


b) Select the **Parameters** tab.



c) Select the **Instance Backing** type.

Click **Edit** for the **Instance Backing** setting.



Local RAW LVM backed

Local storage for instances is provided using LVM RAW disks to optimize run-time I/O performance.

Local CoW Image backed

Local storage for instances is provided using copy-on-write (CoW) image files to optimize launch and delete performance. This is the default.

Remote RAW Ceph storage backed

Local storage for instances is provided using a Ceph storage pool. To use this option, a system with storage hosts is required.

For more information about the **Instance Backing** type, see *Helion OpenStack Carrier Grade 4.0* System *Administration: Storage on Compute Hosts* .

After making your selection, click **Save** to return to the Parameters tab.

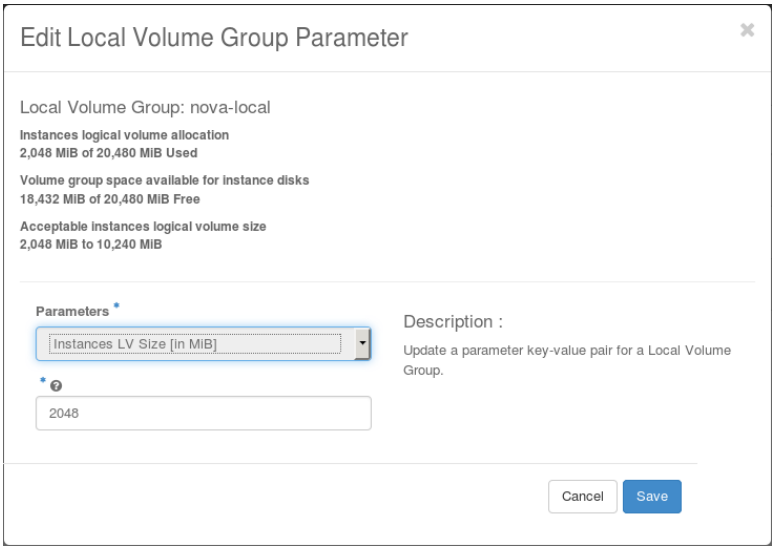
The Parameters list is updated to show the corresponding value (**lvm** or **image**).

If the **Instance Backing** parameter is set to **lvm**, the **Instances LV Size** parameter is also shown.

d) If you are using LVM-backed storage, specify the **Instances LV Size**.

NOTE: The **Instances LV Size** parameter is available only if the **Instance Backing** is set to **lvm**.

Click **Edit**, and then set the **Instances Logical Volume Size**.



If the total space in the volume group is less than 80GB (81920 MiB), then you must allocate at least 2048 MiB. If it is greater or equal than 80GB (81920 MiB), then you must allocate at least 5120 MiB. The actual size is limited to ensure at least 50% free space in the volume group for creating disks for launched instances. The dialog box provides an acceptable parameter range for convenience.

For more information, see *Helion OpenStack Carrier Grade 4.0 System Administration: Storage on Compute Hosts*.

Provisioning Storage on a Compute Host Using the CLI

You must configure the storage resources on a host before you can unlock it. If you prefer, you can use the CLI.

Procedure

1. Add the **nova-local** local volume group.

```
~(keystone_admin)$ system host-lvg-add compute-0 nova-local
+-----------------+-------------------------------------------------------------+
| Property        | Value                                                       |
+-----------------+-------------------------------------------------------------+
| lvm_vg_name     | nova-local                                                  |
| vg_state        | adding                                                      |
| uuid            | 5b8f0792-25b5-4e43-8058-d274bf8fa51c                        |
| ihost_uuid      | 327b2136-ffb6-4cd5-8fed-d2ec545302aa                        |
| lvm_vg_access   | None                                                        |
| lvm_max_lv      | 0                                                           |
| lvm_cur_lv      | 0                                                           |
| lvm_max_pv      | 0                                                           |
| lvm_cur_pv      | 0                                                           |
| lvm_vg_size     | 0                                                           |
| lvm_vg_total_pe | 0                                                           |
| lvm_vg_free_pe  | 0                                                           |
| created_at      | 2015-12-23T16:30:25.524251+00:00                            |
| updated_at      | None                                                        |
| parameters      | {u'instance_backing': u'lvm', u'instances_lv_size_mib': 0}  |
+-----------------+-------------------------------------------------------------+
```

2. Assign a physical volume to provide **nova-local** storage.

   To list the available physical volumes, use the **system host-disk-list** command.

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

+------+-------------+------------+-------------+----------+------------+
| uuid | device_node | device_num | device_type | size_mib | serial_id  |
+------+-------------+------------+-------------+----------+------------+
| 2a.. | /dev/sda    | 2048       | disk        | 20480    | VBba4fe... |
+------+-------------+------------+-------------+----------+------------+
| 2f.. | /dev/sdb    | 2048       | disk        | 20480    | VBba47c... |
+------+-------------+------------+-------------+----------+------------+
```

   To assign a disk for **nova-local** storage, specify the disk **uuid**. For example, if the **uuid** is **2f1cdf25-73d5-4e3f-ac7d-269c7fbb8647**:

```
~(keystone_admin)$ system host-pv-add compute-0 nova-local 2f1cdf25-73d5-4e3f-
ac7d-269c7fbb8647
+-------------------+--------------------------------------+
| Property          | Value                                |
+-------------------+--------------------------------------+
| uuid              | f0bce808-81d6-4084-b874-1beb1f697056 |
| pv_state          | adding                               |
| pv_type           | partition                            |
| idisk_uuid        | 2f1cdf25-73d5-4e3f-ac7d-269c7fbb8647 |
| idisk_device_node | /dev/sdb                             |
| lvm_pv_name       | /dev/sdb7                            |
| lvm_vg_name       | nova-local                           |
| lvm_pv_uuid       | None                                 |
| lvm_pv_size       | 0                                    |
| lvm_pe_total      | 0                                    |
| lvm_pe_alloced    | 0                                    |
| ihost_uuid        | 327b2136-ffb6-4cd5-8fed-d2ec545302aa |
| created_at        | 2015-12-23T16:45:40.776426+00:00     |
```

```
| updated_at        | None                                 |
+-------------------+--------------------------------------+
```

⚠ **CAUTION:** Always use non-root disks for **nova-local** storage. Use of the root disk for this purpose is not a supported configuration.

3. Specify the local storage space.

   You can implement local storage space for instances using LVM RAW disks or CoW image files. For LVM RAW disks, you must provide the storage size.

```
~(keystone_admin)$ system host-lvg-modify [-b instance_backing] \
[-c concurrent_disk_operations] [-s size] hostname lvgname
```

   where

   instance_backing

   specifies the storage method (**lvm**, **image**, or **remote**). The default is **image**.

   concurrent_disk_operations

   is the number of I/O intensive disk operations, such as glance image downloads or image format conversions, that can occur at the same time

   size

   is the size in MiB for LVM RAW storage. This parameter is not required for CoW image storage.

   hostname

   is the name or id of the host (for example, **compute-0**)

   lvgname

   is the name or uuid of the local volume group (**nova-local**).

   For example:

```
~(keystone_admin)$ system host-lvg-modify -s 2048 compute-0 nova-local
+-----------------+-------------------------------------------------------------------+
| Property        | Value                                                             |
+-----------------+-------------------------------------------------------------------+
| lvm_vg_name     | nova-local                                                        |
| vg_state        | adding                                                            |
| uuid            | 5b8f0792-25b5-4e43-8058-d274bf8fa51c                              |
| ihost_uuid      | 327b2136-ffb6-4cd5-8fed-d2ec545302aa                              |
| lvm_vg_access   | None                                                              |
| lvm_max_lv      | 0                                                                 |
| lvm_cur_lv      | 0                                                                 |
| lvm_max_pv      | 0                                                                 |
| lvm_cur_pv      | 0                                                                 |
| lvm_vg_size     | 0                                                                 |
| lvm_vg_total_pe | 0                                                                 |
| lvm_vg_free_pe  | 0                                                                 |
| created_at      | 2015-12-23T16:30:25.524251+00:00                                  |
| updated_at      | None                                                              |
| parameters      | {u'instance_backing': u'lvm', u'instances_lv_size_mib': 2048,     |
|                 |  u'concurrent_disk_operations': 2}                                |
+-----------------+-------------------------------------------------------------------+
```

   For storage size considerations, see *Helion OpenStack Carrier Grade 4.0 System Administration: Storage on Compute Hosts*.

Unlocking Compute Nodes

Unlocked compute nodes are required to launch instances.

Prerequisites

In order to unlock a compute node, you must attach its data interfaces to provider networks and configure local storage. You can then unlock the node using the web administration interface.

Procedure

Unlock the host to make it available for use.

In the **Hosts** list, on the row associated with the node, open the drop-down menu and select **Unlock Host**.

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

Unlocking Compute Nodes Using the CLI

Unlocked compute nodes are required to launch instances.

Prerequisites

In order to unlock a compute node, you must attach its data interfaces to provider networks and configure local storage. You can then unlock the node using the web administration interface.

Procedure

Use the **system host-unlock** command to unlock the node.

```
~(keystone_admin)$ system host-unlock compute-0
~(keystone_admin)$ system host-unlock compute-1
```

A

Resources for Host Installation

Boot Sequence Considerations

During HCG 4.0 software installation, each host 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 compute node.

Using a Controller Configuration Input File

For automated installation, you can create a configuration file to use with the controller configuration script.

The controller configuration script accepts a path to a configuration file as an optional parameter:

```
$ config_controller --config-file filename
```

where *filename* is the path and name of the file.

NOTE: The **config_controller** controller configuration script will verify the installed software as either HCG 4.0 CPE or HCG 4.0 standard product against the provided license file. It will be rejected if the license file and the installed software do not match.

The configuration file contains all the settings required by the script, expressed using INI format. You can create one manually, or you can use the configuration file generator utility provided with the HCG 4.0 Guest Software Development Kit (SDK). For more about the format, see Configuration Input File Format on page 70. For information about the configuration file generator utility, see the documentation included with the SDK.

You can validate a configuration file before applying it, using the **config_validator** utility provided with the SDK. The same validation is also performed automatically when the configuration controller script is executed. For information about the configuration file validator utility, see the documentation included with the SDK.

For general information about the SDK, see the *HCG 4.0 Software Development Kit*.

Postrequisites

CAUTION: The configuration file contains clear-text authentication data. For improved security, delete this file from the system after use.

Configuration Input File Format

The configuration file uses key-value pairs in standard INI format.

Valid sections, keys, and values are as follows.

Table 1 **Configuration Input File INI Specification**

[Section] / Key	Value	Remarks
[STORAGE]		
DATABASE_STORAGE	(size in GB)	Postgres database size
IMAGE_STORAGE	(size in GB)	Storage for nova instances launched from glance images
BACKUP_STORAGE	(size in GB)	
CINDER_BACKEND	**lvm** or **ceph**	
CINDER_DEVICE	(string)	
CINDER_STORAGE	(size in GB)	
[DNS]		(optional)
NAMESERVER_1	(IP address)	
NAMESERVER_2	(IP address)	
NAMESERVER_3	(IP address)	
[NTP]		(optional)
NTP_SERVER_1	(IP address or FQDN)	
NTP_SERVER_2	(IP address or FQDN)	
NTP_SERVER_3	(IP address or FQDN)	
[LOGICAL_INTERFACE_n]		(where *n* is an interface number, beginning with 1)
LAG_INTERFACE	**Y** or **N**	
LAG_MODE	**802.3ad (LACP) policy** or **Balanced XOR policy** or **Active-backup policy**	
INTERFACE_MTU	(MTU size)	
INTERFACE_PORTS	(a comma-separated list of ethernet interfaces)	for example: **eth0,eth1**
[MGMT_NETWORK]		
VLAN	(VLAN id)	
IP_START_ADDRESS	(IP address)	
IP_END_ADDRESS	(IP address)	
CIDR	(network/mask)	
MULTICAST_CIDR	(IP address)	

[Section] / Key	Value	Remarks
DYNAMIC_ALLOCATION	**Y** or **N**	This setting applies to other network types system-wide, such as the Infra network.
LOGICAL_INTERFACE	**LOGICAL_INTERFACE**_*n*	(where *n* is an interface number, beginning with 1)
GATEWAY	(IP address)	This key can be specified in the MGMT_NETWORK section or OAM_NETWORK section, but not both
[INFRA_NETWORK]		
VLAN	(VLAN id)	
IP_START_ADDRESS	(IP address)	
IP_END_ADDRESS	(IP address)	
CIDR	(network/mask)	
LOGICAL_INTERFACE	**LOGICAL_INTERFACE**_*n*	(where *n* is an interface number, beginning with 1)
[OAM_NETWORK]		
VLAN	(VLAN id)	
IP_START_ADDRESS	(IP address)	You can use these to define contiguous addresses for the IP floating address and unit addresses; for example, 10.10.10.2 (the IP floating address) through 10.10.10.4 (for two contiguous unit addresses). As an alternative, you can specify the addresses separately (and non-contiguously) using the keys IP_FLOATING_ADDRESS, IP_UNIT_0_ADDRESS, and IP_UNIT_1_ADDRESS.
IP_END_ADDRESS	(IP address)	
CIDR	(network/mask)	
MULTICAST_CIDR	(IP address)	
LOGICAL_INTERFACE	**LOGICAL_INTERFACE**_*n*	(where *n* is an interface number, beginning with 1)
GATEWAY	(IP address)	This key can be specified in the MGMT_NETWORK section or OAM_NETWORK section, but not both

[Section] / Key	Value	Remarks
[PXEBOOT_NETWORK]		
PXEBOOT_CIDR	(network/mask)	
[LICENSING]		
LICENSE_FILE_NAME	(filename or full path to license file)	
[SECURITY]		
CONFIG_WRSROOT_PW_AGE	(number of days)	
SSL_REST_API	**Y** or **N**	
SELF_SIGNED	**Y** or **N**	
CERTIFICATE_FILE_NAME	(filename or full path to license file)	Required only if SELF_SIGNED=N
CERTIFICATE_PASSWORD	(string)	Required if CERTIFICATE_FILE_NAME is password-protected
FIREWALL_RULES_FILE	(full path to a rules file)	Optional if changes to the default firewall are required
[BOARD_MANAGEMENT_NETWORK]		
VLAN	(VLAN id)	
MTU	(MTU size)	
SUBNET	(network/mask)	
[CEILOMETER]		
TIME_TO_LIVE	(seconds)	
[AUTHENTICATION]		
ADMIN_PASSWORD	(string)	
[VERSION]		
RELEASE	4.0	Checked by **config_validator**

The following example is provided for reference.

```
[STORAGE]
; Storage Configuration
CINDER_BACKEND=lvm
DATABASE_STORAGE=20
IMAGE_STORAGE=10
BACKUP_STORAGE=42
CINDER_DEVICE=/dev/sdb
CINDER_STORAGE=110

;LOGICAL_INTERFACE_<number>
;  LAG_INTERFACE   <Y/N>
;  LAG_MODE        One of 1) Active-backup policy
;                         2) Balanced XOR policy
```

```
;                          4) 802.3ad (LACP) policy
;                  Interface for pxebooting can only be LACP
;  INTERFACE_MTU   <mtu size>
;  INTERFACE_PORTS <comma separated list of ethernet interfaces>

[LOGICAL_INTERFACE_1]
LAG_INTERFACE=N
;LAG_MODE=
INTERFACE_MTU=1500
INTERFACE_PORTS=eth1

[LOGICAL_INTERFACE_2]
LAG_INTERFACE=N
;LAG_MODE=
INTERFACE_MTU=1500
INTERFACE_PORTS=eth0

[MGMT_NETWORK]
; Management Network Configuration
CIDR=192.168.204.0/24
MULTICAST_CIDR=239.1.1.0/28
DYNAMIC_ALLOCATION=Y
IP_START_ADDRESS=192.168.204.2
IP_END_ADDRESS=192.168.204.99
LOGICAL_INTERFACE=LOGICAL_INTERFACE_1

;[INFRA_NETWORK]
; Infrastructure Network Configuration

[OAM_NETWORK]
; External OAM Network Configuration
CIDR=128.224.150.0/23
MULTICAST_CIDR=239.1.1.0/28
GATEWAY=128.224.150.1
IP_FLOATING_ADDRESS=128.224.151.212
IP_UNIT_0_ADDRESS=128.224.151.192
IP_UNIT_1_ADDRESS=128.224.151.193
LOGICAL_INTERFACE=LOGICAL_INTERFACE_2

[DNS]
; DNS Configuration
NAMESERVER_1=128.224.144.130
NAMESERVER_2=8.8.8.8
NAMESERVER_3=8.8.4.4

[NTP]
; NTP Configuration
NTP_SERVER_1=0.pool.ntp.org
NTP_SERVER_2=1.pool.ntp.org
NTP_SERVER_3=2.pool.ntp.org

[LICENSING]
LICENSE_FILE_NAME=license.lic

[SECURITY]
ENABLE_HTTPS=N
FIREWALL_RULES_FILE=/home/wrsroot/iptables3.rules
CONFIG_WRSROOT_PW_AGE=45

[AUTHENTICATION]
ADMIN_PASSWORD=admin

[VERSION]
RELEASE=4.0
```

Adding Hosts Using the host-add Command

You can add hosts to the system inventory using the command line.

There are several ways to add hosts to HCG 4.0; for an overview, see Methods for Adding and Configuring Hosts on page 31. Instead of powering up each host and then defining its personality and other characteristics interactively, you can use the **system host-add** command to define hosts before you power them up. This can be useful for scripting an initial setup.

NOTE: On systems that use static IP address assignment on the management network, new hosts must be added to the inventory manually and assigned an IP address using the **system host-add** command. If a host is not added successfully, the host console displays the following message at power-on:

```
This system has been configured with static management
and infrastructure IP address allocation. This requires
that the node be manually provisioned in System
Inventory using the 'system host-add' CLI, GUI, or
sysinv-api equivalent.
```

Procedure

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 a host and specify its personality. You can also specify the device used to display messages during boot.

   NOTE: The **hostname** parameter is required for compute hosts. For controller and storage hosts, it is ignored.

   ```
   ~(keystone_admin)$ system host-add  -p personality -n hostname \
   [-l location] [-o install_output[-c console]] [-b boot_device] \
   [-r rootfs_device] [-m mgmt_mac] [-i mgmt_ip] [-D ttys_dcd] \
   [-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 (used for compute nodes only)

   personality

   is the host type (**controller**, **storage**, or **compute**)

location

is a string describing the location of the host

console

is the output device to use for message display on the host (for example, **tty0**). The default is **ttys0, 115200**.

install_output

is the format for console output on the host (**text** or **graphical**). The default is **text**.

NOTE: The **graphical** option currently has no effect. Text-based installation is used regardless of this setting.

boot_device

is the host device for boot partition, relative to **/dev**. The default is **sda**.

rootfs_device

is the host device for rootfs partition, relative to **/dev**. The default is **sda**.

mgmt_mac

is the MAC address of the port connected to the internal management or PXE boot network.

mgmt_ip

is the IP address of the port connected to the internal management or PXE boot network, if static IP address allocation is used.

ttys_dcd

is set to **True** to have any active console session automatically logged out when the serial console cable is disconnected, or **False** to disable this behavior. The server must support data carrier detect on the serial console port.

bm_type

is the board management controller type (**iLO3**, **iOL4** or **Quanta**)

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_password

is the password for board management controller access

For example:

```
~(keystone_admin)$ system host-add -n compute-0 -p compute -m 08:00:27:5C:97:DB
+---------------------+--------------------------------------+
| Property            | Value                                |
+---------------------+--------------------------------------+
| action              | none                                 |
```

```
| administrative      | locked                                   |
| availability        | offline                                  |
| bm_ip               | None                                     |
| bm_mac              | None                                     |
| bm_type             | None                                     |
| bm_username         | None                                     |
| boot_device         | sda                                      |
| capabilities        | {u'bm_region': u'External'}              |
| config_applied      | None                                     |
| config_status       | None                                     |
| config_target       | None                                     |
| console             | tty0                                     |
| created_at          | 2015-12-24T12:04:56.114817+00:00         |
| hostname            | compute-1                                |
| id                  | 5                                        |
| install_output      | graphical                                |
| invprovision        | None                                     |
| location            | {}                                       |
| mgmt_ip             | None                                     |
| mgmt_mac            | 08:00:27:5c:97:db                        |
| operational         | disabled                                 |
| personality         | compute                                  |
| reserved            | False                                    |
| rootfs_device       | sda                                      |
| serialid            | None                                     |
| software_load       | 15.10                                    |
| task                | None                                     |
| ttys_dcd            | None                                     |
| updated_at          | None                                     |
| uptime              | 0                                        |
| uuid                | 61aed626-8301-4f76-a895-ff16ce9f4fe2     |
| vim_progress_status | None                                     |
+---------------------+------------------------------------------+
```

2. With **controller-0** running, start the host.

   The host is booted and configured with a personality.

Postrequisites

After adding the host, you must provision it according to the requirements of the personality. For more information, see Software Installation Workflow on page 2.

Adding Hosts in Bulk

You can add an arbitrary number of hosts using a single CLI command.

Procedure

1. Prepare an XML file that describes the hosts to be added.

   For more information, see Bulk Host XML File Format on page 78.

   You can create a configuration file using the **config_gui** utility provided with the HCG 4.0 Guest Software Development Kit. For more information, see the *HCG 4.0 Software Development Kit: wrs-configutilities—Configuration Utilities*.

You can also create the XML configuration file from an existing, running configuration using the **system host-bulk-export** command. For more information, see Exporting Host Configurations on page 80.

2. Run the **system host-bulk-add** utility.

   The command syntax is:

   ```
   ~[keystone_admin]$ system host-bulk-add xml_file
   ```

   where *xml_file* is the name of the prepared XML file.

3. Power on the hosts to be added, if required.

NOTE: Hosts equipped with board management modules can be powered on automatically using settings in the XML file.

The hosts are configured. The utility provides a summary report, as shown in the following example:

```
Success:
compute-0
compute-1
Error:
controller-1: Host-add Rejected: Host with mgmt_mac 08:00:28:A9:54:19 already exists
```

Bulk Host XML File Format

Hosts for bulk addition are described using an XML document.

The document root is **hosts**. Within the root, each host is described using a **host** node. To provide details, child elements are used, corresponding to the parameters for the **host-add** command.

The following elements are accepted. Each element takes a text string. For valid values, refer to the CLI documentation.

Element	Remarks
hostname	A unique name for the host.
personality	The type of host.
mgmt_mac	The MAC address of the management interface.
mgmt_ip	The IP address of the management interface.
bm_mac	The MAC address of the board management module, if present.
bm_ip	The IP address of the board management module, if present.

Element	Remarks
bm_type	The board management module type.
bm_username	The username for board management module authentication.
bm_password	The password for board management module authentication.
power_on	An empty element. If present, powers on the host automatically using the specified board management module.
install_output	The display mode to use during installation (text or graphical). The default is **text**.
console	If present, this element specifies the port, and if applicable the baud, for displaying messages. If the element is empty or not present, the default setting **ttyS0,115200** is used.
rootfs_device	The device to use for the rootfs partition, relative to **/dev**.
boot_device	The device to use for the boot partition, relative to **/dev**.
location	A description of the host location.

The following sample describes a controller, three compute nodes, and two storage nodes:

```
<?xml version="1.0" encoding="UTF-8" ?>
<hosts>
    <host>
        <personality>controller</personality>
        <mgmt_mac>08:00:27:19:b0:c5</mgmt_mac>
        <install_output>text</install_output>
        <location>System12/A4</location>
    </host>
    <host>
        <hostname>compute-0</hostname>
        <personality>compute</personality>
        <mgmt_mac>08:00:27:dc:42:46</mgmt_mac>
        <mgmt_ip>192.168.204.50</mgmt_ip>
        <install_output>text</install_output>
        <console></console>
    </host>
    <host>
        <hostname>compute-1</hostname>
        <personality>compute</personality>
        <mgmt_mac>08:00:27:87:82:3E</mgmt_mac>
        <mgmt_ip>192.168.204.51</mgmt_ip>
        <rootfs_device>sda</rootfs_device>
        <install_output>text</install_output>
    </host>
    <host>
        <hostname>compute-2</hostname>
        <personality>compute</personality>
        <mgmt_mac>08:00:27:b9:16:0d</mgmt_mac>
        <mgmt_ip>192.168.204.52</mgmt_ip>
```

```
        <rootfs_device>sda</rootfs_device>
        <install_output>graphical</install_output>
        <console></console>
        <power_on/>
        <bm_mac>08:00:27:b9:16:ac</bm_mac>
        <bm_ip>192.168.204.60</bm_ip>
        <bm_type>ilo4</bm_type>
        <bm_username>tsmith1</bm_username>
        <bm_password>mypass1</bm_password>

    </host>
    <host>
        <personality>storage</personality>
        <mgmt_mac>08:00:27:dd:e3:3f</mgmt_mac>
    </host>
    <host>
        <personality>storage</personality>
        <mgmt_mac>08:00:27:8e:f1:b8</mgmt_mac>

    </host>
</hosts>
```

Exporting Host Configurations

You can generate a host configuration file from a running configuration for re-installation, upgrade, and maintenance purposes.

You use the **system host-bulk-export** command to generate the host configuration file. You can then use this file as the basis for re-configuring the system in the case of a system re-installation or upgrade using the **system host-bulk-add** command.

The **host-bulk-export** command copies all settings (management MAC address, BM MAC address, and so on) into the host configuration file. This enables you to leverage the non-interactive and bulk installation and commissioning commands more easily.

- Run the **host-bulk-export** command to create the host configuration file.

  The command syntax is shown below.

  ```
  system host-bulk-export [--filename FILENAME]
  ```

  - Where *FILENAME* is the path and name of the output file. If the **--filename** option is not present, the default path **./hosts.xml** is used.

    The **host-bulk-export** command is an **admin** command.

    It can not be run by a tenant.

    It exports all hosts except **controller-0**.

    Certain information is not loaded into the host configuration file.

    - The power-on element is commented out. This is because we can not know what you will want to do when you run the **host-bulk-add** utility to apply this configuration to another system.
    - For a system that does not have BMC configured, the BMC elements will be left empty.

    For details on the structure and elements of the XML bulk configuration file, see Bulk Host XML File Format on page 78.

You can later use the generated host configuration file as the XML file name argument for the **system host-bulk-add** command to reconfigure the system during a system re-installation. For more information, see Re-installing a System Using an Exported Host Configuration File on page 81 and Adding Hosts in Bulk on page 77.

Re-installing a System Using an Exported Host Configuration File

You can re-install a system using the host configuration file that is generated using the **host-bulk-export** command.

Prerequisites

For the following procedure, **controller-0** must be the active controller.

Procedure

Procedure

1. Create a host configuration file using the **system host-bulk-export** command, as described in Exporting Host Configurations on page 80.
2. Copy the host configuration file to a USB drive or somewhere off the controller hard disk.
3. Edit the host configuration file as needed, for example to specify power-on or BMC information.
4. Delete all the hosts except **controller-0** from the inventory.
5. Re-install the HCG 4.0 software on **controller-0**, which must be the active controller.
6. Run **config_controller**.
7. Follow the instructions for using the **system host-bulk-add** command, as detailed in Adding Hosts in Bulk on page 77.

DRBD Sync Settings

DRBD sync settings are set to a default value but can be changed as needed to enhance performance.

The Distributed Replicated Block Device (DRBD) sync rate for the controllers is set initially to a default value of 40% of the link capacity rate reported by the user during controller configuration. This allows bandwidth for other traffic on the network. If the default value causes unwanted interruptions or delays for other processes, you can lower it to provide more bandwidth. Calculations for an optimal bandwidth must consider not only the actual link capacity, but also disk performance, network propagation speeds, and other relevant factors.

Peak utilization occurs as the controller disks are synchronized initially during installation or re-installation. For large media, this can continue for an hour or more. During this time the controllers are functional, but they are reported as **Degraded**, and **lock** and **swact** operations are unavailable.

After initial synchronization, utilization drops to levels required for incremental updates, and bandwidth requirements are not normally significant with respect to other processes.

DRBD file system synchronization uses the infrastructure interface if configured, otherwise, it uses the management interface. It is configured to use a variable resync rate: various parameters are derived from the available link bandwidth, and it assumes that several file systems sync in parallel. The default setting is 40% of available DRBD replication link bandwidth. This utilization setting may be modified using the following command:

```
~(keystone_admin)$ system drbdsync-modify --util percent
```

Tuning DRBD Sync Settings

You may need to adjust the DRBD sync rate for slower drives.

Procedure

1. To view the configuration status of controllers and to see the parameters that govern the Distributed Replicated Block Device (DRBD) sync rate, run the **drbdsync-show** command.

```
system drbdsync-show
+--------------+--------------------------------------+
| Property     | Value                                |
+--------------+--------------------------------------+
| uuid         | 0833c9ba-ecb4-409c-886a-7430ab9d01d3 |
| isystem_uuid | bfc37360-4cae-4c2f-a1e8-ec9548f5e995 |
| created_at   | 2015-12-02T15:12:12.532684+00:00     |
| updated_at   | 2015-12-02T15:12:25.580281+00:00     |
| link_util    | 40                                   |
| num_parallel | 3                                    |
| rtt_ms       | 0.2                                  |
+--------------+--------------------------------------+

+----+--------------+-------------+----------------+-------------+--------------
+---------------+
| id | hostname     | personality | administrative | operational | availability |
config_status |
+----+--------------+-------------+----------------+-------------+--------------
+---------------+
| 1  | controller-0 | controller  | unlocked       | enabled     | available    |
None          |
| 2  | controller-1 | controller  | unlocked       | enabled     | degraded     |
None          |
+----+--------------+-------------+----------------+-------------+--------------
+---------------+
```

2. Use the **drbdsync-modify** command to modify the DRBD sync rate by setting the link utilization percentage.

   Issuing this command pushes the DRBD reconfiguration to controllers, and takes approximately one minute to complete. Upon completion, the new settings have an immediate throttling effect. This command is accepted as long as controller configuration is not already in progress. You can issue the command when the DRBD re-sync operation is underway (for example, when you want to slow the sync down).

Help information for the command is as follows:

```
system help drbdsync-modify

usage: system drbdsync-modify [--util <percent>]

Modify DRBD sync rate parameters.

Optional arguments:
  --util <percent>  Engineered percentage of link utilization for DRBD sync.
```

The following is an example execution of the **drbdsync-modify** command:

```
system drbdsync-modify --util 40

+--------------+--------------------------------------+
| Property     | Value                                |
+--------------+--------------------------------------+
| uuid         | 0833c9ba-ecb4-409c-886a-7430ab9d01d3 |
| isystem_uuid | bfc37360-4cae-4c2f-a1e8-ec9548f5e995 |
| created_at   | 2015-12-02T15:12:12.532684+00:00     |
| updated_at   | 2015-12-02T15:12:25.580281+00:00     |
| link_util    | 40                                   |
| num_parallel | 3                                    |
| rtt_ms       | 0.2                                  |
+--------------+--------------------------------------+
waiting for hosts: controller-0, controller-1 to finish configuring . . . . . .
DRBD configuration finished.
```

B

Resources for Host Provisioning

Hardware Profiles

You can capture aspects of a host configuration as a *hardware profile*, and then use the profile to apply the configuration to other hosts.

You can capture the following aspects of a host configuration:

- CPU assignments for platform, vSwitch, or VM use (see *HCG 4.0 Installation: CPU Profiles on page 86*)
- Ethernet port and interface attachments (see *HCG 4.0 Installation: Interface Profiles on page 87*)
- Storage resource allocations (see *HCG 4.0 Installation: Storage Profiles on page 88*)

NOTE: Storage profiles for compute-based or CPE ephemeral storage (that is, storage profiles containing volume group and physical volume information) can be applied in two scenarios:

- on initial installation where a nova-local volume group has not been previously provisioned
- on a previously provisioned host where the nova-local volume group has been marked for removal

On a previously provisioned host, delete the nova-local volume group prior to applying the profile.

- Memory allocations for platform and VM use (see *HCG 4.0 Installation: Memory Profiles on page 90*)

You can create profiles from existing hosts (see *HCG 4.0 Installation: Creating Hardware Profiles from an Existing Host on page 90*), or define them using XML and then import them to HCG 4.0 (see *HCG 4.0 Installation: Importing Hardware Profiles on page 93*.)

To apply profiles to hosts, see *HCG 4.0 Installation: Applying Hardware Profiles on page 98*.

If you prefer, you can work with profiles using the CLI. For more information, see *HCG 4.0 Installation: Managing Hardware Profiles Using the CLI on page 99*.

CPU Profiles

A CPU profile is a named assignment of processors and cores to specific types of processing functions.

Each CPU profile assigns cores to one or more of the following types of functions:

Platform

System functions handling maintenance, inventory, and VM hosting for the host. Platform functions are always present on all types of hosts in the cluster.

vSwitch

AVS functions dedicated to handling various networking tasks for VMs (L2 switching, L3 routing, QoS, SNAT, floating IP addresses, and so on). They exist on the compute nodes only.

Shared

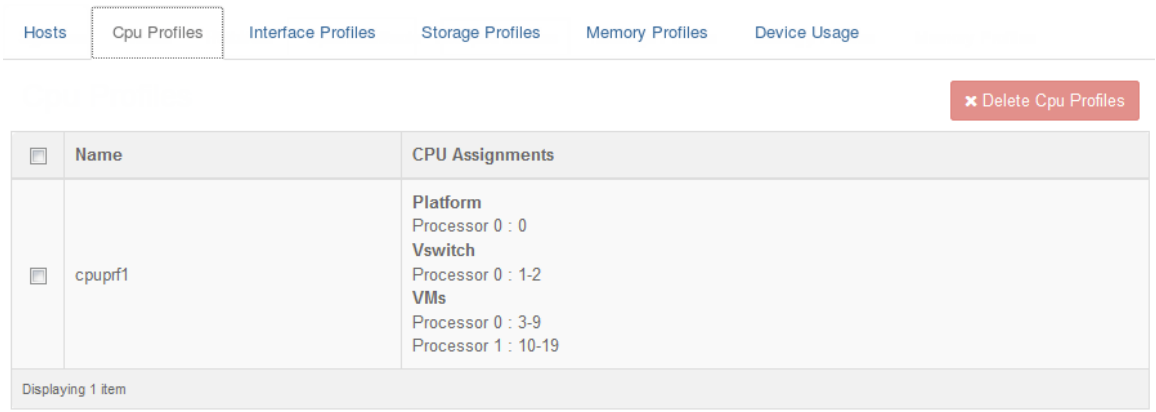
Functions handling low-load or non-real-time virtual machine tasks, implemented on a shared physical CPU in a compute node.

Virtual Machines

Functions handling virtual machines. They exist on the compute nodes only.

On controller and storage nodes, all cores are automatically assigned to platform functions, as they are the only ones available. On compute nodes, which always run a number of functions of all types, a default CPU allocation is done automatically when the system software is initially installed.

CPU profiles are shown on the **CPU Profiles** tab on the Host Inventory page.



This example lists one CPU profile, named **cpuprf1**, with the following processor and core allocation:

Table 2 **CPU Allocation Example**

Function Type	CPU Allocation
Platform	Processor 0, core 0
vSwitch	Processor 0, cores 1 and 2
Virtual Machines	Processor 0, cores 3 to 9 Processor 1, cores 10 to 19

To delete CPU profiles, select the check boxes next to the profile names, and then click **Delete CPU Profiles**. This does not affect hosts where the profiles have already been applied.

Interface Profiles

An interface profile is a named configuration of Ethernet ports and interfaces on a host.

Each interface profile assigns the following:

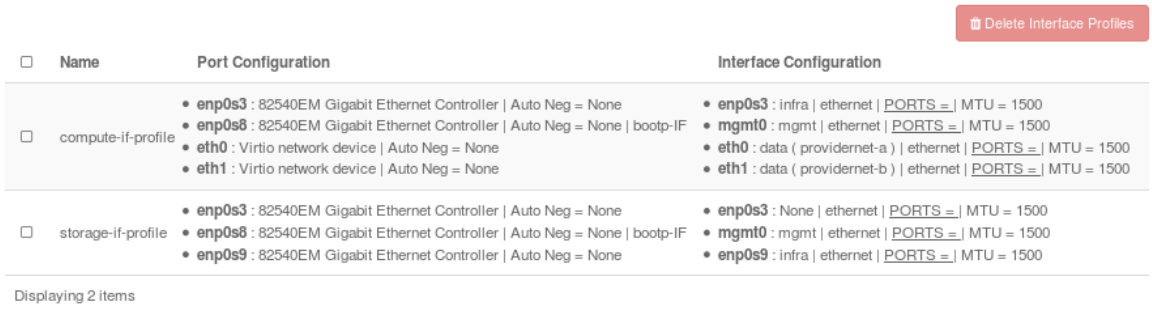
Ethernet Ports

The list of physical Ethernet ports that have been allocated to connect to a network.

Interfaces

Logical L2 interfaces defined on top of physical Ethernet ports.

Interface profiles are shown on the **Interface Profiles** tab on the Host Inventory page.



This example lists two interface profiles, as follows:

Table 3 **Interface Profiles**

Profile Name	Ports	Interfaces
compute-if-profile	enp0s3, enp0s8, eth0, eth1	enp0s3 on infrastructure network mgmt0 on internal management network eth0 on providernet-a eth1 on providernet-b
storage-if-profile	enp0s3, enp0s8, enp0s9	enp0s3 unused mgmt0 on internal management network enp0s9 on infrastructure network

The interface profile **compute-if-profile** is appropriate for a compute node. It lists four physical ports, allocated to connect to a network. It also lists four logical L2 interfaces:

- enp0s3, allocated to connect to the infrastructure network
- mgmt0, allocated to connect to the internal management network
- a data interface associating port eth0 with the provider network providernet-a.
- a data interface associating port eth1 with the provider network providernet-b.

The interface profile **storage-if-profile** is appropriate for a storage node. It lists three physical ports, and three logical L2 interfaces. Two logical interfaces connect the **enp0s8** and **enp0s9** ports to the internal management and infrastructure networks respectively. A third logical interface is unused.

To delete interface profiles, select the check boxes next to the profile names, and then click **Delete Interface Profiles**. This does not affect hosts where the profiles have already been applied.

Storage Profiles

A storage profile is a named configuration for a list of storage resources on a storage node or compute node.

Storage profiles for storage nodes are created using the **Create Storage Profile** button on the storage node Inventory Detail page.

Storage profiles for compute nodes are created using the **Create Storage Profile** button on the compute node Inventory Detail page.

Storage profiles are shown on the **Storage Profiles** tab on the Host Inventory page.

Each storage resource consists of the following elements:

Name

This is the name given to the profile when it is created.

Disk Configuration

A Linux block storage device, such as **/dev/sdb**, identifying an entire hard drive.

Storage Configuration

This field provides details on the storage type. The details differ depending on the intended type of node for the profile.

Profiles for storage nodes indicate the type of storage backend, such as **osd**.

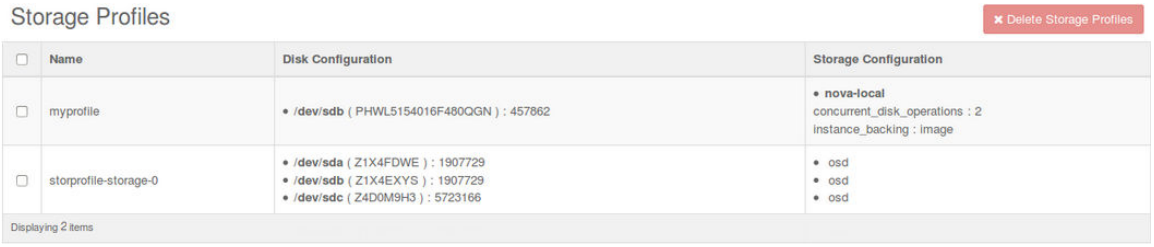
Profiles for compute nodes provide details for the **nova-local** volume group used for instance local storage. The details include the local storage backing type (LVM or CoW-Image), and for LVM-backed local storage, the size of the Instances LV volume. The maximum number of concurrent disk operations supported is also shown; this is for information only, and is not user-adjustable.

NOTE: Storage profiles for compute-based or CPE ephemeral storage (that is, storage profiles containing volume group and physical volume information) can be applied in two scenarios:

- on initial installation where a nova-local volume group has not been previously provisioned
- on a previously provisioned host where the nova-local volume group has been marked for removal

On a previously provisioned host, delete the nova-local volume group prior to applying the profile.

The example Storage Profiles screen below lists a storage profile that uses the hard drive **/dev/sdb** for image-backed **nova-local** storage, suitable for compute hosts, and a storage profile that uses hard drives **/dev/sda**, **/dev/sdb**, and **/dev/sdc** for **osd** storage, suitable for storage hosts.

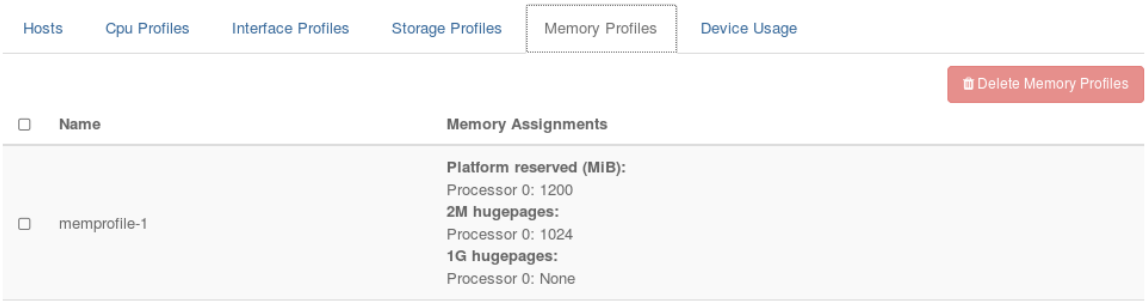


To delete storage profiles, select the check boxes next to the profile names, and then click **Delete Storage Profiles**. This does not affect hosts where the profiles have already been applied.

Memory Profiles

A memory profile is a named assignment of memory on a compute host for platform and VM use.

Memory profiles are shown on the **Memory Profiles** tab on the Host Inventory page.



This example lists one memory profile named memprofile-1. This profile assigns 1072 2M hugepages and no 1G hugepages for use by VMs, and reserves 1200 MiB for platform use.

To delete memory profiles, select the check boxes next to the profile names, and then click **Delete Memory Profiles**. This does not affect hosts where the profiles have already been applied.

Creating Hardware Profiles from an Existing Host

You can save an existing host configuration as a hardware profile.

For more information about hardware profiles, see Hardware Profiles on page 85.

If you prefer, you can use the CLI to create hardware profiles from existing hosts. For more information, see Managing Hardware Profiles Using the CLI on page 99.

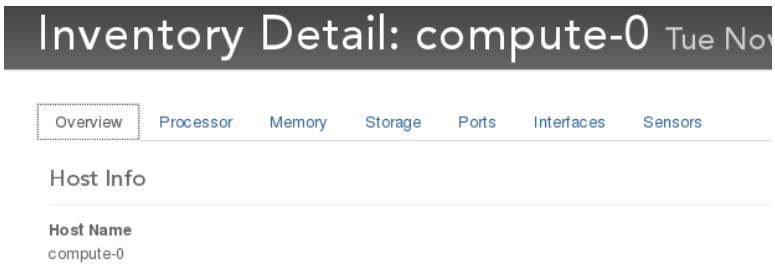
As an alternative to using a configured host, you can define hardware profiles using XML files. For more information see Importing Hardware Profiles on page 93.

Prerequisites

A host with the desired configuration is required. For information about creating processor, interface, storage, or memory configurations on a host, see the *Helion OpenStack Carrier Grade 4.0* System *Administration Guide: Inventory Detail*.

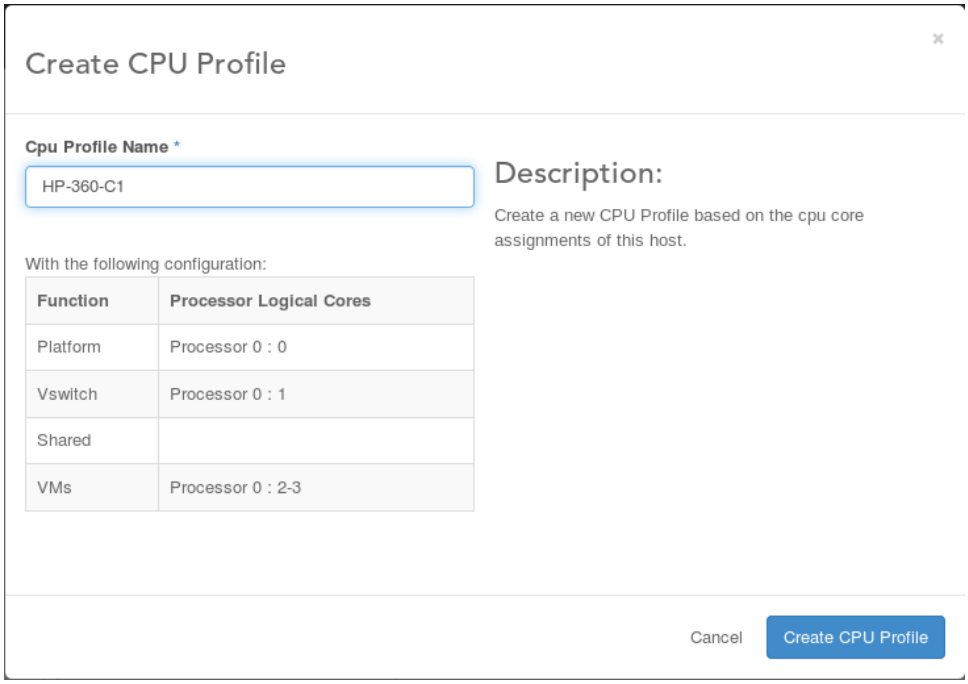
Procedure

1. Open the **Inventory Detail** page for the host.
   a) Open the Host Inventory page, available from **Admin** > **Platform** > **Host Inventory** in the left-hand pane.
   b) Select the **Hosts** tab, and then in the **Host Name** column, click the name of the host.
2. On the Inventory Detail page, select the applicable tab and then open the dialog box for the type of hardware profile you want to create.



- To create a CPU profile, select the **Processor** tab, and then on the the CPU Assignments page, click **Create CPU Profile**.

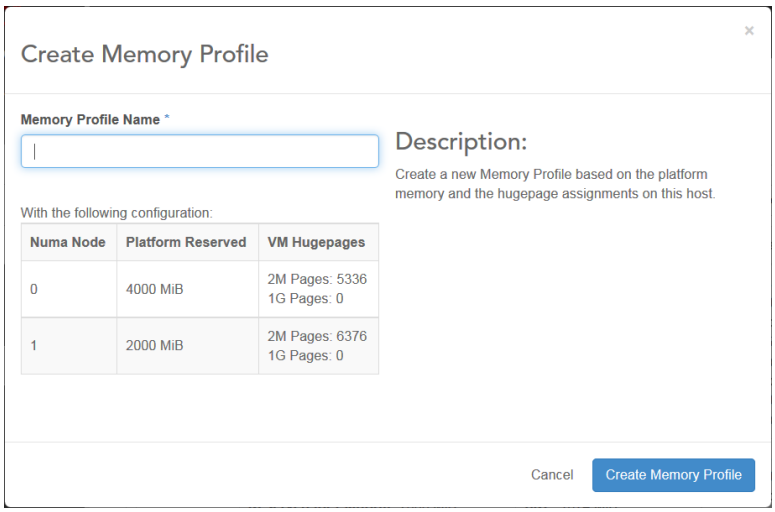
  The Create CPU Profile dialog box appears.



- To create a memory profile, select the **Memory** tab, and then on the Memory page, click **Create Memory Profile**.

NOTE: The **Create Memory Profile** button is available for compute hosts only.

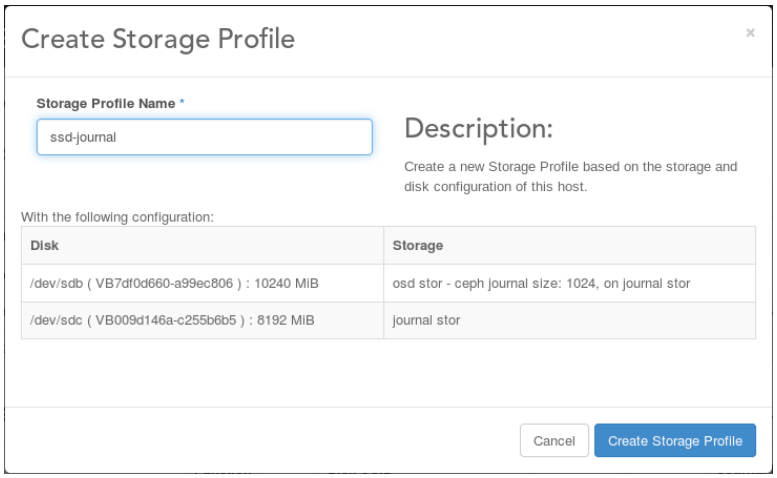
The Create Memory Profile dialog box appears.



- To create a storage profile from a storage host, select the **Storage** tab, and then on the Storage page, click **Create Storage Profile**.

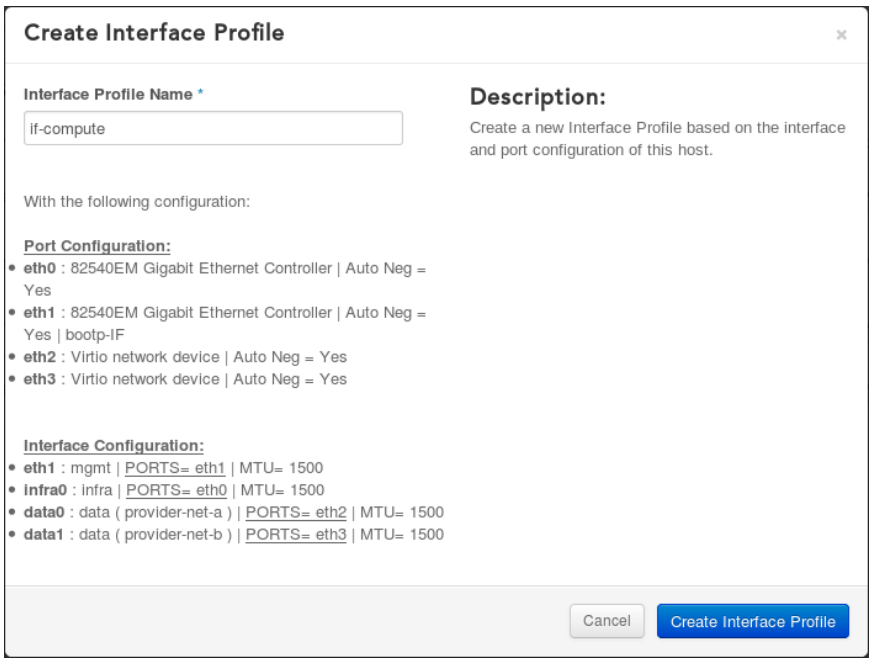
NOTE: The **Create Storage Profile** button is available for storage hosts only.

The Create Storage Profile dialog box appears.



- To create an interface profile, select the **Interfaces** tab, and then on the Interfaces page, click **Create Interface Profile**.

  The Create Interface Profile dialog box appears.



3. Provide a name for the profile.
4. Click the applicable button (**Create CPU Profile**, **Create Memory Profile**, **Create Storage Profile**, or **Create Interface Profile**) to save the profile and close the dialog box.

   The profile is created. To view it, select **Admin** > **Platform** > **Host Inventory**, and then select the applicable tab (**CPU Profiles**, **Interface Profiles**, **Storage Profiles**, or **Memory Profiles**) .

Postrequisites

To apply profiles to other hosts, see Applying Hardware Profiles on page 98 .

Importing Hardware Profiles

You can define hardware profiles using XML files, and then import them into HCG 4.0. For XML syntax and examples, see Profile File Format on page 93. For general information about hardware profiles, see Hardware Profiles on page 85.

To import profiles, use a command of the following form:

```
~(keystone_admin)$ system profile-import file
```

where *file* is the name and path of an XML file.

To apply profiles, see Applying Hardware Profiles on page 98.

Profile File Format

Profile files are defined using XML with schema-based validation.

You can define multiple profiles in a single file. If the file contains invalid XML, the entire file is rejected. If the XML is valid, then each profile is validated separately for correct data types.

The following example is provided for convenience. For a more comprehensive reference, you can find the schema at **/etc/sysinv/profileSchema.xsd** on a controller node.

```
<?xml version="1.0" encoding="utf-8"?>
<profiles xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
xsi:noNamespaceSchemaLocation="profileSchema.xsd">
<!-- This is a sample profiles file that defines:
     - a CPU profile
     - a memory profile
     - a storage profile
     - an interface profile
     Valid nodes, attributes, structures, and data types are controlled
     using profileSchema.xsd.
-->
    <cpuProfile name="cpu-2x10">
    <!--  This section defines the available processors,
          and assigns cores for platform or vSwitch use.
          Any remaining cores are available for guest VMs. -->
        <processor>
            <!-- Number of physical processors (sockets) on the server: -->
            <numberOfProcessor>2</numberOfProcessor>
            <!-- Number of physical cores in each processor: -->
            <coresPerProcessor>10</coresPerProcessor>
            <!-- Hyperthreading status of the server.
                 This reflects the setting in the BIOS, and is used to adjust
                 reports. If hyperThreading is set to true, then reports for
                 the profile are adjusted to list assigned logical cores
                 instead of assigned physical cores. For example, if physical
                 core 0 is assigned for platform use and hyperThreading is set
                 to true, then in profile reports, processors 0-1 are shown as
                 assigned for platform use.  -->
            <hyperThreading>false</hyperThreading>
        </processor>

        <platformCores>
          <!-- Number of physical cores assigned for platform use on each processor.
                 The index indicates the physical processor (0, 1, and so on).
                 If a processor is not listed here, none of its cores are assigned
                 for platform use. -->
            <processor index="0" numberOfCores="1"></processor>
        </platformCores>

        <vswitchCores>
          <!-- Number of physical cores assigned for vSwitch use on each processor.
               NOTE: This section applies to compute nodes only.
               The index indicates the physical processor (0, 1, and so on).
               If a processor is not listed here, none of its cores are assigned
               for vSwitch use. -->
            <processor index="0" numberOfCores="2"></processor>
        </vswitchCores>

    </cpuProfile>

    <memoryProfile name="mem-profile">
        <!-- This section assigns NUMA node memory for platform or huge page use.
             Any remaining memory is available for guest VM use. -->
        <numberOfProcessor>2</numberOfProcessor>
          <!-- Number of physical processors (in effect, NUMA nodes)
               on the server -->

        <platformReservedMiB>
            <!-- Memory in MiB assigned for platform use.
                 The index indicates the physical processor (0, 1, and so on). -->
            <processor index="0" size="4000"></processor>
            <processor index="1" size="2000"></processor>
        </platformReservedMiB>

        <vmHugePages2M>
            <!-- Number of 2M huge pages to reserve for guest VMs.
                 NOTE: This section applies to compute nodes only.
                 The index indicates the physical processor (0, 1, and so on). -->
            <processor index="0" size="29096"></processor>
            <processor index="1" size="30129"></processor>
        </vmHugePages2M>
```

```
        <vmHugePages1G>
            <!-- Number of 1G huge pages to reserve for guest VMs.
                 NOTE: This section applies to compute nodes only.
                 The index indicates the physical processor (0, 1, and so on). -->
            <processor index="0" size="0"></processor>
            <processor index="1" size="0"></processor>
        </vmHugePages1G>
    </memoryProfile>

  <storageProfile name="storage-profile">
            <!-- This section assigns storage resources.
                 For each device (@node), a volume function and minimum size
                 are specified. -->
        <disk node="/dev/sdb" size="228936" volumeFunc="osd" />
        <disk node="/dev/sdc" size="228936" volumeFunc="osd" />
  </storageProfile>

    <interfaceProfile name="if-hp380-profile">
        <!-- This section assigns interfaces. Valid interface types are:
               ethernetInterface
               vlanInterface
               aeInterface -->
        <ethernetInterface ifName="eth0"  mtu="1500" >
        <!--  An Ethernet interface is assigned an MTU (@mtu) and an arbitrary name
              (@ifName). All Ethernet interfaces require a child node (port)
              to identify the physical port. Ethernet Interfaces attached to
              networks use an additional child node (networks) to identify
              the networks.-->
           <port name="eth0" pciAddress="0000:03:00.0" class="Ethernet controller"
device="NetXtreme BCM5719 Gigabit Ethernet PCIe" />
           <!-- The physical port is identified using either the PCI slot address
                (recommended), or the physical port name. If both are provided,
                the PCI address is used. The class and device are required.
                pciAddress: PCI address of the Ethernet port, in the form
                              XXXX:XX:XX.X
                              where 'X' represents a hexadecimal digit.
                class:      PCI class. Valid values are:
                                Ethernet controller
                                Network controller
                  device:     Name of the device -->
        </ethernetInterface>
        <ethernetInterface ifName="data0"  mtu="1500" >
            <port name="eth1" pciAddress="0000:03:00.1" class="Ethernet controller"
device="NetXtreme BCM5719 Gigabit Ethernet PCIe" />
            <networks>
            <!-- An interface may be attached to more than one network
                (combined interface). Only mgmt/data or infra/data networks
                 can be combined on an interface. Each network is described
                 using a child node. Valid child nodes for ethernetInterface are:
                   mgmtNetwork
                   infraNetwork
                   dataNetwork
                   oamNetwork
                   pciPassthrough
                   pciSriov -->
                <dataNetwork>
                    <!-- A data network must be attached to one or more
                         provider networks.-->
                    <providerNetworks>
                        <providerNetwork name="group0-data0" />
                        <providerNetwork name="group0-data0b" />
                    </providerNetworks>
                    <!-- A data network can support IPv4 or IPv6 IP address
                         assignment for VXLAN applications, using different
                         assignment modes.
               Valid modes for IPv4 are:
                 disabled
                 pool
                 dhcp
                 static
               Valid modes for IPv6 are:
                 disabled
                 pool
                 dhcp
                 static
```

```
                auto
                link-local
                        For additional information about pool mode,
                        see the example for vlanINterface ifname="vlan11" below.   -->
                   <ipv4 mode="disabled"></ipv4>
                   <ipv6 mode="link-local"></ipv6>
                </dataNetwork>
          </networks>
        </ethernetInterface>

        <ethernetInterface ifName="eth2"  mtu="1500" >
           <port name="eth2" pciAddress="0000:03:00.2" class="Ethernet controller"
device="NetXtreme BCM5719 Gigabit Ethernet PCIe" />
        </ethernetInterface>

        <ethernetInterface ifName="passthrough-0"  mtu="1500" >
           <port name="eth3" pciAddress="0000:03:00.3" class="Ethernet controller"
device="NetXtreme BCM5719 Gigabit Ethernet PCIe" />
            <networks>
                <pciPassthrough>
                    <providerNetworks>
                        <providerNetwork name="data1" />
                    </providerNetworks>
                </pciPassthrough>
            </networks>
        </ethernetInterface>

        <ethernetInterface ifName="eth4"  mtu="1600" >
           <port name="eth4" pciAddress="0000:04:00.0" class="Ethernet controller"
device="82599ES 10-Gigabit SFI/SFP+ Network Connection" />
        </ethernetInterface>

        <ethernetInterface ifName="eth5"  mtu="1500" >
          <port name="eth5" pciAddress="0000:04:00.1" class="Ethernet controller"
device="82599ES 10-Gigabit SFI/SFP+ Network Connection" />
            <networks>
                <mgmtNetwork/>
            </networks>
        </ethernetInterface>

        <ethernetInterface ifName="data1"  mtu="1500" >
          <port name="eth6" pciAddress="0000:07:00.0" class="Ethernet controller"
device="82599ES 10-Gigabit SFI/SFP+ Network Connection" />
          <networks>
            <dataNetwork>
              <providerNetworks>
                  <providerNetwork name="group0-data1" />
              </providerNetworks>
              <ipv4 mode="disabled"></ipv4>
              <ipv6 mode="disabled"></ipv6>
            </dataNetwork>
          </networks>
        </ethernetInterface>

        <ethernetInterface ifName="eth7"  mtu="1500" >
           <port name="eth7" pciAddress="0000:07:00.1" class="Ethernet controller"
device="82599ES 10-Gigabit SFI/SFP+ Network Connection" />
        </ethernetInterface>

        <vlanInterface ifName="infra0" interface="eth4" vlanId="303" mtu="1500">
        <!-- Each VLAN interface is assigned an MTU, an Ethernet interface,
             a VLAN ID, and an arbitrary name.
             interface: The Ethernet interface referenced here must be defined
                        in the interfaceProfile section
                        using an ethernetInterface or aeInterface node.
                        It is referenced using its @ifName.
               vlanId:  valid values are between 1 and 4094 inclusive
             VLAN Interfaces attached to networks use an additional child node
(networks)
             to identify the networks. -->
        <networks>
        <!-- An interface may be attached to more than one network (combined
interface).
                Only mgmt/data or infra/data can be combined.
                Each network is described using a child node.
                Valid child nodes for vlanInterface are:
```

```
                    mgmtNetwork
                    infraNetwork
                    dataNetwork
                    oamNetwork -->
                <infraNetwork/>
            </networks>
        </vlanInterface>

        <aeInterface ifName="ae0" mtu="1500">
        <!--  Each Aggregated Ethernet interface is assigned an MTU and an
              arbitrary name (@ifName). All Aggregated Ethernet interfaces require
              - a child node (interfaces) to identify the individual Ethernet
                interfaces used.
              - a child node (aeMode) to identify the link aggregation mode. --
>
            <interfaces>
              <!-- The Ethernet interfaces referenced here must be defined
                   in the interfaceProfile section using ethernetInterface nodes.
                   They are referenced using their @ifName. -->
                <interface name="eth0"/>
                <interface name="eth2" />
            </interfaces>
            <aeMode>
                <!--valid aggregated Ethernet mode values are:
                      activeStandby
                      balanced
                      ieee802.3ad
                    For balanced or ieee802.3ad mode, txPolicy is required.
                    Valid txPolicy values are:
                        layer3+4
                        layer2
                        layer2+3 -->
                <ieee802.3ad txPolicy="layer3+4" />
            </aeMode>
        </aeInterface>


        <vlanInterface ifName="vlan11" interface="ae0" vlanId="11" mtu="1600">
          <networks>
            <dataNetwork>
              <providerNetworks>
                   <providerNetwork name="group0-ext0" />
              </providerNetworks>
              <ipv4 mode="pool">
           <pool name="pool-1" />
           <!-- name: The name of an IP address pool defined in HCG 4.0.
                      This is not validated until the profile is applied to a host. -->
        </ipv4>
              <ipv6 mode="pool">
           <pool name="pool-2" />
        </ipv6>
            </dataNetwork>
          </networks>
        </vlanInterface>

  </interfaceProfile>
</profiles>
```

Applying Hardware Profiles

You can apply hardware profiles to a host to simplify the process of configuring the host.

NOTE: Storage profiles for compute-based or CPE ephemeral storage (that is, storage profiles containing volume group and physical volume information) can be applied in two scenarios:

- on initial installation where a nova-local volume group has not been previously provisioned
- on a previously provisioned host where the nova-local volume group has been marked for removal

On a previously provisioned host, delete the nova-local volume group prior to applying the profile.

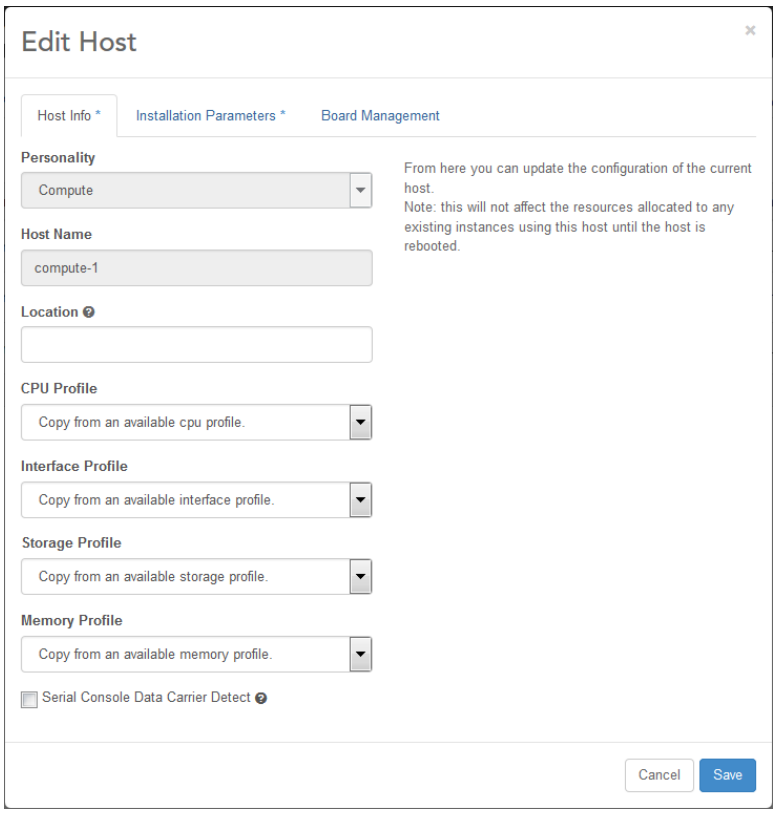
For more information about hardware profiles, see Hardware Profiles on page 85.

If you prefer, you can work with profiles using the CLI. For more information, see Managing Hardware Profiles Using the CLI on page 99.

Procedure

1. Lock the host to make changes.
   a) On the **Admin** menu of the Web administration interface, in the **System** section, select **Inventory**.
   b) Select the **Hosts** tab.
   c) In the **Actions** column, open the drop-down list for the host, and then select **Lock Host**.
   d) Wait for the host to be reported as **Locked**.
2. Click **Edit Host**.

   The Edit Host dialog box appears.



3. Select one or more profiles to apply to the host.

NOTE: The selected profiles must be applicable for the host personality. For example, a storage profile created from a storage host is applicable only to other storage hosts.

4. Click **Save** to apply the profiles and close the dialog box.

   The profiles are applied, and a confirmation message is displayed.

Managing Hardware Profiles Using the CLI

As an alternative to the web administration interface, you can use the CLI to work with hardware profiles.

For more information about hardware profiles, see Hardware Profiles on page 85.

CPU Profiles

The following command creates a CPU profile:

```
~(keystone-admin)$ system cpuprofile-add profile hostid
```

where *profile* is the name or UUID of the profile, and *hostid* is the name or UUID of the host from which to create the profile.

- To list CPU profiles:

```
~(keystone-admin)$ system cpuprofile-list
```

- To show details for a CPU profile:

```
~(keystone-admin)$ system cpuprofile-show profile
```

  where *profile* is the name or UUID of the profile.

- To delete a CPU profile:

```
~(keystone-admin)$ system cpuprofile-delete profile
```

  where *cpuprofile* is the name or UUID of the profile.

- To apply a CPU profile:

```
~(keystone-admin)$ system host-apply-cpuprofile hostid profile
```

  where *hostid* is the name or UUID of the host, and *profile* is the name or UUID of the profile.

Interface Profiles

The following command creates a new interface configuration profile named **hp360-server**.

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

- To list interface profiles:

```
~(keystone_admin)$ system ifprofile-list
+------+----------------------+----------------------+-------------------...+
| uuid | profilename          | port config          | interface config     |
+------+----------------------+----------------------+-------------------...+
| 21...| compute-if-profile   | enp0s3: 82540EM G... | enp0s3: infra | et...|
|      |                      | Controller | Auto... | mgmt0: mgmt | ethe...|
|      |                      | enp0s8: 82540EM G... | data( providernet-...|
|      |                      | Controller | Auto... | eth1: data( provid...|
|      |                      | bootp-IF eth0: Vi... | = 1500               |
|      |                      | device | Auto Neg... |                      |
|      |                      | Virtio network dev...|                      |
|      |                      | Yes                  |                      |
+------+----------------------+----------------------+----------------------+
```

- To show details for an interface profile:

```
~(keystone-admin)$ system ifprofile-show profile
```

  where *profile* is the name or UUID of the profile.

- To delete an interface profile:

```
~(keystone-admin)$ system ifprofile-delete profile
```

  where *profile* is the name or UUID of the profile.

- To apply an interface profile:

```
~(keystone-admin)$ system host-apply-ifprofile hostid profile
```

  where *hostid* is the name or UUID of the host, and *profile* is the name or UUID of the profile.

Memory Profiles

The following command creates a memory profile:

```
~(keystone-admin)$ system memprofile-add profile hostid
```

where *profile* is the name or UUID of the memory profile, and *hostid* is the name or UUID of the host from which to create the profile.

- To list memory profiles:

  ```
  ~(keystone-admin)$ system memprofile-list
  ```

- To show details for a memory profile:

  ```
  ~(keystone-admin)$ system memprofile-show profile
  ```

  where *profile* is the name or UUID of the profile.

- To delete a memory profile:

  ```
  ~(keystone-admin)$ system memprofile-delete profile
  ```

  where *memoryprofile* is the name or UUID of the profile.

- To apply a memory profile:

  ```
  ~(keystone-admin)$ system host-apply-memprofile hostid profile
  ```

  where *hostid* is the name or UUID of the host, and *profile* is the name or UUID of the profile.

Storage Profiles

The following command creates a new storage profile named **hp360-storage**, based on the storage configuration of the **storage-0** host.

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

- To list storage profiles:

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

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

- To show details for a storage profile:

  ```
  ~(keystone-admin)$ system storprofile-show profile
  ```

  where *profile* is the name or UUID of the profile.

- To delete a storage profile:

  ```
  ~(keystone-admin)$ system storprofile-delete profile
  ```

where *profile* is the name or UUID of the profile.

- To apply a storage profile:

```
~(keystone-admin)$ system host-apply-storprofile hostid profile
```

where *hostid* is the name or UUID of the host, and *profile* is the name or UUID of the profile. The following command applies the **hp360-storage** profile to the **storage-1** host.

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

NOTE: Storage profiles for compute-based or CPE ephemeral storage (that is, storage profiles containing volume group and physical volume information) can be applied in two scenarios:

- on initial installation where a nova-local volume group has not been previously provisioned
- on a previously provisioned host where the nova-local volume group has been marked for removal

On a previously provisioned host, delete the nova-local volume group prior to applying the profile.

Network Interface Provisioning

Before you can unlock and use the compute or storage nodes, you must configure the interfaces to attach them to networks.

Some interfaces require manual provisioning before the nodes can be unlocked.

- For the second controller node, you must attach an interface to the OAM network, and to the infrastructure network if used, before you can unlock the node.
- 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 *Helion OpenStack Carrier Grade 4.0 System Administration: Configuring Provider Networks* .
  If the compute cluster uses an infrastructure network, you must attach an interface to the infrastructure network before you can unlock the node. In addition, if the infrastructure uses static addressing, you must assign an IP address to the interface using the **system host-addr-add** command.

HCG 4.0 supports three types of interfaces:

Ethernet interfaces

These are created automatically for each port on the host. You must configure Ethernet interfaces by specifying the network type.

aggregated Ethernet interfaces

For link protection, you can create an aggregated Ethernet interface with two or more ports, and configure it with the network type.

VLAN interfaces

To support multiple interfaces on the same physical Ethernet or aggregated Ethernet interface, you can create VLAN interfaces and configure them with the network type.

The procedure for attaching an interface depends on the interface type.

- To attach an Ethernet interface, see Configuring Ethernet Interfaces on page 112.
- To attach an aggregated Ethernet interface, see Configuring Aggregated Ethernet Interfaces on page 115.
- To attach a VLAN interface, see Configuring VLAN Interfaces on page 120.

NOTE: To attach a data network to an existing management or infrastructure network interface, see Editing Interface Settings on page 108.

As an alternative, you can use the CLI to attach interfaces. See Network Interface Provisioning Using the CLI on page 103.

Logical interfaces of network types **oam** and **mgmt** cannot be deleted. They can only be modified to use different physical ports when required.

For more information on interfaces, see *HCG 4.0 Planning: Ethernet Interfaces*.

NOTE: On compute and storage nodes, the Ethernet interface for the internal management network is attached automatically, to support installation using PXE booting. On controller nodes, the interface for the internal management network is attached according to the settings specified during the controller configuration script. For more information, see *HCG 4.0 Installation: The Controller Configuration Script on page 20*.

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 102.

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'enp0s3'] | []         | []
|...
...| mgmt0  | mgmt ...| ethernet | None    | [u'enp0s8'] | []         | [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'enp0s10'] | []         | []
|...
...| infra0 | infra...| vlan     | 22      | []           | [u'mgmt0'] | []
|...
...| eth2   | None ...| ethernet | None    | [u'enp0s9']  | []         | []
|...
...| oam0   | oam  ...| ethernet | None    | [u'enp0s3']  | []         | []
|...
...| mgmt0  | mgmt ...| ethernet | None    | [u'enp0s8']  | []         | [u'infra0']
|...
...+--------+------...+----------+---------+--------------+------------+-------------
+...
```

To assign an IP address to an interface, use the **system host-addr-add** command. This is required for the management and infrastructure networks if static IP address assignment is in use.

```
~(keystone_admin)$ system host-addr-add node ifname ip_address prefix
```

where

node

is the name or UUID of the compute node

ifname

is the name of the interface

ip_address

is an IPv4 or IPv6 address

prefix

is the netmask length for the address

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**.

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**).

These settings are available on the **Edit Interface** and **Create Interface** dialog boxes for a host, accessible from the **Interfaces** tab of the Host Inventory page.

For more about creating and editing interfaces, see Network Interface Provisioning on page 102.

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. HCG 4.0 also supports multiple network types on the same *physical* interface, using VLAN interfaces.

You can select multiple checkboxes, 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 checkbox options can include:

none

Clears the Network Type setting.

infra

Attaches the interface to an infrastructure network.

When a compute or storage node is added to HCG 4.0, 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 internal management network.

When a compute or storage node is added to HCG 4.0, the interface used for PXE boot is assigned automatically to the internal 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 *Helion OpenStack Carrier Grade 4.0 Cloud Administration: Configuring PCI Passthrough Ethernet Interfaces*.

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 *Helion OpenStack Carrier Grade 4.0 Cloud Administration: Configuring 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 *HCG 4.0 Planning: The Ethernet MTU*.

NOTE: You cannot change the MTU for an infrastructure interface. The value from the network resource is always used.

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 *Helion OpenStack Carrier Grade 4.0 System Administration: Using VXLANs*.

Disabled

Do not assign an IPv4 address.

Static

Use a static IPv4 address.

Pool

Use an address from a pool of IPv4 addresses that has been defined and associated with the data interface.

IPv4 Address Pool

(Shown only when the **IPv4 Addressing Mode** is set to **pool**) The pool from which to assign an 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 *Helion OpenStack Carrier Grade 4.0 System Administration: Using VXLANs*.

Disabled

Do not assign an IPv6 address.

Static

Use a static IPv6 address.

Pool

Use an address from a pool of IPv6 addresses that has been defined and associated with the data interface.

Automatic Assignment

Use an automatically assigned IPv6 address.

Link Local

Use a link local IPv6 address.

IPv6 Address Pool

(Shown only when the **IPv6 Addressing Mode** is set to **pool**) The pool from which to assign an 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 *Helion OpenStack Carrier Grade 4.0 Cloud Administration: Configuring 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 *Helion OpenStack Carrier Grade 4.0 System Administration: Configuring Provider Networks*.

For more information about link aggregation, see *Link Aggregation Settings on page 119*.

For more information about IP address pools, see *Helion OpenStack Carrier Grade 4.0 System Administration: Using IP Address Pools for Data Interfaces*.

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 internal management interface is automatically set up using the default **Interface Type** (**ethernet**). If you are using LAG on the internal management network, you must update this manually to **aggregated ethernet**.

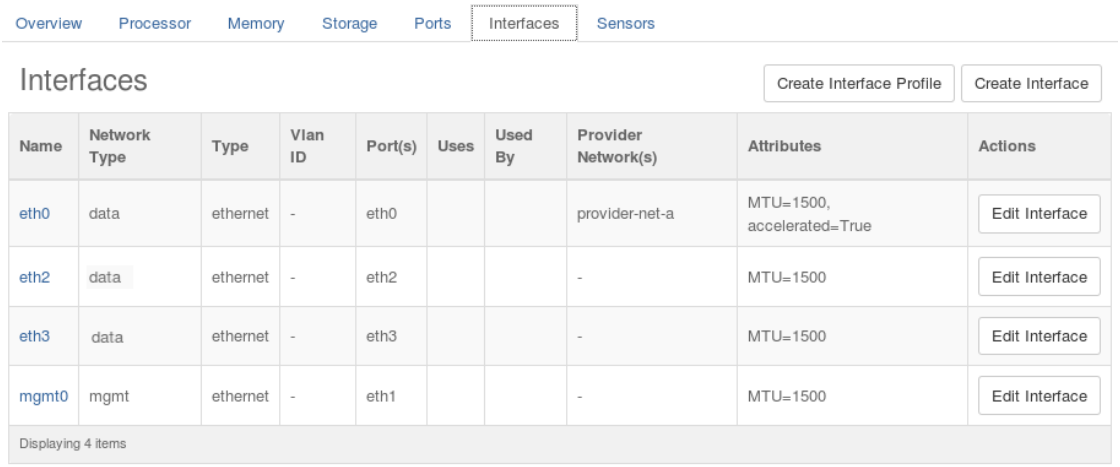
You can also edit an internal management or infrastructure interface to attach to a data network by selecting **data** as an additional Network Type for the interface, or using the CLI. For CLI instructions, see Network Interface Provisioning Using the CLI on page 103.

To add or edit IP addresses on a data interface, see *Helion OpenStack Carrier Grade 4.0 System Administration: Adding a Static IP Address to a Data Interface*.

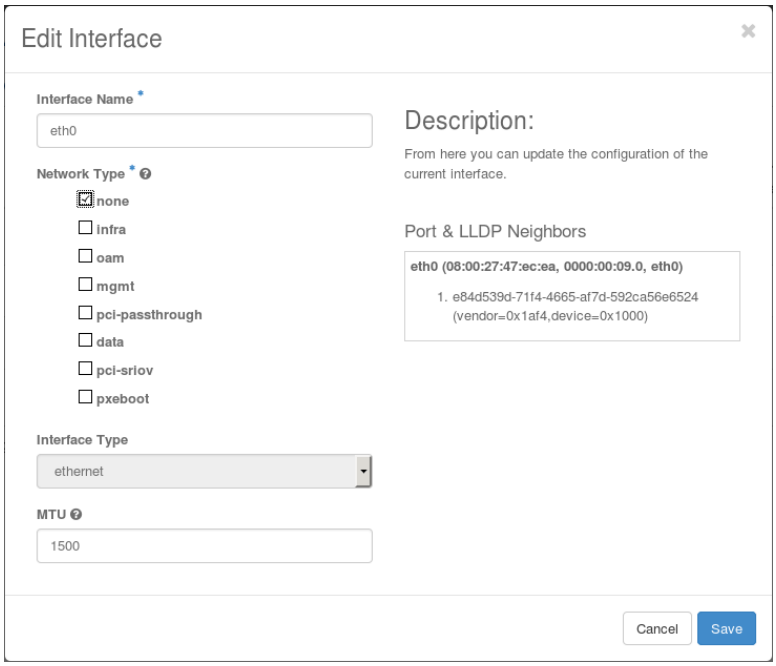
Procedure

1. Lock the host to make changes.
   a) On the **Admin** menu of the Web administration interface, in the **System** section, select **Inventory**.
   b) Select the **Hosts** tab.
   c) In the **Actions** column, open the 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**.

The settings shown depend on the interface type. For information about the available settings, see Interface Settings on page 105.

6. Unlock the host.

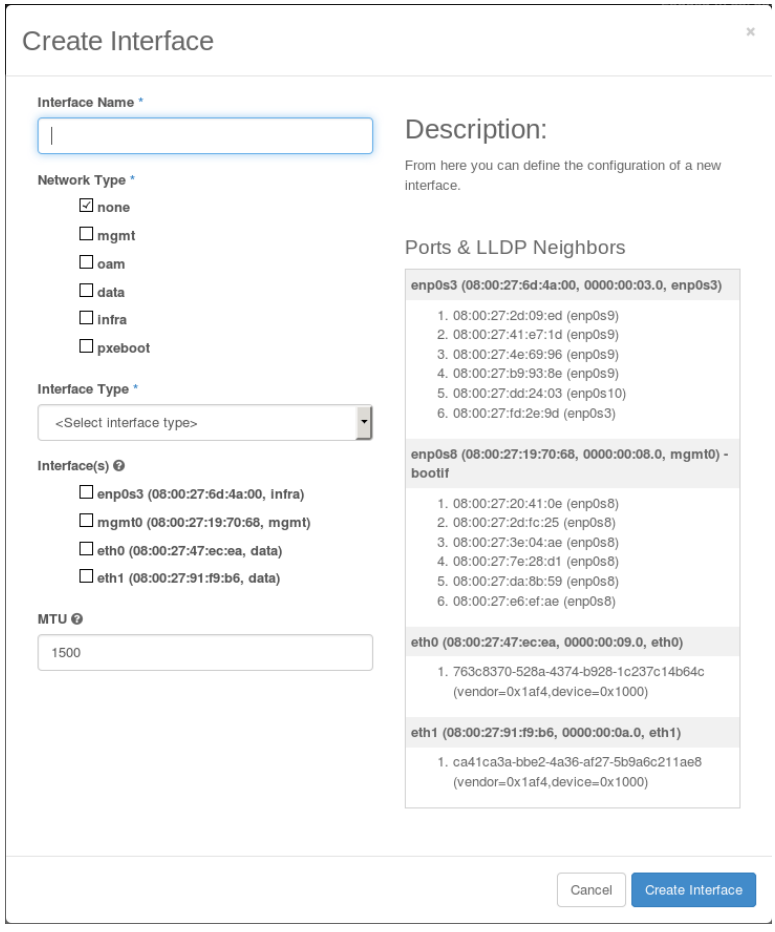
Related Links

Ports Tab
Interfaces Tab

Creating Interfaces

You can create new logical interfaces using the **Create Interface** button on the **Interfaces** tab.

This button is available only on nodes in the locked state. When the button is clicked, the Create Interface dialog box is displayed, as illustrated below.



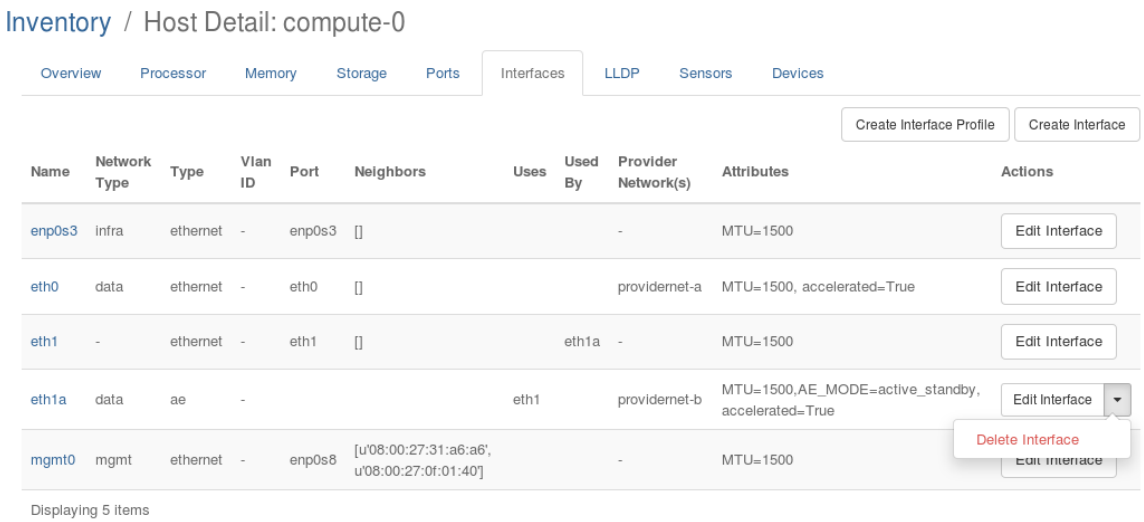
Different fields are displayed depending on the interface type selected. For more information, see Interface Settings on page 105.

Deleting Interfaces

You can delete an interface using the Web administration interface or the CLI.

NOTE: You cannot delete an interface of type **Ethernet**. You can only designate it as unused by setting its network type to **none**.

From the Web administration interface, you can delete an interface from the **Interface** tab of the Host Inventory page.



From the CLI, you can use the **system host-if-delete** command.

```
~(keystone_admin)system host-if-delete host interface
```

where

host

is the hostname or ID of the host

interface

is the name or UUID of the interface

For example, to delete an aggregated Ethernet interface named **eth1a** on **compute-0**:

```
~(keystone_admin)$ system host-if-delete compute-0 eth1a
Deleted interface: host compute-0 if eth1a
```

Marking an Ethernet Interface as Unused

You cannot delete an Ethernet interface. You can mark an Ethernet interface as unused by setting the interface type to **none** from the Web administration interface, or from the CLI using the **system host-if-modify** command.

For example, to designate the **eth1** Ethernet interface on **compute-0** as unused:

```
~(keystone_admin)$ system host-if-modify -nt none compute-0 eth1
+------------------+--------------------------------------+
| Property         | Value                                |
+------------------+--------------------------------------+
| ifname           | eth1                                 |
| networktype      | None                                 |
| iftype           | ethernet                             |
| ports            | [u'eth1']                            |
| providernetworks | None                                 |
| imac             | 08:00:27:91:f9:b6                    |
| imtu             | 1500                                 |
| aemode           | None                                 |
| schedpolicy      | None                                 |
| txhashpolicy     | None                                 |
| uuid             | 87dd1d4b-1e38-4f6c-a692-4c4199a3ef0e |
| ihost_uuid       | 3b659824-eac3-4446-af73-f4a519e8ab30 |
| vlan_id          | None                                 |
| uses             | []                                   |
| used_by          | []                                   |
| created_at       | 2016-09-22T18:24:08.092296+00:00     |
| updated_at       | 2016-09-22T18:36:46.333354+00:00     |
| sriov_numvfs     | 0                                    |
| ipv4_mode        | None                                 |
| ipv6_mode        | None                                 |
| accelerated      | [u'True']                            |
+------------------+--------------------------------------+
```

Configuring Ethernet Interfaces

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

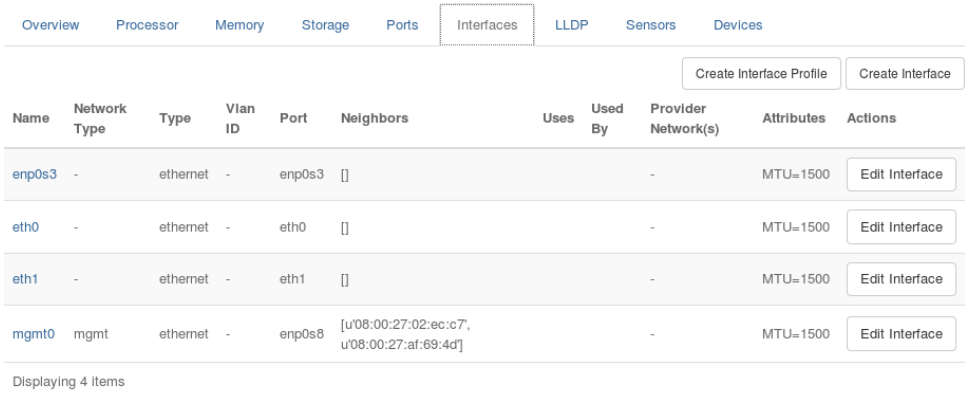
When a compute or storage node is added to HCG 4.0 and initialized, Ethernet interfaces are created automatically for each physical port detected. To support installation using PXE booting, one interface is attached automatically to the internal management network. You must attach additional interfaces manually before you can unlock the node. For more about this requirement, see Network Interface Provisioning on page 102.

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 103.

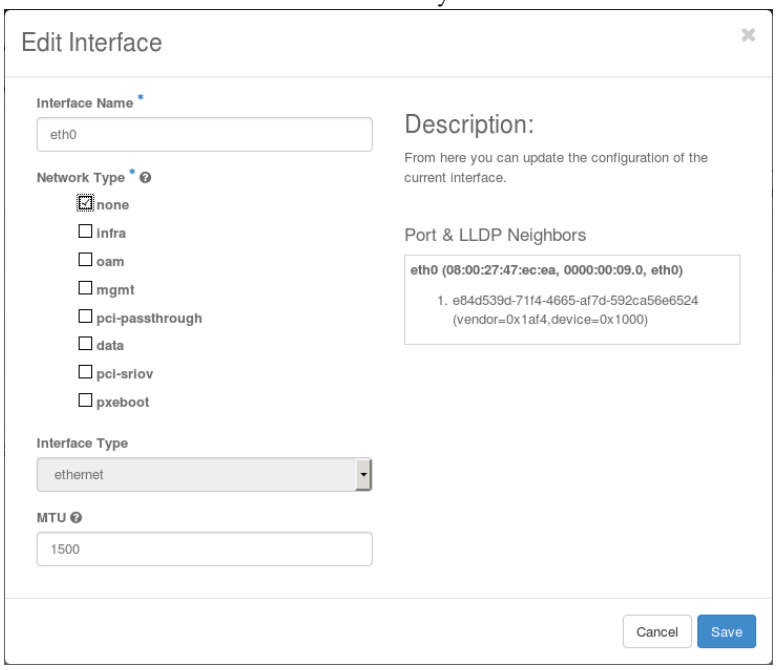
For a network that uses aggregated Ethernet or VLAN interfaces, you must create an interface in order to attach it; see Configuring Aggregated Ethernet Interfaces on page 115 or Configuring VLAN Interfaces on page 120.

Procedure

1. Open the **Inventory Detail** page for the host.
   a) Open the Host Inventory page, available from **Admin** > **Platform** > **Host Inventory** in the left-hand pane.
   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 105.

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

   For more information, see Interface Settings on page 105.

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

NOTE:

If an interface is not supported by AVS using DPDK poll-mode drivers, it will operate in non-accelerated mode leveraging kernel drivers.

The interface is attached to the network.

Configuring Ethernet Interfaces Using the CLI

You can use the CLI to attach Ethernet interfaces to networks.

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] \
[--ipv4-mode=ip4_mode [ipv4-pool addr_pool]] [--ipv6-mode=ip6_mode [ipv6-pool
addr_pool]]
```

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**.

ip4_mode

is the mode for assigning IPv4 addresses to a data interface (**static** or **pool**), for use with VXLANs

ip6_mode

is the mode for assigning IPv6 addresses to a data interface (**static** or **pool**), for use with VXLANs

addr_pool

is the name of an IPv4 or IPv6 address pool, for use with the **pool** mode of IP address assignment for data interfaces used with VXLANs

For valid values, see Interface Settings on page 105.

For example, to attach an interface named **enp0s3** to the OAM network, using Ethernet interface **enp0s3** on **controller-1**:

```
~(keystone_admin)$ system host-if-modify -n enp0s3 \
-nt oam controller-1 enp0s3
+------------------+----------------------------------------+
| Property         | Value                                  |
+------------------+----------------------------------------+
| ifname           | enp0s3                                 |
```

```
| networktype      | oam                                      |
| iftype           | ethernet                                 |
| ports            | [u'enp0s3']                              |
| providernetworks | None                                     |
| imac             | 08:00:27:58:0c:e5                        |
| imtu             | 1500                                     |
| aemode           | None                                     |
| schedpolicy      | None                                     |
| txhashpolicy     | None                                     |
| uuid             | 14300770-13bf-48fd-b9af-756ec7d8adc1     |
| ihost_uuid       | e1c47086-3230-4b92-91d0-208c55130a52     |
| vlan_id          | None                                     |
| uses             | []                                       |
| used_by          | []                                       |
| created_at       | 2015-12-10T14:24:25.967362+00:00         |
| updated_at       | 2015-12-10T17:01:08.761323+00:00         |
| sriov_numvfs     | 0                                        |
| accelerated      | [u'True']                                |
+------------------+------------------------------------------+
```

To attach an interface named **enp0s9** to a VLAN provider network named **providernet-a**, using Ethernet interface **enp0s9** on **compute-0**:

```
~(keystone_admin)$ system host-if-modify -n enp0s9 \
-nt data compute-0 enp0s9 -p providernet-a
+------------------+------------------------------------------+
| Property         | Value                                    |
+------------------+------------------------------------------+
| ifname           | enp0s9                                   |
| networktype      | data                                     |
| iftype           | ethernet                                 |
| ports            | [u'enp0s9']                              |
| providernetworks | providernet-a                            |
| imac             | 08:00:27:66:38:c6                        |
| imtu             | 1500                                     |
| aemode           | None                                     |
| schedpolicy      | None                                     |
| txhashpolicy     | None                                     |
| uuid             | 4ff97cc5-8e59-4763-9a85-c4be3996ddbe     |
| ihost_uuid       | 327b2136-ffb6-4cd5-8fed-d2ec545302aa     |
| vlan_id          | None                                     |
| uses             | []                                       |
| used_by          | []                                       |
| created_at       | 2015-12-23T13:04:49.768322+00:00         |
| updated_at       | 2015-12-23T16:16:19.540661+00:00         |
| sriov_numvfs     | 0                                        |
| ipv4_mode        | disabled                                 |
| ipv6_mode        | disabled                                 |
| accelerated      | [u'True']                                |
+------------------+------------------------------------------+
```

Configuring Aggregated Ethernet Interfaces

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 103. HCG 4.0 supports up to four ports in a LAG group.

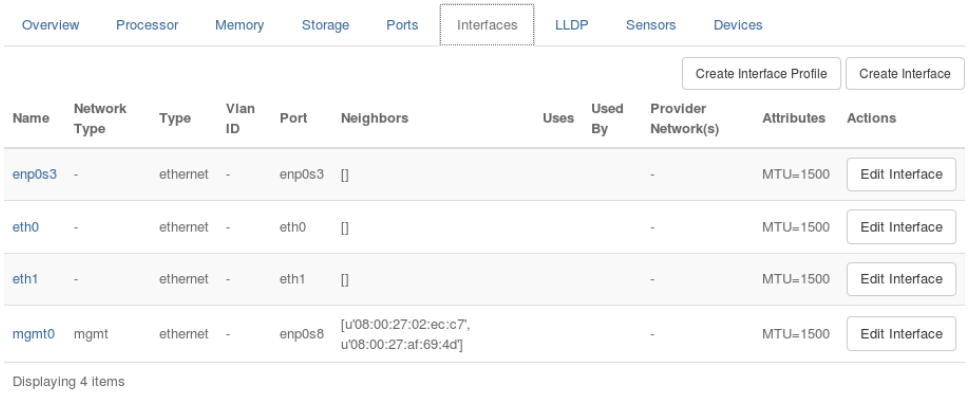
Procedure

1. Open the **Inventory Detail** page for the host.

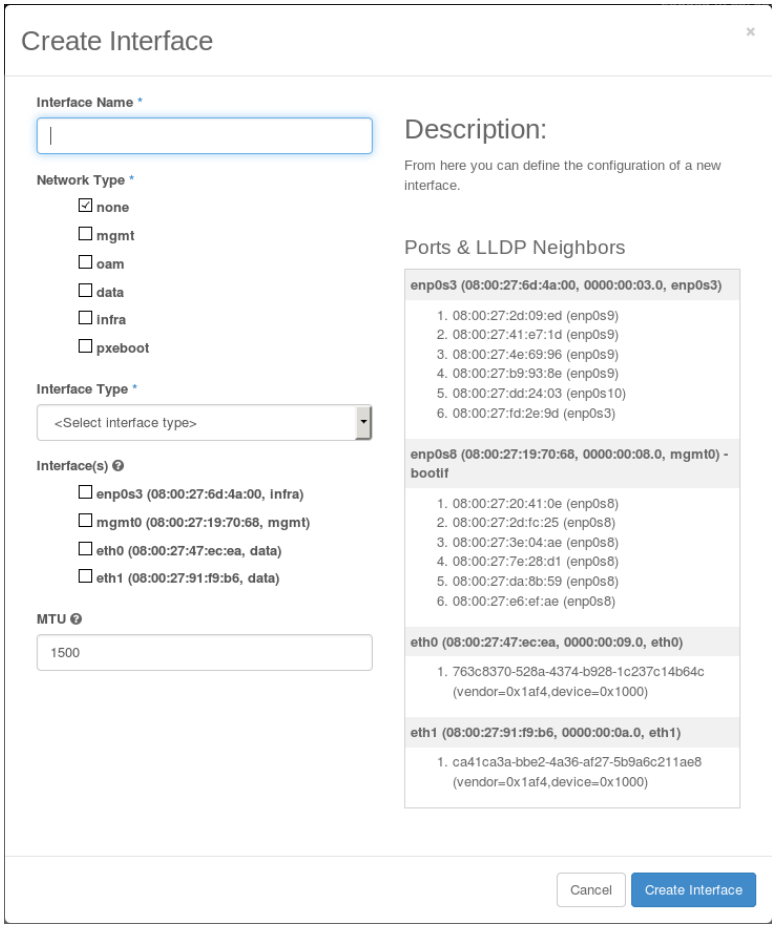
a) Open the Host Inventory page, available from **Admin** > **Platform** > **Host Inventory** in the left-hand pane.

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 105.

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 on page 119.

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 105.

9. To save your changes and close the dialog box, click **Create Interface**.

The interface is created and attached to the network.

Configuring Aggregated Ethernet Interfaces Using the CLI

You can use the CLI to attach aggregated Ethernet interfaces to networks.

HCG 4.0 supports up to four ports in a LAG group.

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 hostname -m mtu \
-a aemode -x policy ifname \
 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 **enp0s9** and **enp0s10** on **compute-0**:

```
~(keystone_admin)$ system host-if-add compute-0 -a balanced \
-x layer2 ae0 ae "provider-net-a provider-net-b" enp0s9 enp0s10
```

For more about link aggregation modes and policies, see Link Aggregation Settings on page 119.

Changing a Management Interface to Aggregated

When compute and storage nodes are provisioned, the Ethernet interface used for PXE boot is automatically assigned to the internal management network.

To configure a management LAG interface you first need to remove the internal management network type from the existing management Ethernet interface and then add a new AE interface, specifying the **mgmt** network type, **ae** interface type, **802.3 AE** mode, transmit hash policy and the slave interfaces.

Prerequisites

The node must be locked to edit an interface.

From the command line, you must first delete and then recreate the management interface.

```
~(keystone_admin)$ system host-if-modify -nt none node interface
```

where:

node

is the name of the node from which to delete an interface

interface

is the Ethernet interface to delete

You must then create the new interface.

```
~(keystone_admin)$ system host-if-add -nt mgmt -a 802.3ad -x layer2 node interface ae
none ports
```

where

node

is the name of the node

interface

is the name to be assigned to the interface

ports

are the Ethernet ports to assign

For example:

```
~(keystone_admin)$ system host-if-add -nt mgmt -a 802.3ad -x layer2 compute-0 bond0 ae
none enp0s8 enp0s9
```

Link Aggregation Settings

HCG 4.0 supports several link aggregation (LAG) operational modes.

If you select link aggregation (also known as Aggregate Ethernet) when configuring the management, infrastructure, or OAM networks, you can choose from the following operational modes. For more information, refer to the Linux kernel Ethernet Bonding Driver documentation available online.

NOTE: Ensure that the LAG mode on the corresponding Top-of-Rack (ToR) switch ports is configured to match your selection.

Table 4 **Supported Link Aggregation Operational Modes**

Mode	Description	Supported Interface Types
Active-backup (default value)	Provides fault tolerance. Only one slave interface at a time is available. The backup slave interface becomes active only when the active slave interface fails.	OAM, infrastructure, and data interfaces (compute nodes)
Balanced XOR	Provides aggregated bandwidth and fault tolerance. The same slave interface is used for each destination MAC address. This mode uses the default transmit policy, where the target slave interface is determined by calculating the source MAC address XOR'd with the destination MAC address, modulo 2. You can modify the transmit policy using the **xmit-hash-policy** option. For details, see Table 5 on page 120.	OAM, infrastructure, and data interfaces (compute nodes)
802.3ad	Provides aggregated bandwidth and fault tolerance. Implements dynamic link aggregation as per the IEEE 802.3ad (LACP) specification. You can modify the transmit policy using the xmit-hash-policy option. For details, see Table 5 on page 120. In order to support PXE booting over an aggregated management interface, the far-end switch ports must be configured in passive LACP mode. This is required because the BIOS on the host does not support LACP and cannot establish a LAG group, and therefore can use only one of the aggregated interfaces during PXE boot. If the far-end switch is configured to use active LACP, it can establish a LAG group and use either interface, potentially resulting in a communication failure during the boot process.	Management, infrastructure, and data interfaces (compute nodes)

Table 5 **xmit-hash-policy Options**

Option	Description	Supported Interface Types
Layer 2 (default value)	Hashes on source and destination MAC addresses.	OAM, internal management, infrastructure, and data interfaces (compute nodes)
Layer 2 + 3	Hashes on source and destination MAC addresses, and on source and destination IP addresses.	OAM, internal management, and infrastructure
Layer 3 + 4	Hashes on source and destination IP addresses, and on source and destination ports.	OAM, internal management, and infrastructure

Configuring VLAN Interfaces

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

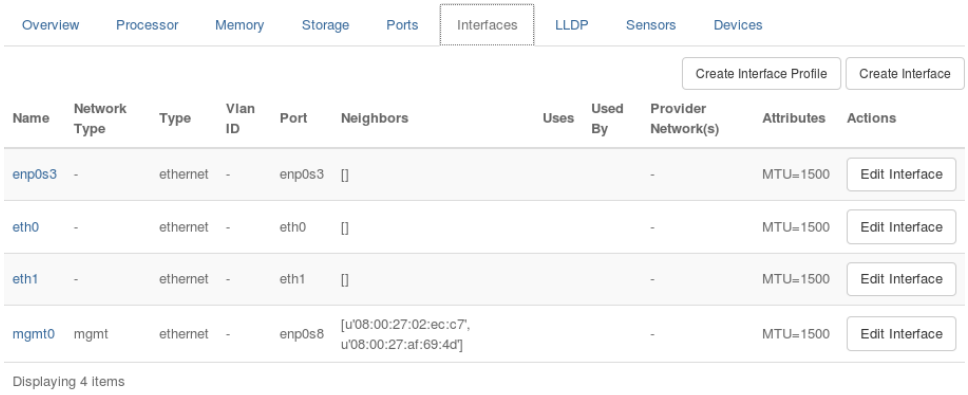
If the cluster is configured with VLAN-tagged networks, you can share an Ethernet interface by attaching it to one or more VLAN-tagged networks. You can do this using the Web administration interface or the CLI. For CLI instructions, see Network Interface Provisioning Using the CLI on page 103.

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 108.

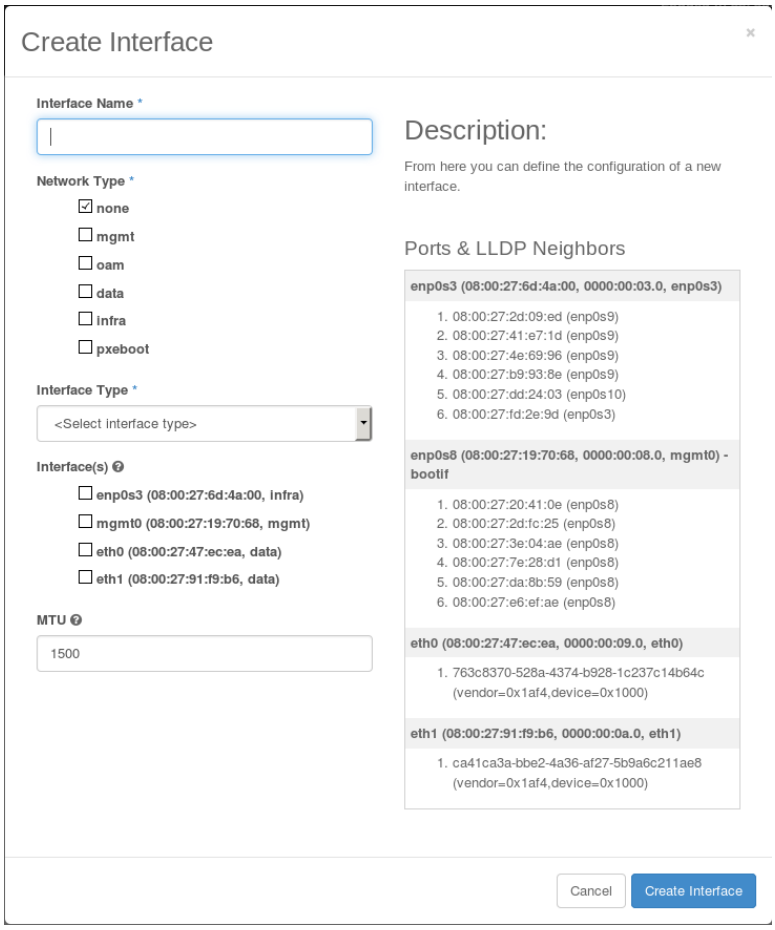
For more information about shared interfaces, see *HCG 4 .0 Planning: Shared (VLAN) Ethernet Interfaces*.

Procedure

1. Open the **Inventory Detail** page for the host.
   a) Open the Host Inventory page, available from **Admin** > **Platform** > **Host Inventory** in the left-hand pane.
   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 105.

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 102.

8. Complete any other settings required for the Network Type. For more information, see Interface Settings on page 105.

9. To save your changes and close the dialog box, click **Create Interface**.

The interface is created and attached to the network.

Configuring VLAN Interfaces Using the CLI

You can use the CLI to attach VLAN interfaces to networks.

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

```
~(keystone_admin)$ system host-if-add hostname -V vlan_id \
-nt networktype ifname 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 **enp0s8** on **storage-0**:

```
~(keystone_admin)$ system host-if-add storage-0 -V 22 -nt infra infra0 vlan enp0s8
+------------------+----------------------------------------+
| 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'enp0s8']                            |
| 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

Configuring Data Interfaces for VXLANs

For VXLANs, static endpoint IP addresses are required on compute host data interfaces.

For complete information about configuring VXLANs and assigning static IP address to data interfaces, see *Helion OpenStack Carrier Grade 4.0 Administration:Using VXLANs*.

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.

For some board management modules, you can also configure reporting for hardware sensors. For more information, see *Helion OpenStack Carrier Grade 4.0 System Administration: Sensors Tab*.

Prerequisites

To use board management on a host, the host must be equipped with a supported HP Integrated Lights Out (iLO) module (iLO3, iLO4, or Quanta). To provision a host with board management, you need the MAC address, user name, 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 125.

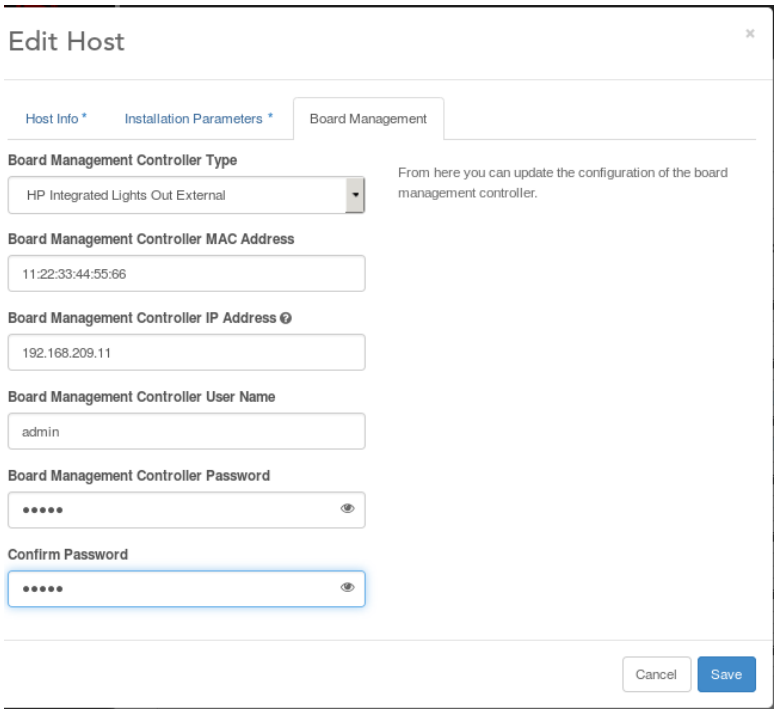
Procedure

1. Open the **Hosts** list.

   On the Host Inventory page, available from **Admin** > **Platform** > **Host Inventory** in the left-hand pane, select **Inventory**.

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.

Field	Comments
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 Password Confirm Password	Provide the user name and password configured for the iLO module.

5. Click **Save**.

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 some board management modules, you can also configure reporting for hardware sensors. For more information, see *Helion OpenStack Carrier Grade 4.0 System Administration: Sensors Tab*.

Prerequisites

To complete this task, you need the board type (iLO3, iLO4, or Quanta), MAC address, user name, 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.

Procedure

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 user name 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
```