



**Hewlett Packard
Enterprise**

HPE Integrity rx2800 i4 & rx2900 i4 Server Hewlett Packard Enterprise User Service Guide

Abstract

This document contains specific information that is intended for users of this Hewlett Packard Enterprise product. This document provides system information, server specifications, and installation procedures for the HPE Integrity rx2800 i4 Server. It also provides information on parts, troubleshooting, diagnosing server issues, and how to remove and replace server components.

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Revision history

The publishing history table identifies the publication dates of this manual. Updates are made to this publication on an unscheduled, **as needed**, basis. The updates will consist of a complete replacement manual and pertinent online or CD documentation.

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http://www.hpe.com/info/Integrity_Servers-docs

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Table Continued

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Overview

Table 1: Hardware specifications for the server

Component	Server
Processors	<p>One or two Itanium quad-core or eight-core processors:</p> <ul style="list-style-type: none">• 2.53 / 2.67 GHz eight-core 32-MB cache (170W)• 2.13 / 2.40 GHz eight-core 24-MB cache (170W)• 2.40 / 2.67 GHz quad-core 32-MB cache (170W)• 1.73 / 2.40 GHz quad-core 20-MB cache (130W) <hr/> <p>NOTE:</p> <p>Supported processors vary by geography and server model. Check the QuickSpecs for your server for supported processor models.</p> <hr/>
Memory	<p>Supports up to 24 Double Data Rate 3 (DDR3) DIMMs mounted on memory risers that attach to the system board.</p> <p>Supported DIMM sizes are as follows:</p> <ul style="list-style-type: none">• 4 GB• 8 GB• 16 GB <p>Minimum memory configuration is 8 GB (2 x 4 GB DIMMs) with a single CPU.</p> <p>Maximum memory configuration 384 GB (24 x 16 GB DIMMs).</p>
Disk drives	One to eight hot-plug SAS hard drives
PCI slots	<p>I/O riser options:</p> <ul style="list-style-type: none">• One full height full length PCIe x8 and two low profile PCIe x4 slots• One full height full length PCIe x8 and one low profile PCIe x8 slots
SAS I/O	Eight port SAS core I/O card or eight port SAS core I/O card with internal RAID
LAN I/O	Four GigE LAN ports

Table Continued

Component	Server
Management I/O	<p>One serial port, four USB 2.0 ports, one 1G/100/10 LAN port, and two VGA ports</p> <hr/> <p>NOTE:</p> <p>The serial port is intended primarily for use as a serial console port. It can be configured through iLO 3 for use with other serial devices (subject to OS and device limitations and dependencies).</p> <hr/>
Optical drive	One SATA DVD+RW drive
Power supply	<p>One power supply which supports dual range operation (Low-line 100-120 & High-line 200-240). At low-line only 800 watts are available.</p> <hr/> <p> IMPORTANT:</p> <p>The 800 W redundancy does not apply to all configurations.</p> <hr/>

Server subsystems

Internal components

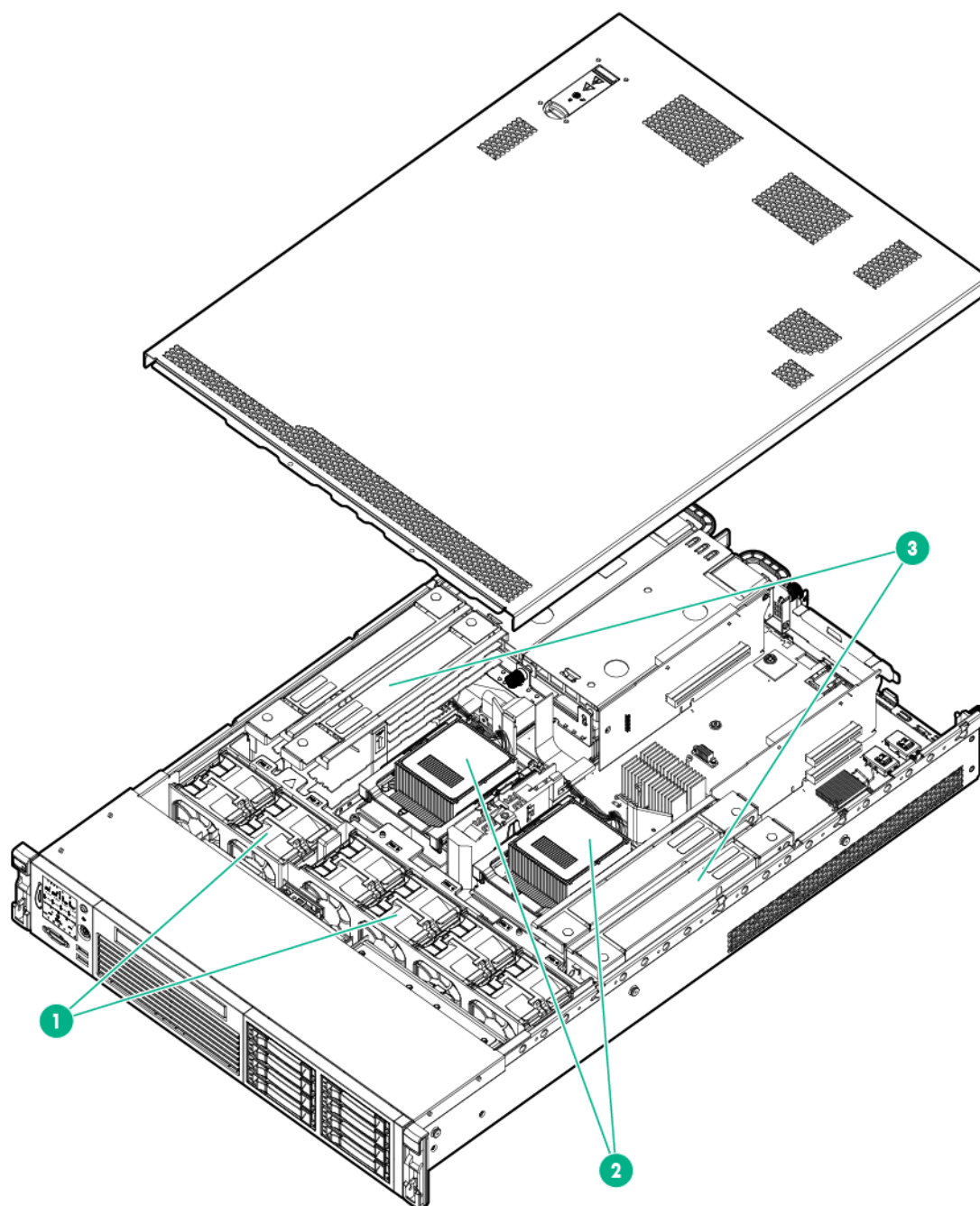


Figure 1: Internal components

1. Fans
2. Processors
3. DIMM risers

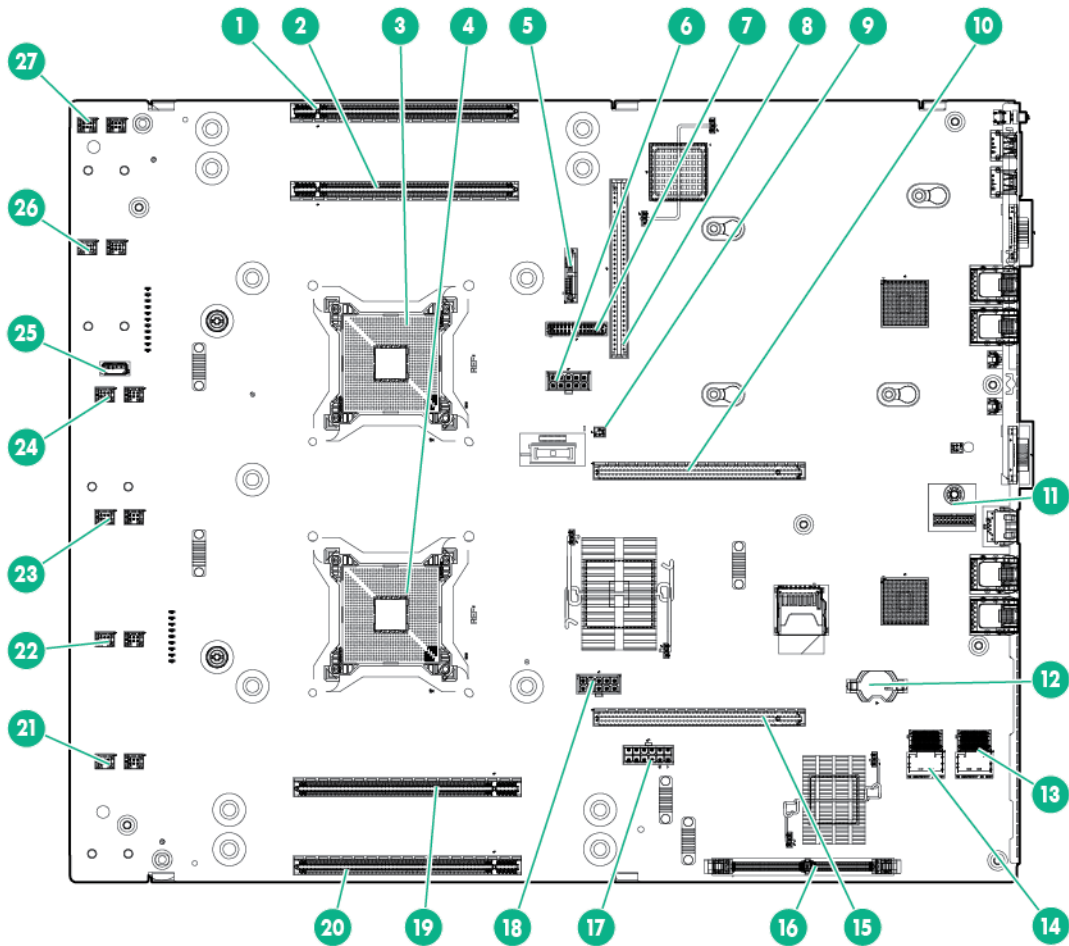


Figure 2: System board components

1. Memory riser connector 1
2. Memory riser connector 2
3. Processor socket 0
4. Processor socket 1
5. SATA optical drive connector
6. CPU 0 power connector
7. Front I/O connector
8. Power supply backplane connector
9. Intrusion switch connector
10. Primary riser connector
11. TPM connector
12. System battery
13. SAS B connector
14. SAS A connector

15. Secondary riser connector
16. SAS cache module connector
17. SAS power connector
18. CPU 1 power connector
19. Memory riser connector 3
20. Memory riser connector 4
21. Fan 6 connector
22. Fan 5 connector
23. Fan 4 connector
24. Fan 3 connector
25. Internal USB connector
26. Fan 2 connector
27. Fan 1 connector

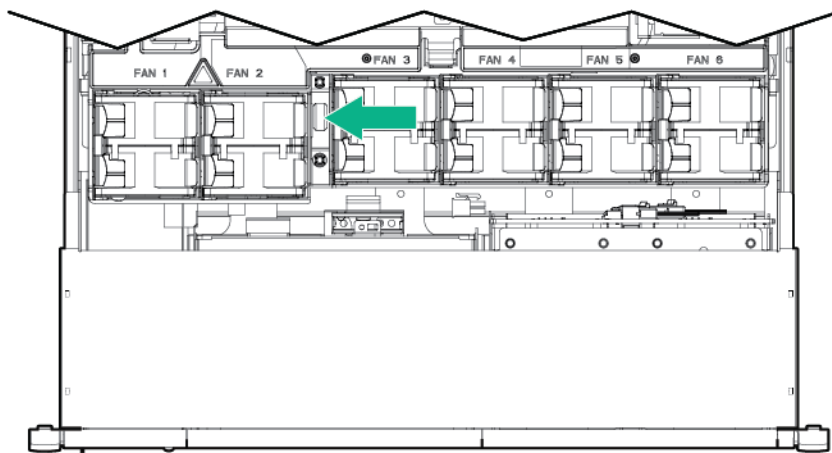


Figure 3: Internal USB location

I/O subsystem

The I/O subsystem consists of the core I/O and two optional I/O riser boards. Wake-on-LAN is not enabled on any PCIe Public slots. The server does not support PCI Hot Plug (PHP).

Both the primary and secondary I/O riser position can either be a riser that supports one full-height, full-length PCIe x8 and two low-profile PCIe x4 add-in cards or a riser that supports one full-height, full-length PCIe x8 and one low profile PCIe x8.

NOTE:

All PCIe x8 slots are electrically connected as x8 slots but are physically loaded with x16 connectors.

RAID support

The following levels of RAID support are offered:

- Zero memory
 - RAID 0, 1, 10
 - Maximum 8 drives, 2 logical volumes
 - No cache or super capacitor needed. Performance improved with cache.
- Full feature
 - RAID 0, 10, 5
 - Cache needed and installing it automatically enables the full feature firmware stack. Super capacitor is optional.
- Advanced pack
 - RAID 6, 50, 60
 - Cache needed. Advanced Pack license must be entered to enable. Super capacitor is required.

To enable Advanced Pack licensing, see [**Adding a RAID Advanced Pack license key**](#).

NOTE:

To utilize all 8 disks with the zero memory option, the following RAID configurations are possible:

- RAID 0: 1 or 2 LUNs striped with up to 8 disks
- RAID 10: 1 or 2 LUNs striped & mirrored with even number of up to 8 disks
- RAID 1: 1 LUN using 2 mirrored disks, and one additional LUN in RAID 0 or 10

Example Configurations 8 Disks with Zero Memory

- LLUN 1: RAID 1 bays 1 & 2
 - LUN 2: RAID 0 bays 3, 4, 5, 6, & 7
 - Hot Spare: bay 8
 - LUN 1: RAID 10 bays 1, 2, 3, & 4
 - LUN 2: RAID 10 bays 5, 6, 7, & 8
 - LUN 1: RAID 0 bays 1, 2, & 3
 - LUN 2: RAID 10 bays 5, 6, 7, & 8
 - Hot Spare: bay 4
-

Controls and ports

Front panel controls and ports

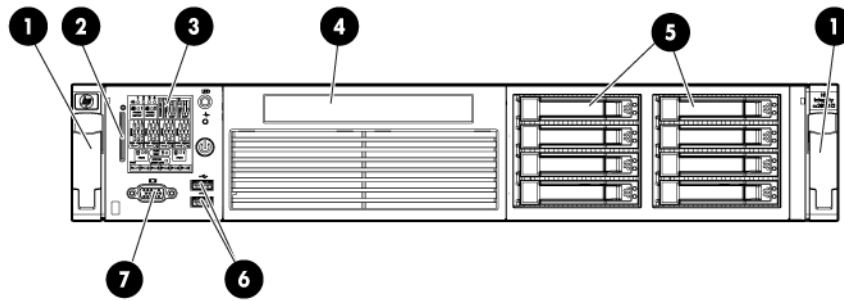


Figure 4: Front panel components

1. Quick release levers
2. iLO 3 information pull tab
3. SID
4. Optical drive bay
5. Hard drive bays
6. USB connectors
7. Video connector

Storage and media devices

The server supports up to eight hot-plug SAS HDDs, and one optical (SATA DVD+RW) drive, with LEDs that indicate activity and device statuses.

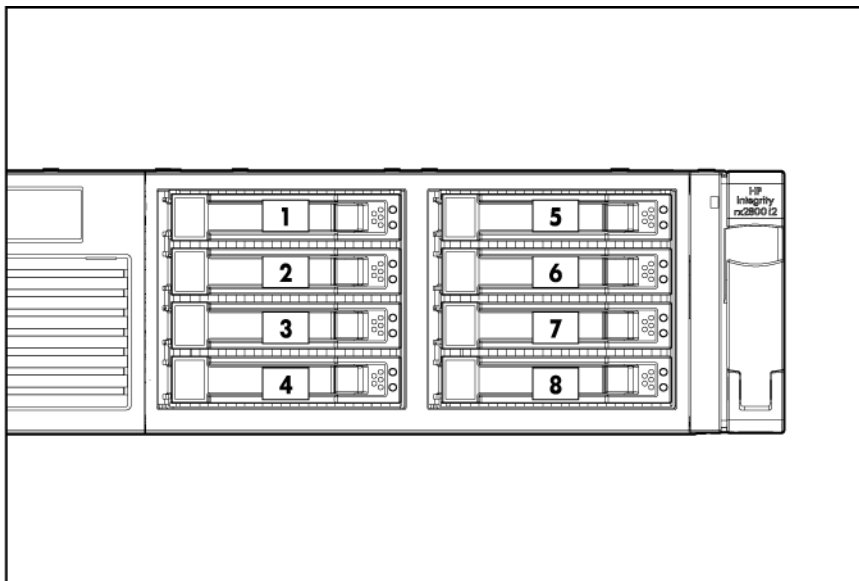


Figure 5: SAS device numbers

Rear panel controls and ports

The server rear panel includes communication ports, I/O ports, USB ports, AC power connectors, and the locator LED and button. LEDs located on the rear panel of the server signal the operational status of the rear panel components.

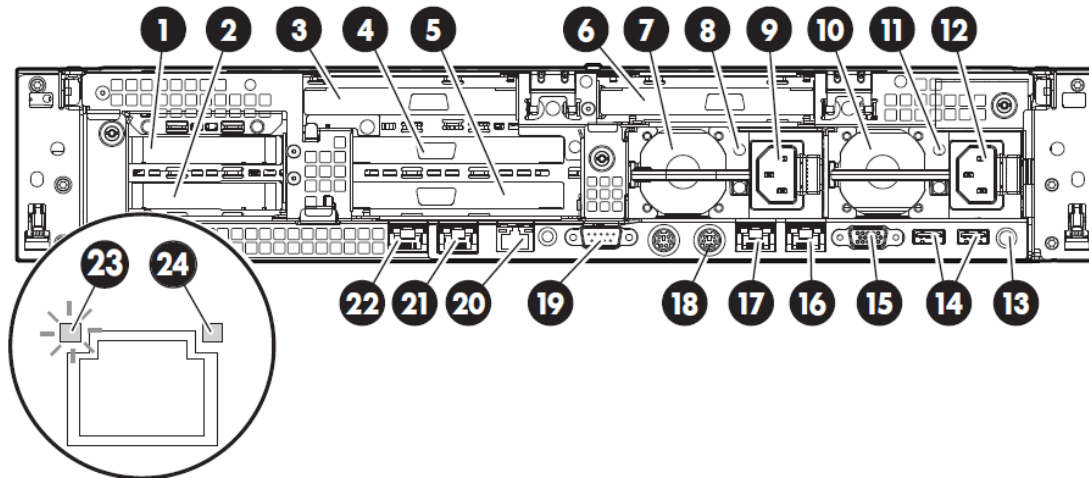


Figure 6: Rear panel components

1. PCI 5
2. PCI 6
3. PCI 4
4. PCI 2
5. PCI 3
6. PCI 1
7. Power supply 2
8. Power supply 2 LED
9. Power supply 2 power connector
10. Power supply 1
11. Power supply 1 LED
12. Power supply 1 power connector
13. UID LED button
14. USB connectors (2)
15. Video connector
16. NIC 1 connector
17. NIC 2 connector
18. iLO 3 physical presence pinhole button
19. Serial connector
20. iLO 3 connector

- 21.** NIC 3 connector
- 22.** NIC 4 connector
- 23.** NIC link LED
- 24.** NIC activity LED

Site preparation

For information on general computer room site preparation, see the [HPE Generalized Site Preparation Guide](#)

❗ IMPORTANT:

To avoid hardware damage, allow the thermal mass of the product to equalize to the temperature and humidity of the installation facility after removing the shipping materials. A minimum of one hour per 10° C (50° F) of temperature difference between the shipping facility and installation facility is required.

Server dimensions and weight

Table 2: Rack or pedestal-mounted server dimensions

Dimensions and weight	Value
Data center server dimensions	
Depth	69.2 cm (27.25 in)
Width	48.3 cm (19 in)
Height	8.9 cm (3.5 in)
Weight	Maximum configuration – 30 kg (66 lb)
Rack unit	2U

Grounding

The site building must provide a safety ground/protective earth for each AC service entrance to all cabinets.

Install a PE conductor that is identical in size, insulation material, and thickness to the branch-circuit supply conductors. The PE conductor must be green with yellow stripes. The earthing conductor is to be connected from the unit to the building installation earth or, if supplied by a separately derived system, at the supply transformer or motor-generator set grounding point.

Server electrical specifications

System power specifications

Available power (output) is the maximum DC power that the power supply can supply to the system.

Maximum input power is what the power supply requires from the AC line to deliver that maximum DC output (given worst case efficiency and maximum loading).

Maximum input current is the worst case/highest current given the lowest input voltage and the maximum input power.

Table 3: System power specifications

Parameter			
Input voltage	100 V AC	110 - 120 V AC	200 - 240 V AC
Input current (maximum)	9.3 A	9.5 A	6.6 A
Input frequency	47 to 63 Hz	47 to 53 Hz	57 to 63 Hz
Power supply maximum output power	800 W (MAX) +12V /66.7A MAX +12VSB /2.5A MAX	900 W (MAX) +12V /75A MAX +12VSB /2.5A MAX	1200 W (MAX) +12V /100A MAX +12VSB /2.5A MAX

If an overload triggers the power supply overload protection, the system is immediately powered off. To reset the power supply unit:

Procedure

1. Disconnect the power cord.
2. Determine what caused the overload by contacting an Hewlett Packard Enterprise support representative.
3. Reconnect the power cord.
4. Reboot the system.

NOTE:

If an overload occurs twice, an undetected short circuit exists.

When you use the front panel power button to turn off the server, power consumption falls below the low power consumption, but does not reach zero. To reach zero power consumption in "off" mode, disconnect all power supplies from their power sources.

Power consumption and cooling

The power consumptions listed in **Table 5** are valid for the configuration shown. Please use the HPE Power Advisor tool to obtain power information for other configurations or utilization factors.

Table 4: Standard configuration power consumption

Standard configuration	Power consumption	
One 1.46 GHz quad-core processor, 4 GB memory, one 1200 W power supply, and one SAS disk drive	360 W (maximum)	1228 Btu/h (maximum)

Server physical and environmental specifications**NOTE:**

De-rate maximum allowable dry-bulb temperature 1 °C/175 m above 900 m.

Table 5: Environmental specifications (system processing unit with hard disk)

Parameter		Value	
		Data Center Server	Office Friendly Server
Maximum Airflow		193 cubic feet/minute (CFM)	213 CFM
Operating temperature (up to 3050 m / 10000 ft)		+5° C to +40° C (+41° F to +104° F)	
Non-operating temperature		- 40° C to +80° C (–40° F to 176° F)	
Over-temperature shutdown		+51° C (+124° F)	
Operating humidity		-12 °C DP and 8% RH to 85% RH	
Non-operating humidity		8% to 90% RH non-condensing	
Acoustic Noise Emission (ISO 9296)			
Sound Power Level	Maximum configuration (disk active)	LwAd = 7.0 B	LwAd = 6.0 B
Sound Pressure Level		LpAm = 52.7 dB	LpAm = 42.4 dB
Altitude			
Operating altitude		0 to 3000 m (10,000 ft) maximum	
Non-operating altitude		0 to 4,600 m (15,000 ft) maximum	

Unpacking and inspecting the server

This section describes pre installation procedures. Ensure that you have adequately prepared your environment for installing the new server, received the components that you ordered, and verified that the server and the containers are in good condition after shipment.

Verifying site preparation

- Gather LAN information. The MAC addresses for the iLO 3 MP LAN and the system LAN are located on the iLO Network Information Tag.
- Establish a method to connect to the server console.
- Verify electrical requirements. Ensure that grounding specifications and power requirements are met.
- Validate server physical space requirements.
- Confirm environmental requirements

For server-specific information on electrical, physical space, and environmental requirements, see the site prep guide. For general site preparation information, see the *HP Generalized Site Preparation Guide* on the Hewlett Packard Enterprise website at http://www.hpe.com/info/Integrity_Servers-docs.

Inspecting the shipping containers for damage

Under normal shipping conditions, Hewlett Packard Enterprise shipping containers protect the contents. After the equipment arrives, carefully inspect each carton for signs of shipping damage. Shipping damage constitutes moderate to severe damage, such as punctures in the corrugated carton, crushed boxes, or large dents. Normal wear or slight damage to the carton is not considered shipping damage. If you find

shipping damage to the carton, immediately contact your Hewlett Packard Enterprise customer service representative.

Unpacking the server

Procedure

1. Follow the instructions printed on the outside top flap of the carton to remove the banding and the outer carton from the server pallet.
2. Remove all inner accessory cartons and the top foam cushions, leaving only the server.



IMPORTANT:

Inspect each carton for shipping damage as you unpack the server.

Verifying the inventory

The sales order packing slip lists all the equipment shipped from Hewlett Packard Enterprise. Use this packing slip to verify that all equipment has arrived.

NOTE:

To identify each item by part number, see the sales order packing slip.

Returning damaged equipment

If the equipment is damaged, immediately contact your Hewlett Packard Enterprise customer service representative. The service representative initiates appropriate action through the transport carrier or the factory and assists you in returning the equipment.

Unloading the server with a lifter



WARNING:

Use caution when using a lifter. Because of the weight of the server, to avoid injury, you must center the server on the lifter forks before lifting it off the pallet.

NOTE:

Hewlett Packard Enterprise recommends that you follow your local guidelines when lifting equipment.

Procedure

1. Unpack the server.
2. Unroll the bottom corrugated tray corresponding to the side on which the lifter is to be placed, and then slide the server as close to that edge of the pallet as possible.
3. Break off any foam packaging that can prevent the lifter from being fully inserted under the server. Do not remove the foam packaging from the corners of the server. This foam is required to elevate the server and to enable the forks of the lifter to be placed under the server.
4. Insert the lifter forks under the server.
5. Carefully roll the lifter forward until it is fully positioned against the side of the server.

6. Slowly raise the server off the pallet until it clears the pallet cushions.
7. Carefully roll the lifter and server away from the pallet. Do not raise the server any higher than necessary when moving it over to the rack.

Installing the server

Safety information

Follow the instructions carefully to prevent injury and equipment damage when performing removal and replacement procedures. Voltage might be present within the server. Many assemblies are sensitive to damage by ESD.

Follow the safety considerations listed to ensure safe handling of components, to prevent injury, and to prevent damage to the server:

- If installing a hot-swappable or hot-pluggable component when power is applied (fans are running), reinstall the server cover immediately to prevent overheating.

If installing a hot-pluggable component, complete the required software intervention prior to removing the component.

- If installing an assembly that is neither hot-swappable nor hot-pluggable, disconnect the power cable from the external server power receptacle before starting the installation.



WARNING:

Ensure that the system is powered off and all power sources are disconnected from the server before removing or installing server hardware (unless you are removing or installing a hot-swappable or hot-pluggable component). Voltage is present at various locations within the server whenever an AC power source is connected. This voltage is present even when the main power switch is off. Failure to observe this warning might result in personal injury or equipment damage.

-
- Do not wear loose clothing that might snag or catch on the server or on other components.
 - Do not wear clothing subject to static charge buildup, such as wool or synthetic materials
 - If installing an internal assembly, wear an antistatic wrist strap and use a grounding mat, such as those included in the Electrically Conductive Field Service Grounding Kit.
 - Handle accessory boards and components by the edges only. Do not touch any metal edge connectors or any electrical components on accessory boards.

Preventing electrostatic discharge

To prevent damaging the system, be aware of the precautions you need to follow when setting up the system or handling parts. A discharge of static electricity from a finger or other conductor might damage system boards or other static-sensitive devices. This type of damage might reduce the life expectancy of the device.

To prevent electrostatic damage:

- Avoid hand contact by transporting and storing products in static-safe containers.
- Keep electrostatic-sensitive parts in their containers until they arrive at static-free workstations.
- Place parts on a grounded surface before removing them from their containers.

- Avoid touching pins, leads, or circuitry.
- Always be properly grounded when touching a static-sensitive component or assembly.

Installation sequence and checklist

Step	Description	Completed
1	Perform site preparation.	
2	Install the server into a rack or pedestal.	
3	Connect cables to the server.	
	a. Connect the AC input power cable.	
	b. Connect LAN core I/O cable.	
	c. Connect the iLO 3 MP LAN cable.	
4	Connect and set up the console for access.	
5	Power on the server.	
6	From iLO MP, access UEFI.	
7	Boot the operating system.	
8	Using Smart Update Manager (HPSUM), download the latest firmware.	

Installing the server into a rack or pedestal

Rack installation

HPE rack

HPE servers that are installed into racks are shipped with equipment-mounting slides. The *HPE 2U Quick Deploy Rail System Installation Instructions for HPE Products* ships with each set of slides. Follow the steps in this installation guide to determine where and how to install the server into the rack.

For more information on rack deployment, stabilization and transportation, see the **10000 Series G2 Rack Best Practices Guide**.

Non-HPE rack

For information on installing a rx2800 i4 server in a third party rack, see the QuickSpecs located on the HPE Integrity rx2800 i4 Server product page at

<http://h41370.www4.hpe.com/quickspecs/overview.html>

To view the QuickSpecs, click the **HTML** or **PDF** link under **Quick Specs**.

Pedestal kit installation

If you order the rackless configuration option, the server ships with a pedestal mount. The pedestal mount is packaged in a separate carton that is attached to the server carton.

Remove the rails from the server

If your server has rails when you receive it, you need to remove the rails before mounting it in the pedestal kit. To remove the component:

Procedure

1. Slightly pull the rail lock away from the rail to unlock the rail. See [Removing the rails from the server](#)
2. Slide the rail toward the front of the server to disengage the rail from the posts on the server.
3. Repeat these steps for the rail on the other side of the server.

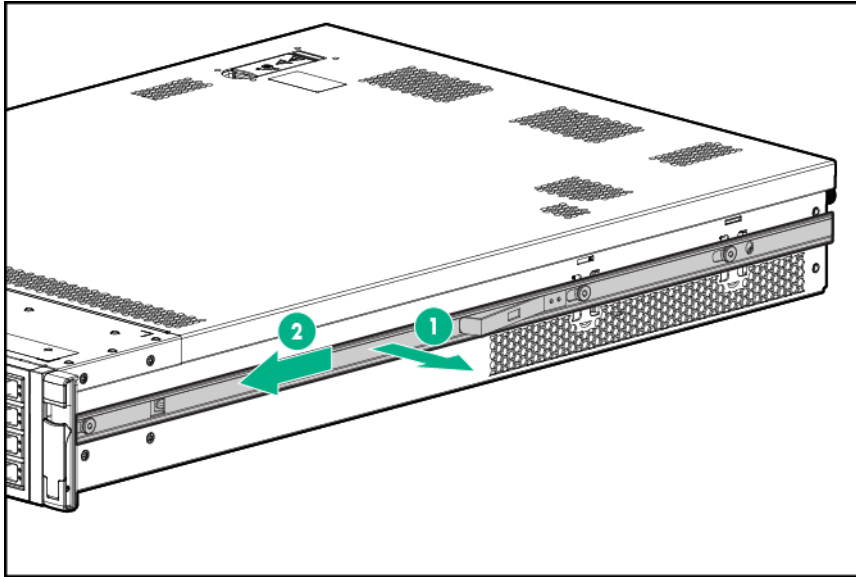


Figure 7: Removing the rails from the server

Attaching the pedestal kit top and bottom

ⓘ IMPORTANT:

In this document the server top, bottom, right and left refer to the server as faced from the front with the server in a horizontal orientation. The pedestal kit components are referred to by the final position with the server in a vertical orientation. For example, the pedestal kit bottom attaches to the server right side

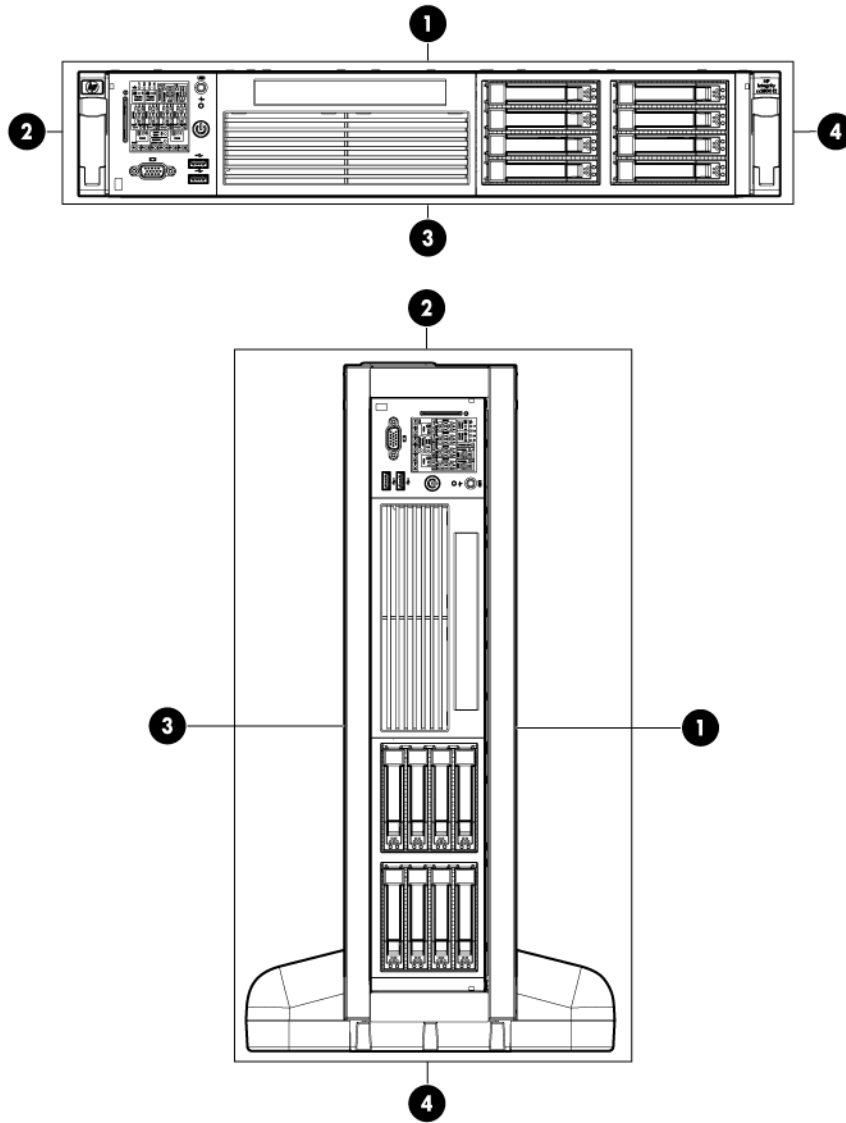


Figure 8: Front of server

1. Server top/pedestal right
2. Server left/pedestal top
3. Server bottom/pedestal left
4. Server right/pedestal bottom

The pedestal kit bottom attaches to the right side of the server when the server is in the horizontal position. The pedestal kit top attaches to the left side of the server when in the server is in the horizontal position. The pedestal bottom can be distinguished from the pedestal top by the pedestal feet slots.

Procedure

NOTE:

The bottom piece of the pedestal is taller than the server, so try to position the server so the right side (in the horizontal position) of the server hangs off the edge of the work surface by a few inches to allow the bottom piece to be attached to the server chassis. If that is not possible, then raise up the server approximately three inches from the work surface to enable the pedestal kit bottom piece to be attached to the server right side.

To attach the components.

1. Align the holes in the pedestal component with the posts on the server. See **Figure 9**.

NOTE:

One of the holes in the pedestal component contains the locking mechanism. This makes the hole appear partially blocked.

2. Hold the pedestal component flush against the server.
3. Slide the pedestal component forward until it locks into place.

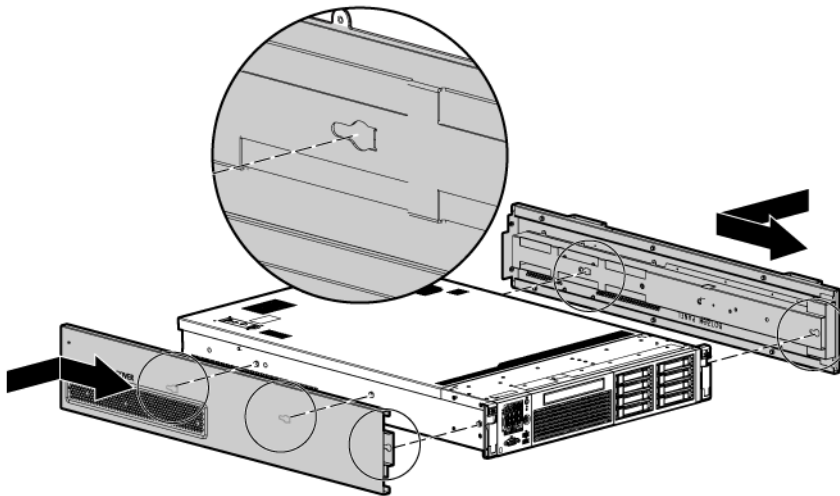


Figure 9: Installing the pedestal bottom piece

4. Stand the server up on the bottom piece of the pedestal kit that was just installed so the server is in the vertical position.

⚠ CAUTION:

The server is heavy. Be careful when lifting it to the vertical position.

Without the feet installed, the server might tip over easily. Be careful when working near the server to avoid tipping it over.

5. Align the holes in the pedestal top piece with the posts on the server

NOTE:

One of the holes in the pedestal component contains the locking mechanism. This makes the hole appear partially blocked.

6. Hold the pedestal top piece flush against the server.
7. Slide the pedestal top piece forward until it locks into place.
8. The top and bottom pedestal kit pieces are now in place.

Attaching the bezel cover

To attach the bezel cover:

Procedure

1. Apply the rx2800 i4 product label provided in the pedestal kit to the bottom front of the bezel cover (label can be seen in the figure below.)
2. Attach the bezel cover to the front of the server starting from the bottom of the pedestal kit.
3. Push the bezel cover into place against the pedestal kit top piece until the tabs on the bezel cover snap into place.

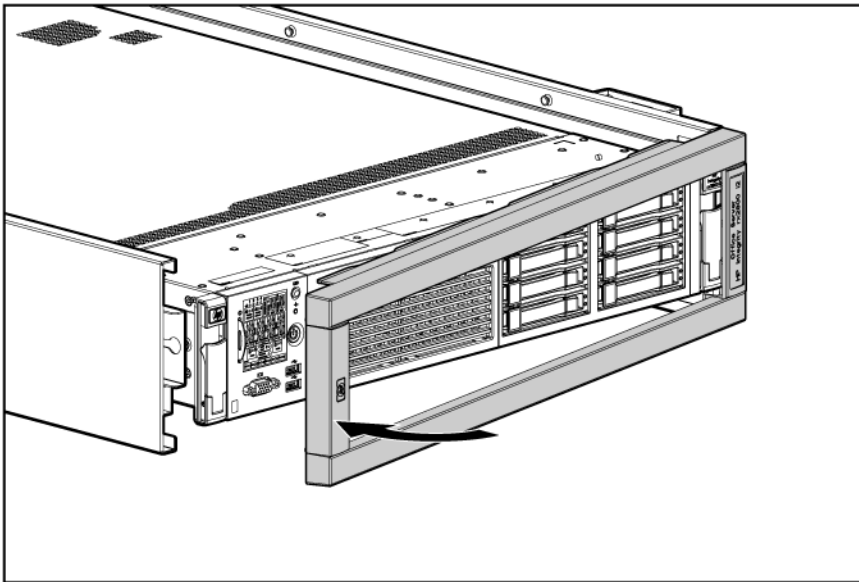


Figure 10: Attaching the bezel cover

Attaching the pedestal kit side pieces

The pedestal kit right side piece attaches to the top of the server. The top cover of the server might have ventilation holes in it to enable proper air flow and cooling. The right side piece of the pedestal kit also has ventilation holes in it to enable the proper cooling and air flow. Follow these steps to attach the pedestal kit right side piece.

⚠ CAUTION:

The ventilation holes in the pedestal kit right side piece **must** be matched up with the ventilation holes on the top cover of the Integrity rx2800 i4 Server to enable proper cooling and air flow. Failure to heed this warning causes the server to shut down with an overtemp condition.

To attach the component:

Procedure

1. Align the posts on the pedestal kit right side piece with the slots in the pedestal kit top and bottom.
2. Hold the pedestal side flush against the server and slide it toward the front of the server.

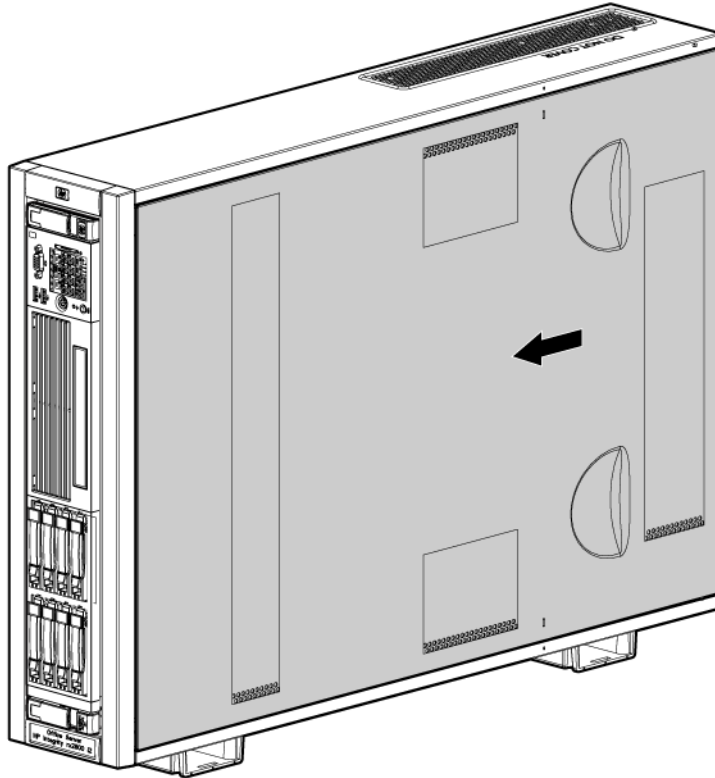


Figure 11: Attaching the pedestal kit side piece

3. Secure the pedestal side by hand tightening the captive thumb screws on the rear of the server.

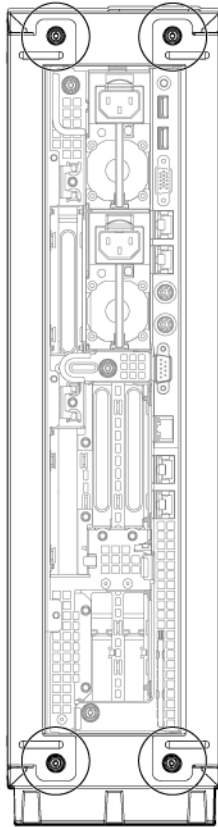


Figure 12: Thumb screw locations

Repeat these steps to install the left side piece.

Attaching the pedestal feet

The pedestal feet slide into the slots on the pedestal bottom, two on each side. The feet are all the same and can be mounted in any slot on the bottom piece of the pedestal kit.

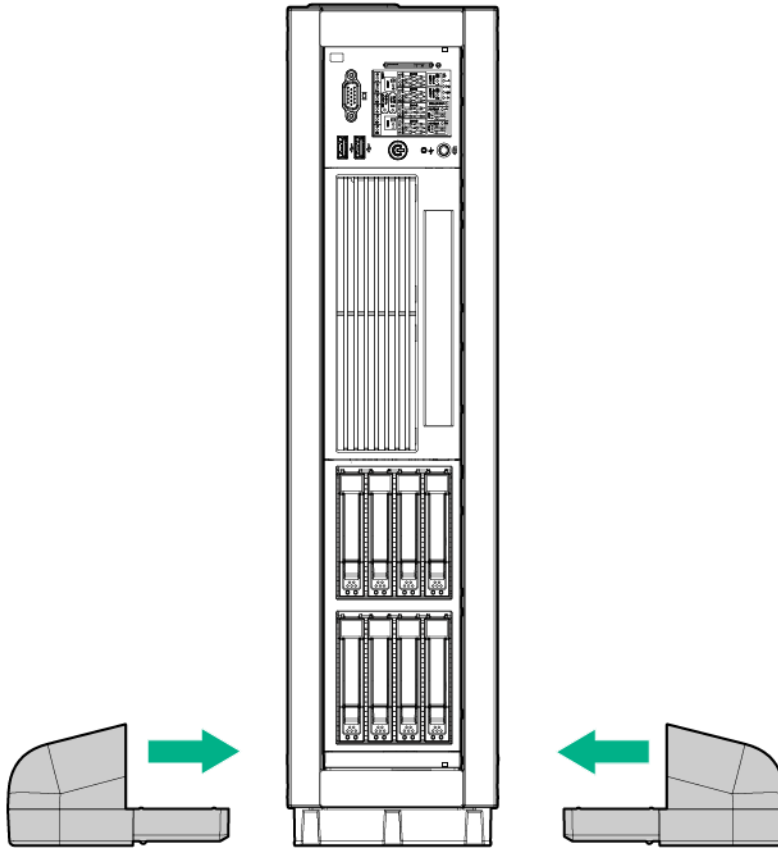


Figure 13: Attaching the feet

Connecting server cables

AC input power

The server can receive AC input from two different AC power sources. The power receptacles are located at the rear of the server.

A maximum of two power supplies can be installed in the server. Installing two power supplies in the server provides 1+1 redundancy, meaning that if one power supply fails, there is still enough power supplied to the server to operate. You must promptly replace the failed power supply to restore 1+1 functionality.

All high-line (220 V) configurations are capable of 1+1 redundancy. Low-line (110 V) configurations can maintain 1+1 redundancy as long as the total power consumed does not exceed 800 W.

A minimum of one power supply is required to power the server. If only one power supply is installed in the server, there is no 1+1 capability.

Power states

The server has the following power states:

- Standby power
- Full power
- Off

Table 6: Power states

Power states	Power cable plugged into receptacle?	Power activated through the iLO 3 ^{PR} command; or front panel power button activated?	Standby DC voltage applied?	DC voltage applied?
Standby power	Yes	No	Yes	No
Full power	Yes	Yes	Yes	Yes
Off	No	No	No	No

NOTE:

If the power restore feature is set to **Always On** through the iLO 3 MP ^{PR} command, the server automatically powers on to the full power state when the power cord is plugged in to the server.

The *HPE Integrity rx2800 i4 Server User Service Guide* shows the ports and power supplies located on the rear panel of the server.

Applying standby power to the server

Procedure

1. Plug the power cord into the receptacle in power supply.
2. Plug the other end of the power cord into an AC outlet.

NOTE:

The LED on the power supply does not illuminate in the standby power state. The LED is green when the server is powered on to full power.

If the power restore feature is set to **Always On** through the iLO 3 MP ^{PR} command, the server automatically powers on to the full power state when the power cord is plugged into the server.

3. If the server has two power supplies, plug the second power cord into the power supply.
4. Plug the other end of the power cord into an AC outlet.

Connecting to the LAN

The server has four LAN ports that provide network connectivity. *The HPE Integrity rx2800 i4 Server User Service Guide* shows the available LAN ports for the server.

Procedure

1. Obtain valid IP addresses for each LAN port you plan to activate.
2. Connect the LAN cable from an available LAN port into a live connection on the network.

Setting up the system

For more information on using the iLO 3 MP, see the *HPE Integrity iLO 3 Operations Guide*.

Setup checklist

Use the checklist in **Setup checklist** while setting up the Integrity iLO 3.

Table 7: Setup checklist

Step	Action	Procedure	Status
Standard setup			
1	Preparation	<ol style="list-style-type: none">1. Determine an access method to select and connect the cables.2. Determine a LAN configuration method and assign an IP address if necessary.	
2	Configure the iLO 3 MP LAN	Select one of the three methods to configure the LAN for iLO 3 MP access: <ul style="list-style-type: none">• DHCP with DNS• RS-232 serial port• Static IP address	
3	Log on to the iLO 3 MP	Log on to the iLO 3 MP from a supported web browser or command line using the default user name and password.	
4	Change default user name and password	Change the default user name and password on the administrator account to your predefined selections.	
5	Set up user accounts	Set up the user accounts if you are using the local accounts feature.	
6	Set up security access	Set up the security access settings.	

Accessing UEFI or the OS from iLO MP

The Unified Extensible Firmware Interface is an architecture that provides an interface between the server OS and the server firmware. UEFI provides a standard environment for booting an OS and running preboot applications.

Use this procedure to access UEFI or the OS from the iLO MP. Your security parameters were set regarding remote access.

NOTE:

Commands are case-insensitive.

Procedure

1. From the MP Main Menu, enter the command `co` to access the Console.

NOTE:

Terminal windows must be set to a window size of 80 columns x 25 rows for optimal viewing of the console at UEFI

2. After memory test and CPU late self test the following message appears:

```
Press Ctrl-C now to bypass loading option ROM UEFI drivers.
```

- Bypass loading from I/O slots.
- Bypass loading from I/O slots and core I/O.

The Bypass loading from I/O slots and core I/O option may be useful if a bad core I/O UEFI driver is preventing system boot. USB drives can still be used at the UEFI shell to update core I/O drivers.

CAUTION:

Pressing **Ctrl-C** before the prompt does not work and might disable this feature. Therefore, be sure to wait for the prompt before pressing **Ctrl-C**.

NOTE:

The prompt might take several minutes to appear, and the period that you can press **Ctrl-C** is very short. For typical boots, Hewlett Packard Enterprise recommends that you let the prompt time out.

After selecting an option, the boot proceeds.

NOTE:

If no option is selected, the boot proceeds after a few seconds.

3. Depending on how the server was configured from the factory and if the OS is installed at the time of purchase, you are taken to:
 - a. UEFI shell prompt
 - b. OS login prompt

If the server has a factory-installed OS, you can interrupt the boot process to configure your specific UEFI parameters.

If you are at the UEFI shell prompt, go to "[UEFI Front Page](#)"

If you are at the OS login prompt, go to "[OS login prompt](#)"

UEFI Front Page

If you are at the UEFI shell prompt, enter the command `exit` to navigate to the UEFI Front Page

```

fs1      :Removable HardDisk - Alias hd9a0d blk1
         PciRoot(0x30304352)/Pci(0x1,0x0)/Pci(0x0,0x0)/Scsi(0x0,0x0)/HD(3,GPT,
E3A2D88A-08A2-11E2-8000-D6217B60E588)
blk0     :Removable HardDisk - Alias hd9a0b fs0
         PciRoot(0x30304352)/Pci(0x1,0x0)/Pci(0x0,0x0)/Scsi(0x0,0x0)/HD(1,GPT,
E3A2D844-08A2-11E2-8000-D6217B60E588)
blk1     :Removable HardDisk - Alias hd9a0d fs1
         PciRoot(0x30304352)/Pci(0x1,0x0)/Pci(0x0,0x0)/Scsi(0x0,0x0)/HD(3,GPT,
E3A2D88A-08A2-11E2-8000-D6217B60E588)
blk2     :BlockDevice - Alias (null)
         PciRoot(0x30304352)/Pci(0x1F,0x2)/Sata(0x0,0x0)
blk3     :Removable HardDisk - Alias (null)
         PciRoot(0x30304352)/Pci(0x1,0x0)/Pci(0x0,0x0)/Scsi(0x0,0x0)/HD(2,GPT,
E3A2D880-08A2-11E2-8000-D6217B60E588)
blk4     :Removable BlockDevice - Alias (null)
         PciRoot(0x30304352)/Pci(0x1,0x0)/Pci(0x0,0x0)/Scsi(0x0,0x0)
hd9a0b   :Removable HardDisk - Alias fs0 blk0
         PciRoot(0x30304352)/Pci(0x1,0x0)/Pci(0x0,0x0)/Scsi(0x0,0x0)/HD(1,GPT,
E3A2D844-08A2-11E2-8000-D6217B60E588)
hd9a0d   :Removable HardDisk - Alias fs1 blk1
         PciRoot(0x30304352)/Pci(0x1,0x0)/Pci(0x0,0x0)/Scsi(0x0,0x0)/HD(3,GPT,
E3A2D88A-08A2-11E2-8000-D6217B60E588)

Shell> exit

```

Figure 14: Shell map page

```

Note, menu interfaces might only display on the primary console device.
The current primary console device is:
Serial PciRoot(0x30304352)/Pci(0x1,0x0)/Pci(0x0,0x5)
The primary console can be changed via the 'conconfig' UEFI shell command.

Press: ENTER - Start boot entry execution
       B / b - Launch Boot Manager (menu interface)
       D / d - Launch Device Manager (menu interface)
       M / m - Launch Boot Maintenance Manager (menu interface)
       S / s - Launch UEFI Shell (command line interface)
       I / i - Launch iLO Setup Tool (command line interface)

*** User input can now be provided ***

Waiting for user input.

```

Figure 15: UEFI front page

To view boot options, or launch a specific boot option, press **B** to launch the Boot Manager.

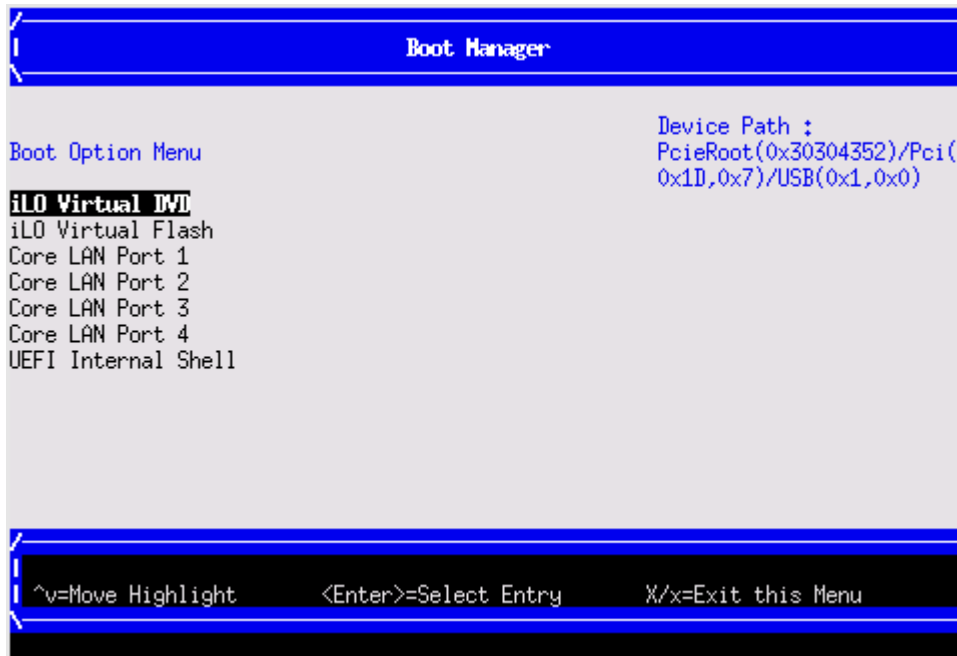


Figure 16: Boot Manager screen

To configure specific devices, press **D** to launch the Device Manager. This is an advanced feature and must only be performed when directed.

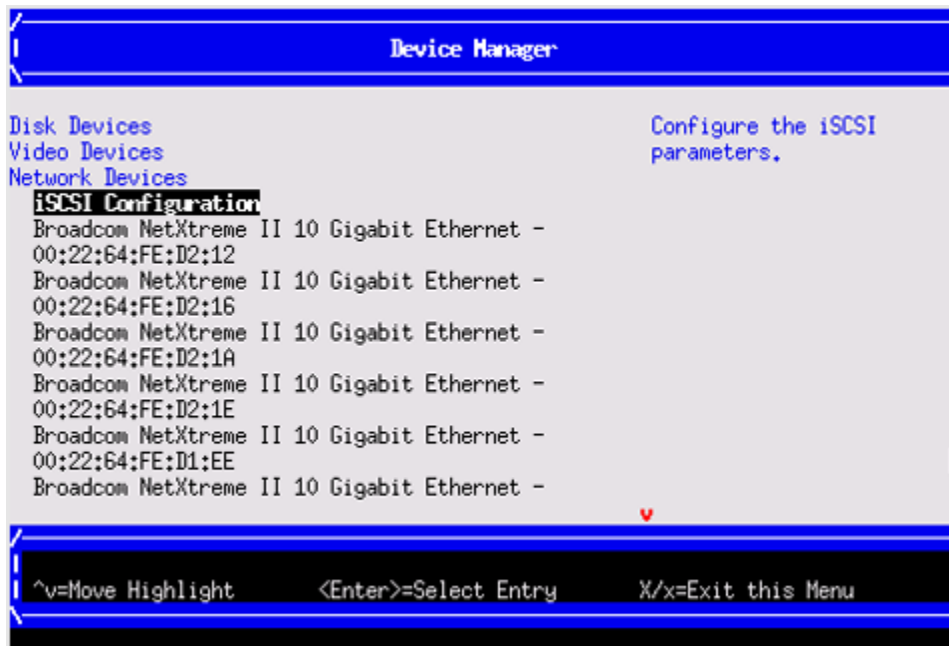


Figure 17: Device Manager screen

To perform maintenance on the system such as adding, deleting, or reordering boot options, press **M** to launch the Boot Maintenance Manager.

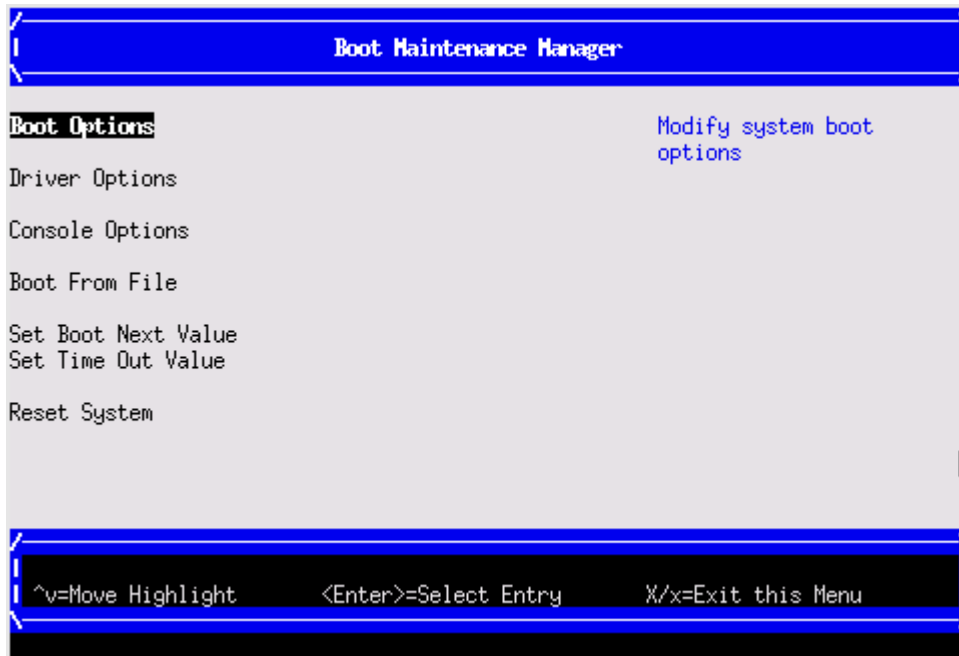


Figure 18: Boot Maintenance Manager screen

To perform more advanced operations, press **S** to launch the UEFI Shell.

To view the iLO LAN configuration, press **I** to launch the iLO Setup Tool.

Saving UEFI configuration settings

You can configure other UEFI settings at this time. For more UEFI configuration options, see the *HPE Integrity rx2800 i4 Server User Service Guide*.

Bootting and installing the operating system

From the **UEFI Front Page** prompt, you can boot and install in either of two manners:

- If your OS is loaded onto your server, see [Operating System Is loaded onto the server](#).
- If the OS is not installed onto your server, see [Operating system is not loaded onto the server](#).

Operating system is loaded onto the server

If the OS is loaded on your server, normally UEFI automatically boots to the OS. If the UEFI Front Page is loaded, press **ENTER** to start auto boot, or **B** to select a specific boot option for your OS.

Use your standard OS login procedures, or see your OS documentation to log in to your OS.

Operating system is not loaded onto the server

If the OS is not already on the server, the three options are: using Ignite-UX or vMedia, or loading from a DVD. For details on all of these options, see the *HPE Integrity rx2800 i4 Server User Service Guide*.

OS login prompt

If your server is at the OS login prompt after you establish a connection to the server, use your standard OS log in procedures, or see your OS documentation for the next steps.

Powering on and powering off the server

Power states

The server has the following power states:

- Standby power
- Full power
- Off

For details about server power states, see [Setup checklist](#).

NOTE:

If the power restore feature is set to **Always On** through the iLO 3 MP `PR` command, the server automatically powers on to the full power state when the power cord is plugged in to the server.

Powering on the server

Power on the server to full power using the following methods if the server is in the standby power state:

- iLO 3 MP `PC` command
- Power button

Powering on the server using the iLO 3 MP

NOTE:

If the power restore feature is set to **Always On** through the iLO 3 MP `PR` command, the server automatically powers on to the full power state when the power cord is plugged in to the server.

Procedure

1. Plug all power cables into the receptacles on the rear panel of the server.
2. Initiate a console session, and access the MP Main Menu.
3. Enter the command `CM` to enable command mode.
4. Enter the command `PC` to use the remote power control command. A command output similar to the one shown below will appear:

NOTE:

Your display may not match the display shown.

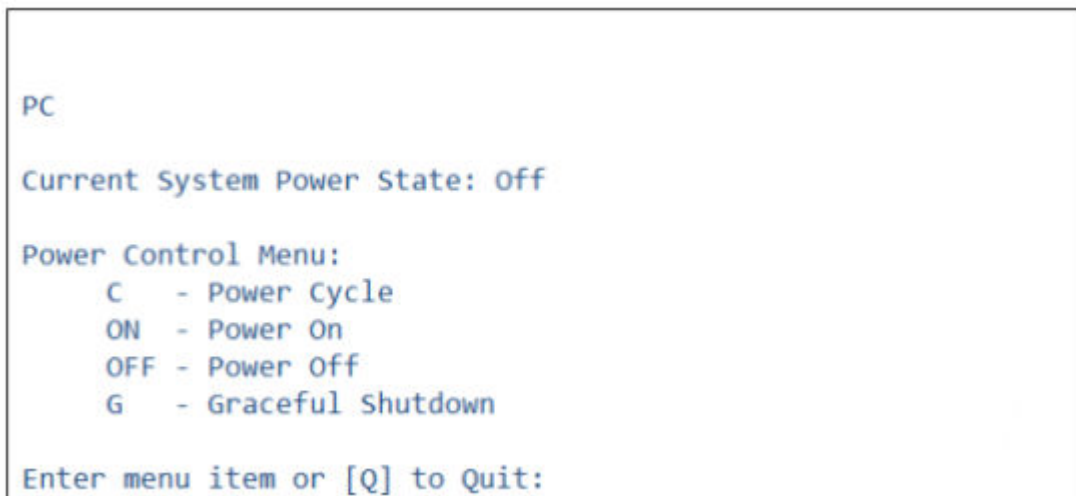


Figure 19: Power Control Menu screen

5. Enter the command **ON** to power on the server, and enter **YES** when prompted to confirm the action.
6. Boot the operating system.

For more information, see the operating system documentation.

Powering on the server manually

NOTE: If the power restore feature is set to **Always On** through the iLO 3 MP **PR** command, the server automatically powers on to the full power state when the power cord is plugged in to the server.

Procedure

1. Plug all power cables into the receptacles on the rear panel of the server.
2. Press the power button to start the server.
3. Start the operating system. For more information, see the operating system documentation.

Powering off the server

If the server is in the standby or full power state, power off the server by using either of the following methods:

- iLO 3 MP **PC** command
- Power button

Powering off the server using the iLO 3 MP

Procedure

1. Gracefully shut down the operating system. See the operating system documentation for more information.
2. Initiate a console session, and access the MP Main Menu.
3. Enter **CM** to enable command mode.

4. Enter **PC** to use the remote power control command.
5. Enter **OFF** to power off the server, and enter **YES** when prompted to confirm the action.

⚠ CAUTION:

The main DC voltage is now removed from the system. However, AC voltage for standby power is still present in the server.

6. Unplug all power cables from the receptacles on the rear panel of the server.

Powering off the server manually

Procedure

1. Gracefully shut down the operating system. For more information, see the operating system documentation.
2. To power off the server, press the power button.

⚠ CAUTION:

The main DC voltage is now removed from the system. However, AC voltage for standby power is still present in the server.

3. Unplug all power cables from the receptacles on the rear panel of the server.

Installing the latest firmware using Smart Update Manager (SUM)

The Smart Update Manager utility enables you to deploy firmware components from either an easy-to-use interface or a command line. It has an integrated hardware discovery engine that discovers the installed hardware and the current versions of firmware in use on target servers. This prevents extraneous network traffic by only sending the required components to the target. SUM also has logic to install updates in the correct order and ensure all dependencies are met before deployment of a firmware update. It also contains logic to prevent version-based dependencies from preventing a successful installation and ensures updates are handled in a manner that reduces any downtime required for the update process. Smart Update Manager does not require an agent for remote installations. After the installation is complete, Smart Update Manager also removes all remote files associated with the installation.

Key features of Smart Update Manager are:

- GUI and CLI
- Dependency checking, which ensures appropriate installation order and dependency checking between components
- Intelligent deployment of only required updates
- Improved deployment performance
- Remote command-line deployment

At this time, firmware updates on Integrity systems through SUM are done remotely. For example, SUM runs on an x86 Linux or Windows management system and updates targeted Integrity systems through the network. SUM supports firmware updates on rx2800 i4 servers. Firmware bundles for these servers

are available and can be downloaded from the Hewlett Packard Enterprise website at <http://www.hpe.com>.

For more information about SUM, see the *Smart Update Manager User Guide* (<http://www.hpe.com/info/hpsum/documentation>).

Troubleshooting installation issues

Cause

To troubleshoot issues that might occur during server installation, see the *HP Integrity rx2800 i4 Server User Service Guide*.

Operating system procedures

Operating system supported on the server

HP-UX 11i v3 HWE 1209 or later

NOTE:

Wake-On-LAN (WOL) is supported on integrated LAN ports only with Integrity rx2800 i4 & rx2900 i4 Servers running HP-UX 11i v3.

Installing the operating system onto the server

The following procedures describe generalized operating system installation. For more details, see the operating system documentation.

Installing the operating system from the DVD drive or tape drive

NOTE:

Commands are not case-sensitive.

NOTE:

Tapeboot requires an add-on AM311A Integrity Smart Array P411/256 HBA running 5.06 firmware or later.

Procedure

1. Insert the OS Media into the DVD (internal to system) or tape drive (external to system).
 2. Power on the server and boot to UEFI. If the server is already powered on, then using the `reset` command at the UEFI prompt, reboot to UEFI.
 3. From the UEFI Front Page, press **S** to launch the UEFI Shell.
-

NOTE:

If the device is already selected or you already know the device name, skip the following step.

If you are using a tape device:

When the UEFI shell comes up you should see a message similar to the following on the console:

```
HP Smart Array P411 Controller      (version 5.06)
Tape Drive(s) Detected:
Port: 2E, box:0, bay:  5 (SAS)
```

If you do not see a line starting with `Port` and ending with `(SAS)`, the tape is NOT connected correctly, or it is not responding.

4. Locate the device you want to boot from.
 - a. For DVD, locate the device:

```
fs2:\> map
Device mapping table

fs6:      Removable CDROM - Alias cd66d0a blk6
          PcieRoot(0x30304352)/Pci(0x1D,0x7)/USB(0x3,0x0)/CDROM(0x0)
```

- I. To list all the device names from the UEFI Shell prompt, use the `map` command.
- II. From the list generated by the `map` command, locate the device name (in this example, `fs6`).

III.

NOTE:

Your DVD drive might not be named `fs6`. Make sure you verify the ID appropriate to your DVD device.

Tape will autoboot without the need to select a boot image.

- IV. At the UEFI Shell prompt, specify the device name for the DVD-ROM.
- V. Enter the appropriate UEFI install command, as in the following example:

HP-UX

```
Shell> fs6:
fs6:\> install
```

b. For tape, locate the device:

- I. To boot from tape once you are at the UEFI shell:

```
Shell> tapeboot select
01
PcieRoot(0x30304352)/Pci(0x8,0x0)/Pci(0x0,0x0)/SAS(0x50060B00007F6FFC,0x0,0x1,NoTopology,0,0,0,0x0)
Select Desired Tape: 01 <<input 01
```

- If the correct media is installed, it will boot from tape when you enter the index number.
- If there is no media in the SAS tape drive and you select 1, you will see the following message:

```
tapeboot: Could not load tapeboot image
```

5. The operating system will start loading onto the server.
6. Follow the on-screen instructions to install the OS fully.
7. Continue with **Configuring system boot options**.

Installing the operating system using HPE Ignite-UX

Ignite-UX is an HP-UX administration toolset that enables:

- Simultaneous installation of HP-UX on multiple clients
- The creation and use of custom installations
- The creation of recovery media
- The remote recovery of clients

To install the OS onto the server using Ignite-UX, go to <http://www.hpe.com/info/ignite-ux>.

Installing the operating system with Virtual Media

NOTE:

Installing the OS with Virtual Media (vMedia) might be significantly slower than installing using other methods.

Using vMedia enables connections of a DVD physical device or image file from the local client system to the remote server. The virtual device or image file can be used to boot the server with an operating system that supports USB devices.

Using vMedia depends on a reliable network with good bandwidth, which is especially important when you are performing tasks such as large file transfers or OS installations.

For more information regarding loading the OS with vMedia, see the [**HPE Integrity iLO 3 Operations Guide**](#).

NOTE:

After the OS is loaded, to preserve boot entries in case of failure, make sure to save your nonvolatile memory settings.

Configuring system boot options

- **Boot Manager**

Contains the list of boot options available. Ordinarily, the boot options list includes the UEFI Internal Shell and one or more operating system loaders.

To manage the boot options list for each server, use the UEFI Shell, the Boot Maintenance Manager, or operating system utilities.

- **Autoboot setting**

The `autoboot` setting determines whether a server automatically loads the first item in the boot options list or remains at the UEFI Front Page menu. With autoboot enabled, UEFI loads the first item in the boot options list after a designated timeout period.

Configure the autoboot setting for an HPE Integrity server using either the UEFI Shell `autoboot` command or the Set Time Out Value menu item from the Boot Maintenance Manager.

Examples of autoboot commands for HP-UX:

- Disable autoboot from the UEFI Shell by issuing `autoboot off`
- Enable autoboot with the default timeout value by issuing `autoboot on`
- Enable autoboot with a timeout of 60 seconds by issuing `autoboot 60`
- Set autoboot from HP-UX using `setboot`
- Enable autoboot from HP-UX using `setboot -b on`
- Disable autoboot from HP-UX using `setboot -b off`

For more information on the `autoboot` command, enter `help autoboot`.

Booting and shutting down HP-UX

- To add an HP-UX entry to the boot options list, see [Adding HP-UX to the boot options list](#) on page 45.
- To boot HP-UX, use one of the following procedures:
 - To boot HP-UX in the standard mode, see [HP-UX standard boot](#) on page 46. HP-UX boots in multi-user mode.
 - To boot HP-UX in single-user mode, see [Booting HP-UX in single-user mode](#) on page 47.
 - To boot HP-UX in LVM-maintenance mode, see [Booting HP-UX in LVM-maintenance mode](#) on page 47.
- To shut down the HP-UX operating system, see [Shutting down HP-UX](#) on page 48.

Adding HP-UX to the boot options list

You can add the `\EFI\HPUX\HPUX.EFI` loader to the boot options list from the UEFI Shell or the Boot Maintenance Manager. For more information, see [Using the boot maintenance manager](#) on page 183.

NOTE:

On HPE Integrity servers, the operating system installer automatically adds an entry to the boot options list.

NOTE: To add an HP-UX boot option when logged in to HP-UX, use the `setboot` command. For details, see the `setbootvolume(1M)` manpage.

To add HP-UX to the list:

NOTE:

Commands are not case-sensitive.

Procedure

1. Access the UEFI Shell environment.
 - a. Log in to iLO for Integrity, and then to access the system console, enter `CO`.

When accessing the console, confirm that you are at the UEFI Front Page.

If you are at another UEFI menu, then choose the **Exit** option, or press **X** to exit the menu. Exit until you return to the screen that lists the keys that can be pressed to launch various Managers.
 - b. To launch the UEFI shell, press **S**.
2. Access the UEFI System Partition (`fsX:` where *X* is the file system number) for the device from which you want to boot HP-UX.

For example, to access the UEFI System Partition for the bootable file system number **2**, enter `fs2:`. The UEFI Shell prompt changes to reflect the file system currently accessed.

The full path for the HP-UX loader is `\EFI\HPUX\HPUX.EFI` and is on the device you are accessing.
3. At the UEFI Shell environment, use the `bcfg` command to manage the boot options list.

The `bcfg` command includes the following options for managing the boot options list:

a. `bcfg boot dump`

–Display all items in the boot options list for the server.

b. `bcfg boot rm #`

–Remove the item number specified by `#` from the boot options list.

c. `bcfg boot mv #a #b`

–Move the item number specified by `#a` to the position specified by `#b` in the boot options list.

d. `bcfg boot add # file.EFI"Description"`

–Add a new boot option to the position in the boot options list specified by `#`. The new boot option references `file.EFI` and is listed with the title specified by `Description`.

For example, `bcfg boot add 1 \EFI\HPUX\HPUX.EFI "HP-UX 11i v3"` adds an HP-UX 11i v3 item as the first.

For details, see the `help bcfg` command.

4. Exit the console and iLO MP interfaces.

Press **Ctrl-B** to exit the system console and return to the iLO 3 MP Main Menu. To exit the MP, at the Main Menu, enter `x`.

HP-UX standard boot

Use either of the following procedures to boot HP-UX:

- **Booting HP-UX from the UEFI Boot Manager** on page 46
- **Booting HP-UX from the UEFI Shell** on page 47

Booting HP-UX from the UEFI Boot Manager

Procedure

1. From the UEFI Boot Manager menu, choose an item from the boot options list to boot HP-UX.
2. Access the UEFI Boot Manager menu for the server on which you want to boot HP-UX.
3. Log in to iLO MP, and then to choose the system console, enter `co`.
4. Confirm you are at the UEFI Front Page. If you are at another UEFI menu, then to exit the menu, choose the **Exit** option or press **X**. Exit until you return to the screen that lists the keys that can be pressed to launch various Managers. To launch the Boot Manager, press **B**.
5. At the UEFI Boot Manager menu, choose an item from the boot options list.

Each item in the boot options list references a specific boot device and provides a specific set of boot options or arguments you use when booting the device.

6. To initiate booting using your chosen boot option, press **Enter**.

7. Exit the console and iLO MP interfaces.
8. To exit the system console and return to the MP Main Menu, press **Ctrl-B**. To exit the MP Main Menu, enter **x** at the MP Main Menu.

Booting HP-UX from the UEFI Shell

Procedure

1. Access the UEFI Shell.
2. From the UEFI Front Page, press **s** to launch the UEFI shell.
3. Use the `map` command to list the file systems (fs0, fs1, and so on) that are known and have been mapped.
4. To select a file system to use, enter the mapped name followed by a colon (:). For example, to operate with the boot device that is mapped as fs0, at the UEFI Shell prompt, enter `fs0:`.
5. To launch the `HPUX.EFI` loader from the currently selected boot device, at the UEFI Shell command prompt, enter `HPUX`.

If needed, specify the full path of loader by entering `\EFI\HPUX\HPUX` at the UEFI Shell command prompt.

By default, the `HPUX.EFI` loader boots using the loader commands found in the `\EFI\HPUX\AUTO` file on the UEFI System Partition of the selected boot device. The `AUTO` file typically contains the `boot vmunix` command.

To interact with the `HPUX.EFI` loader, interrupt the boot process (for example, enter a **space**) within the time-out period provided by the loader. To exit the loader, use the `exit` command, which returns you to UEFI.

Booting HP-UX in single-user mode

Procedure

1. Use steps 1–5 from **Booting HP-UX from the UEFI Shell** on page 47 to access the UEFI shell, and launch the `HPUX.UEFI` loader.
2. Access the HP-UX Boot Loader prompt (`HPUX>`) by pressing any key within the 10 seconds given for interrupting the HP-UX boot process. Use the `HPUX.EFI` loader to boot HP-UX in single-user mode in step 3.

After you press a key, the `HPUX.EFI` interface (the HP-UX Boot Loader prompt, `HPUX>`) launches. For help using the `HPUX.EFI` loader, enter the `help` command. To return to the UEFI Shell, enter `exit`.

3. At the `HPUX.EFI` interface (the HP-UX Boot loader prompt, `HPUX>`) enter the `boot -is vmunix` command to boot HP-UX (the `/stand/vmunix` kernel) in single-user (`-is`) mode.

Booting HP-UX in LVM-maintenance mode

The procedure for booting HP-UX into LVM Maintenance Mode is the same as for booting into single user mode (**Booting HP-UX in single-user mode**), except use the `-lm` boot option instead of the `-is` boot option:

```
HPUX> boot -lm vmunix
```

Shutting down HP-UX

For more information, see the *shutdownvolume(1M)* manpage.

To shut down HP-UX running on a server:

Procedure

1. Log in to HP-UX running on the server that you want to shut down, or log in to iLO MP for the server and use the Console menu to access the system console. Accessing the console through iLO MP enables you to maintain console access to the server after HP-UX has shut down.
2. Use the `shutdown` command with the appropriate command-line options.

The command-line options you specify determines the way in which HP-UX shuts down and whether the server is rebooted.

Choose an HP-UX shutdown option for your server:

- To shut down HP-UX and halt (power off) the server, use the `shutdown -h` command.
To reboot a halted server, power on the server by using the `PC` command at the iLO MP Command menu.
- To shut down HP-UX and reboot the server, use the `shutdown -r` command.

Optional components

This section describes how to install components into the server that are not factory-installed. If you have additional components to install, be sure to install the additional components before installing the server into your rack or pedestal configuration. Most servers are pre-configured with all components installed before shipping from the Hewlett Packard Enterprise factory.

Externally accessible components:

- SAS hard drives
- Power supplies

Internal components:

- Memory DIMMs
- Processors
- PCIe cards
- SAS cache module and super capacitor pack



WARNING:

Ensure that the system is powered off and all power sources are disconnected from the server prior to removing or installing server hardware (unless you are removing or installing a hot-swappable or hot-pluggable component). Voltage is present at various locations within the server whenever an AC power source is connected. This voltage is present even when the main power switch is turned off. Failure to observe this warning can result in personal injury or damage to the equipment.

Installing a hot-pluggable SAS hard drive

The front of the server has eight hot-plug SAS hard drive slots. Slots without hard drives installed have slot fillers installed for cooling purposes.



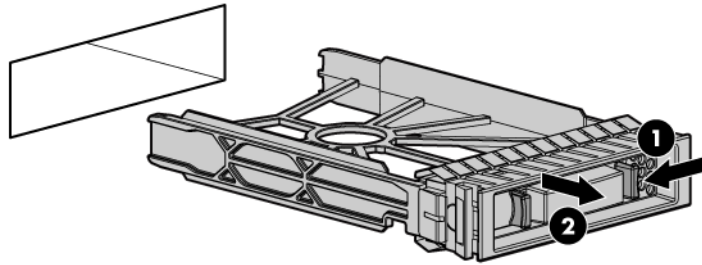
IMPORTANT:

SAS hard drives are loaded in sequence, starting with the top left slot and proceeding down filling slots 1, 2, 3, 4 in order; and then fill the right side top to bottom 5, 6, 7, 8. See **Rear panel components**.

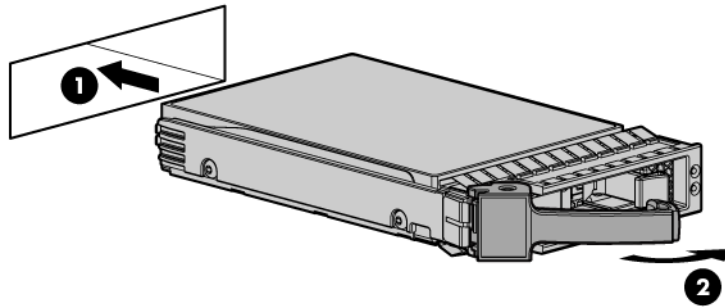
Save the hard drive filler for future use. For airflow purposes, place hard drive fillers in slots that do not contain hard drives.

Procedure

1. To remove the hard drive filler, squeeze the tab and then pull out the filler.



2. To install the hard drive, push in the drive and then close the locking lever.



Installing a hot-swappable power supply

The server has at least one hot-swappable power supply installed before shipping. This power supply is located at the rear of the server. You can install a second, optional power supply to provide N+1 capability.

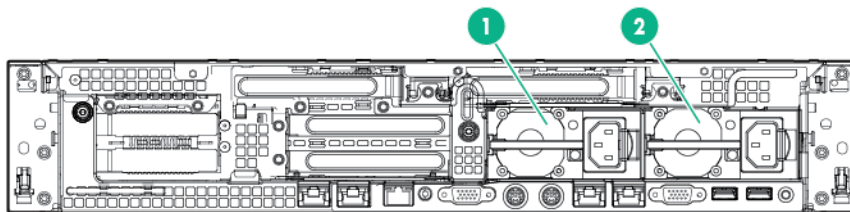


Figure 20: Power supply loading guidelines

1. Power supply bay 2
2. Power supply bay 1



CAUTION:

Observe all ESD safety precautions before attempting this procedure. Failure to follow ESD safety precautions might result in damage to the server.

⚠ CAUTION:

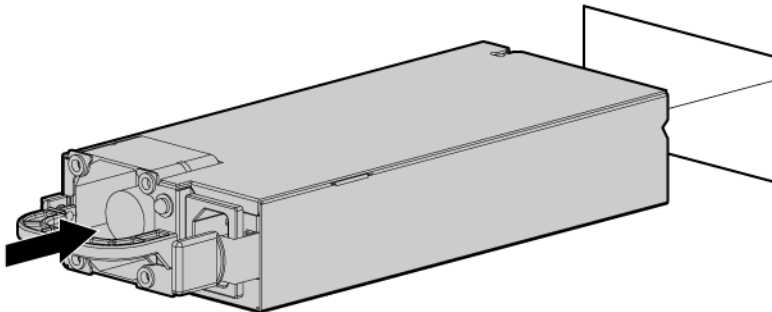
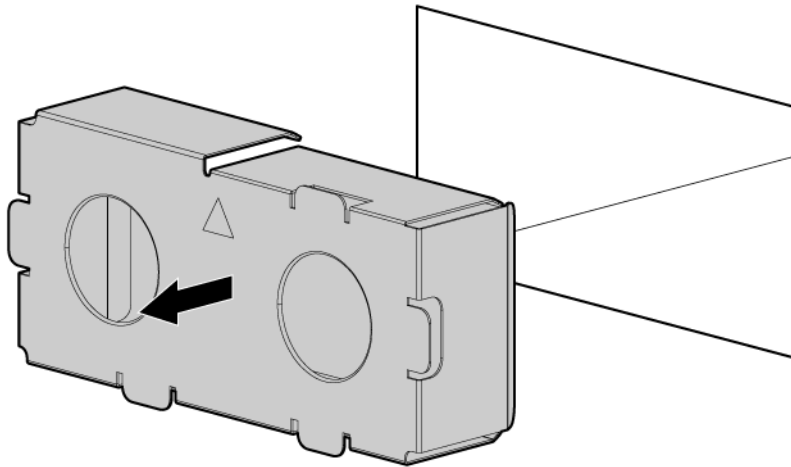
If you do not purchase a second power supply, the empty power supply slot must remain covered with the supplied power supply blank. Failure to observe this caution might result in server shutdown due to overheating.

NOTE:

The power supply is a hot-swappable device. You do not have to interact with the operating system to add a power supply to the server.

Procedure

1. Remove the power supply blank.

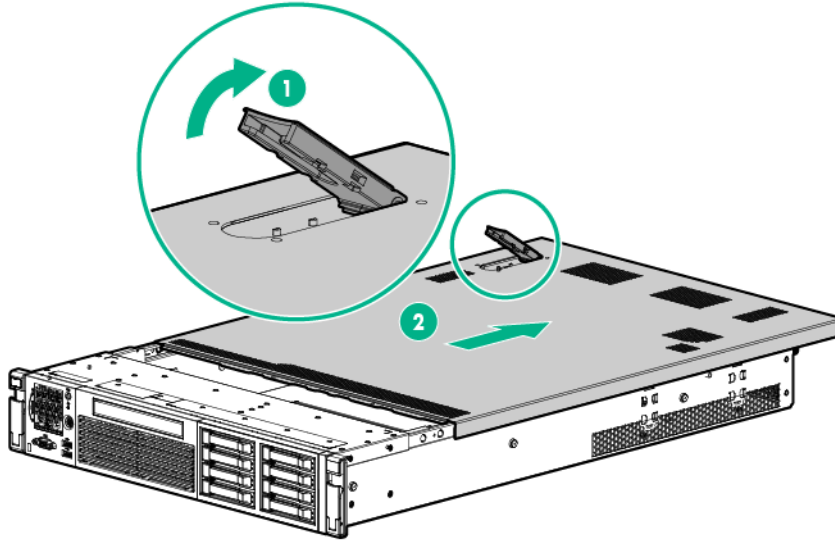


2. Install the power supply.

Removing the access panel

Procedure

1. Use the T-15 Torx screwdriver attached to the rear of the server to loosen the security screw on the hood latch.
2. Lift the hood latch handle, and then remove the access panel.



To replace the component, reverse the removal procedure.

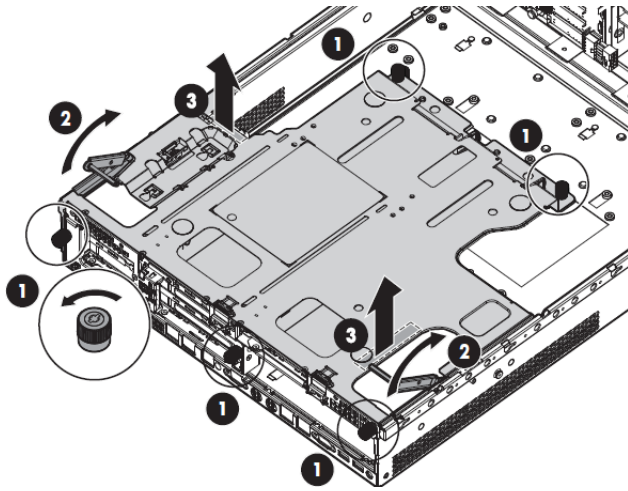
Removing the PCI riser cage

⚠ CAUTION:

For proper cooling, do not operate the server without the access panel, baffles, expansion slot covers, or blanks installed. If the server supports hot-pluggable components, minimize the amount of time the access panel is open.

Procedure

1. Disconnect any cables connected to optional I/O cards before removing cage.
2. Remove the PCI riser cage.



To replace the component, reverse the removal procedure. When replacing the PCI riser cage, to ensure that it has properly seated into the system board, push down on the top of the component where the riser is located.

Removing expansion slot covers

⚠ CAUTION:

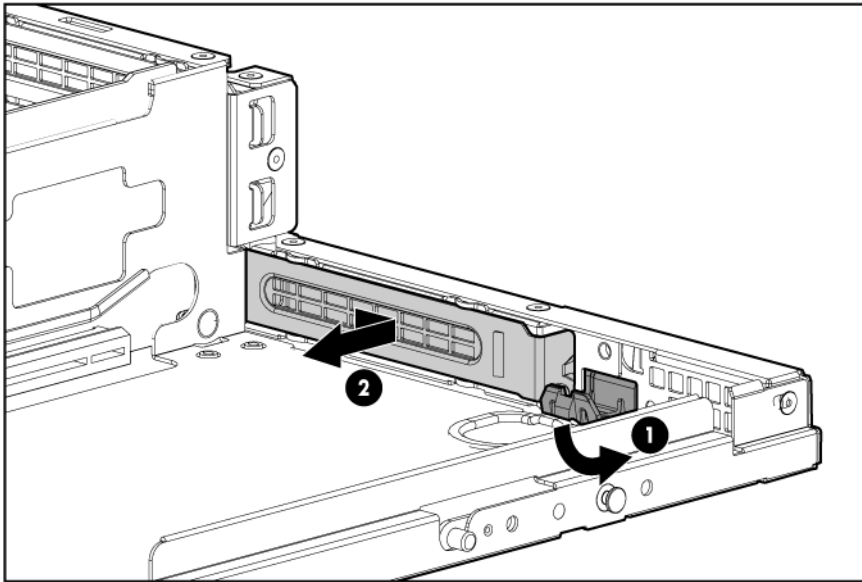
To prevent damage to the server or expansion boards, power off the server, and then remove all AC power cords before removing or installing the PCI riser cage.

⚠ CAUTION:

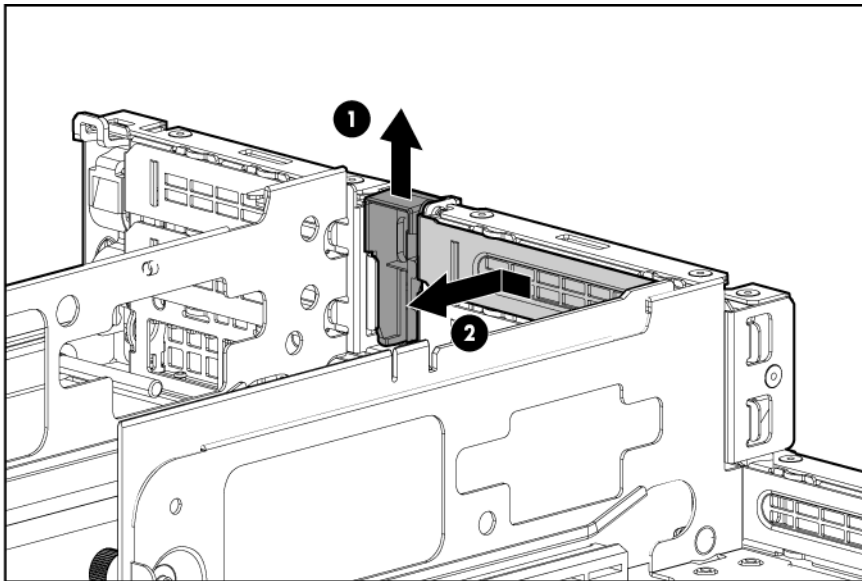
For proper cooling, do not operate the server without the access panel, baffles, expansion slot covers, or blanks installed. If the server supports hot-plug components, minimize the amount of time the access panel is open.

Procedure

1. Remove the access panel ([Removing the access panel](#) on page 52).
2. Remove the PCI riser cage ([Removing the PCI riser cage](#) on page 52).
3. Remove the expansion slot cover.
 - a. To remove slot cover 1 or 4, push the retainer to release it, and then slide out the cover.



- b. To remove slot covers 2 and 3, lift up and remove the latch, and then remove the cover.



- c. To remove slot covers 5 and 6, push down on the latch, rotate the latch down, and then remove the cover.

Installing expansion boards

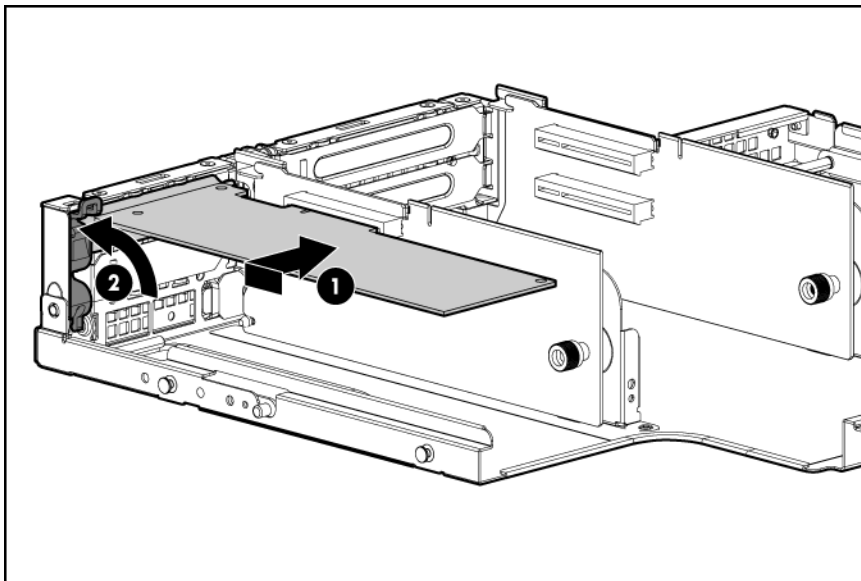
The server supports up to two PCIe riser boards. Each PCIe riser board holds up to three PCIe cards. The standard riser board configuration contains one riser board with one full-length, full-height PCIe x8 slot, and two half-length, full-height PCIe x4 slots. The second board contains one full-length, full-height PCIe x8 slot, and two half-length, half-height PCIe x4 slots.

Optionally, you can purchase a riser board that contains two full-length PCIe x8 slots.

Installing a half-length expansion board

Procedure

1. Remove the access panel. See [Removing the access panel](#) on page 52.
2. Remove the PCI riser cage. See [Removing the PCI riser cage](#) on page 52.
3. Remove the expansion slot cover. See [Removing expansion slot covers](#) on page 53.
4. Install the expansion board.

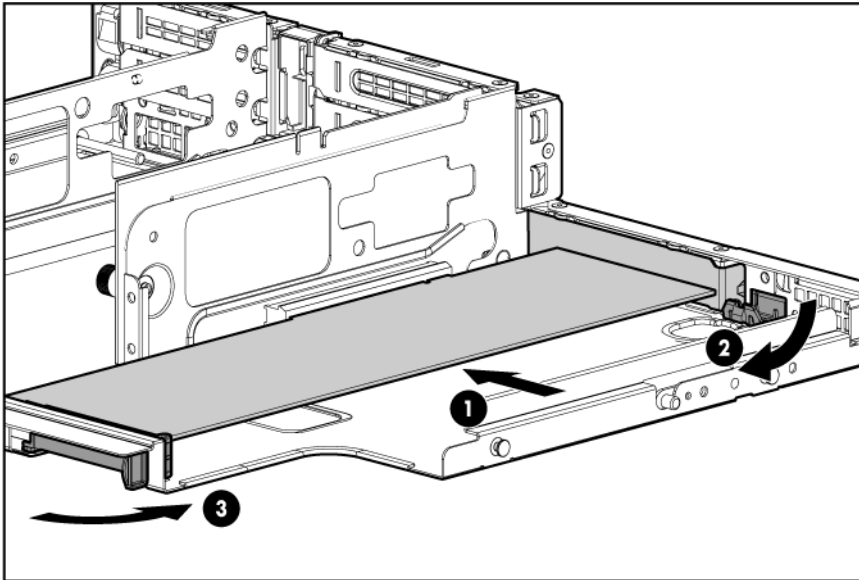


5. Connect any required internal cables to the expansion board.
6. Reinsert the PCI riser cage into the chassis.
7. Connect any required external cables to the expansion board.

Installing a full-length expansion board

Procedure

1. Remove the access panel. See [Removing the access panel](#) on page 52.
2. Remove the PCI riser cage. See [Removing the PCI riser cage](#) on page 52.
3. Remove the expansion slot cover. See [Removing expansion slot covers](#) on page 53.
4. Install the expansion board.



5. Connect any required internal cables to the expansion board.
6. Reinsert the PCI riser cage into the chassis.
7. Connect any required external cables to the expansion board.

Installing DIMMs

Memory configurations

The server has 24 system memory DIMM slots located on 4 memory risers (6 DIMMs per riser). You can access the memory risers without removing the airflow guide or the I/O card cage.

The DIMMs are partitioned by the number of processors installed in the server. If you have only one processor installed in the system, you can only use 12 of the 24 memory slots.

⚠ CAUTION:

Observe all ESD safety precautions before attempting this procedure. Failure to follow ESD safety precautions might result in damage to the server.

Memory riser locations and slot IDs

Install DIMMs into the risers attached to the system board. Each slot has a unique ID. For memory riser locations, see [System board components](#).

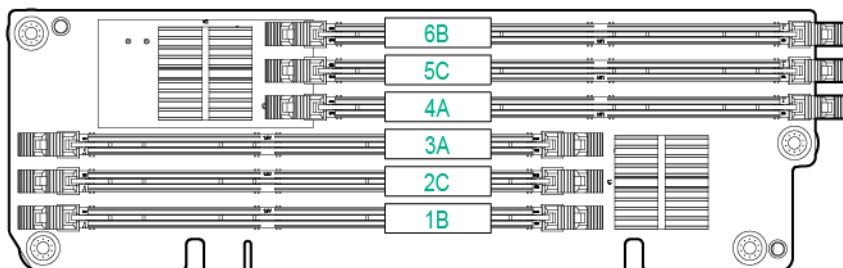


Figure 21: DIMM slot IDs

Table 8: Memory Load Order

Pair number	2 Processor system (socket 0 and 1)		1 Processor system (socket 0)	
	Memory riser	Memory slots	Memory riser	Memory slots
1	Memory riser 1	3A and 4A	Memory riser 1	3A and 4A
2	Memory riser 3	3A and 4A	Memory riser 2	3A and 4A
3	Memory riser 2	3A and 4A	Memory riser 1	1B and 6B
4	Memory riser 4	3A and 4A	Memory riser 2	1B and 6B
5	Memory riser 1	1B and 6B	Memory riser 1	2C and 5C
6	Memory riser 3	1B and 6B	Memory riser 2	2C and 5C
7	Memory riser 2	1B and 6B	—	—
8	Memory riser 4	1B and 6B	—	—
9	Memory riser 1	2C and 5C	—	—
10	Memory riser 3	2C and 5C	—	—
11	Memory riser 2	2C and 5C	—	—
12	Memory riser 4	2C and 5C	—	—

**IMPORTANT:**

A maximum of 8 DIMMs are supported in a configuration with low line AC voltage and 2 processors.

**TIP:**

You can load DIMM pairs on a single riser at a time, but this option reduces system performance.

Supported DIMM sizes

DIMMs seat onto the four memory risers that seat on the system board. The minimum server configuration requires that at least one memory pair (group of two DIMMs) is installed on memory riser 1.

Supported DIMM sizes:

- 4 GB
- 8 GB
- 16 GB

Memory loading rules and guidelines

CAUTION:

Failure to observe the following cautions results in system degradation or failure:

- Only ECC DIMMs are supported.
- Load DIMM pairs from largest to smallest capacity. For example, if you have a pair of 8 GB DIMMs and a pair of 16 GB DIMMs, install the pair of 16 GB DIMMs first.

NOTE:

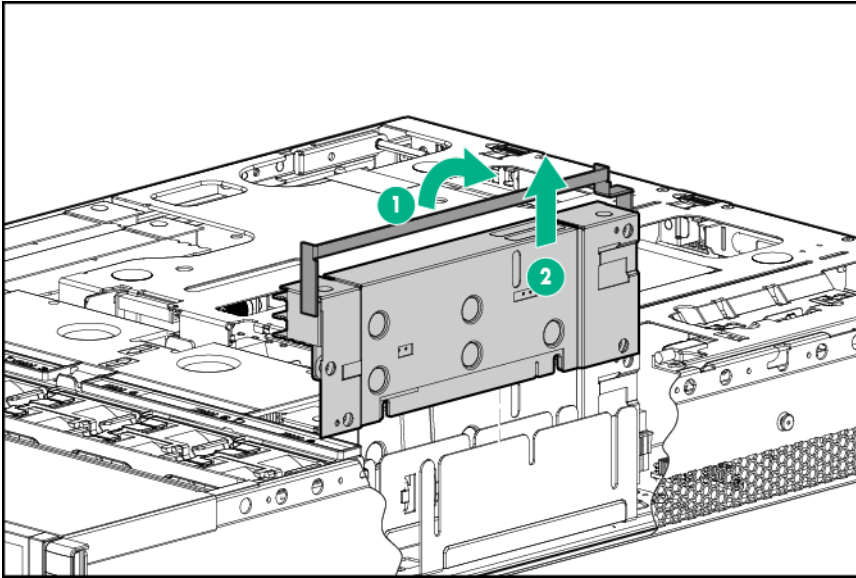
Faster DIMMs and slower DIMMs can be installed on different slots within the same channel, but faster DIMMs operate at the timing of the slowest DIMM populated.

- Alternate loading between installed processors. Do not install DIMMs if the corresponding processor is not installed.
 - Spread DIMMs evenly between processors.
 - Load DIMMs in pairs by increasing letter.
 - For best performance, install DIMM pairs in the specified sequence shown in **Memory Load Order**. DIMMs can be loaded in an economic order, for example, loading the first riser full before loading DIMMs on other memory risers, but the DIMMs must still follow the basic DIMM load sequence.
 - Load highest density DIMMs first.
 - Load DIMMs in pairs by increasing letter.
 - Mixed DIMM types are supported with the following qualifications:
 - DIMMs with x4 and x8 modes can be mixed.
 - DIMMs with different sizes can be mixed.
 - DIMMs with different rows, columns, bank, and rank numbers can be mixed.
 - Do not mix unbuffered DIMMs with registered DIMMs.
 - A maximum of two unbuffered DIMMs per channel can be installed.
 - If quad-rank DIMMs are installed for a processor, a maximum of two DIMMs can be installed on each channel for that processor.
 - If a channel contains quad-rank DIMMs, the quad-rank DIMM must be installed first on the channel.
-

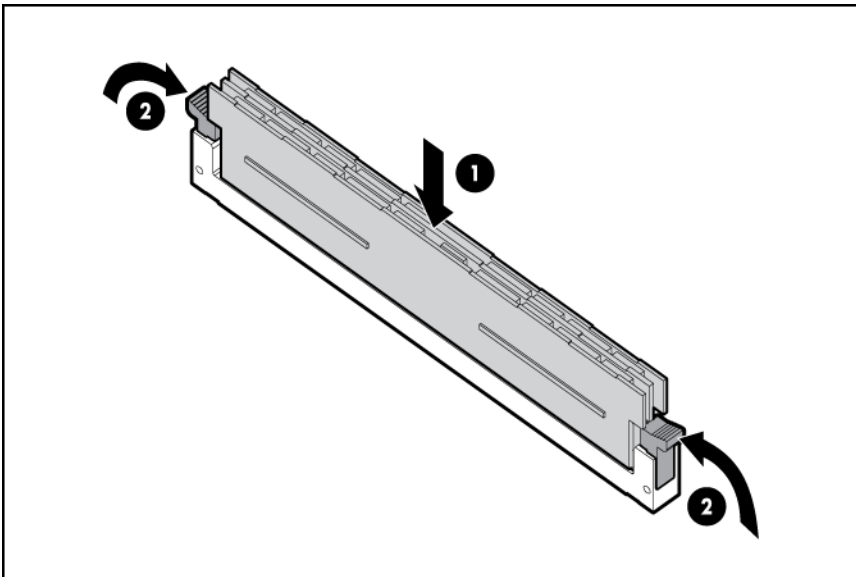
Installing DIMMs

Procedure

1. Remove the access panel. See [Removing the access panel](#) on page 52.
2. Lift the memory riser handle and remove the component.



3. Install the DIMM.

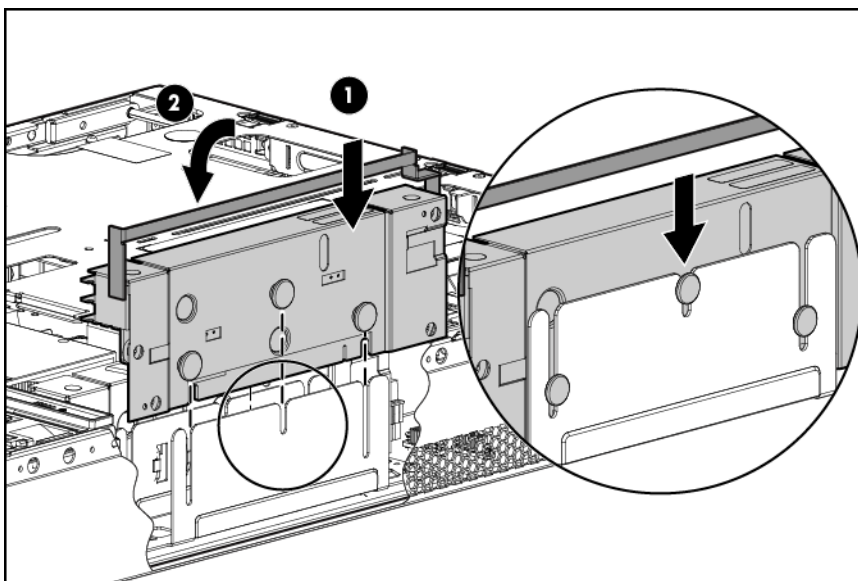


4. Replace the memory riser.



CAUTION:

Be sure to align the three stand-offs in the alignment slots.

**TIP:**

If you see abnormal error lights after installing DIMMs, try uninstalling and reinstalling the DIMMs and the memory riser to make sure the DIMMs and memory riser are correctly seated.

Installing a processor

The server holds one or two quad or eight-core processors that provide the following configuration options:

Quad-core processors:

- 2.40 P1/2.67 Uncore GHz 32-MB LL cache (170W)
- 1.73 P1/2.40 Uncore GHz 20-MB LL cache (130W)

Eight-core processors:

- 2.53 P1/2.67 Uncore GHz 32-MB LL cache (170W)
- 2.13 P1/2.40 Uncore GHz 24-MB LL cache (170W)

The first processor must be installed in socket 0, and the second processor in socket 1.

**CAUTION:**

Processor speed, number of cores, and cache size must be identical for all the processors installed in a server. To ensure compatibility, whether upgrading, replacing, or adding an additional processor, use processors with identical part numbers.

Failure to observe this caution results in performance degradation or server failure.

**CAUTION:**

Observe all ESD safety precautions before attempting this procedure. Failure to follow ESD safety precautions can result in damage to the server.

Processor load order

The server holds up to two quad-core or eight-core processors on the system board. The sockets on the system board are labeled Module 0 and Module 1. If the server has only one processor, it is installed in socket 0. Install the second processor in socket 1.

See **System board components** for the processor socket numbers.

Table 9: Processor load order

Processor	Socket
0	Module 0
1	Module 1

Installing a processor and heat sink module

CAUTION:

The pins on the processor socket are very fragile. Any damage to them might require replacing the system board.

CAUTION:

To avoid damage to the processor, verify that the plastic tabs on the heat sink assembly are pulled fully out before installation.

CAUTION:

To avoid damage to the processor, handle the processor only by the edges. Do not touch the bottom of the processor, especially the contact area.

CAUTION:

To prevent possible server malfunction and damage to the equipment, multiprocessor configurations must contain processors with the same part number.

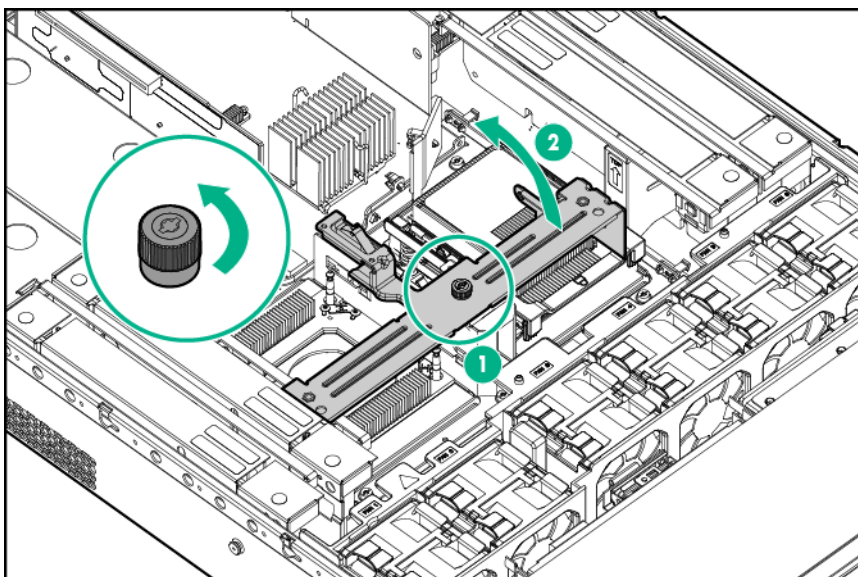
CAUTION:

To prevent thermal instability and damage to the server, do not separate the processor from the heat sink after assembling.

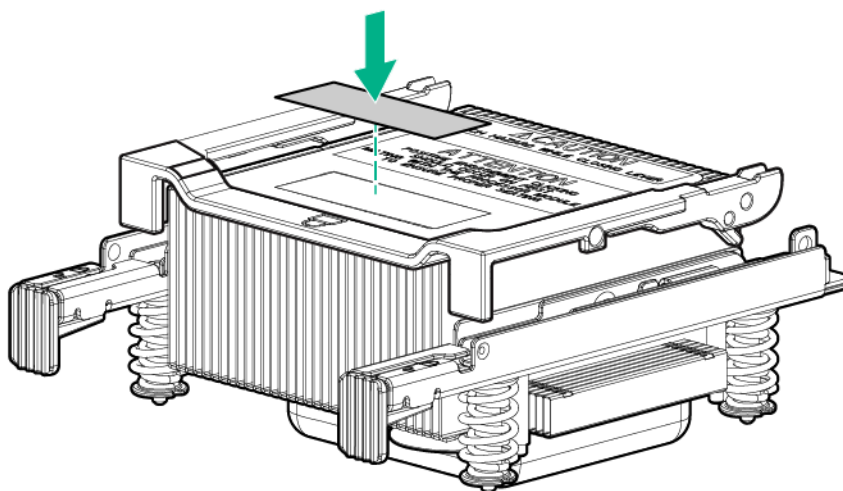
The processor and heat sink ship as separate units and are coupled during installation into the server.

Procedure

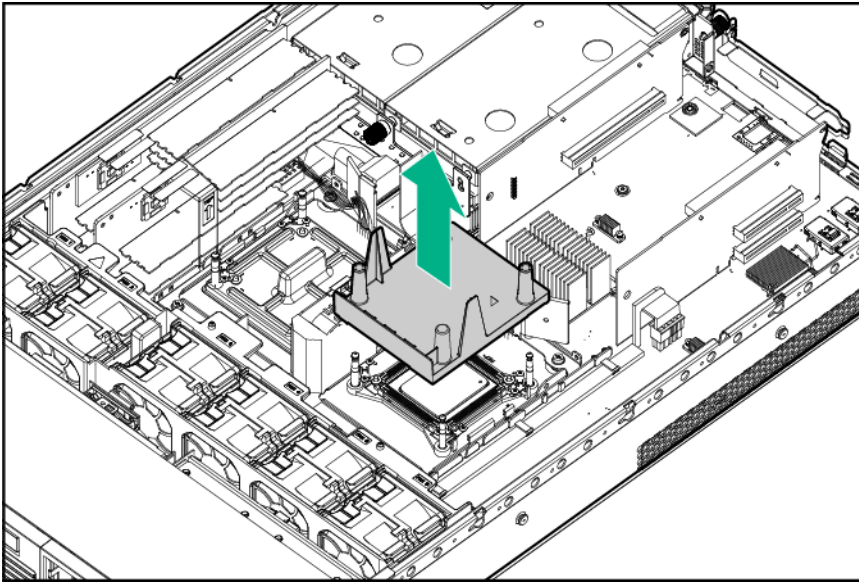
1. Open the processor cage.



2. Transfer the duplicate part/serial numbers label from the processor module to the processor heat sink:
 - a. Remove the duplicate tear-away label that lists the part and serial numbers from the processor module.
 - b. Place the label on the top of the heat sink.



3. Remove the processor airflow baffle.

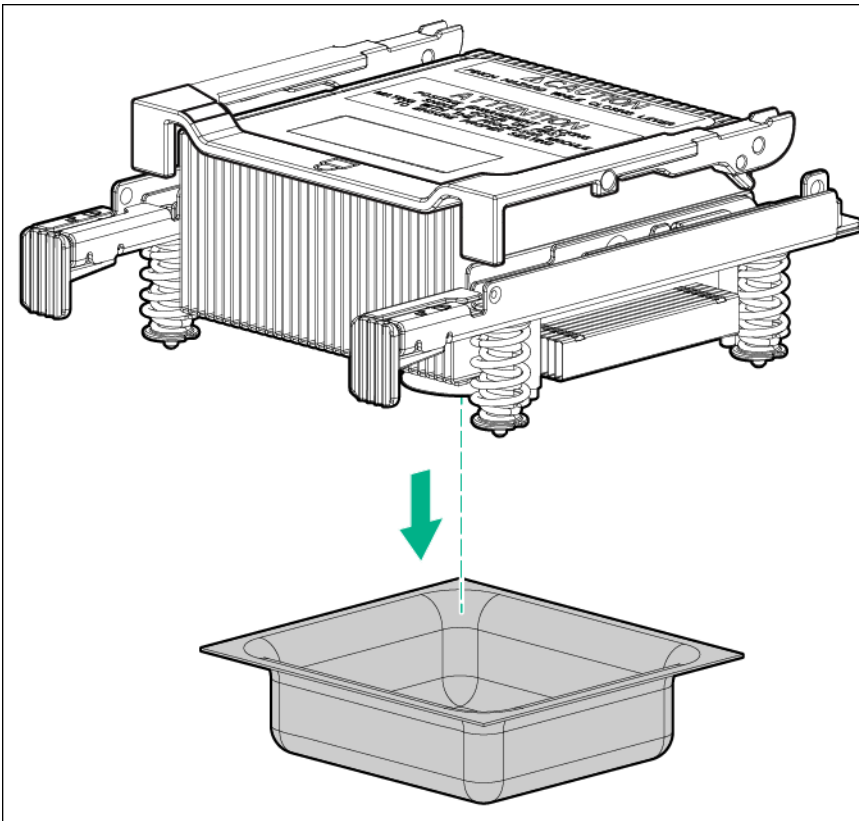


4. Install the processor over the load posts.

NOTE:

Ensure pin 1, indicated on the empty socket with an embossed triangle, matches the pin 1 marker on the processor module, the chamfered corner of its attached voltage regulator heat sink.

5. Remove the heat sink cover.



⚠ CAUTION:

To avoid damage to the server and processor, ensure the processor heat sink locking handle is fully back against the stops, rotated approximately 120° back. Also, verify that the plastic tabs on the processor heat sink are fully pulled out before installation.

⚠ CAUTION:

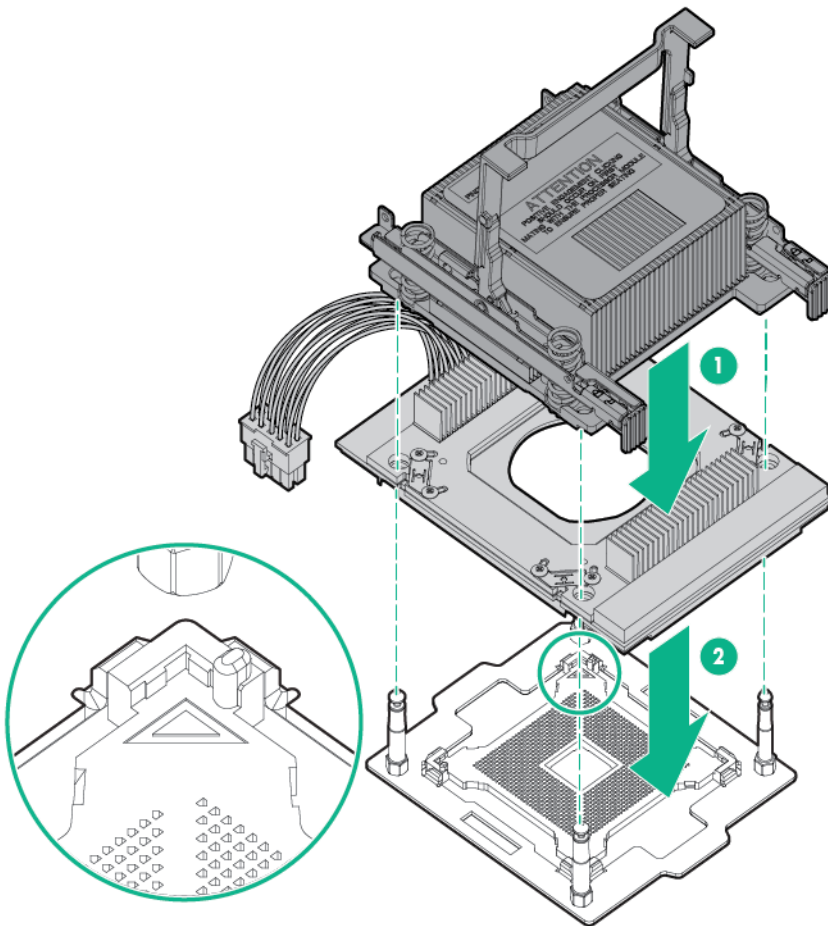
During installation, after removing the protective cover from the heat sink:

- Do not touch or come into contact with the thermal interface material.
- Immediately install the heat sink.

6. Install the heat sink over the load posts.

⚠ CAUTION:

Do not lower the heat sink locking handle before pushing the plastic locking tabs into place.



⚠ CAUTION:

To prevent thermal instability and damage to the server, do not separate the processor module from the processor heat sink after they have been coupled.

NOTE:

Positive engagement clicking must occur during engaging of the processor heat sink and processor module onto the socket to ensure proper seating.

7. Secure the heat sink to the processor.

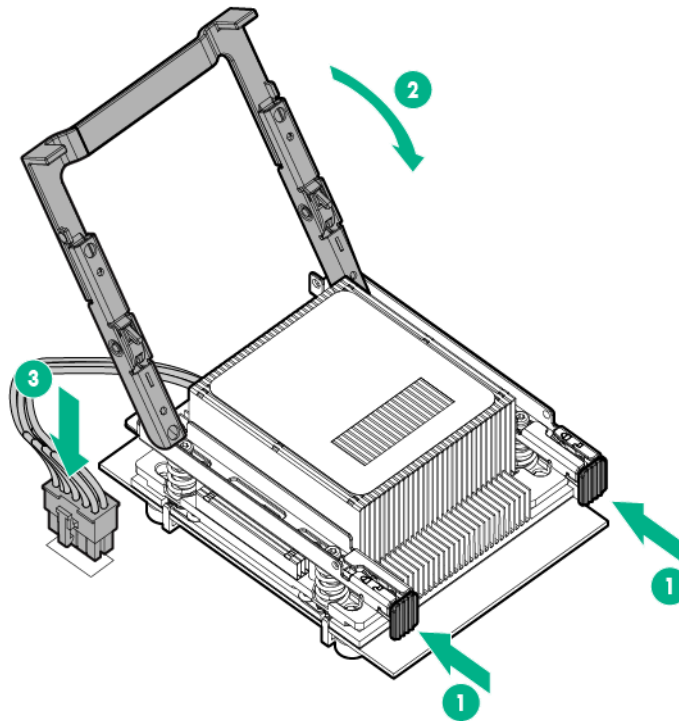
- a. Slide both plastic locking tabs into place. See callout 1 in the following figure.
- b. Flip the latch down. See callout 2 in the following figure.

⚠ WARNING:

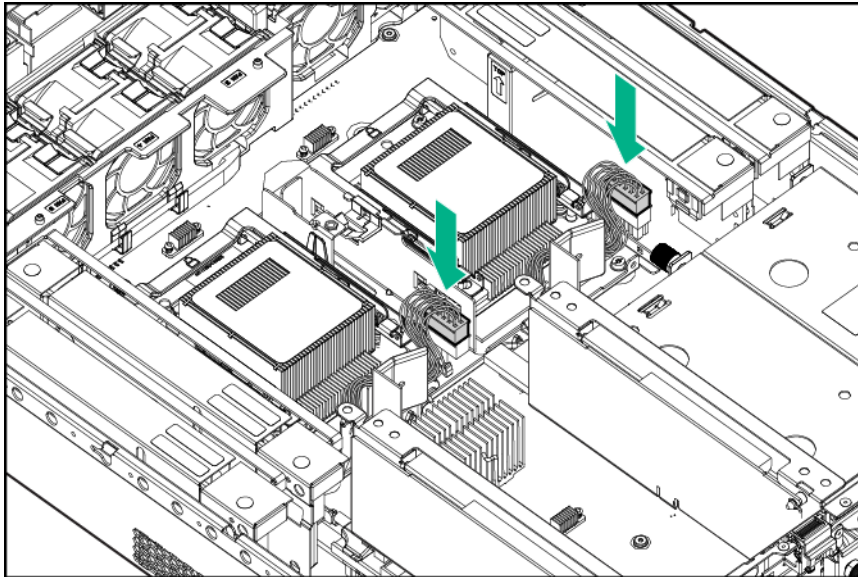
The heat sink locking lever can constitute a pinch hazard. Keep your hands on top of the lever during installation to avoid personal injury.

⚠ CAUTION:

To prevent thermal instability and damage to the server, do not separate the processor module from the processor heat sink after they have been coupled.



8. Route and connect the power cord.



⚠ CAUTION:

When the processor is installed, dress all slack in the power cable to the connector end of the cable. Failure to do so can result in pinched or damaged processor power cables.

NOTE:

If you are adding an additional processor to your server, the DIMMs in the server must be reconfigured to support both processors. For more information, see **Memory configurations** on page 56.

HPE Trusted Platform Module (TPM)

The TPM is not a customer-serviceable part.

⚠ CAUTION:

Any attempt to remove an installed TPM from the system board breaks or disfigures the TPM security rivet. Upon locating a broken or disfigured rivet on an installed TPM, administrators should consider the system compromised and take appropriate measures to ensure the integrity of the system data.

If you suspect a TPM board failure, leave the TPM installed and remove the system board (**Removing and replacing the system board** on page 160). Contact an HPE authorized service provider for a replacement system board and TPM board.

Installing a Trusted Platform Module (TPM) and TPM security rivet

The TPM is an optional security component which enhances security capabilities for the server running the HP-UX operating system. The TPM is a security chip that is unique to the server. It performs key security processes independent of other hardware components. The TPM creates and stores additional encryption keys from the root key of the system. The encryption keys created by the TPM encapsulate system application encryption keys to provide an additional layer of security for sensitive system data.

TPM installation requires the use of drive encryption technology.

**WARNING:**

To reduce the risk of personal injury, electric shock, or damage to the equipment, remove the power cord to remove power from the server. The front panel Power On/Standby button does not completely shut off system power. Portions of the power supply and some internal circuitry remain active until AC power is removed.

**CAUTION:**

Once the TPM is installed on your system board, it cannot be removed. If the TPM fails, the system board needs to be replaced. Attempting to remove the TPM from the system board will void any existing HPE service contract and cause the server to fail.

**CAUTION:**

Always observe the guidelines in this document. Failure to follow these guidelines can cause hardware damage or halt data access.

When installing a TPM, observe the following guidelines:

Procedure

1. Always enable the TPM and ensure that the TPM is recognized by the system before installing the TPM security rivet.
2. When installing or replacing hardware, HPE service providers cannot enable the TPM or the encryption technology. For security reasons, only the customer can enable these features.
3. When returning a system board for service replacement, do not remove the TPM from the system board. When requested, HPE Service will provide a TPM with the spare system board.
4. Any attempt to remove an installed TPM from the system board breaks or disfigures the TPM security rivet. Upon locating a broken or disfigured rivet on an installed TPM, consider the system compromised and take appropriate measures to ensure the integrity of the system data.
5. HPE is not liable for blocked data access caused by improper TPM use. For operating instructions, see the encryption technology feature documentation provided by the operating system.

HPE SPECIAL REMINDER: Before enabling TPM functionality on this system, you must ensure that your intended use of TPM complies with relevant local laws, regulations and policies, and approvals or licenses must be obtained if applicable. For any compliance issues arising from your operation/usage of TPM which violates the above mentioned requirement, you shall bear all the liabilities wholly and solely. HPE will not be responsible for any related liabilities.

惠普特别提醒：在您在系统中启用 **TPM** 功能前，请您务必确认，您将要对 **TPM** 的使用遵守相关的当地法律、法规及政策，并已获得所需的一切事先批准及许可（如适用）。若因您未获得相应的操作/使用许可而发生的合规问题，皆由您自行承担全部责任，与惠普无涉。

To install a TPM:

1. Power off the server.

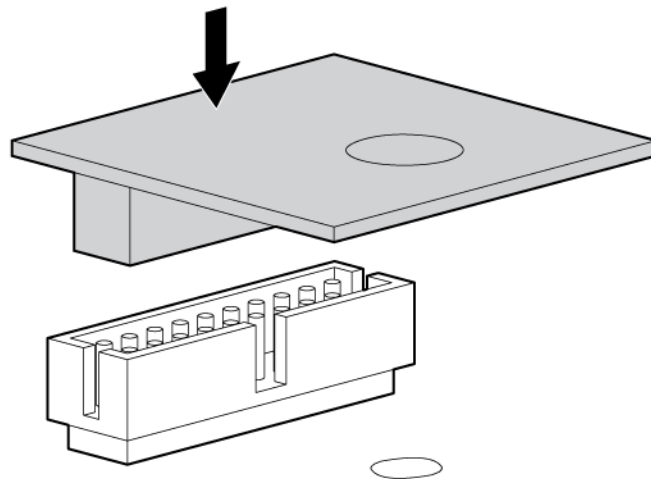
- a. Shut down the OS as directed by the OS documentation.
 - b. Press the Power On/Standby button to place the server in standby mode.
When the server enters standby power mode, the system power LED changes to amber.
 - c. Disconnect the power cords to the server.
2. Extend the server from the rack, or remove the server from the pedestal kit, and place it on an anti-static pad.
3. Remove the top access panel.
4. Disconnect any cables that might prevent access to the TPM connector.

⚠ CAUTION:

Any attempt to remove an installed TPM from the system board breaks or disfigures the TPM security rivet. Upon locating a broken or disfigured rivet on an installed TPM, consider the system compromised and take appropriate measures to ensure the integrity of the system data.

Do not install the TPM security rivet at this time.

5. Install the TPM board. Press down on the connector to seat the board.



6. Install any options or cables previously removed to access the TPM connector.
7. Install the access panel.
8. Install the server in the rack or replace the server in the pedestal kit.
9. Power up the server.
 - a. Connect the power cords.
 - b. Press the power button.

To enable the TPM:

1. Boot to the UEFI menu.
2. Enter the `seccfg tpm on` command.
3. Enter the `reset` command. The system will reboot and the TPM is enabled.
4. When the system has rebooted, enter the command `seccfg tpm`, to verify the TPM is enabled.
5. Enable the TPM in the OS. For OS-specific instructions, see the OS documentation.

⚠ CAUTION:

When a TPM is installed and enabled on the server, data access is locked if you fail to follow the proper procedures for updating the system or option firmware, replacing the system board, replacing a hard drive, or adjusting the OS application TPM usage.

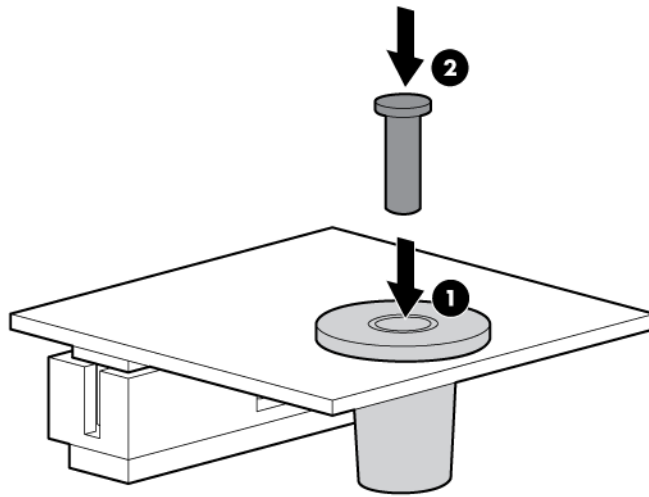
For more information on firmware updates and hardware procedures, see the HPE Trusted Platform Module Best Practices White Paper on the Hewlett Packard Enterprise website: <http://www.hpe.com/support>.

To install the TPM security rivet:

⚠ CAUTION:

Always enable the TPM and ensure that the TPM is recognized by the system before installing the security rivet. Removing the TPM security rivet after it is secured to the system board can cause damage to the TPM security rivet, the TPM, and the system board.

1. Power off the server.
 - a. Shut down the OS as directed by the OS documentation.
 - b. Press the Power On/Standby button to place the server in standby mode. When the server enters standby power mode, the server power LED changes to amber.
 - c. Disconnect the power cords.
2. Extend the server from the rack, or remove the server from the pedestal kit.
3. Place the server on a flat, level work surface.
4. Remove the access panel.
5. Remove any cables that might prevent access to the TPM connector.
6. Install the TPM security rivet by pressing the rivet firmly into the system board.



7. Install any cables previously removed to access the TPM.
8. Install the top access panel.
9. Install the server into the rack.
10. Power up the server.

Verifying installed components in the server

Use the following procedure to verify that the components you have installed into the server are recognized by the server:

Procedure

1. From the UEFI Front Page press **S** to enter the UEFI shell.
2. Wait for the `UEFI Shell` prompt to appear.
3. Enter `info all` from the UEFI Shell prompt. The following appears:

NOTE:

Your display might not match the display shown.

4.

```
info all

SYSTEM INFORMATION

[]

CPU INFORMATION

[Details omitted]
```

```
BOOT PROCESSOR INFORMATION
    [Details omitted]

MEMORY INFORMATION
    [Details omitted]

I/O INFORMATION
    [Details omitted]

PCI DEVICE INFORMATION
    [Details omitted]

CONSOLE CONFIGURATION
    [Details omitted]

BOOT INFORMATION
    [Details omitted]

FIRMWARE INFORMATION
    [Details omitted]

SYSTEM SECURITY CONFIGURATION
    [Details omitted]

Shell>
```

Completing installation

After all components are installed:

Procedure

1. Close the processor cage.
2. Install the PCI riser cage.
3. Install the access panel.
4. Install the server into the rack or pedestal.
5. Connect all cables.
6. Power on the server.

Troubleshooting

Cause

The purpose of this chapter is to provide a preferred methodology (strategies and procedures) and tools for troubleshooting the server error and fault conditions.

How to contact Hewlett Packard Enterprise

For information on how to contact Hewlett Packard Enterprise, see [Troubleshooting](#).

Methodology

General troubleshooting methodology

There are multiple entry points to the troubleshooting process, dependent upon your level of troubleshooting expertise, the tools/processes/procedures which you have at your disposal, and the nature of the system fault or failure.

Typically, you select from a set of symptoms, ranging from very simple (system LED is blinking) to the most difficult (Machine Check Abort (MCA) has occurred). The following is a list of symptom examples:

NOTE:

Your output might differ from the output in the examples in this book depending on your server and its configuration.

- Front panel LED blinking
- System alert present on console
- System will not power-up
- System will not boot
- Error/Event Message received
- Machine Check Abort (MCA) occurred

Narrow down the observed issue to the specific troubleshooting procedure required. Isolate the failure to a specific part of the server, so you can perform more detailed troubleshooting. For example:

- Issue- Front panel LED blinking
-

NOTE:

The front panel health LEDs flash amber with a warning indication, or flash red with a fault indication.

- System Alert on console?

Analyze the alert by using the system event log (SEL) and forward progress log (FPL), to identify the last error logged by the server. Use the iLO 3 MP commands to view the SEL and FPL, either

through the iLO 3 MP serial text interface, or through Secure Shell, or through the web GUI on the iLO 3 MP LAN.

You can now determine which area of the system requires further analysis. For example, if the symptom was "system will not power-up", the initial troubleshooting procedure might indicate a issue with a DC power rail not coming up after the power switch was turned on.

You have now reached the point where the failed CRU (Customer Replaceable Unit) has been identified and needs to be replaced. Perform the specific removal and replacement procedure, and verification steps.

NOTE:

If multiple CRUs are identified as part of the solution, a fix cannot be guaranteed unless all identified failed CRUs are replaced.

You might have to perform specific recovery procedures to finish the repair. For example, if the system board is replaced, you need to restore customer specific information.

Should a failure occur, the System Insight Display LEDs, SEL and FPL help you identify the issue or CRU:

- LEDs. The front panel LEDs and LAN LEDs of the server change color and blink to help identify specific issues.
- The System Event Log (SEL) provides detailed information about the errors identified by the LEDs.
- The Forward Progress Log (FPL) provides details about the boot progress of the server.

The System Insight Display LEDs are cleared after the issue is corrected or the CRU is replaced and by cycling AC power.

If the LEDs, SEL and FPL do not give you enough information to identify the issue, HP also provides diagnostic tools with each operating system (see **Troubleshooting tools** on page 81 for more details).

NOTE:

Always check the iLO 3 MP SEL in the case of a blinking yellow or red front panel LED, before replacing any hardware. The default display mode is **Keyword** mode. You can also view the error messages in **Text** mode.

Recommended troubleshooting methodology

The recommended methodology for troubleshooting a server error or fault is as follows:

Procedure

1. Consult the system console for any messages, emails, etc., pertaining to a server error or fault.
2. View the front panel LEDs (power, SID, and system health), either locally, or remotely through the iLO 3 MP `vfp` command.
3. Compare the state of the server LEDs (off; flashing or steady; red, green, or amber) with the LED states listed in the LED Panel State Table in this section.
4. Go to the step number of the Basic Low End Troubleshooting Table, as specified in the right column of the LED Panel State Table, located in the row which corresponds to your front panel LED display state.

5. Read the symptom/condition information in the left column of the Basic Low End Troubleshooting Table.
6. Perform the actions specified in the Action column.
7. If you need more details, see the appropriate subsection of this chapter, where this information is provided in the Action column. You might be directed to access and read one or more error logs (SEL and/or FPL).

While Hewlett Packard Enterprise suggests that all users follow the recommended troubleshooting methodology and use the Basic and Advanced Troubleshooting Tables in the next subsection, as a more experienced troubleshooter, you might elect to go directly to the subsection which corresponds to your own entry point of choice.

Troubleshooting entry points provides the corresponding subsection or location title for these different entry points (for example, if you would prefer to start by examining the logs, you can go directly to the subsection entitled **Errors and reading error logs** on page 96):

Table 10: Troubleshooting entry points

Entry point	Subsection or location
Front panel/System Insight Display LEDs	Basic and advanced troubleshooting tables on page 74 and Troubleshooting tools on page 81
System Event Log and Forward Progress Logs	Errors and reading error logs on page 96
Offline and Online Diagnostics/INIT button	Troubleshooting tools on page 81
System Event Analyzer	Troubleshooting tools on page 81 for more information about this tool)

Basic and advanced troubleshooting tables

The following troubleshooting tables are designed for use by both trained and untrained support personnel. The tables are the first tools used to determine the symptoms or condition of a suspect server. Be aware that the state of the front panel LEDs can be viewed locally or remotely (using the `vfp` command from the iLO 3 MP).

The tables are designed to cover troubleshooting symptoms from AC power-on up to booting the operating system (OS), specifically in Steps 1-5. In most cases begin with Step 1 in **Basic low end troubleshooting**, sequencing through the table steps to locate the symptom/condition most descriptive of your current server status; this becomes the first step in your troubleshooting procedure. Where appropriate, an action or actions prescribed in the "Action" column of **Basic low end troubleshooting** is followed by a reference to the corresponding subsection of this chapter for further information.

Table 11: Basic low end troubleshooting

Step	Condition	Action
1	Server appears "dead" -- no front panel LEDs are on, and no fans are running.	<p>Nothing is logged for this condition.</p> <ol style="list-style-type: none"> 1. For new server installations, review the install procedures. 2. Verify that the power cords are connected to both the power supplies and to the AC receptacles. 3. Verify that AC power, at the proper AC voltage levels, is available to the receptacles. 4. Check the front panel connector and the cable to the rest of the system. 5. If the integrated power button LED on front panel remains off, then re-seat the power supplies, replace the power cords, and replace the bulk power supplies, in that order (see <u>Troubleshooting the power subsystem</u> on page 109 for details). <p>The preceding issue is fixed when the front panel LED states are as follows: system health LED is off; and power is steady amber.</p>
2a	<p>Server does not power on after front panel power button is momentarily pressed (less than four seconds).</p> <hr/> <p>NOTE:</p> <p>This step assumes iLO 3 is running. If iLO 3 is not running, proceed to step 4a.</p> <hr/>	<p>A fatal fault has been detected and logged, attempting to power on the server (system health is off, and power is steady amber).</p> <ol style="list-style-type: none"> 1. Examine each power supply LED -- if not solid green, then replace power supply (see <u>Troubleshooting the power subsystem</u> on page 109 for more details). 2. Examine the iLO 3 MP logs for events related to bulk power supplies (see <u>Troubleshooting the power subsystem</u> on page 109 for details). <p>The preceding issue is fixed when the front panel LEDs are as follows: system health is off, and power is solid green.</p>

Table Continued

Step	Condition	Action
2b	System health LED is flashing amber.	<p>A warning or critical failure has been detected and logged after server powers on (system health is flashing amber, and power is steady green). Examine each power supply LED. If not solid green, replace power supply (see <u>Troubleshooting the power subsystem</u> on page 109for details).</p> <p>The preceding issue is fixed when the failure condition is corrected, and the front panel LED states are as follows: system health is steady green, and power is steady green.</p>
3	System health LED is flashing red.	<p>A fatal fault has been detected and logged after attempting to power on the server (system health is flashing red, SEL is red, and power is steady green).</p> <ol style="list-style-type: none"> 1. Examine each power supply LED. If not solid green, replace power supply (see <u>Troubleshooting the power subsystem</u> on page 109 for details). 2. Check SID LED panel to identify failed or faulty internal CRU (see <u>Troubleshooting tools</u> on page 81 for details). <p>The preceding issue is fixed when a redundant, internal CRU is replaced, and the front panel LED states are as follows: system health is off, SEL is off and power is steady green.</p>

Table Continued

Step	Condition	Action
4a	Cannot see iLO 3 MP prompt on system console -- server power is off/on.	<p>Front panel LEDs indicate that the server is either booting or running system firmware, or is booting or running the OS (system health is steady green, and power is steady green). Nothing might be logged for this condition.</p> <ol style="list-style-type: none"> 1. The most common reasons for this are local console device cabling issues, local console device configuration issues, etc. Check these issues first. 2. Be sure that the RS-232 configuration matches between the server and the local console (see <u>Troubleshooting the system console</u> on page 119 for more details). 3. Reset iLO 3 MP, by using the iLO 3 physical presence pinhole button on the rear panel of the server. 4. If no change, replace the system board (see <u>Removing and replacing the system board</u> on page 160 for details). <p>The preceding issue is fixed when the iLO 3 prompt can be seen and the system health LED is steady green.</p>
4a (cont.)	Still no iLO 3 MP prompt on system console.	<p>Nothing might be logged for this condition (NOTE: if the iLO 3 MP is off, the system health LED is off as well).</p> <p>Front panel LEDs indicate that the server is either booting or running the OS (see <u>Troubleshooting the boot process</u> on page 116 for details).</p> <ol style="list-style-type: none"> 1. Verify that the proper terminal type is set: Supported settings are hpterm, VT100+ (default), and VTUTF8. 2. Verify that the RS-232C configuration matches between the server and the local console or modem (see <u>Troubleshooting the system console</u> on page 119 for details). 3. Look for loose, damaged, or disconnected power and signal cables on the I/O riser. <p>The preceding issue is fixed when iLO 3 MP menu appears on the system console, and the system health is steady green.</p>

Table Continued

Step	Condition	Action
4b	Cannot see UEFI prompt on system console.	<p>Nothing might be logged for this condition (system health is steady green, and power is steady green).</p> <ol style="list-style-type: none"> 1. Examine the SID LEDs for any faults. 2. Examine the iLO 3 MP logs for entries related to processors, processor power modules (PPMs), shared memory, and core I/O devices (see <u>Errors and reading error logs</u> on page 96 for details). 3. As a last resort, restart the server by cycling AC power. <p>The preceding issue is fixed when UEFI menu appears on the system console, and system firmware booting completes.</p>
4c	Cannot find a boot disk or removable media drive.	<p>Nothing might be logged for this condition (system health is green, and power is steady green).</p> <ol style="list-style-type: none"> 1. Examine the boot device, to determine if it is plugged into its drive bay properly. 2. Examine the drive cabling for any issues. 3. Examine the boot path settings. 4. Examine the iLO 3 MP logs for entries related to processors, processor power modules (PPMs), shared memory, and core I/O devices (see <u>Errors and reading error logs</u> on page 96 for more details). <p>The preceding issue is fixed when all boot devices are found.</p>

Table Continued

Step	Condition	Action
4d	There are RAID channel redundancy failures.	<p>Nothing is logged for this condition (system health is off or steady green, and power is steady green). Examine the LED next to each RAID connector, and replace the RAID HBA (if this LED is either steady amber or steady red, it indicates RAID drives are degraded or corrupted, respectively).</p> <p>The preceding issue is fixed when all of these LEDs remain off, after next power on.</p>
5	Cannot see OS prompt on system console.	<p>Front panel LEDs indicate that the server power is turned on, and that the server is either booting or running the OS. Nothing might be logged for this condition (system health is steady green, and power is steady green). Examine the iLO 3 MP logs for entries related to processors, processor power modules (PPMs), shared memory, and core I/O devices (see Errors and reading error logs on page 96 for details).</p> <hr/> <p>NOTE:</p> <p>Be sure to check the console settings from the Boot Manager for your OS.</p> <hr/> <p>The preceding issue is fixed when OS prompt appears on the system console.</p>

Table 12: Advanced low end troubleshooting

Step	Symptom/Condition	Action
6	Cannot read System Event Log from the iLO console.	<p>System event logging has stopped and a iLO MP malfunction is assumed (system health is steady green, and power is steady green).</p> <ol style="list-style-type: none"> 1. Examine console messages for any UEFI errors or warnings about iLO operation or communications. 2. Test the operation of the iLO MP by toggling the UID locator switch LED on the front panel -- the blue LED is turned on/off by the iLO, when this switch is toggled. 3. Reset iLO 3 MP, by using the iLO 3 physical presence pinhole button on the rear panel of the server. <p>The preceding issue is fixed when the SEL resumes logging.</p>
7	OS is non-responsive (hung).	<p>Front panel LEDs indicate that the server power is turned on, and it is either booting or running the OS (system health is steady green, and power is steady green). Nothing might be logged for this condition.</p> <ol style="list-style-type: none"> 1. Use the iLO 3 MP Command Menu to initiate a ToC, using the <code>tc</code> command. 2. Reboot the OS and escalate. 3. Obtain the system hardware status dump for root cause analysis. 4. Examine the iLO 3 MP logs for entries related to processors, processor power modules (PPMs), shared memory, and core I/O devices (see <u>Errors and reading error logs</u> on page 96 for details). <p>The preceding issue is fixed when the root cause has been determined.</p>

Table Continued

Step	Symptom/Condition	Action
8a	MCA occurs during server operation; the server reboots the OS. (NOTE: Server reboots OS, if enabled)	<p>Front panel LEDs indicate that the server detected a fatal error that it cannot recover from through OS recovery routines (system health is flashing red, SEL is red, and power is steady green).</p> <ol style="list-style-type: none"> 1. Capture the MCA dump with the UEFI <code>errdump mca</code> command. If the system can boot the OS, you can capture binary MCA dump files online. 2. Examine the iLO 3 MP logs for entries related to processors, processor power modules (PPMs), shared memory, and core I/O devices (see Errors and reading error logs on page 96 for more details).
8b	MCA occurs during server operation; server reboot of OS is prevented. NOTE: The troubleshooting actions for this step are identical to those in Step 8a, except that the server in this step must be hard reset to begin the booting process. You must hard reset the server to clear the fatal condition and boot the OS.	<p>Front panel LEDs indicate that the server detected a fatal, front side bus error, caused by DIMMs; or by any parity in the I/O path between SBA, LBA, or HBA (system health is flashing red, SEL is red, power is steady green). System firmware is running to gather and log all error data for this MCA event.</p> <ol style="list-style-type: none"> 1. Examine the iLO 3 MP logs for entries related to processors, processor power modules (PPMs), shared memory, and core I/O devices (See Errors and reading error logs on page 96 for details).

Troubleshooting tools

Cause

Use the following tools to aid in troubleshooting the server.

LEDs

Front panel LEDs

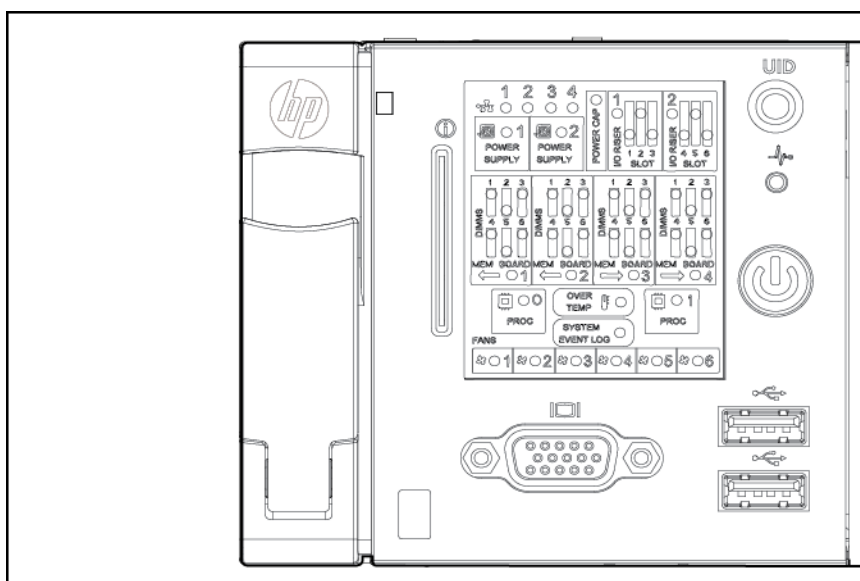


Figure 22: Front panel LEDs and buttons

1. UID LED and button
2. System health LED
3. Power button

Table 13: Front panel controls

Name	Function	Status
UID button	This button helps locate a particular server within a rack of servers. You can remotely activate this function through various system utilities.	<ul style="list-style-type: none"> • Blue = Identification • Flashing blue = Remote iLO session or a firmware flash update is in progress • Off = Off
System health LED	This LED provides information about the system status.	<ul style="list-style-type: none"> • Green = Health good on all internal FRUs and system firmware has passed "BOOT_START" • Flashing Amber = A FRU or subsystem has failed, or a fatal fault has occurred (system is on or in standby mode). • Flashing Red = A fatal fault has been detected and a FRU or subsystem has failed. View the SID, other LEDs, and the logs for information. • Off = Health good on all internal FRUs and system off <hr/> <p>NOTE:</p> <p>The System Health LED does not change status if AC power is removed from a single power supply in a system with power redundancy.</p>
Power button	This button manually powers the server on and off.	<ul style="list-style-type: none"> • Green = System on • Amber = System is powered off, but standby power is on • Off = System power and standby power is off

The front panel of the system contains the power button/system power LED, health LED, System Event Log LED, and locator switch/LED. The server use flashing states (for example, flashing amber or red) on these LEDs to indicate a warning or an error.

There are a total of three LEDs, arranged vertically, with the UID button and the power button each having an integrated LED. In addition to the two integrated button/LEDs, there is a health LED.

System health LED

The front panel health LED indicates the status of the components that are externally serviceable. Whenever the system health LED illuminates, the corresponding CRU illuminates for the failed component.

Table 14: System health LED states

Definition	Flash Rate	LED Color
Health good on all CRUs and system power is off.	LED Off	Off
System power is on and serviceable components (usually accessible from front or back, such as fans and power supplies) are okay.	Steady	Green
An accessible CRU failed (system is on or in standby mode). Usually, this is a power supply or fan failure. Check SID LEDs for failed component.	Flash 1 Hz	Amber
A fatal fault has been detected and logged. View the SID, other LEDs, and the logs for information.	Flash 1 Hz	Red

Red supersedes green. This LED is cleared when all failed externally accessible entities are repaired and report that they are good, or on any AC or standby power cycle.

The iLO 3 MP displays the following strings in its Virtual Front Panel for the three states of this LED:

Table 15: VFP health description

LED Status	VFP Status
Off	<none>
On green	External parts, including fans and power supplies, okay
Flashing red	A redundant, externally accessible CRU failed (check SID LEDs)

Locator Switch/LED (UID)

The locator switch/LED enables a specific system to be identified in a rack or data center environment. One locator switch/LED is located in the front panel, and a second is located in the rear of the server. LEDs are incorporated inside the push-button to minimize space. Both switches are toggle switches, meaning you push it once to turn on the LED, and you push it again to turn off the LED. Pressing the front panel Switch/LED, or entering the iLO 3 MP and `LOC` commands, illuminates the rear panel LED, and vice versa.

- Off = Off
- Blue (Not flashing) = Identification

SID LEDs

The SID consists of several LEDs that can be lit to show the health or failure of various server components. The layout mimics the physical placement of components as viewed from the top of the server.

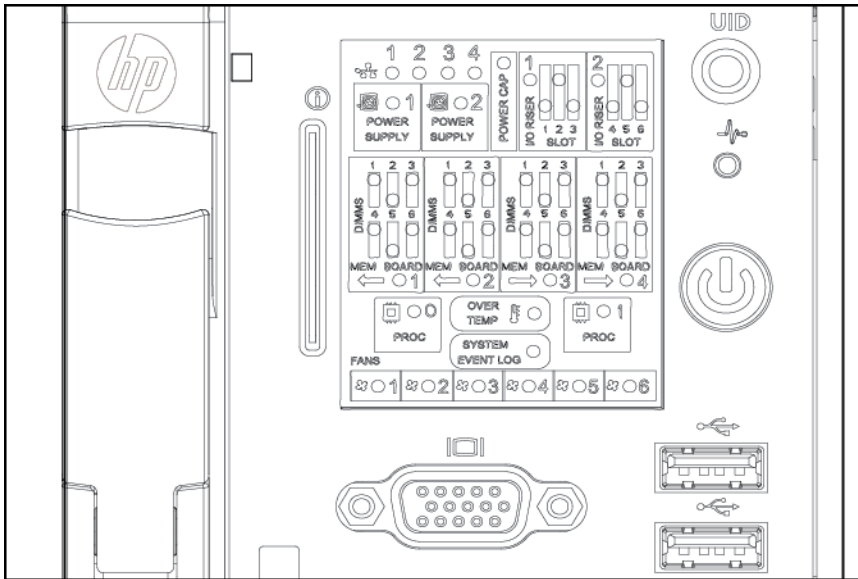


Figure 23: System Insight Display LEDs

Table 16: SAS disk drive LEDs: RAID mode

LED	State															
NICs	<ul style="list-style-type: none">• Off = No link to network• Flashing green = Network link and activity• Green = Network link															
Power Cap	<table><tr><th>Capping</th><th>Power</th><th>LED</th></tr><tr><td>On</td><td>On</td><td>Green</td></tr><tr><td>On</td><td>Off</td><td>Off</td></tr><tr><td>Off</td><td>On</td><td>Off</td></tr><tr><td>Off</td><td>Off</td><td>Off</td></tr></table> <p>NOTE: Power capping operation can be observed through iLO 3 also. For more information, see the <i>HPE Integrity iLO 3 Operations Guide</i>.</p>	Capping	Power	LED	On	On	Green	On	Off	Off	Off	On	Off	Off	Off	Off
Capping	Power	LED														
On	On	Green														
On	Off	Off														
Off	On	Off														
Off	Off	Off														
Over Temp	<ul style="list-style-type: none">• Off = Server temperature good• Amber = Server temperature too high, attention required															

LED	State
System Event Log	<ul style="list-style-type: none"> Green = Normal Red = System fatal
Component LEDs	<ul style="list-style-type: none"> Off = Component health is assumed good Amber = Component health last known to be bad <hr/> <p>NOTE:</p> <p>The Power Supply LED is lit only when a failure or fault is detected in a power supply. Loss of AC power to a power supply generates a SEL entry, but does not result in the Power Supply LED becoming lit.</p>

Table 17: SAS disk drive LEDs : HBA mode

Drive activity LED status	Drive status LED status	Indication
Off, or flashing	Alternating amber and blue	The drive has failed, or a predictive failure alert has been received for this drive; it also has been selected by a management application.
Off, or flashing	Blue	The drive is operating normally, and it has been selected by a management application.
Flashing irregularly	Regularly flashing amber(1 Hz)	The drive is active, but a predictive failure alert has been received for this drive. Replace the drive as soon as possible.
Flashing irregularly	Off	The drive is active, and it is operating normally.
Off	Amber	A critical fault condition has been identified for this drive. Replace the drive as soon as possible.
Off	Regularly flashing amber(1 Hz)	A predictive failure alert has been received for this drive. Replace the drive as soon as possible.
Off	Off	The drive is online.
Off	Off	Normal operation; no activity

The System Insight Display improves serviceability by enabling you to look in a single location for the LEDs that provide failing CRU locating/mapping information. These amber LEDs are only lit when a failure occurs; otherwise, they are off. The System Insight Display is located on the front panel of the server. A diagnostic LED exists for each CRU in the system, including all DIMMs. **Figure 23: System Insight Display LEDs** on page 85 shows the System Insight Display LEDs.

Table 18: SID LED States

Definition	Flash Rate	LED Color
CRU health is assumed good.	LED Off	Off
CRU health last known to be bad.	Steady	Amber

NOTE:

The Power Supply LED illuminates only when a failure or fault is detected in a power supply. Loss of AC power to a power supply will generate a SEL entry, but does not result in the Power Supply LED illuminating.

FRU and CRU health LEDs

In addition to the front panel diagnostic LEDs, CRUs provide additional diagnostic capability through LEDs, whose order or layout is product dependent.

NOTE:

If multiple error conditions occur, all applicable CRU lights are activated. In such a case, the most critical error determines the front panel color.

System Event Log LED

The server has this LED for the following reasons:

- To carry forward the ATTENTION functionality of legacy Integrity and HPE9000 front panel designs
- To give the customer an indication of whether the system is up or down (the health LED does not tell the user if the system is booted.)
- To cover the wide range of faults for which software/firmware is not 100% sure that a CRU must be re-seated/replaced. (The system health LED does not illuminate unless software/firmware can make a solid determination that a CRU must be re-seated/replaced.)

This LED indicates the overall health state of the system, including the state of system firmware and the OS. If the LED is red, the system needs attention, and the event logs must be examined for details of the issue.

Table 19: SEL LED states

Definition	Flash Rate	LED Color
System is off, or system is booting firmware with no failures, since SEL logs last examined.	LED Off	
System has left the firmware boot, and an OS is booting or running with no failures, since SEL logs last examined.	Steady	Green
A fatal fault has been detected and logged.	Flash 2 Hz	Red

The iLO 3 MP displays the following strings in its Virtual Front Panel for the states of this LED:

Table 20: VFP health description

Off	<none>
On green	OS booting or running
Flashing red	Fatal fault -- system crashed or cannot boot: check logs for details

Hard drive LEDs

The hard drives have two LEDs per drive. See **Hot-plug SAS disk drive LEDs** :

Drive status LED

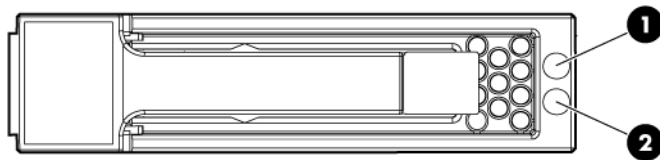
The drive status LED can appear amber or blue.

- Amber indicates a warning, or failure condition.
- Blue is a locator LED that identifies a particular disk drive.

Various software utilities, such as online diagnostics or SAS disk drive configuration tools, can activate the locator LED.

Drive activity LED

The drive activity LED is solid green during normal operation and flashes green when a drive is accessed.

**Figure 24: Hot-plug SAS disk drive LEDs**

1. Drive status LED (locator LED)
2. Drive activity LED

Table 21: SAS disk drive LEDs: RAID mode

Drive activity LED status	Drive status LED status	Indication
On, off, or flashing	Alternating amber and blue	The drive has failed, or a predictive failure alert has been received for this drive; it also has been selected by a management application.
On, off, or flashing	Blue	The drive is operating normally, and it has been selected by a management application.

Table Continued




Drive activity LED status	Drive status LED status	Indication
On	Regularly flashing amber (1 Hz)	<p>A predictive failure alert has been received for this drive.</p> <hr/> <p> IMPORTANT: Replace the drive as soon as possible.</p> <hr/>
On	Off	The drive is online, but it is not active currently.
Flashing regularly (1 Hz)	Regularly flashing amber (1 Hz)	<p> CAUTION: Do not remove the drive. Removing a drive might terminate the current operation and cause data loss.</p> <hr/> <p>The drive is part of an array that is undergoing capacity expansion or stripe migration, but a predictive failure alert has been received for this drive. To minimize the risk of data loss, do not replace the drive until the expansion or migration is complete.</p> <hr/>
Flashing regularly (1 Hz)	Off	<p> CAUTION: Do not remove the drive. Removing a drive might terminate the current operation and cause data loss.</p> <hr/> <p>The drive is rebuilding, erasing, or it is part of an array that is undergoing capacity expansion or stripe migration.</p> <hr/>
Flashing irregularly	Regularly flashing amber (1 Hz)	The drive is active, but a predictive failure alert has been received for this drive. Replace the drive as soon as possible.
Flashing irregularly	Off	The drive is active, and it is operating normally.
Off	Amber	A critical fault condition has been identified for this drive, and the controller has placed it offline. Replace the drive as soon as possible.
Off	Regularly flashing amber (1 Hz)	A predictive failure alert has been received for this drive. Replace the drive as soon as possible.
Off	Off	The drive is offline, a spare, or not configured as part of an array.

Table 22: SAS disk drive LEDs : HBA mode

Drive activity LED status	Drive status LED status	Indication
Off, or flashing	Alternating amber and blue	The drive has failed, or a predictive failure alert has been received for this drive; it also has been selected by a management application.
Off, or flashing	Blue	The drive is operating normally, and it has been selected by a management application.
Flashing irregularly	Regularly flashing amber(1 Hz)	The drive is active, but a predictive failure alert has been received for this drive. Replace the drive as soon as possible.
Flashing irregularly	Off	The drive is active, and it is operating normally.
Off	Amber	A critical fault condition has been identified for this drive. Replace the drive as soon as possible.
Off	Regularly flashing amber(1 Hz)	A predictive failure alert has been received for this drive. Replace the drive as soon as possible.
Off	Off	The drive is online.
Off	Off	Normal operation; no activity

Optical drive

The server has one SATA DVD+RW drive. This device has one activity LED.

Rear panel LEDs

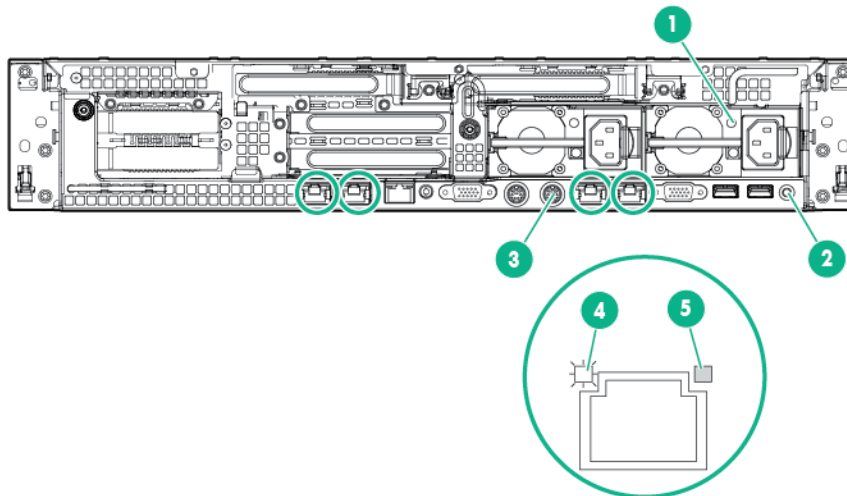


Figure 25: Rear panel LEDs and buttons

1. Power supply LED
2. UID LED/button
3. iLO 3 physical presence pinhole button
4. NIC/iLO 3 activity LED
5. NIC/iLO 3 link LED

Table 23: Rear panel LEDs and buttons

Name	Status
Power supply LED	<ul style="list-style-type: none"> • Green = Normal • Off = System is off or power supply has failed
UID LED/button	<ul style="list-style-type: none"> • Blue = Identification • Flashing blue = Remote iLO session or a firmware flash update is in progress • Off = Off
NIC/iLO 3 activity LED	<ul style="list-style-type: none"> • Green = Network activity • Flashing green = Network activity • Off = No network activity

Table Continued

Name	Status
NIC/iLO 3 link LED	<ul style="list-style-type: none"> Green = Network link Off = No network link
iLO 3 physical presence pinhole button	<p>The iLO 3 physical presence button enables you to reset iLO 3 and gain access to the system if all iLO passwords are lost. A momentary press causes a soft reset of iLO 3 when the button is released. The iLO 3 Physical Presence button enables you to reset iLO, enter TPM physical presence mode, and enter security override mode.</p> <ul style="list-style-type: none"> A momentary press of the button resets iLO, clears any security override or TPM physical presence mode that were initiated by this button, and returns the serial port to iLO mode. A greater than 4-second and less than 8-second press of the button places the system in physical presence mode for up to 15 minutes. A greater than 8-second and less than 12-second press of this button places iLO into security override mode for up to 15 minutes. Security override mode enables you to enter iLO without being challenged for a password enabling you to set up users. The UID LED blinks once after holding the button for 4 seconds and once after holding the button for 8 seconds to help you gauge how long the button press has been held. <hr/> <p>NOTE:</p> <p>The iLO 3 physical presence pinhole button is located behind the sheet metal grill and the circular punch-out in the rear panel.</p>

Power supply

The server is equipped with one or two power supplies, labeled PS1 and PS2. Each power supply has an AC power input receptacle and an LED that indicates the power state of the server.

The server has the following power states: standby power, full power, and off. To achieve the standby power state, plug the power cord into the appropriate receptacle at the rear of the server. To achieve full power, plug the power cord into the appropriate receptacle, and either push the power button or enter the iLO 3 MP `PC` command. In the off state, the power cords are not connected to a power source.

Table 24: Power supply LED states

LED state	Indication
Off	No AC power
Green	Full power on; normal operation

Diagnostics

A suite of offline and online support tools are available to enable manufacturing, field support personnel, and the customer to troubleshoot system issues. In general, if the operating system is already running,

then Hewlett Packard Enterprise recommends that you do not shut it down and instead, use the online support tools.

If the operating system cannot be booted, then use the offline support tools to help resolve the issue. The offline support tools are available either from the UEFI partition, or from the IPF Offline Diagnostics and Utilities CD (IPF systems only). After the issue preventing booting has been resolved, boot the operating system, and then use the online support tools for any further testing..

If you cannot reach UEFI from either the main disk or from a CD, you must troubleshoot, using the visual fault indicators, console messages, and system error logs that are available.

Online diagnostics and exercisers

Online support tools are available which permit centralized error archiving, and which provide hardware inventory tools, as long as the agents/providers that support them are installed on the managed server.

On HP-UX systems, the legacy tools within OnlineDiag are supported. The online support tools, on the HP-UX 11.23 and greater operating systems, include the WBEM features added by SysFaultMgmt.

Verifiers quickly determine whether or not a specific device is operational by performing tasks similar in nature to the way applications use the device. No license is required to run the verifiers.

Diagnostics are tools designed to identify faulty or failed CRUs.

Exercisers stress devices in order to facilitate the reproduction of intermittent issues.

Information modules create a log of information specific to one device, including:

The product identifier

A description of the device

The hardware path to the device

The vendor

Onboard log information (if applicable)

Miscellaneous information associated with the device

The firmware revision code, if firmware is present in the device, is also displayed

Expert tools are device-specific troubleshooting utilities for use by sophisticated users. Their functionality varies from tool to tool, but they are intended to be interactive, and rely on users to provide information necessary to perform a particular task. These tools require users to have the appropriate license, if they wish to run them.

Online support tool availability

Online diagnostics are included in the HP-UX OE media, and are installed by default.

Online support tools list

The following online support tools are available on HP-UX 11.31 hosted systems. In some cases, a tool, such as a disk exerciser, is generic to many types of hardware; in other cases, a tool, such as a tape diagnostic, is specific to a particular technology or type of tape drive.

Table 25: Online Support Tools List

Functional Area	Information	Verify	Exercise	Diagnose	Expert
System	Yes	No	No	No	No
Processor/FPU	No	No	Yes	No	Yes
Memory	Yes	No	Yes	No	No
Graphics	Yes	Yes	Yes	No	No
Core I/O LAN	Yes	Yes	Yes	Yes	No
Disk/Arrays	Yes	Yes	Yes	No	No
Tape	Yes	Yes	Yes	Yes	Yes
M/O	Yes	No	No	No	Yes
Add-On Network I/O Cards	Yes	Yes	Yes	No	Yes
Add-On Mass Storage I/O Cards	Yes	No	No	No	No

Offline support tools list

Table 26: Offline Support Tools List

Offline Tool	Functional Area
DFDUTIL	SAS/SCSI Disk Firmware Update Utility
COPYUTIL	Data Copy Utility

Fault management overview

The goal of fault management and monitoring is to increase system availability, by moving from a reactive fault detection, diagnosis, and repair strategy to a proactive fault detection, diagnosis, and repair strategy. The objectives are as follows:

To detect issues automatically, as nearly as possible to when they actually occur.

To diagnose issues automatically, at the time of detection.

To automatically report in understandable text a description of the issue, the likely causes of the issue, the recommended actions to resolve the issue, and detailed information about the issue.

To ensure that tools are available to repair or recover from the fault.

HP-UX fault management

Proactive fault prediction and notification is provided on HP-UX by SysFaultMgmt WBEM indication providers. WBEM provides frameworks for monitoring and reporting events.

SysFaultMgmt WBEM indication providers enable users to monitor the operation of a wide variety of hardware products, and alert them immediately if any failure or other unusual event occurs. By using hardware event monitoring, users can virtually eliminate undetected hardware failures that could interrupt system operation or cause data loss.

WBEM indication providers

Hardware monitors are available to monitor the following components (These monitors are distributed free on the OE media):

Server/fans/environment

CPU monitor

UPS monitor*

FC hub monitor*

FC switch monitor*

Memory monitor

Core electronics components

Disk drives

Ha_disk_array

* No SysFaultMgmt WBEM indication provider is currently available for the above-listed components followed by an asterisk.

Errors and reading error logs

Event log definitions

Often the underlying root cause of an MCA event is captured by system or iLO MP firmware in both the System Event and Forward Progress Logs (SEL and FPL, respectively). These errors are easily matched with MCA events by their timestamps. For example, the loss of a processor VRM might cause a processor fault. Decoding the MCA error logs would only identify the failed processor as the most likely faulty FRU. Following are some important points to remember about events and event logs:

- Event logs are the equivalent of the old server logs for status or error information output.
- Symbolic names are used in the source code; for example, `MC_CACHE_CHECK`.
- The hex code for each event log is 128 bits long with an architected format:
 - Some enumerated fields can be mapped to defined text strings.
 - All can be displayed in hex, keyword, or text mode.
- Events are created by firmware or OS code, and are sent over the PDH bus to the iLO MP for storage in either or both of the SEL and FPL logs (HP-UX shows an I/O path for the iLO MP).

- The iLO 3 MP can display event logs: SEL events are sent over the IPMB.
- Event logs can also be read back over the PDH bus by software (for example, the IPMI driver or agent) for storage on disk.

Using event logs

To consult the event logs:

Procedure

1. Connect to the system console.
2. Use **Ctrl-B** to access the iLO 3 MP menu.
3. Use the `sl` command to view event logs: System Event (E) and Forward Progress (F) logs are very useful in determining the context of an error (see the following figure for an example):

NOTE:

Remember that:

- `E` shows only event logs for Warning, Critical, or Fatal faults by default; `F` shows all event log outputs.
 - System Event Logs are never overwritten, unless they are first manually cleared. When the SEL is filled, no more events are logged. Forward Progress Logs (FPL) are circular and contain additional, non-critical information.
 - The alert threshold can be changed.
-

iLO 3 MP event logs

The iLO 3 MP provides diagnostic and configuration capabilities. See the [HPE Integrity iLO 3 Operations Guide](#) for details on the iLO 3 MP commands.

To access the iLO 3 MP:

NOTE:

The iLO 3 MP must be accessed from a terminal console which has access to the iLO 3 MP.

Procedure

1. Log in with proper username and password.
2. Press `cl` to display the console history log. This log displays console history from oldest to newest.
3. Press `sl` to display the status logs. The status logs consist of:
 - a. System Event
 - b. Forward Progress
 - c. iLO Event
 - d. Clear SEL and FPL
 - e. Live Events

4. For a more information on configuring the iLO 3 MP and using the iLO 3 MP commands, see the *HPE Integrity iLO 3 MP Operations Guides*.

System event log review

See the *HPE Integrity iLO 3 Operations Guide* for this procedure.

http://www.hpe.com/info/integrity_servers-docs

Supported configurations

This subsection provides a system build-up procedure.

Server block diagram

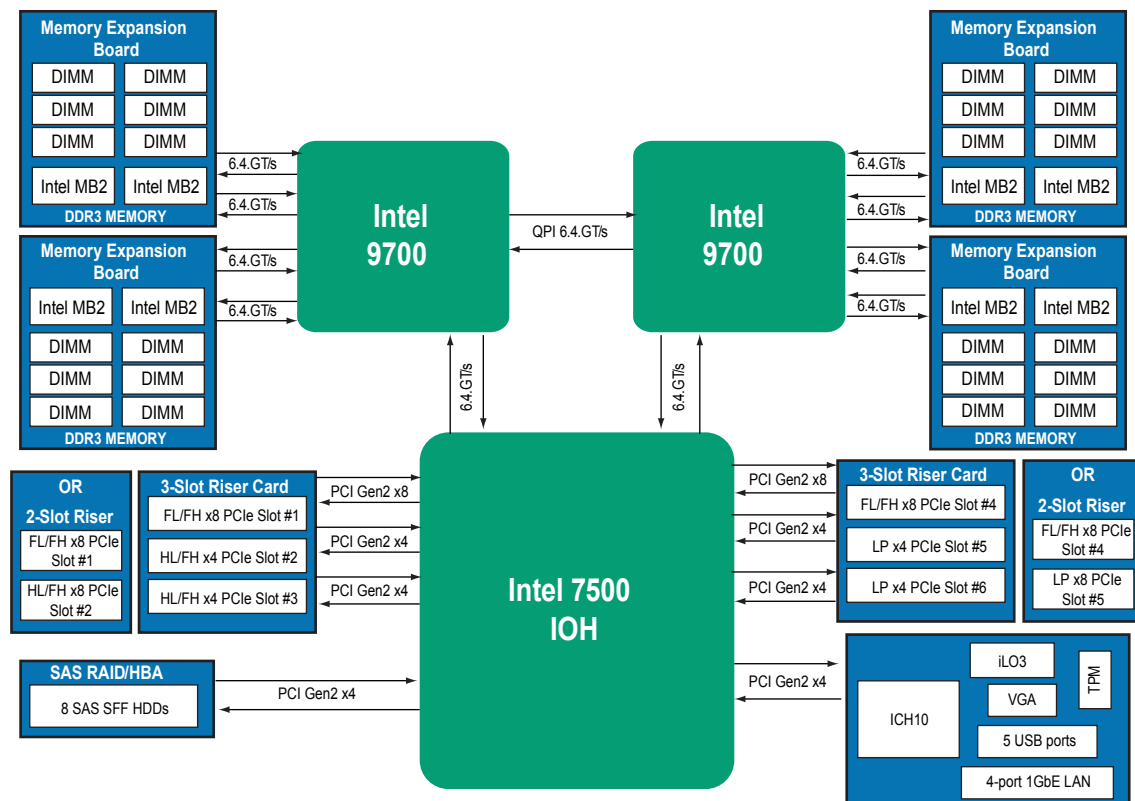


Figure 26: Server block diagram

System build-up troubleshooting procedure

Use this procedure only when the system powers on and remains powered on but does not enter into or pass power-on self test (POST) or does not boot to the UEFI menu.

Procedure

1. Remove the AC power cord from each power supply and extend the server, if racked.
2. Remove all of the SAS disk drives from the front of the server.

3. Remove the top cover to gain access to, and remove all CRUs See **CRU list** except the system board.

NOTE:

In the following steps, CRU and FRU are used interchangeably.

4. Plug in the AC power cords. The iLO 3 MP and system console appears. At the console, execute the MP `DF` command. The following CRU IDs appear. Your display might not exactly match the display shown:

```
FRU IDs:
-----
00-System Board      02-Display Board      04-Power Supply 1
42-Virtual Connect
```

NOTE:

Your display might not exactly match the display shown.

5. Remove the AC power. Add CPU 0, memory expansion board 1, 2 DIMMs 4A and 3A slots. Plug in AC power, and check to ensure the CPU, memory riser and DIMMs FRU IDs are detected, as described in Step

```
FRU IDs:
-----
00-System Board      02-Display Board      04-Power Supply 1
0C-Memory Riser 1    20-Processor 0        24-Processor 0 RAM
42-Virtual Connect   82-DIMM CPU0-R1 3A    83-DIMM CPU0-R1 4A
```

6. Power on system, go to SL system event and check if there is CPU IPMI event. If you see an event message below, it means your CPU cannot fetch code. Check your CPU or replace your CPU.

```
FRU IDs:
-----
Log Entry 4: 01 Aug 2012 17:22:00
Alert Level 7: Fatal
Keyword: BOOT_NOT_DETECTED
No events were received from system firmware
Logged by: integrated Lights Out
Sensor: Processor
Data1: FRB2/Hang in POST failure
20501965B8020006 FFFF036F00070400
```

7. With a good CPU installed and the power on, you should see this message:

```
FRU IDs:
-----
Log Entry 3: 02 Aug 2012 11:28:16
Alert Level 2: Informational
Keyword: BOOT_START
CPU starting boot
Logged by: System Firmware located in socket 0,cpu 2,thread 0
Data: Major change in system state - Boot Start
5480006309E10005 0000000000000000
```

8. Go to SL system event and check if there is Memory IPMI event. If you see the event text messages such as the ones shown below, it means that the system cannot find the DIMMs. Check your memory riser expansion and DIMMs, or replace your memory riser expansion and DIMMs.

```

FRU IDs:
-----
Log Entry 1: 01 Aug 2012 17:20:38
Alert Level 5: Critical
Keyword: INSUFFICIENT_SYSTEM_MEMORY
This HW configuration does not have enough memory for the OS to boot.
Logged by: integrated Lights Out
Data: Data field unused
A080274200E10001 0000000000000000

Log Entry 11: 02 Aug 2012 11:28:38
Alert Level 7: Fatal
Keyword: MEM_NO_MEM_FOUND
No memory found
Logged by: System Firmware located in socket 0,cpu 2,thread 0
Data: Location - Blade (Blade Board)
E48000D109E10010 FFFFFFFFFFFFFFFF94

```

9. If you still see the above alert level 5 and 7 messages after CPU, memory expansion and DIMMs change, then you must replace the system board. With a good CPU, memory expansion and DIMMs, your system will boot to UEFI and will display the following event text messages

NOTE:

Your display might not exactly match the display shown.

```

FRU IDs
-----
Log Entry 11: 03 Aug 2012 11:04:58
Alert Level 2: Informational
Keyword: EFI_START
CPU starting to boot EFI
Logged by: System Firmware located in socket 0,cpu 2,thread 0
Data: Major change in system state - State Change
5480020709E1000F 000000000011000C

Log Entry 12: 03 Aug 2012 11:05:20
Alert Level 2: Informational
Keyword: EFI_LAUNCH_BOOT_MANAGER
Launching EFI boot manager
Logged by: System Firmware located in socket 0,cpu 2,thread 0
Data: Major change in system state - EFI
5480020B09E10011 0000000000000006

```

10. If the installed CRUs are all functional, then the system initiates POST on all processors. Hewlett Packard Enterprise recommends that you observe the system console output through Live Logs to ensure that POST is initiated and completes without error.
11. If POST does not start after a few seconds then suspect some sort of system board or processor issue. Typical issues appear in the SEL or FPL. If the IPMI event logs do not point to a root cause, then seek assistance.

Installation troubleshooting

Installation troubleshooting methodology

A server is tested before shipping. Failures encountered during installation can be due to damage that occurred in transit. Re-seating connectors can resolve issues that result from rough handling. If you are installing components or assemblies, you might encounter compatibility issues or incorrect installations. If

you are installing components or assemblies, verify that items are correctly installed and that all connectors are fully engaged. If the unit does not power on, verify the power source before proceeding.

If an issue is encountered during initial operation, remove any add-in or optional components, and then retest the server before continuing. Verify basic server operation before installing additional cards, and configuring software and hardware for the server requirements.

Troubleshooting is based on observation of server status indications and error messages, and by reviewing system event logs. You can observe the LED indicators on the front and rear of the server. Error messages appear on local and remote consoles. System history (console, event, and history logs) is available through the iLO 3 MP, and is accessed through the console. Additional information about troubleshooting is available on the CD provided with the server.

Installation troubleshooting using the server power button

The server power button on the front panel operates differently depending on how long the button is pressed, and on what the system is doing when the button is pressed. You must be aware of the uses to properly troubleshoot the system.

Table 27: Server power button functions when server is on and at UEFI

Action	Reaction
1-3 seconds	System power turns off immediately (hard power off)
5 seconds or longer	System power turns off immediately (hard power off)

Table 28: Server power button functions when server is on and OS is running

Action	Reaction
1-3 seconds	System power turns off (software-controlled power off)
5 seconds or longer	System power turns off immediately (hard power off)

If the server is off, and power is not connected to the server power supplies, pressing the power button has no effect.

If the server is off, and power is connected to server power supplies, the front panel power LED flashes at a 1 Hz rate. In this state, standby power is available to server circuits, but main power is off.

Table 29: Server power button functions when server is off

Action	Reaction
1-3 seconds	System power turns on

Server does not power on

The server power button on the front panel operates differently depending on how long the button is pressed, and on what the system is doing when the button is pressed. You must be aware of its uses to properly troubleshoot the system.

NOTE:

If the server is off, and power is not connected to server power supplies, pressing the power button has no effect.

Power issues during installation are usually related to the installation process. If the server does not power on, view the LED indicators on the power supply rear panels and perform the following:

- If the AC power LED on the power supply on the rear panel of the server is lit, power is available to the server.
- If the AC power LED is not lit, the server is either in standby power mode, or an issue may have occurred. Re-seat the power supply. If the issue persists, remove and re-seat the board within the server. If the issue still persists, replace the power supply or the power supply interface board.

UEFI menu is not available

If you cannot access the UEFI from either the main disk partition or the CD, use the following tools to resolve the issue:

- Front panel LEDs
- iLO 3 MP
 - Console messages
 - SEL
 - FPL

Operating system does not boot

If the operating system does not boot, boot to UEFI, and use the following tools to view the system logs. Analyze any error messages to resolve the issue.

- UEFI Shell
- iLO 3

Operating system boots with issues

If the operating system is running and you are experiencing issues, use the following tools to resolve the issue:

- LEDs
- Error Messages and event logs

Intermittent server issues

You can usually trace intermittent issues that occur during installation to power source issues, a loose connector, or some other hardware issue. If you are experiencing intermittent issues:

Procedure

1. View iLO 3 MP logs and analyze the issue. Determine if there is more than one symptom and if the issue is random.
2. Verify that the AC power source is stable.
3. Re-seat all rear panel connectors.
4. Re-seat all hot-swap fans and power supplies.
5. Re-seat all main memory DIMMs.
6. Re-seat all cable harnesses and board connectors.

SATA DVD+RW drive issues

SATA DVD+RW drive issues that occur during installation are usually related to faulty connections. If you are experiencing DVD drive issues:

Procedure

1. Remove and reinsert the media.
2. Replace the disk.
3. Remove and reinstall the DVD drive. Verify that connectors are fully engaged.
4. Replace the DVD drive.
5. Re-seat cables.

SAS disk drive issues

Hard drive issues that occur during installation are usually due to rough handling. The drive may not be correctly seated or may have been damaged in transit. If you are experiencing hard drive issues:

Procedure

1. Remove and reinsert the faulty hard drive.
2. Swap the hard drive with one from another slot or with a known good spare.
3. Remove and reinstall the hard drive backplane. Verify that connectors are fully engaged.
4. Replace the hard drive backplane.
5. Re-seat cables.

Console issues

Console issues during installations can be caused by faulty interconnections. If you are experiencing monitor, keyboard, or mouse issues:

Procedure

1. View the monitor controls. Adjust contrast and brightness as required.
2. Inspect all power and interconnecting cables. Verify that all console connectors are fully engaged.

3. Verify that all iLO 3 MP board connectors are fully engaged.
4. Exercise the appropriate self-test features of the console software.

Troubleshooting the processor and memory

Cause

All of the processor functions reside on the system board. DIMMs reside on the memory riser. PCIe bus controller chips reside on the I/O riser and the system board. This section discusses the roles of logical processors, and physical memory ranks.

Troubleshooting the server processor

Cause

The server supports both quad-core and octo-core processors. Each server supports one or two processor modules. The quad-core processor module contains four individual processor cores. When two quad-core processors are installed in the server, the server contains eight physical processors. Similarly, the octo-core processor module contains eight individual processor cores. When two octo-core processors are installed in the server, the server contains sixteen physical processors.

Furthermore, each physical processor core contains logic to support two physical threads. When two quad-core processor modules are installed and enabled in the server, the server supports up to sixteen threads, or the equivalent of sixteen logical processors.

Processor load order

For a minimally loaded server, one processor module must be installed in processor socket 0 on the system board. Additional processor modules of the same revision are installed in processor socket 1 for the server.

Processor module behaviors

Local MCA events can cause the physical processor core and one or both of the logical processors within that processor module to fail while all other physical and their logical processors continue operating. Double-bit data cache errors in any physical processor core causes a Global MCA event, which, in turn, causes all logical and physical processors in the server to fail and reboot the operating system.

Customer messaging policy

- A diagnostic LED only illuminates for physical processor core errors, when isolation is to a specific IPF processor module. If there is any uncertainty about a specific processor, then the customer is pointed to the SEL for any action, and the suspect IPF processor module CRU LED on the System Insight Display does not illuminate.
- For configuration-type errors (for example, when no IPF processor module is installed in processor slot 0) all of the CRU LEDs on the diagnostic LED panel illuminate for all of the IPF processors that are missing.
- No diagnostic messages are reported for single-bit errors that are corrected in both instruction and data caches, during CMC events to any physical processor core. Diagnostic messages are reported for CMC events when thresholds are exceeded for single-bit errors; fatal processor errors cause global / local MCA events.

Table 30: Processor events that illuminate SID LEDs

Diagnostic LEDs	Sample IPMI Events	Cause	Source	Notes
Processors	Type E0h, 39d:04d BOOT_DECONFIG_CPU	Processor failed and deconfigured	SFW	This event follows other failed processors
Processors	Type E0h, 5823d:26d PFM_CACHE_ERR_PROC	Too many cache errors detected by processor	WIN Agent	Threshold exceeded for cache parity errors on processor
Processors	Type E0h, 5824d:26d PFM_CORR_ERROR_MEM	Too many corrected errors detected by platform	WIN Agent	Threshold exceeded for cache errors from processor corrected by ICH10
Processors	Type 02h, 02h:07h:03h VOLTAGE_DEGRADES_TO_NON_RECOVERABLE	Voltage on CRU is inadequate	iLO MP	Power Pod voltage is out of range (likely too low)

Table 31: Processor events that might illuminate SID LEDs

Diagnostic LEDs	Sample IPMI Events	Cause	Source	Notes
Processors	Type E0h, 734d:26d BOOT_CPU_LOADING_ERROR	Installed processors are not compatible	SFW	
Processors	Type E0h, 2953d:26d BOOT_CPU_LOADING_ERROR	Processors and/or termination out of order	SFW	
Processors	Type E0h, 36d:26d BOOT_CPU_LATE_TEST_FAIL	A logical processor (thread) failed late self test	SFW	

Table Continued

Diagnostic LEDs	Sample IPMI Events	Cause	Source	Notes
Processors	Type E0h, 677d:26d MC_RENDEZVOUS_SLAVES_FAIL	A logical processor (thread) slave failed to rendezvous	SFW	
Processors	Type E0h, 30d:26d BOOT_CPU_CONFIG_FAIL	A processor core failed the configuration process	SFW	
Processor	Type E0h, 790d:26d BOOT_CPU_BAD_CORE_FIXED_RATIO	A processor fixed core frequency ratio is incompatible with bus frequency	SFW	
Processor	Type E0h, 745d:26d BOOT_FINAL_RENDEZ_WATCHDOG_FAIL	A watchdog timer expired and determined that a monarch processor is not responding.	SFW	
Processors	Type E0h, 83d:26d BOOT_RENDEZ_FAILURE	A logical processor (thread) rendezvous failure	SFW	Bad or slow processor
Processors	Type E0h, 67d:26d BOOT_MONARCH_TIMEOUT	The logical monarch processor (thread) has timed out	SFW	

Table Continued

Diagnostic LEDs	Sample IPMI Events	Cause	Source	Notes
Processors	Type E0h, 57d:26d BOOT_INCOMPATIBLE_SLAVE	A logical slave processor (thread) is incompatible with logical monarch processor	SFW	
Processor	Type E0h, 56d:26d BOOT_INCOMPATIBLE_PAL	Processor PAL incompatible with processor	SFW	
Processors	Type E0h, 34d:26d BOOT_CPU_FAILED	A processor failed	SFW	
Processors	Type E0h, 33d:26d BOOT_CPU_EARLY_TEST_FAIL	A logical processor (thread) failed early self test	SFW	
Processors	Type 02h, 25h:71h:80h MISSING_FRU_DEVICE	No physical processor cores present	iLO MP	Possible seating or failed processor

Troubleshooting the server memory

Memory DIMM load order

For a minimally loaded server, two equal-size DIMMs must be installed in the DIMM slots. For more information, see [Memory Load Order](#).

Memory subsystem behaviors

Corrective action, such as DIMM/memory expander replacement, is required when:

- a threshold is reached for multiple double-byte errors from one or more DRAM chips in the same rank
- any uncorrectable memory error (more than 2 bytes) occurs
- no pair of like DIMMs is loaded in rank 0 of side 0

All other causes of memory DIMM errors are corrected by the processor and reported in CMC and CPE error logs.

Customer messaging policy

- The diagnostic LED illuminates only for memory DIMM errors when isolated to a specific DIMM. If there is uncertainty about a specific DIMM, then the customer is pointed to the SEL for any actions, and the DIMM CRU LED for the suspect DIMM on the System Insight Display is not lit.
- For configuration-type errors, for example, if DIMMs are not installed, the CRU LEDs on the SID LED panel illuminate for the missing DIMMs.
- No diagnostic messages are reported for single-byte errors that are corrected in both ICH10 caches and DIMMs during CPE events. Diagnostic messages are reported for CPE events when thresholds are exceeded for both single-byte and double byte errors; all fatal memory subsystem errors cause global MCA events.

Table 32: Memory subsystem events that illuminate SID LEDs

Diagnostic LEDs	Sample IPMI Events	Cause	Source	Notes
DIMMs	Type E0h, 208d:04d MEM_NO_DIMMS_INSTALLED	No DIMMs installed (on one or more sockets)	SFW	N/A
DIMMs	Type E0h, 172d:04d MEM_DIMM_SPD_CHECKSUM	A DIMM has a serial presence detect (SPD) EEPROM with a bad checksum	SFW	Either EEPROM is misprogrammed or this DIMM is incompatible

Table 33: Memory subsystem events that might illuminate SID LEDs

Diagnostic LEDs	Sample IPMI Events	Cause	Source	Notes
DIMMs	Type E0h, 4000d:26d MEM_CHIPSPARE_DEALLOC_RANK	Detected that an SDRAM is failing on the DIMM	SFW	The failing DIMM rank is deallocated
DIMMs	Type E0h, 174d:26d MEM_DIMM_TYPE_INCOMPATIBLE	DIMM type is not compatible with current DIMMs for this platform	SFW	
DIMMs	Type E0h, 173d:26d MEM_DIMM_SPD_FATAL	Detected a fatal error in DIMM serial presence detect (SPD)	SFW	

Troubleshooting the power subsystem

Cause

The two power supply CRUs for the server provides N+1 redundancy for the server. Each power supply CRU is identified by the server as 1 and 2 for logging purposes. The power supplies have corresponding LEDs on the diagnostic LED panel.

Power supply CRU failures are identified visually by a single green LED that is turned off when one or both of the power supplies fail; logged as an IPMI event by voltage sensor logic; and identified as a power supply CRU failure by iLO3 turning on the appropriate LEDs on the front LED panel.

NOTE:

The Power Supply LED on the SID panel illuminates only when a failure or fault is detected in a power supply. Loss of AC power to a power supply generates an SEL entry, but does not result in the Power Supply LED becoming illuminated.

The System Health LED does not change status if AC power is removed from a single power supply in a system with power redundancy.

Power subsystem behavior

For the server, each bulk power supply CRU provides 800 watts of DC power from a nominal 120 VAC, 50-60 Hz; and 1200 watts from a nominal 240 VAC, 50-60 Hz. The iLO MP chip located on the system board controls the flow of +12 V DC power to the server CRUs. You can control and display power supply status remotely with the iLO 3 MP `pc` and `ps` commands, respectively.

Typical power up sequence of the server is as follows:

Procedure

1. Power LED on front panel glows steady amber when one or two bulk power supplies are plugged into nominal AC voltage and the +3.3 VDC housekeeping voltage comes on and stays on whenever AC power is present.
2. The iLO 3 MP, Flash memory, and server intrusion circuits are reset after the +3.3 V DC housekeeping voltage stabilizes.
3. The iLO 3 MP monitors the power button on the front panel.
4. When the power button is pressed, iLO3 signals the bulk power supplies to fully power up.
5. The +12 V DC rail comes up and all of the cooling fans and the various Voltage Regulators come up sequentially.
6. The iLO 3 MP signals when the server is ready to come out of reset (clocks are programmed and stable, etc.).
7. The server is brought out of reset, and begins the boot process.

Power LED button

The front panel system power LED indicates the status of system power. The LED is incorporated inside the power button itself.

The power button has a momentary switch (as opposed to a latching switch) that is recessed or covered to prevent accidental activation or deactivation.

If the OS is up, pressing the power button for less than four seconds results in a graceful shutdown of the operating system and a subsequent removal of system power. Pressing the power button for greater than five seconds results in a hard shutdown (system power removed). While the server is booting (before the system has passed `UEFI_EXIT_BOOT_SERVICES`), the iLO MP immediately powers the server off on a button press, since there is no concept of soft shutdown in this state.

In the event that the OS is absent or hung, or that the manageability subsystem (specifically the iLO MP) in the server is not responding, a greater than five-second press of the power button is required to power off the system (a less than five second press on the power button has no effect in this event).

To ensure that the system powers up in a deterministic fashion, the power button must be masked for five seconds after a power-down.

Table 34: Power LED States

Definition	Flash rate	LED color
No AC power to the system	LED Off	
System power is turned on	Steady	Green
System is shut down, but AC and housekeeping (standby) power are active.	Steady	Amber

For high availability and safety reasons, this LED runs off the power rails, rather than under firmware control.

Troubleshooting the cooling subsystem

Cause

The fans located within the server provide N+1 redundancy for the server using six identical dual fan assembly CRUs. In turn, each dual fan assembly CRU provides additional N+1 redundancy for the fan cooling zone it controls. Each dual fan assembly CRU is identified by the server as fans 1 through 6 both for logging purposes and for fault identification on the diagnostic LED panel.

Cooling fan CRU failures are identified visually by a single green LED on the dual fan assembly CRU that is turned on when one or both of the fans fail; logged as an IPMI event by fan sensor logic; and identified as a fan assembly CRU failure by iLO 3 turning on the appropriate LEDs on the System Insight Display panel.

Cooling subsystem behavior

The iLO 3 MP controls fan speed on ambient air temperatures, chip temperatures, server configuration, and fan operation or failure. Air is drawn through the front of the server and pushed out the rear by the cooling fans. You can display fan status remotely with the iLO 3 MP `ps` command.

Within the server, temperature sensors report server temperatures to iLO 3, which controls fan speed based on this information.

Table 35: Cooling subsystem events that illuminate SID LEDs

Diagnostic LEDs	Sample IPMI Events	Cause	Source	Notes
Fans (1-6)	Type 02h, 0Ah:07h:01h COOLING_UNIT_WARNING	Fan has either previously failed or is degrading	iLO 3	Cleared when fan is replaced
Fans (1-6)	Type 02h, 0Ah:07h:02h COOLING_UNIT_FAILURE	Fan has failed and no longer meets minimum requirements	iLO 3	Cleared when fan is replaced

Troubleshooting the iLO 3 MP subsystem

Cause

This subsection provides information on troubleshooting issues with the iLO 3 MP subsystem.

iLO 3 MP LAN LED on the rear panel

The iLO 3 MP LAN supports two LEDs, viewable from the rear of the system:

- iLO 3 LAN link LED, which indicates link speed
- iLO 3 LAN activity, which indicates link activity

Table 36: iLO 3 MP LAN Activity LED states

Link status	LED state
Activity	Flashing green
Link with no activity	Steady green
No link	Off

NOTE:

For information on the LAN LED, see [System LAN LEDs](#) on page 115.

Troubleshooting the I/O subsystem

Cause

This subsection provides information on troubleshooting issues with the I/O subsystem and public PCIe slots.

I/O subsystem behaviors

The main role of the I/O subsystem is to transfer blocks of data and instruction words between physical shared memory and virtual memory (system disks or disk array). The system boot is the first time blocks

of data and instructions are transferred into physical memory from a local disk or DVD or over the network. This process is referred to as Direct Memory Access (DMA) and is initiated by I/O devices located in I/O or on Host Bus Adapter (HBA) I/O cards and does not involve any logical processors.

In addition, system firmware performs the following tasks to configure the I/O subsystem:

1. Sets up the PCIe Root Complex.

Initialize and configure all root ports.

Initialize and configure all I/O devices, including memory space and I/O port space allocation.

2. Performs a depth-first PCI bus walk to discover all PCI/PCIe devices.

NOTE:

Device drivers should not require legacy I/O port space, so devices that don't get any should still be functional. System firmware will also produce the appropriate EFI protocols for PCI/PCIe devices which are found. System firmware will provide data to ACPI for devices that cannot be discovered by PCI bus walk.

3. Allocates MMIO resources, including I/O port space, LMMIO and GMMIO resources to each device found.

Resources are allocated first to core devices which require it (SAS, UHCI, Gromit, VGA), and then to any other devices that may need it.

4. Handles I/O configuration errors.

Firmware uses the memory address table to determine the location and size of the MMCFG, LMMIO, and GMMIO regions.

5. Programs APICs.

Both Boxboro and ICH have an IOxAPIC, and both are used for the PCI devices underneath Boxboro. The ICH's IOxAPIC range begins at 0xFEC00000, and Boxboro's begins at 0xFEC40000.

6. Hides unused devices from the OS by setting the appropriate ICH registers.

Customer messaging policy

- See the SEL for any action from low level I/O subsystem faults, because the System Insight Display may not have any illuminated LEDs.
- For configuration-type errors, for example, no iLO 3 MP or core I/O HBAs installed or working, see **Supported configurations** on page 98 for actions.
- Some diagnostic messages are reported for high level I/O subsystem errors. All fatal I/O subsystem errors cause global MCAs.

Table 37: I/O subsystem events that light SID LEDs

Diagnostic LEDs	Sample IPMI events	Cause	Source	Notes
I/O Card	Type 02h, 03h:05h:01h CURRENT_LIMIT_EXCEEDED	Over-current on PCI slot	iLO MP	Likely a short on I/O card or I/O slot.
I/O Riser	Type 02h, 02h:07h:03h VOLTAGE_DEGRADES_TO_NON_RECOVERABLE	Voltage on CRU is inadequate	iLO MP	A voltage on the I/O riser is out of range (likely too low)
Disk Backplane	Type 02h, 02h:07h:03h VOLTAGE_DEGRADES_TO_NON_RECOVERABLE	Voltage on CRU is inadequate	iLO MP	A voltage on the disk backplane is out of range (likely too low)

Table 38: I/O card events that might illuminate SID LEDs

Diagnostic LEDs	Sample IPMI Events	Cause	Source	Notes
I/O Card	Type E0h, 4658d:26d IO_PCI_POWER_OVERLOAD_ERR	A non hot plug I/O slot power consumption increases the total I/O power consumption beyond the supported limit	SFW	Disallow O/S boot and display the following UEFI error message, "I/O configuration exceed"
I/O Card	Type E0h, 137d:26d IO_NOT_ENOUGH_POWER_ERROR	Insufficient power to power on a hot-plug PCI-X slot	SFW	Display UEFI warning message "Failed I/O slots deconfigured"
I/O Card	Type E0h, 147d:26d IO_SLOT_STANDBY_POWER_ERROR	PCI slot standby power failed	SFW	Either a card / slot issue. Re-seat card first.
I/O Card	Type E0h, 131d:26d IO_HOT_PLUG_CTRL_FAILED	PCI-X hot-plug controller failed	SFW	Either a card / slot issue. Re-seat card first.

Table Continued

Diagnostic LEDs	Sample IPMI Events	Cause	Source	Notes
I/O Card	Type E0h, 139d:26d IO_PCI_MAPPING_TOO_BIG	PCI bus walk (I/O discovery) resources exceeded	SFW	Remove any unsupported I/O cards. Move I/O card to an unused PCI slot
I/O Card	Type E0h, 148d:26d IO_UNKNOWN_PCIXCAP_VAL	Found invalid PCIXCAP value	SFW	
I/O Card	Type E0h, 141d:26d IO_PCIXCAP_SAMPLE_ERROR	PCIXCAP sampling error	SFW	
I/O Card	Type E0h, 123d:26d IO_CHECK_LBA_MISSING_ERR	Expected I/O host bridge (Lower Bus Adapter) is missing	SFW	
I/O Card	Type E0h, 619d:26d IO_CHECK_LBA_DECONFIG_ERR	Expected I/O host bridge (Lower Bus Adapter) is deconfigured	SFW	
I/O Card	Type E0h, 133d:26d IO_LBA_CLEAR_ERR_FAILED	I/O LBA clear error failed	SFW	
I/O Card	Type E0h, 144d:26d IO_SBA_CLEAR_ERR_FAILED	I/O SBA clear error failed	SFW	
I/O Card	Type E0h, 146d:26d IO_SLOT_POWER_ON_ERROR	PCI-X slot power on error	SFW	
I/O Card	Type E0h, 145d:26d IO_SLOT_POWER_DEFAULT_ERROR	PCI-X slot has incorrect default power state	SFW	
I/O Card	Type E0h, 136d:26d IO_LBA_RESET_ERROR	I/O host bridge (Lower Bus Adapter) is inaccessible because rope reset failed to complete	SFW	
I/O Card	Type E0h, 130d:26d IO_DLL_ERROR	PCI clock DLL error	SFW	
I/O Card	Type E0h, 143d:26d IO_ROPE_RESET_ERROR	I/O rope reset failed to complete	SFW	

Table Continued

Diagnostic LEDs	Sample IPMI Events	Cause	Source	Notes
I/O Card	Type E0h, 7346d CC_IODISC_LBA_LINK_TRAIN_ERR	PCIe link failed to train	SFW	
I/O Card	Type E0h, 7356d IO_PCIE_LINK_SUBOPTIMAL	PCIe link is not running at max capable bandwidth	SFW	

Verifying SAS hard drive operation

Each SAS disk drive has an activity LED indicator on the front of the drive.

NOTE:

On the server, only the activity LED is used. The status LED is not monitored by the OS.

Verify that the LED shows the correct activity indication for all disk drives that you installed:

Procedure

1. Turn on power to the server and display monitor.
2. During the boot sequence, watch the activity LED on each SAS disk drive.
The LED quickly cycles from amber to green. The LED stays steady green until the drive spins up.
3. If the activity LED stays illuminated steady green on any SAS disk drives (after the drive spins up), the drive might not be seated correctly. Check installation as follows:
 - a. Turn off the server power button and unplug the AC power cords and any cables.
 - b. Re-seat all of the SAS disk drives installed in the server.
 - c. Reconnect the AC power cords and any cables. Restart the server to determine whether the LEDs now become illuminated during the boot. If not, contact your reseller.
4. Use the UEFI Shell `map -r` command to check the SAS drives.

System LAN LEDs

Four system LANs are located on the rear bulkhead of the server. These LANs are connected to the system board.

Table 39: Gb LAN connector LEDs

LED	Description
Link (left)	Green: link
	Off: no link

Table Continued

LED	Description
Activity (right)	Green: link
	Off: No link

Troubleshooting the boot process

Cause

Table 40: Normal boot process LED states

Step	System Event Log	Health	Power	SID	Normal power-up through OS boot
1	Off	Off	Off	Off	No AC power to the system.
2	Off	Off	Steady amber	Off	System is shut down, but AC power and standby power is active.
3	Off	Off	Steady green	Off	System power rails are on when power switch is toggled.
4	Off	Steady green	Steady green	Off	System power rails are on; iLO MP drives system health LED.
5	Off	Steady green	Steady green	Off	System is booting firmware (has passed <code>BOOT_START</code> in firmware).
6	Steady green	Steady green	Steady green	Off	System has finished booting firmware and an OS is either booting or running.

NOTE:

In the standard boot process, shown in the preceding table, even though the iLO MP is running while the system is shut down (power LED is steady amber), it does not drive the system health LED to steady green until +12 V DC power from the Bulk Power Supplies is applied.

The following list itemizes the steps that characterize basic platform boot flow. Step numbers provided correspond to the steps in **Normal boot process LED states**.

3. System power switch turns on bulk power supplies and fans, and releases RESET on all processors simultaneously, when toggled on.

5. Initial processor firmware code fetch is PAL code from EEPROM connected directly to the CPU, retrieved 4 bytes at a time by DMDC in ICH10 (No shared memory or I/O devices are available at this time; for example they are not initially configured).

5. Firmware code stack is initially in BBRAM in PDH, retrieved 4 bytes at a time, through PDH and DMD buses.

- 5. PAL code configures all processors.
- 5. SAL code configures all platform ICH10 chips, including shared memory and all responding I/O devices.
- 5. Firmware code and stack are relocated to shared memory, after all x4 DIMM ranks in shared memory are configured and tested.
- 5. UEFI Shell is launched from shared memory, and cache lines are retrieved 128 bytes at a time by MEMC in ICH10.
- 6. OS loader is launched using the UEFI device driver.
- 6. OS boots and starts its own device drivers.
- 6. OS can use runtime PAL and SAL calls, and ACPI features (these abstraction layers enable platform independence).

Troubleshooting the firmware

Cause

The server has the following sets of firmware installed:

- System firmware
- iLO 3 firmware
- I/O card firmware
 - Fibre Channel cards
 - SAS HBA cards
 - LAN cards
- SAS controller firmware
- SAS HDD firmware
- LOM firmware

System firmware and iLO 3 firmware must be from the same release. Independent updates are not supported. Details about a specific release are available in the associated Release Notes.

Firmware updates are available from the Hewlett Packard Enterprise website at <http://www.hpe.com> under "Support and Drivers".

Identifying and troubleshooting firmware issues

Erratic system operation, or the fact that the server might not boot successfully to the UEFI Boot Manager or to the UEFI Shell, are symptoms of possible firmware issues.

Firmware issues are relatively rare, and, therefore, look for other causes first.

If you are attempting to resolve a firmware issue, the possible failure areas are as follows:

Procedure

1. Unsupported firmware installation
2. Corrupt firmware installation

To troubleshoot firmware issues:

- Verify that all system and iLO firmware components are from the same release (use the iLO 3 `sr` command).
- Reinstall all firmware.

Updating firmware

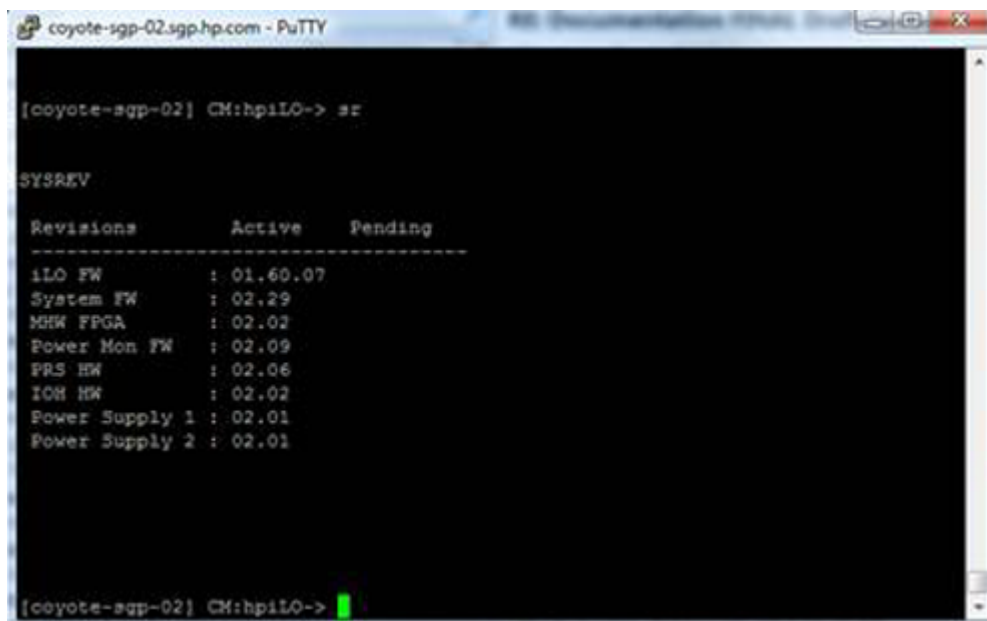
System firmware updates are available from the Hewlett Packard Enterprise Business Support Center:

<http://www.hpe.com/support/hpesc>

To update your firmware:

Procedure

1. Start up the system.
2. To determine the current system firmware version:
 - When the system is shut down, you can use the iLO “sr” command at the command menu to determine the current system firmware version as well as the current iLO firmware version.
 - When the system is online, you can use either iLO “sr” command at the command menu or UEFI “info fw” command at the UEFI shell prompt to determine the current system firmware version.



```
coyote-sgp-02.sgp.hp.com - PuTTY
[coyote-sgp-02] CM:hpilo-> sr

SYSREV

Revisions      Active    Pending
-----
iLO FW         : 01.60.07
System FW      : 02.29
MHW FPGA       : 02.02
Power Mon. FW  : 02.09
PRS HW         : 02.06
ICH HW         : 02.02
Power Supply 1 : 02.01
Power Supply 2 : 02.01

[coyote-sgp-02] CM:hpilo-> 
```

Figure 27: `sr` command at the command menu



Figure 28: info fw command at the shell prompt

3. C Choose the appropriate firmware package from the choices available on the Hewlett Packard Enterprise Support Center web page at <http://www.hpe.com/support/hpesc>. To verify the firmware version, see the Release Notes or Installation Instructions.

To update firmware by using Smart Update Manager, see **Installing the latest firmware using Smart Update Manager (SUM)**.

Troubleshooting the system console

Cause

All system console connections (VGA, USB, local RS-232 and iLO 3 MP LAN) are located on the rear panel of the server.

HP-UX alternatively uses the iLO 3 LAN connection over a network to control server operations remotely through Secure Shell or through a web GUI.

HP-UX uses the RS-232 serial text connection to a terminal or terminal emulator software to control server operations locally.

NOTE: RS-232 connection: If a dummy terminal/PC running terminal emulation software is attached to the iLO MP local port and does not respond to a **CTRL-B** key sequence then it is possible that the iLO MP is not operational/functional.

Troubleshooting the server environment

Cause

Ambient intake air temperature is often different from ambient room temperature. Measure the operating temperature and humidity directly in front of the cabinet cooling air intakes, rather than measuring ambient room conditions only.

Within the server, temperature sensors report server temperature to the iLO, which controls fan speed, based on this information.

Temperature sensors are found on:

Display panel, where a thermal sensor detects the ambient room temperature. This sensor reading is the main parameter used to regulate fan speed, under normal conditions.

See **Server physical and environmental specifications** on page 19 for server environmental specifications.

Removal and replacement procedures

Server components list



IMPORTANT:

Part numbers are found by using the part nomenclature from this list to select the correct part from HPE Partsurfer (<http://partsurfer.hpe.com/>)

To select a replacement part from the full component list, enter the product number for your system.

Table 41: CRU list

Description	Spare part number
Processors	
SPS-Processor 2.53GHz, 32M, 170W 8 core	AT085-69026
SPS-Processor 2.13GHz, 24M, 170W 8 core	AT085-69025
SPS-Processor 2.40GHz, 32M, 4 core	AT085-69024
SPS-Processor 1.73GHz, 20M, 4 core	AT085-69023
NOTE: Not available on HP Integrity rx2900 i4	
Replacmnt, CPU heat sink ¹	AH395-67004
Memory (DIMMs)	
DIMM,4GB PC3L-10600R, 512Mx4, RoHS	708393-001
DIMM,8GB PC3L-10600R, 512Mx4, RoHS	708394-001
DIMM,16GB PC3L-10600R, 1Gx4, RoHS	708395-001
DIMM 4GB PC3L-10600R 512Mx4 RoHS (New type)	739926-001
DIMM 8GB PC3L-10600R 512Mx4 RoHS (New type)	739927-001
DIMM 16GB PC3L-10600R 512Mx4 RoHS (New type)	739928-001
Power supply	
SPS-POWER SUPPLY 1200W 1U HEPB	660185-001
Internal disks and removable media	

Table Continued

Description	Spare part number
SPS-DRV,HD,72G,SAS,2.5DP,15K,6	512743-001
SPS-DRV,HD,146GB,10K 2.5" DP H	507283-001
SPS-DRV,HD,146G,SAS,2.5DP,15K,	512744-001
SPS-DRV HD 450GB 10K 2.5 6G SAS HP	507284-001
SPS-DRV HD 450GB 10K 2.5 6G SAS HP	581310-001
SPS-DRV HD 600GB 10K 2.5 6G SAS HP	581311-001
SPS-DRV 900GB 6G SAS 2.5 10K HP DP ENT	619463-001
SPS-DRV SSD 400GB 2.5 SAS HP SLC	632630-001
SPS-DRV SSD 200GB 2.5 SAS HP SLC	632627-001
SPS - DVD-ROM Drive, Slimline	AM242-6700A
SPS - DVD+RW Drive, Slimline	AM243-6700A
Risers	
SPS-CARD, RISER	496057-001
SPS-BD,RISER,DUAL PORT	507688-001
SPS- Mem Exp Board, rx2800 i4 6-Slot	AT101-69002
Boards	
SPS- PCA, rx2800 i4 System Board	AT101-69001
SPS, PCA, Diagnostic and Front IO Brd	AH395-69003
SPS-BACKPLANE,SAS	507690-001
SPS-BD,FLSHBK,WB CACHE,512MB	578882-001
SPS-BACKPLANE, PS	496062-001
Fans	
Replacmnt, Assy Fan Module	AH395-67003
Cables	
Replcmnt, CBLE,TWISTED PRS,2POS,150mm,I,SWITCH	AH395-67002
SPS-CABLE, SATA DVD PWR	496071-001

Table Continued

Description	Spare part number
SPS-SUPER CAP MOD ASSY MB	587324-001
SPS-CA ASSY MINISAS 28 IN	498425-001
I/O	
HP PCIe, 1000BASE-T 2P adapter	AD337-60001
HP PCIe, 1000BASE-SX 2P adapter	AD338-60001
PS-BD, PCIe, 1000Base-T, 4p Adptr	AD339-67101
RPL,HP PCIe 1p 4GB FC & 1P 100	AD221-67102
SPS PCA I/O, PCIe 2p 4Gb FC + 2p 1000BT	AD222-67102
RPL,HP PCIe 2p 4GB FC & 2P 1000SX Adptr	AD393-67001
HP AH400A 1-port 8 Gb PCIe FC SR QLogic HBA	489190-001
HP AH401A 2-port 8 Gb PCIe FC SR QLogic HBA	489191-001
PCIe single-port Fiber Channel (FC) 81e Host Bus Adapter (HBA) board	489192-001
SPS-BD, HBA, 82e DP FC PCIe	489193-001
SPS-BD, PCA,PCIe 2D FireMV2250 Graphics	AH423-67001
SPS-BD CONTROLLER SAS RA	462918-001
SPS-BD CNTRL SMART ARRAY	587224-001
SPS-BD MEZZ 4X QDR IB CX-2 G2 DUAL PORT	593412-001
Miscellaneous	
SPS-HARDWARE MTG KIT	574765-001
Replacement, Air Baffle	AH395-67001
Replacement, Cover, Air Blocker	AH395-67005
SPS-KIT, MISC HARDWARE	496058-001
SPS-CAGE, HD, SFF	496074-001
SPS-BD,MEZZ,8Gb BL	456978-001
SPS-BD,BLc 8GB,MEZZ	455869-001

Table Continued

Description	Spare part number
SPS-SFP+, 10G BLc, SR	456096-001
System battery (CR2032)	319603-001

¹ Must be replaced together with a new processor.



CAUTION:

FRU components are not customer-serviceable. You must contact an Hewlett Packard Enterprise authorized service provider to install or replace these components.

Table 42: FRU list

Description	Spare part number
Boards	
HPE Integrity TPM Security Chip	505836-001

Required tools

T-10/T-15 wrench (attached to the outside of the server)

Safety considerations

Before performing service procedures, review all the safety information.

Server warnings and cautions

Before installing a server, be sure that you understand the following warnings and cautions.



WARNING:

To reduce the risk of electric shock or damage to the equipment:

- Do not disable the power cord grounding plug. The grounding plug is an important safety feature.
- Plug the power cord into a grounded (earthed) electrical outlet that is easily accessible at all times.
- Unplug the power cord from the power supply to disconnect power to the equipment.
- Do not route the power cord where it can be walked on or pinched by items placed against it. Pay particular attention to the plug, electrical outlet, and the point where the cord extends from the server.



WARNING:

To reduce the risk of personal injury from hot surfaces, allow the drives and the internal system components to cool before touching them.

⚠ CAUTION:

Do not operate the server for long periods with the access panel open or removed. Operating the server in this manner results in improper airflow and improper cooling that can lead to thermal damage.

Preparation procedures

To access some components and perform certain service procedures, you must perform one or more of the following procedures:

- Extend the server from the rack (**Extending the server from the rack** on page 124).

If you are performing service procedures in an HPE, Compaq branded, Telco, or third-party rack cabinet, you can use the locking feature of the rack rails to support the server and gain access to internal components.

For more information about Telco rack solutions, see the HPE infrastructure website (<https://www.hpe.com/us/en/integrated-systems/rack-power-cooling.html>).

- Power off the server (**Powering off the server** on page 128).

If you must remove a server from a rack or a non-hot-plug component from a server, power off the server.

- Remove the server from the rack (**Removing the server from the rack** on page 129).

If the rack environment, cabling configuration, or the server location in the rack creates awkward conditions, remove the server from the rack.

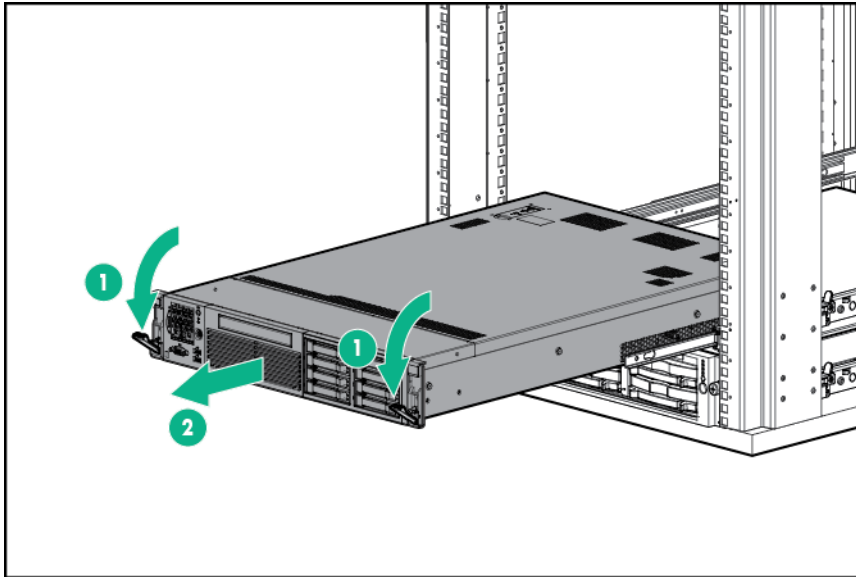
Extending the server from the rack

Procedure

1. Pull down the quick release levers on each side of the server.
2. Extend the server from the rack.

⚠ WARNING:

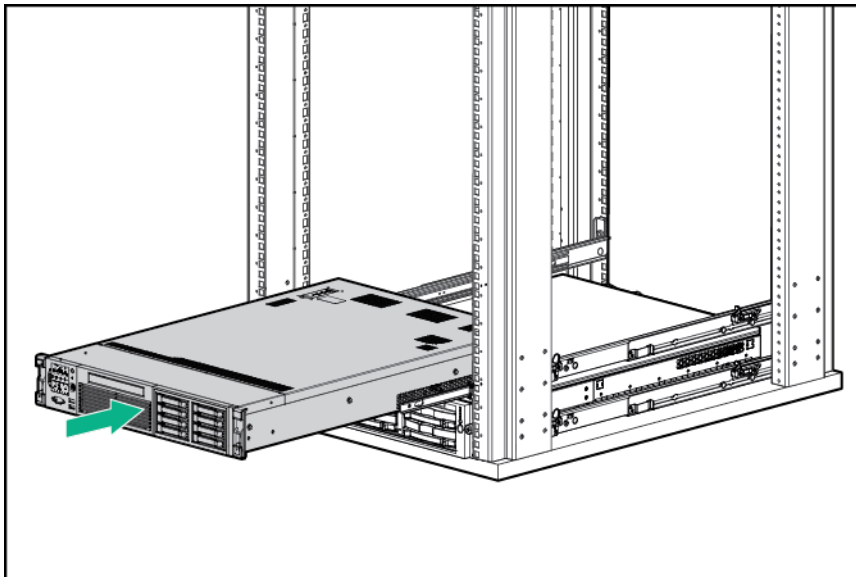
To reduce the risk of personal injury or equipment damage, be sure that the rack is adequately stabilized before extending a component from the rack.



3. After performing the installation or maintenance procedure, slide the server back into the rack, and then press the server firmly into the rack to secure it in place.

**WARNING:**

To reduce the risk of personal injury, be careful when pressing the server rail-release latches and sliding the server into the rack. The sliding rails might pinch your fingers.



Accessing internal components for a pedestal-mounted server

Procedure

1. Power off the server and remove all cables.
2. Remove the pedestal kit feet.

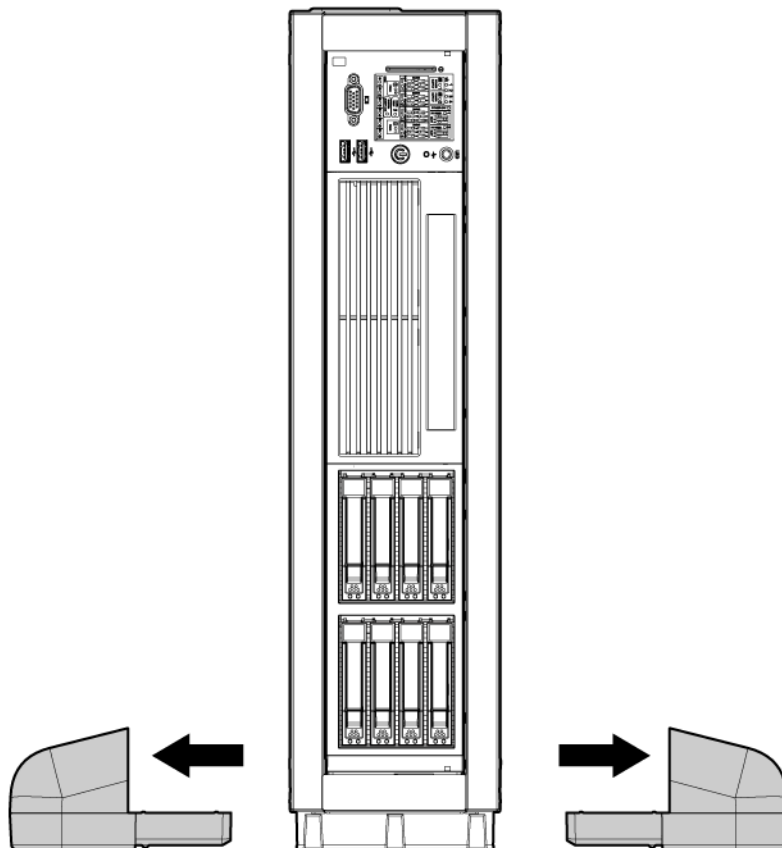


Figure 29: Removing the pedestal kit feet

3. Lay the server on the left side (facing the front of the server). The right side of the pedestal kit (with the ventilation holes) must face up.
4. Unscrew the captive thumbscrews on the rear of the pedestal kit for the right side pedestal kit piece.

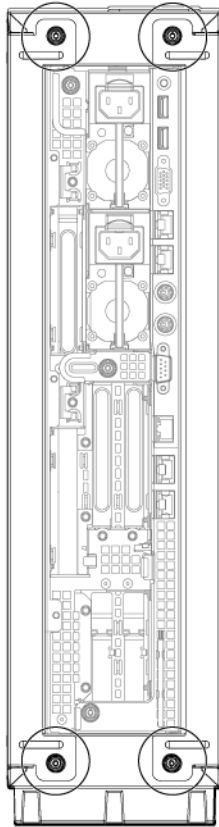


Figure 30: Thumbscrew locations

5. To remove the pedestal kit piece from the pedestal, slide the right side piece toward the back of the server, and then lift it.

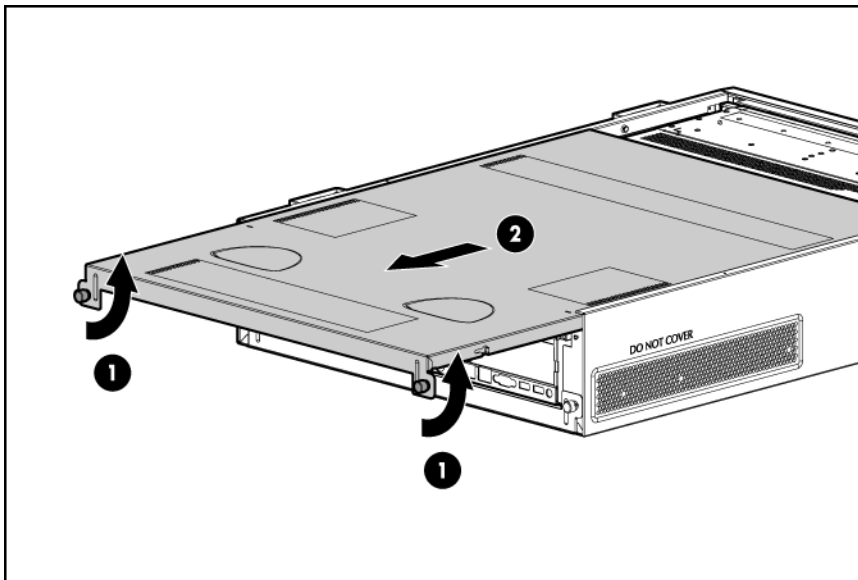


Figure 31: Removing the side piece

6. Remove the server access panel.

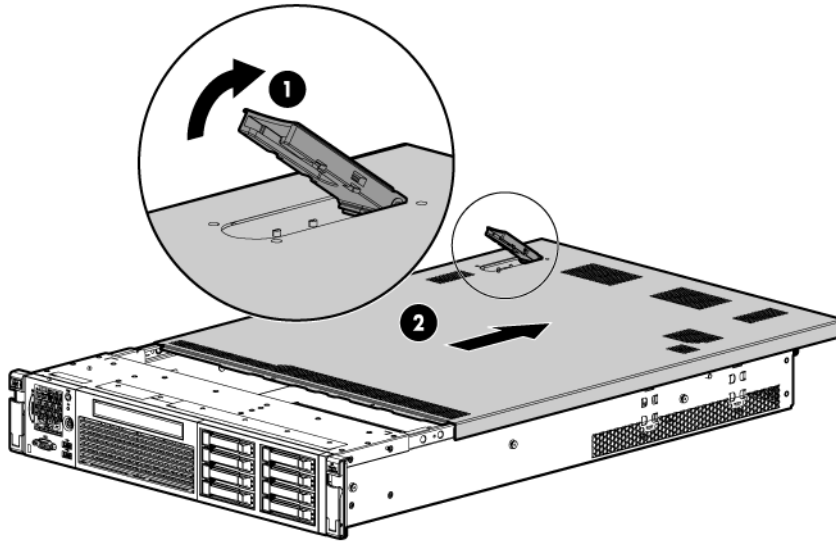


Figure 32: Access panel removal

Powering off the server



WARNING:

To reduce the risk of personal injury, electric shock, or damage to the equipment, remove the power cord to remove power from the server. The front panel Power On/Standby button does not completely shut off system power. Portions of the power supply and some internal circuitry remain active until AC power is removed.

NOTE:

If installing a hot-plug device, you do not have to power off the server.

Procedure

1. Back up the server data.
2. Shut down the operating system as directed by the operating system documentation.

NOTE:

If the operating system automatically places the server in Standby mode, omit the next step.

3. Press the Power On/Standby button to place the server in Standby mode. When the server activates Standby power mode, the system power LED changes to amber.

NOTE:

Pressing the UID button illuminates the blue UID LEDs on the front and rear panels. In a rack environment, this feature facilitates locating a server when moving between the front and rear of the rack.

4. Disconnect the power cords.

The system is now without power.

Removing the server from the rack

To remove the server from an HPE, Compaq branded, Telco, or third-party rack:

Procedure

1. Power off the server (**Powering off the server** on page 128).
2. Extend the server from the rack (**Extending the server from the rack** on page 124).
3. Disconnect the cabling and remove the server from the rack. For more information, see the documentation that ships with the rack mounting option.
4. Place the server on a sturdy, level surface.

Removing the server from the pedestal kit

Required tools

No tools are required for disassembling the pedestal kit.

Power off the server and remove cables

Procedure

1. Power down the server using the instructions provided in the server service guide.
2. Disconnect the power and LAN cables connected to the server.

Removing the pedestal kit

Procedure

1. Remove pedestal feet.

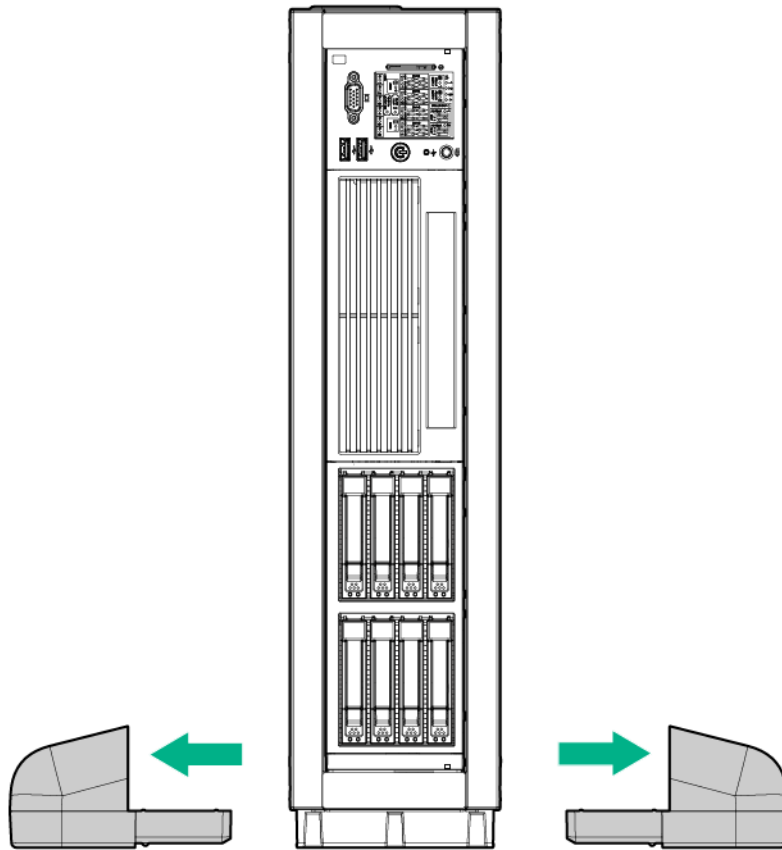


Figure 33: Removing the pedestal kit feet

2. Remove the pedestal side pieces by unscrewing the captive thumbscrews on the rear of the pedestal kit, and sliding the side pedestal kit pieces toward the back of the server.

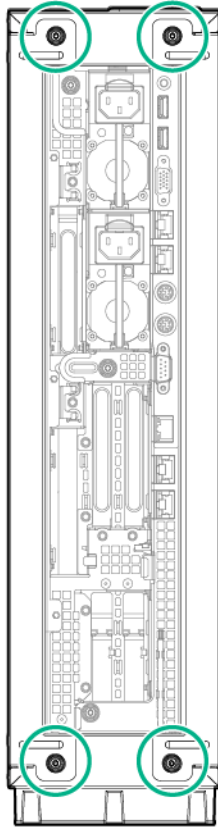


Figure 34: Thumbscrew locations

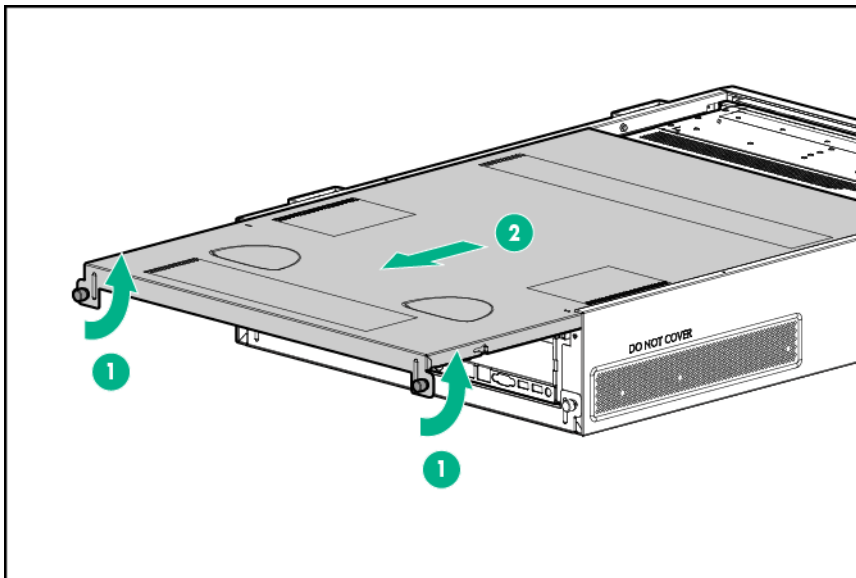


Figure 35: Removing the side piece

3. Release the locking tabs behind the top corners of the bezel cover and remove the component.

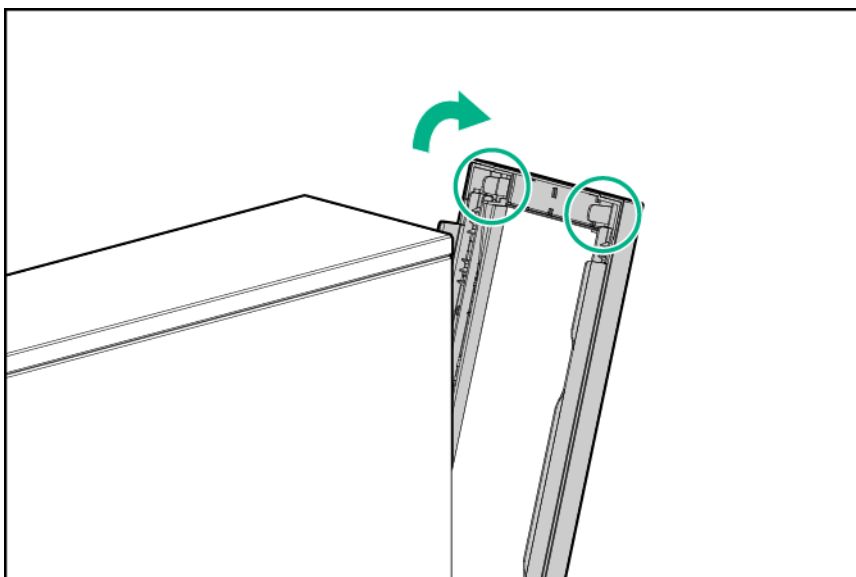


Figure 36: Removing the bezel cover

4. Remove the pedestal top piece.
 - a. With the server still in the vertical position, look at the left side of the server (server bottom) to locate the lock release tab.
 - b. Press the lock release tab on the pedestal top piece away from the chassis to unlock the pedestal top piece from the server. See **Figure 37: Removing the pedestal top piece** on page 132 for the pedestal top and bottom piece lock release locations.

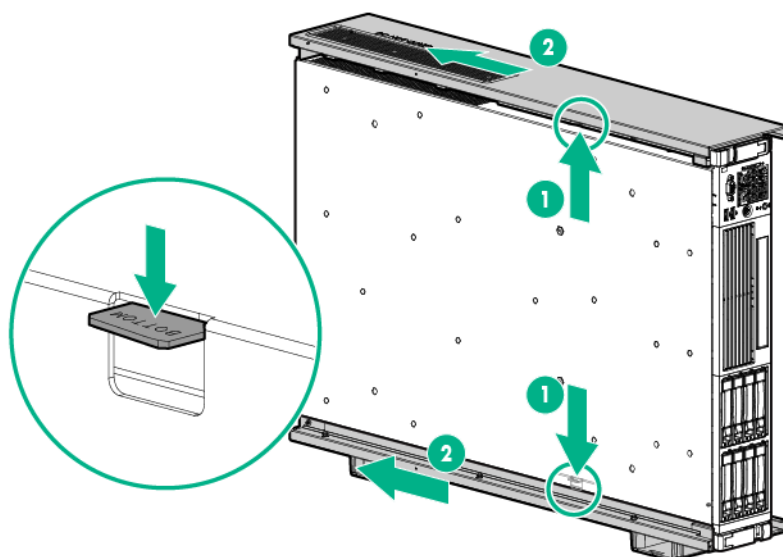


Figure 37: Removing the pedestal top piece

- c. Slide the pedestal top piece toward the back of the server to release it from the server.
 - d. Once the pedestal component has moved about 1/4 inch, the lock releases, and you can release the tab.

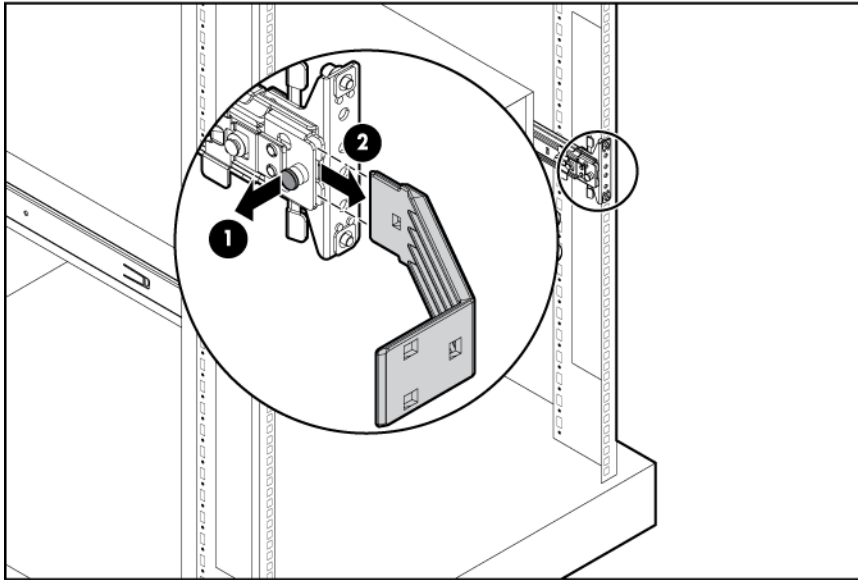
- e. Pull the pedestal kit top piece away from the server.
- f. Repeat these steps for the bottom piece.

Access the product rear panel

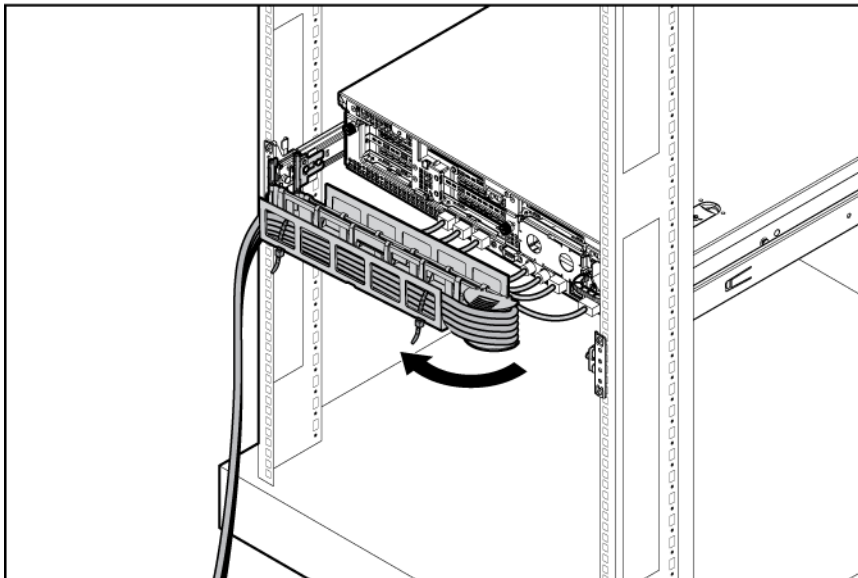
Cable management arm with left-hand swing

Procedure

1. Remove the cable arm retainer.



2. Open the cable management arm.



Cable management arm with right-hand swing

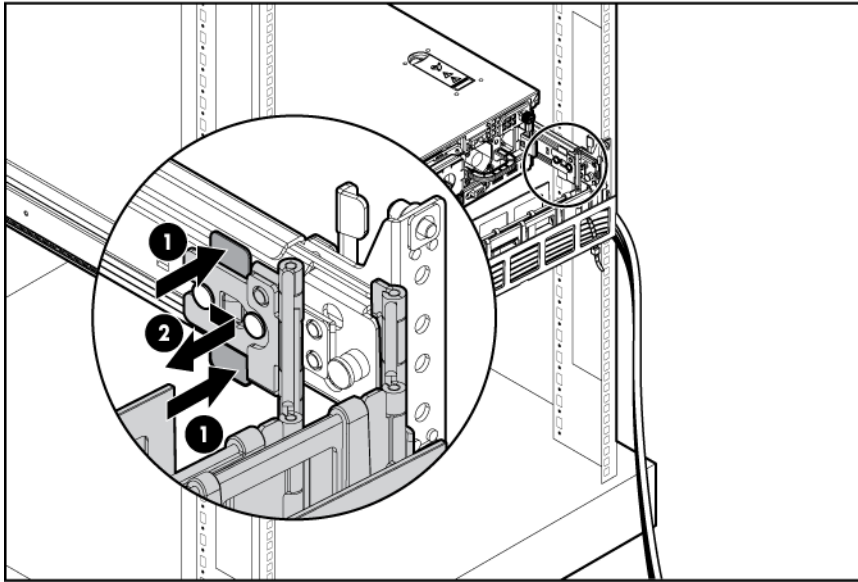
NOTE:

To access some components, you might have to remove the cable management arm.

To access the product rear panel components, open the cable management arm:

Procedure

1. Power off the server (**Powering off the server** on page 128).
2. Swing open the cable management arm.
3. Remove the cables from the cable trough.
4. Remove the cable management arm.



Removing and replacing a SAS hard drive blank

⚠ CAUTION:

For proper cooling do not operate the server without the access panel, baffles, expansion slot covers, or blanks installed. If the server supports hot-plug components, minimize the amount of time the access panel is open.

Remove the component as indicated.

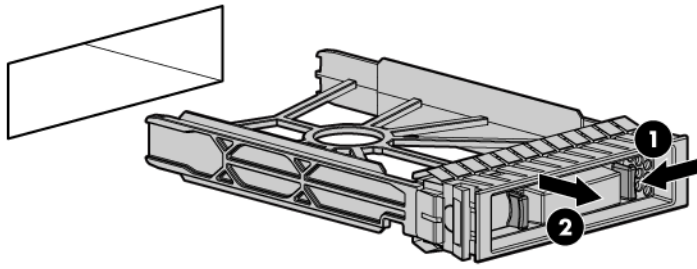


Figure 38: Hard drive filler removal

To replace the blank, slide the blank into the bay until it locks into place.

Removing and replacing a hot-plug SAS hard drive

The server supports up to eight SFF, 2.5-inch SAS hard drives. Each drive is equipped with two LEDs that indicate activity and device status.

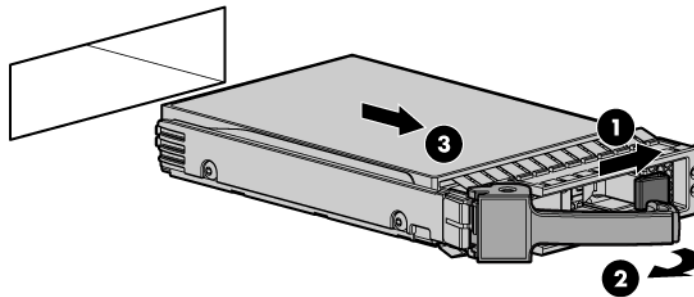
To remove the component:

⚠ CAUTION:

For proper cooling do not operate the server without the access panel, baffles, expansion slot covers, or blanks installed. If the server supports hot-plug components, minimize the amount of time the access panel is open.

Procedure

1. Determine the status of the hard drive from the hot-plug SAS hard drive LED combinations.
2. Back up all server data on the hard drive.
3. Remove the hard drive.



To replace the component, see [Installing a hot-pluggable SAS hard drive](#) on page 49.

Removing and replacing a power supply blank

⚠ CAUTION:

To prevent improper cooling and thermal damage, do not operate the server unless all bays are populated with either a component or a blank.

To remove the component:

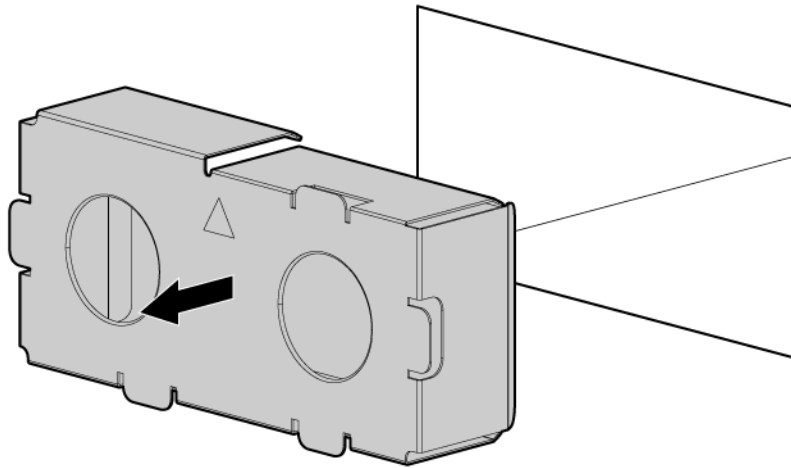


Figure 39: Removing the blank

To replace the component, reverse the removal procedure.

Removing and replacing a hot-swap power supply

The server supports 1+1 redundant power supply for high line (1200W/200~240VAC) and low line (800W/100~120VAC) in the data center and office-friendly server versions.

Table 43: Power redundancy configurations

Line voltage	Power supply count	Processor count	DIMM count	Redundancy
High Line (200-240)	1	1 or 2	2 to 24	No
High Line (200-240)	2	1 or 2	2 to 24	Yes
Low Line (100-120)	1	1 or 2	2 to 12	No
Low Line (100-120)	2	1	2 to 12	Yes
Low Line (100-120)	2	2	2 to 8 ¹	Yes

¹ A maximum of 8 DIMMs are supported in a configuration with low line AC voltage and 2 processors.

NOTE:

Configurations other than those listed in **Power redundancy configurations** do not have 1+1 power redundancy and are not supported.

Power redundancy is dependent on the number of power supplies, processors, and DIMMs in a system. Additional components, such as HDDs or PCIe cards, do not impact power redundancy.

The server also supports power capping. Power capping operation can be observed through iLO 3. For more information, see the *HPE Integrity iLO 3 Operations Guide*.

**WARNING:**

To reduce the risk of personal injury from hot surfaces, allow the power supply or power supply blank to cool before touching it.

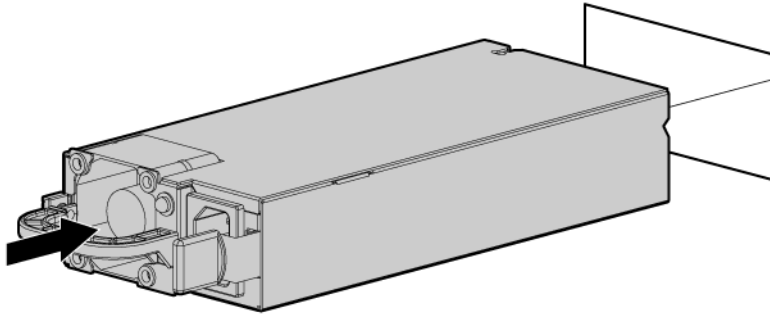
**CAUTION:**

To prevent improper cooling and thermal damage, do not operate the server unless all bays are populated with either a component or a blank.

To remove the component:

Procedure

1. Determine how many hot-swap power supplies are installed:
 - a. If only one hot-swap power supply is installed, power off and remove the power cord from the server (**Powering off the server** on page 128).
 - b. If more than one hot-swap power supply is installed, continue with the next step.
2. Access the product rear panel (**Access the product rear panel** on page 133).
3. Disconnect the power cord from the power supply.
4. Remove the hot-swap power supply.

**WARNING:**

To reduce the risk of electric shock or damage to the equipment, do not connect the power cord to the power supply until the power supply is installed.

To replace the component, see **Installing a hot-swappable power supply** on page 50.

Removing and replacing the access panel

To remove the access panel see **Removing the access panel** on page 52.

To replace the component, reverse the removal procedure.

Removing and replacing the optical drive filler

To remove the component:

CAUTION:

To prevent improper cooling and thermal damage, do not operate the server unless all bays are populated with either a component or a blank.

Procedure

1. Power off the server (**Powering off the server** on page 128).
2. Extend or remove the server from the rack.
3. Remove the access panel. See **Removing the access panel** on page 52.
4. Remove the fans 2 and 3. See **Removing and replacing a hot-swap fan** on page 140.
5. Push out the drive filler.

NOTE:

You might have to use a nonconductive tool with a length of at least 20 cm and a thickness of about 1 mm to push out the drive filler. Hewlett Packard Enterprise recommends using a ruler or similar tool.

To replace the component, reverse the removal procedure.

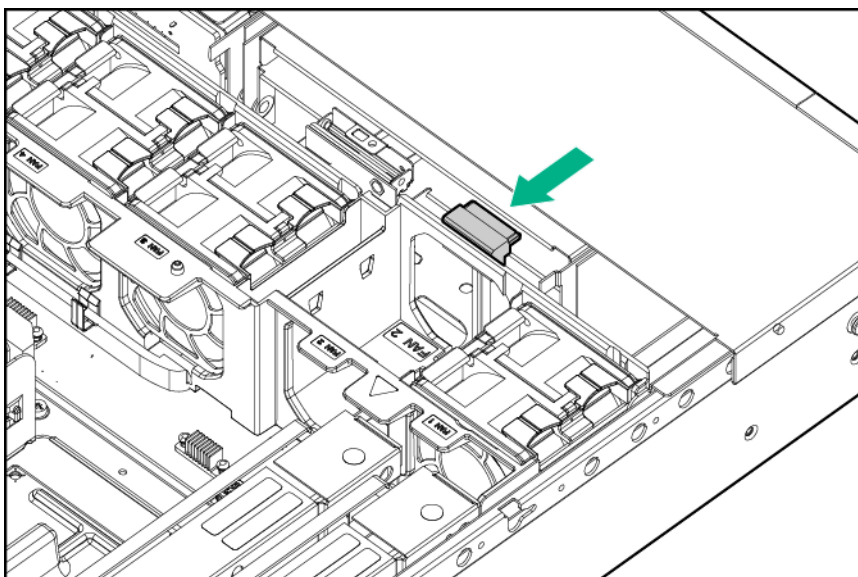
Removing and replacing the optical drive

CAUTION:

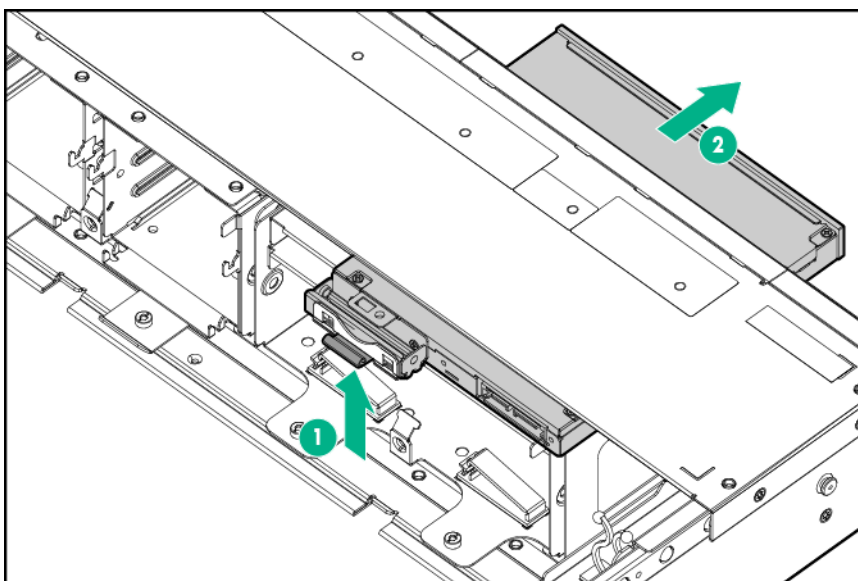
To prevent improper cooling and thermal damage, do not operate the server unless all bays are populated with either a component or a blank.

Procedure

1. Power off the server (**Powering off the server** on page 128).
2. Extend or remove the server from the rack. See **Removing the server from the rack** on page 129.
3. Remove the access panel. See **Removing the access panel** on page 52.
4. Remove the fans 2 and 3. See **Removing and replacing a hot-swap fan** on page 140.
5. Disconnect the drive cable.

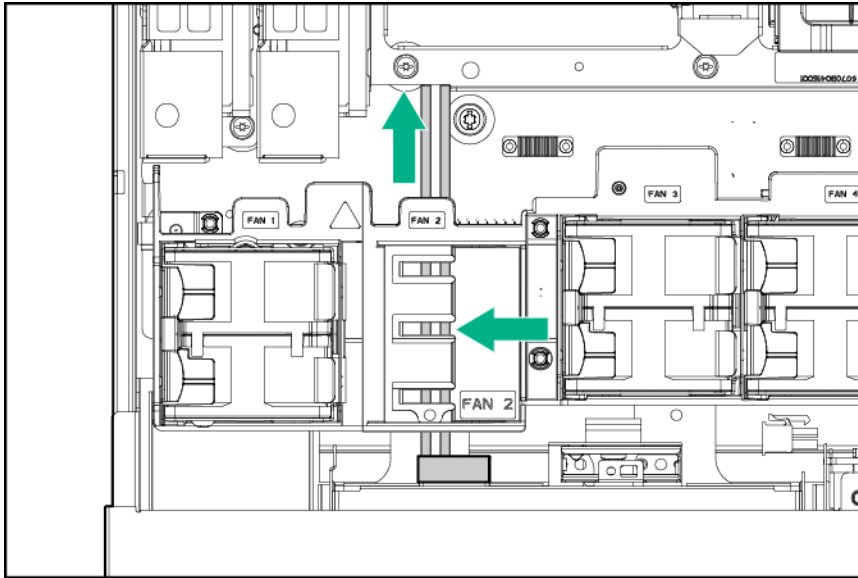


6. Lift the DVD release tab, and push out the drive. Then pull the drive straight out to remove it from the server.



To replace the component, reverse the removal procedure.

The optical drive cable routes beneath fan 2.



Removing and replacing a hot-swap fan

Six fans cool the server. The fans are all redundant, hot-swappable, and interchangeable. If one fan unit fails, then the other fans increase speed to compensate. The fan units are N+1 redundant, meaning that the server has six fan units, but can operate with five fan units running.

⚠ CAUTION:

If more than one fan is removed or fails, the system does not shut down.

If the temperature sensors detect conditions outside of operating limits, the system shuts down.

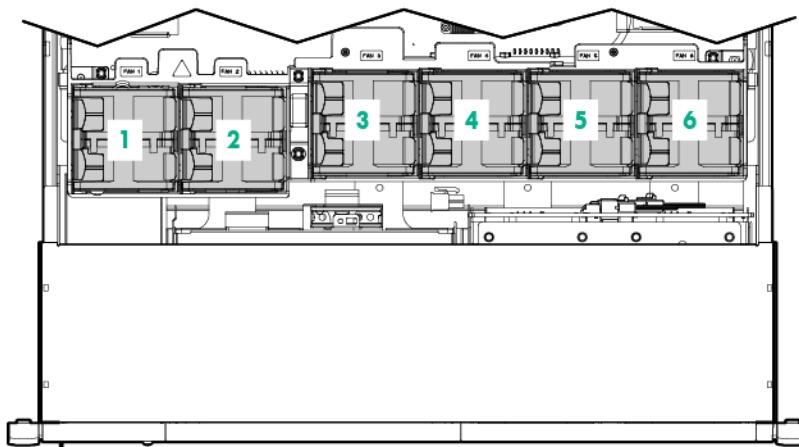


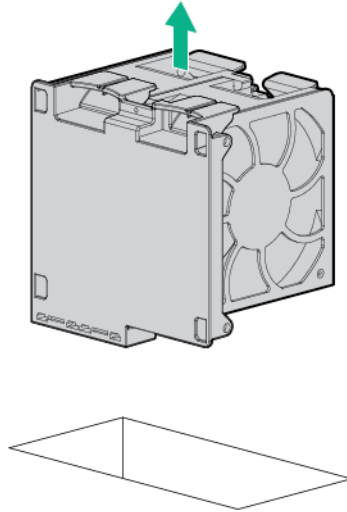
Figure 40: Fan identification

The power supplies have built-in fans and are not controlled by the iLO MP.

For fan identification, see **Figure 40: Fan identification** on page 140.

Procedure

1. Extend or remove the server from the rack (**Removing the server from the rack** on page 129 or **Extending the server from the rack** on page 124).
2. Remove the access panel (**Removing and replacing the access panel** on page 137).
3. Remove the fan.



⚠ CAUTION:

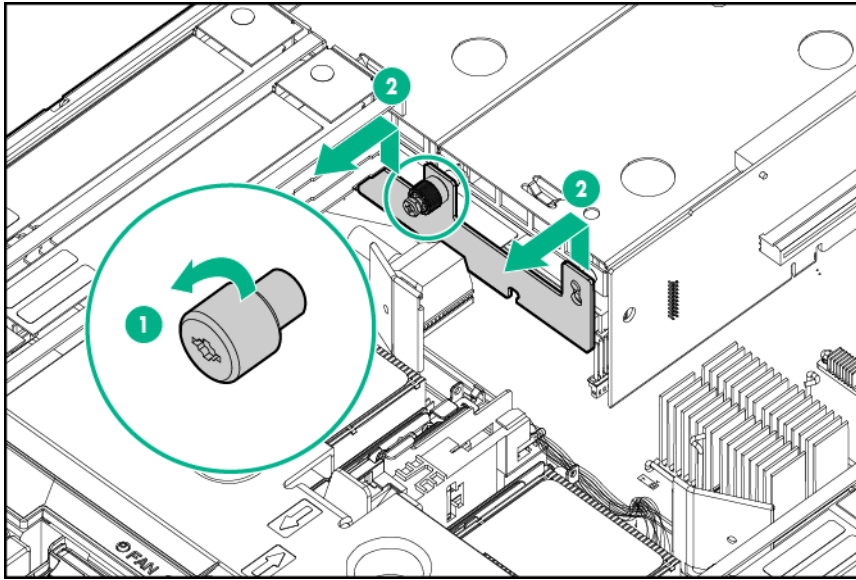
Do not operate the server for long periods with the access panel open or removed. Operating the server in this manner results in improper airflow and improper cooling that can lead to thermal damage.

To replace the component, reverse the removal procedure.

Removing and replacing the power supply backplane

Procedure

1. Power off the server (**Powering off the server** on page 128).
2. Remove all power supplies (**Removing and replacing a hot-swap power supply** on page 136).
3. Extend or remove the server from the rack (**Removing the server from the rack** on page 129) or **Extending the server from the rack** on page 124).
4. Remove the access panel (**Removing the access panel** on page 52).
5. Remove the PCI cage (**Removing the PCI riser cage** on page 52).
6. Remove the necessary memory risers (**Installing DIMMs** on page 59).
7. Remove the power supply backplane.

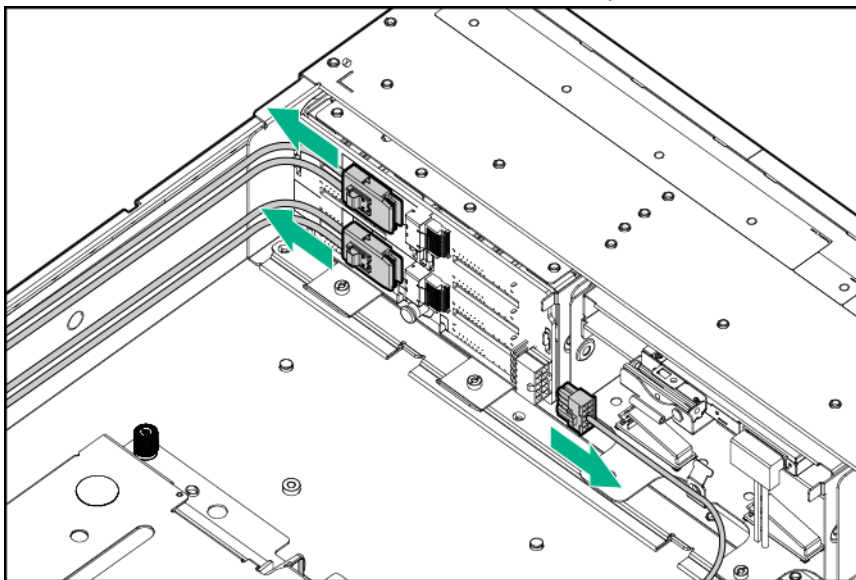


To replace the component, reverse the removal procedure.

Removing and replacing the hard drive backplane

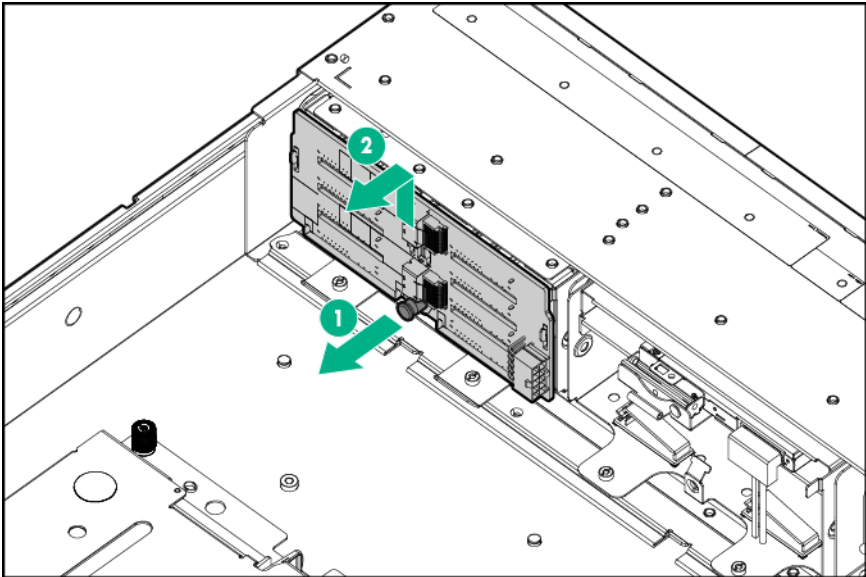
Procedure

1. Power off the server (**Powering off the server** on page 128).
2. Extend or remove the server from the rack (**Removing the server from the rack** on page 129) or **Extending the server from the rack** on page 124).
3. Remove the access panel (**Removing the access panel** on page 52).
4. Remove all hot-plug hard drives (**Removing and replacing a hot-plug SAS hard drive** on page 135).
5. Disconnect the SAS cable from the hard drive backplane.



6. Remove the hard drive backplane.

- a. Pull the plunger to unlock the backplane.
- b. Lift the backplane upward to clear the metal tabs.
- c. Pull out the backplane.



To replace the component, reverse the removal procedure.

⚠ CAUTION:
Carefully align the backplane center through-holes with the chassis mounting posts or you might damage components on the backplane.

Removing and replacing the PCI riser cage

To remove the component, see [Removing the PCI riser cage](#) on page 52.

To replace the component, reverse the removal procedure.

Removing and replacing expansion slot covers

To remove the component see [Removing expansion slot covers](#) on page 53.

To replace the component, reverse the removal procedure.

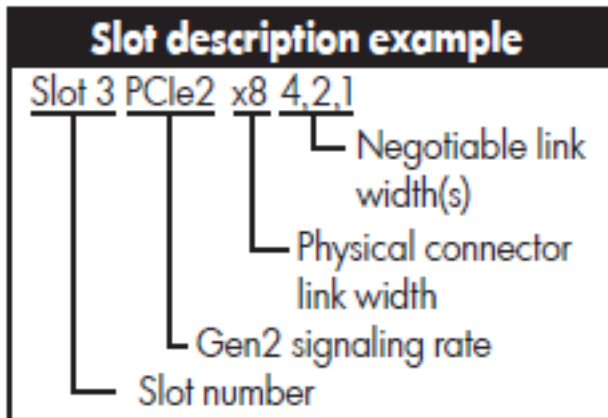
Removing and replacing expansion boards

Table 44: PCI slot descriptions

	3-slot PCIe riser	2-slot PCIe riser
Primary riser connector		
1 — Full length, full height	PCIe2 x16 (8, 4, 2, 1)	PCIe2 x16 (8, 4, 2, 1)

Table Continued

	3-slot PCIe riser	2-slot PCIe riser
2 — Half length, full height	PCIe2 x8 (4, 2, 1)	PCIe2 x16 (8, 4, 2, 1)
3 — Half length, full height	PCIe2 x8 (4, 2, 1)	—
Secondary riser connector		
4 — Full length, full height	PCIe2 x16 (8, 4, 2, 1)	PCIe2 x16 (8, 4, 2, 1)
5 — Low profile	PCIe2 x8 (4, 2, 1)	PCIe2 x16 (8, 4, 2, 1)
6 — Low profile	PCIe2 x8 (4, 2, 1)	—



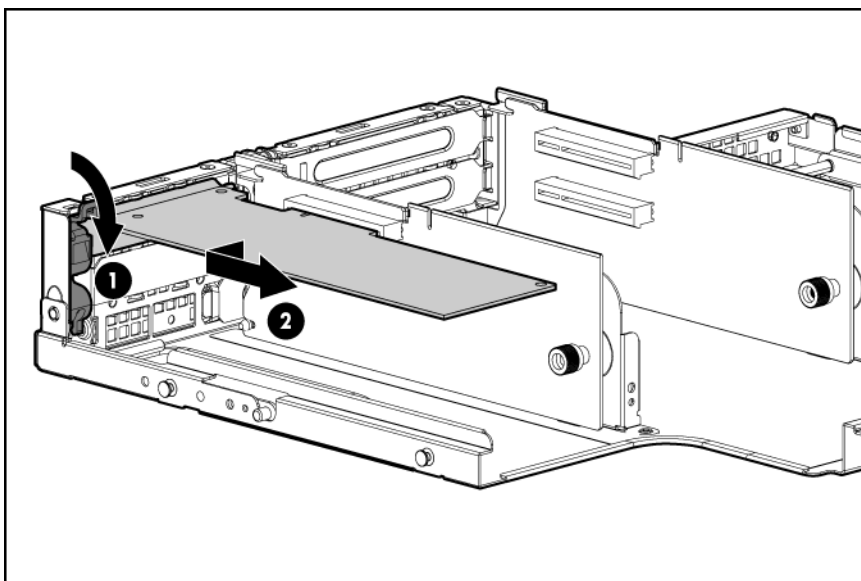
The server supports up to two PCIe riser boards. Each PCIe riser board holds up to three PCIe cards each. The standard riser board configuration contains one riser board with one full-length, full-height PCIe x8 slot, and two half-length, full-height PCIe x4 slots. The second board contains one full-length, full-height PCIe x8 slot, and two half-length, half-height PCIe x4 slots.

The optional riser board configuration contains one riser board with one full-length, full-height PCIe x8 slot, and two half-length, full-height PCIe x4 slots. The second board contains one full-length, full-height PCIe x16 slot.

Removing and replacing a half-length expansion board

Procedure

1. Power off the server (**Powering off the server** on page 128).
2. Extend the server from the rack (**Extending the server from the rack** on page 124).
3. Remove the access panel (**Removing and replacing the access panel** on page 137).
4. Disconnect any external cables that are connected to the expansion board.
5. Remove the PCI riser cage (**Removing and replacing the PCI riser cage** on page 143).
6. Disconnect any internal cables that are connected to the expansion board.
7. Remove expansion board.

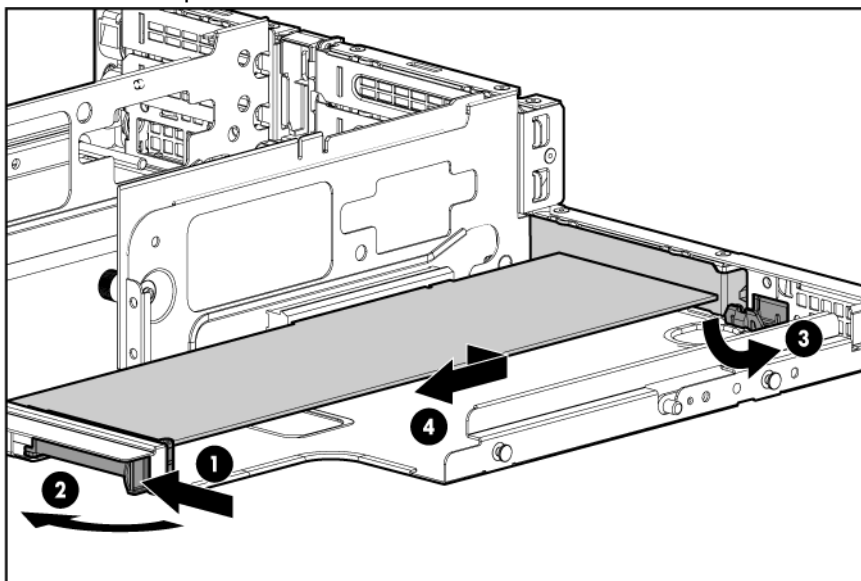


To replace the component, see [Installing expansion boards](#) on page 54.

Removing and replacing a full-length expansion board

Procedure

1. Power off the server ([Powering off the server](#) on page 128).
2. Extend the server from the rack ([Extending the server from the rack](#) on page 124).
3. Remove the access panel ([Removing and replacing the access panel](#) on page 137).
4. Disconnect any external cables that are connected to the expansion board.
5. Remove the PCI riser cage ([Removing and replacing the PCI riser cage](#) on page 143).
6. Disconnect any internal cables that are connected to the expansion board.
7. Remove the expansion board.



To replace the component, see [Installing expansion boards](#) on page 54.

Removing and replacing the cache module

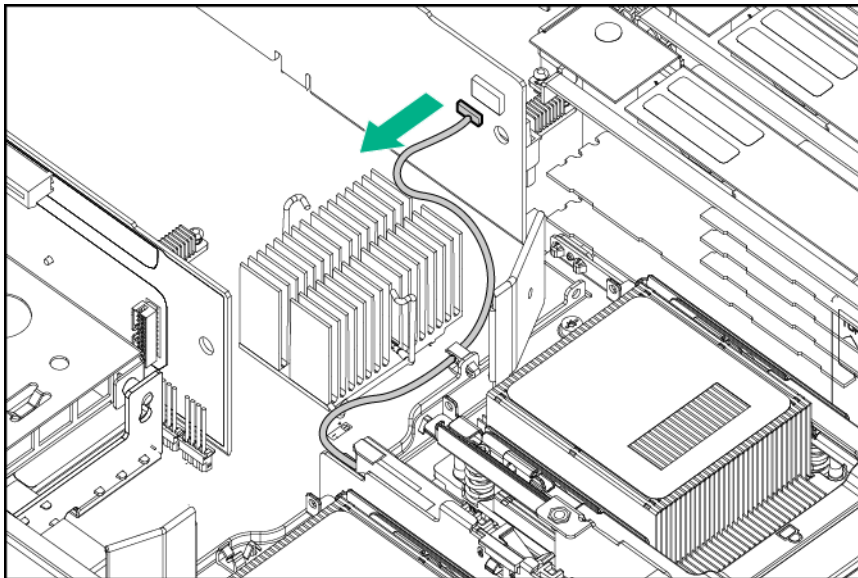
NOTE:

The cache module is required to enable the full feature firmware stack for RAID support, and certain levels of RAID support also require the super capacitor module and a Advanced Pack license key.

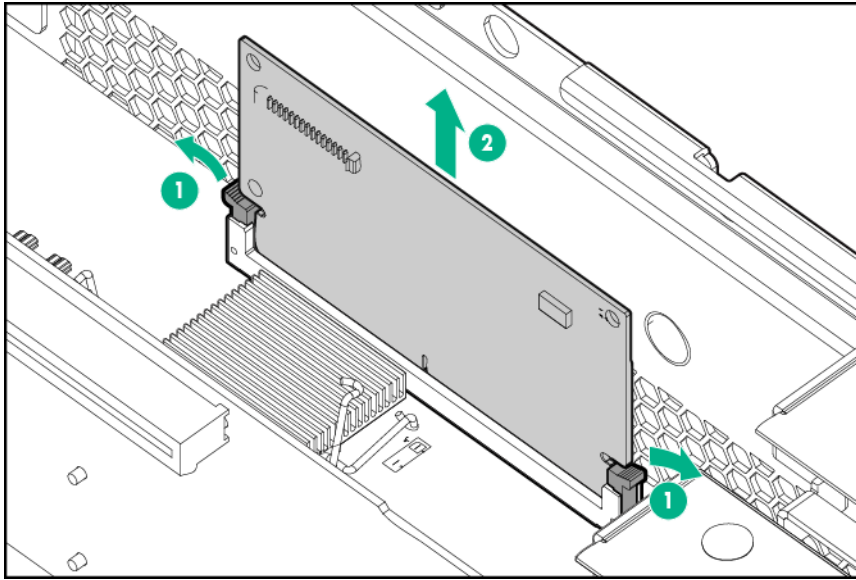
To enable Advanced Pack licensing, see [Adding a RAID Advanced Pack license key](#) on page 177.

Procedure

1. Power off the server ([Powering off the server](#) on page 128).
2. Extend or remove the server from the rack ([Removing the server from the rack](#) on page 129) or [Extending the server from the rack](#) on page 124).
3. Remove the access panel ([Removing and replacing the access panel](#) on page 137).
4. Remove the PCI riser cage ([Removing and replacing the PCI riser cage](#) on page 143).
5. Disconnect the cable to the super capacitor pack.



6. Remove the cache module.



To replace the component, reverse the removal procedure.

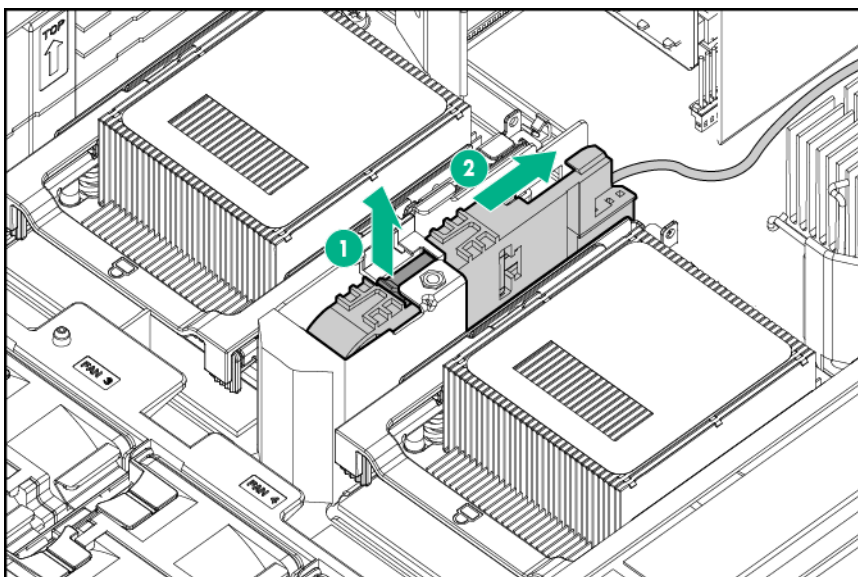
⚠ CAUTION:

To prevent damage to the cache module during installation, be sure the cache module is fully inserted before pressing down.

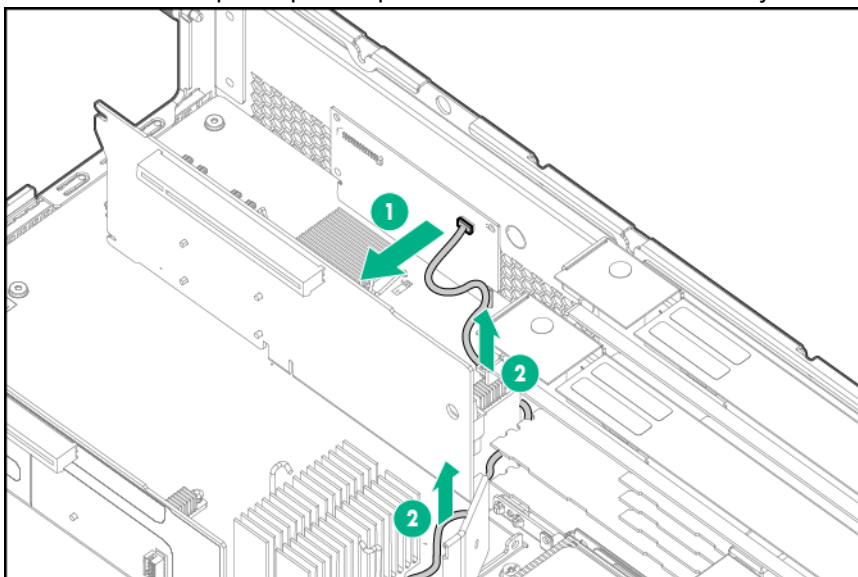
Removing and replacing the super capacitor pack

Procedure

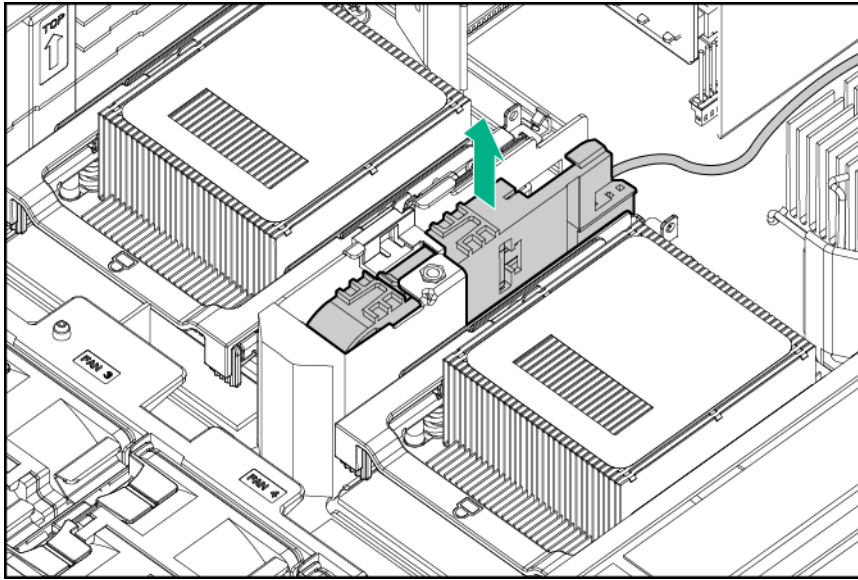
1. Power off the server (**Powering off the server** on page 128).
2. Extend or remove the server from the rack (**Removing the server from the rack** on page 129) or **Extending the server from the rack** on page 124).
3. Remove the access panel (**Removing and replacing the access panel** on page 137).
4. Remove the PCI riser cage (**Removing and replacing the PCI riser cage** on page 143).
5. Pull up the latch and push the super capacitor pack to the rear of the server.



6. Disconnect the super capacitor pack cable from the board and system board clips.



7. Remove the super capacitor pack.



To replace the component, reverse the removal procedure.

Removing and replacing the processor baffle

⚠ CAUTION:

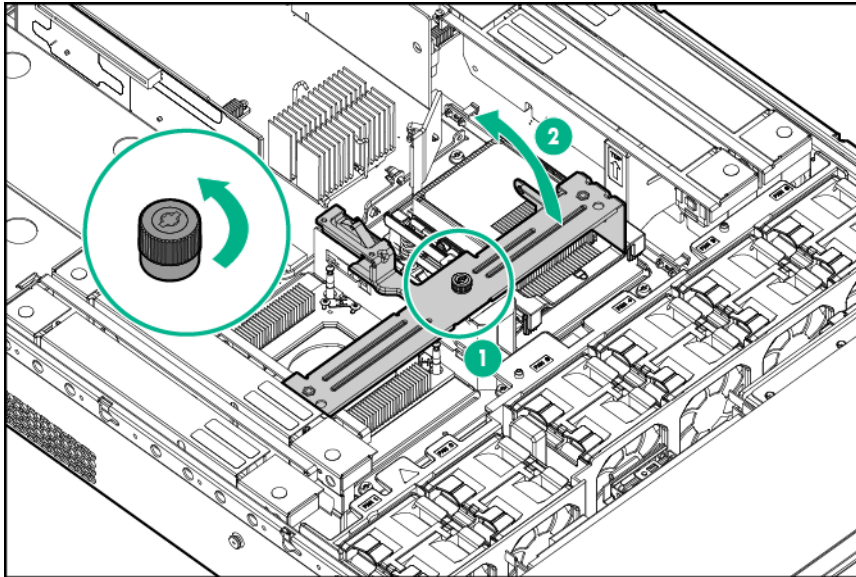
To prevent damage to the server, never power on a server without a processor baffle or processor in each processor socket. The processor baffle is needed for proper system cooling.

⚠ CAUTION:

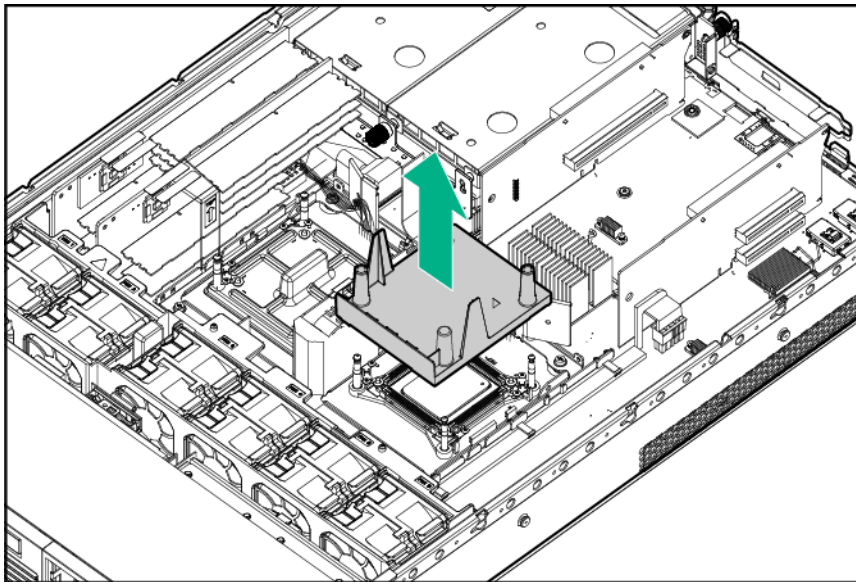
Immediately install a processor baffle in an empty processor socket. To avoid damage to the socket pins, the socket must never be uncovered for more than 5 seconds. If the socket is damaged, the entire system board must be replaced.

Procedure

1. Power off the server and remove it from the rack (**Powering off the server** on page 128 and **Removing the server from the rack** on page 129).
2. Remove the access panel (**Removing the access panel** on page 52).
3. Open the processor cage.



4. Pull the processor baffle straight up and out.



To replace the processor baffle:

- Line the processor baffle up with 4 load posts on each corner of the socket.
- Guide the processor baffle straight down into place.

Removing and replacing a processor and heat sink module

The server processor subsystem supports one or two Quad-Core or eight-Core Itanium processors. When two processors are installed, the speeds must be identical.

**WARNING:**

To reduce the risk of personal injury from hot surfaces, allow the drives and the internal system components to cool before touching them.

**CAUTION:**

To prevent possible server malfunction, do not mix processors of different speeds or cache sizes.

**CAUTION:**

Removing a processor will cause the DIMM loading rules to change. See **Memory configurations** on page 56

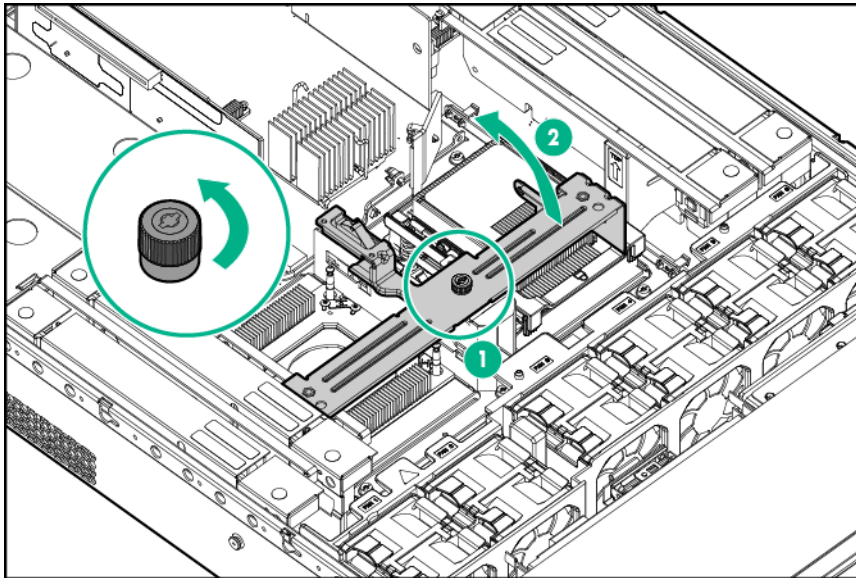
and use the loading rules for two processors. If you do not perform these procedures, then any memory associated with the removed processor will not be seen by the system.

**CAUTION:**

To prevent thermal instability and damage to the server, do not separate the processor module from the heat sink.

Procedure

1. Power off the server and remove it from the rack (**Powering off the server** on page 128 and **Removing the server from the rack** on page 129).
2. Remove the access panel (**Removing the access panel** on page 52).
3. Open the processor cage.

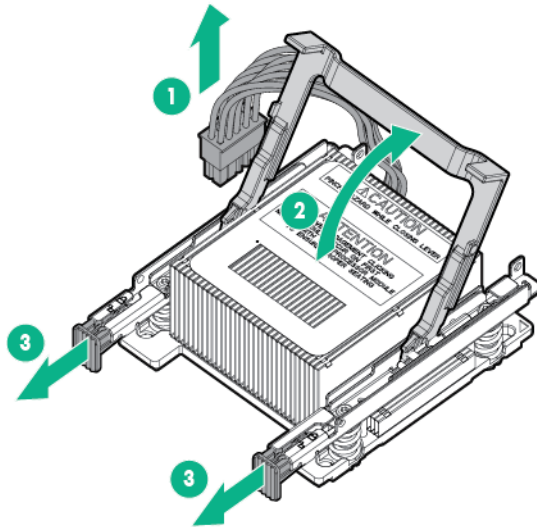


4. Disconnect the power cord (see 1 below).
5. Rotate the processor locking handle up and back until it reaches a hard stop (see 2 below).

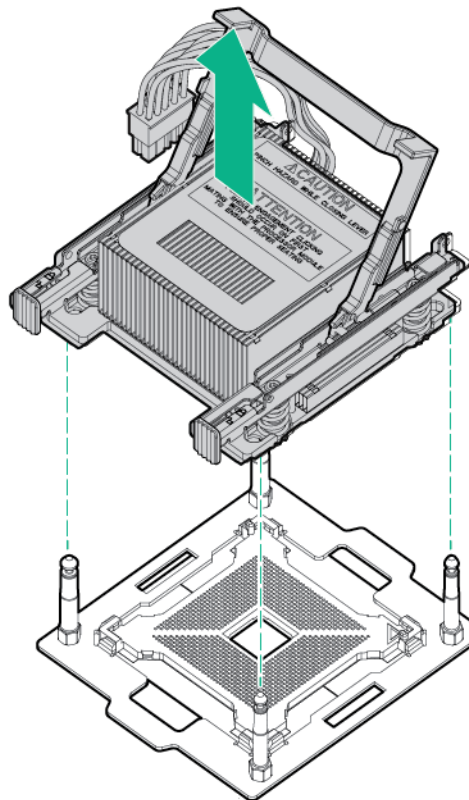
**WARNING:**

The heat sink locking lever can constitute a pinch hazard, keep your hands on top of the lever during installation to avoid personal injury.

6. Pull both plastic tabs out (see 3 below).



7. Lift the processor and heat sink off of the socket, pulling straight up.



8. If the processor is not being replaced, install a processor baffle (**Removing and replacing the processor baffle** on page 149).

**CAUTION:**

To avoid damage to processor socket pins and ensure proper system cooling, install a processor baffle in an empty processor socket.

To replace a processor that is not defective, reverse the removal procedure.

The replacement processor module is shipped from Hewlett Packard Enterprise without a heat sink. You will need to order and attach a heat sink to the processor module before installing them for repair.

For more information on the installation procedure, see [Installing a processor and heat sink module](#) on page 61 .

**IMPORTANT:**

- **DO NOT SEPARATE THE PROCESSOR FROM THE HEAT SINK FOR A DEFECTIVE MATERIAL RETURN.**

The heat sink and processor must be returned as a unit to facilitate testing and root cause analysis.

- Do not discard your heat sink packaging or processor ESD bag. Reuse this packaging to return any exchange material.
 - You **MUST** use a new heat sink with an undisturbed thermal interface for processor installation.
 - To receive credit for returning defective material, make sure to include the processor paperwork.
-

NOTE: After replacing the processor and heat sink module use the `cpuconfig` from UEFI to verify the that the processor socket has been reconfigured.

Removing and replacing DIMMs

The server supports up to 24 memory DIMMs that attach to the system board through 4 memory riser boards (6 DIMMs per board). The minimum amount of memory supported is 8 GB (two 4 GB DIMMs). The maximum memory supported is 384 GB (twenty-four 16 GB DIMMs). The supported DIMMs are industry-standard, 30 mm (1.18 inch) high, DDR3 PC3 DIMMs. The server does not support hot-spare and hot-plug functionality.

The server supports the following DIMM sizes:

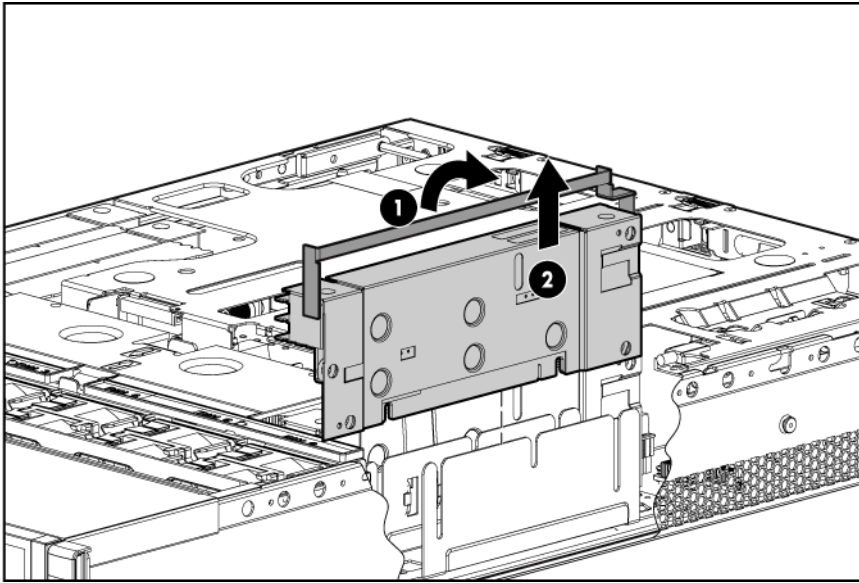
- 4 GB
- 8 GB
- 16 GB

For memory configurations see [Installing DIMMs](#) on page 56.

Procedure

1. Power off the server ([Powering off the server](#) on page 128).
2. Extend or remove the server from the rack ([Removing the server from the rack](#) on page 129 or [Extending the server from the rack](#) on page 124).
3. Remove the access panel ([Removing the access panel](#) on page 52).

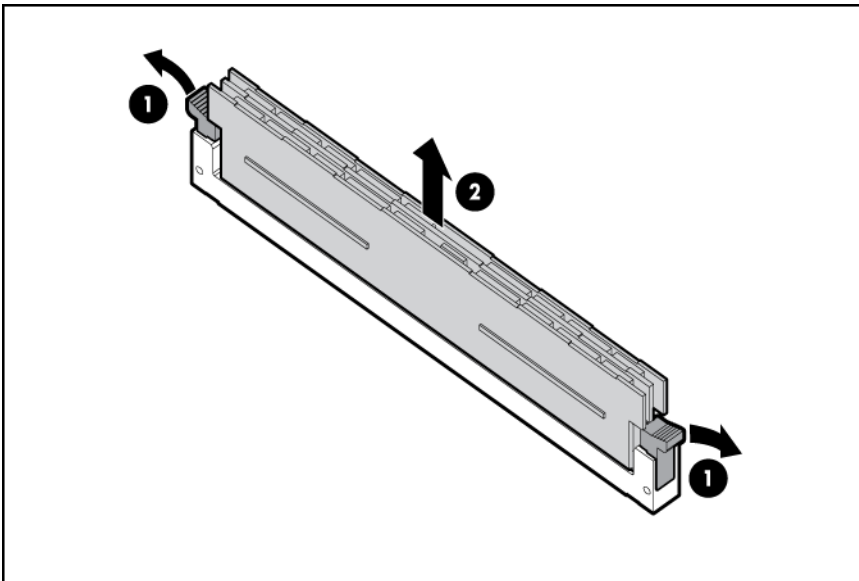
4. Remove the memory riser.



NOTE:

You can access the memory riser boards without removing the airflow guides. Airflow guides are only required for memory riser slots 2 and 3.

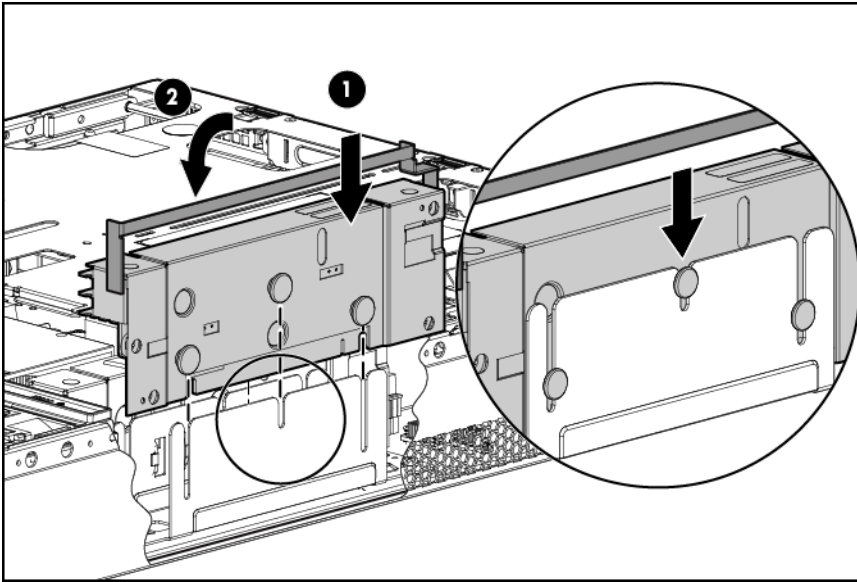
5. Remove the DIMM.



To replace the component, reverse the procedure. Ensure that you follow the memory loading order when you replace DIMMs. For memory configuration information, see **Memory configurations** on page 56.

CAUTION:

Before inserting the memory riser, the three stand-off posts on the riser must be aligned with the alignment slots on the system board. Failure to align the stand-off posts correctly might result in damage to the riser.



Removing and replacing the PDH battery (system battery)

If the server no longer automatically displays the correct date and time, you might have to replace the battery (see [CRU list](#)) that provides power to the real-time clock.



WARNING:

The computer contains an internal lithium manganese dioxide, a vanadium pentoxide, or an alkaline battery pack. If the battery pack is not properly handled, a risk of fire and burns exists. To reduce the risk of personal injury:

- Do not attempt to recharge the battery.
- Do not expose the battery to temperatures higher than 60°C (140°F).
- Do not disassemble, crush, puncture, short external contacts, or dispose of in fire or water.
- Replace only with the spare designated for this product.

Procedure

1. Power off the server ([Powering off the server](#) on page 128).
2. Extend the server from the rack ([Extending the server from the rack](#) on page 124).
3. Remove the access panel ([Removing and replacing the access panel](#) on page 137).
4. Remove the PCI riser cage ([Removing and replacing the PCI riser cage](#) on page 143).



WARNING:

Do not attempt to remove the battery by hand. Doing so can cause the battery holder to separate from the system board.

**WARNING:**

Do not attempt to remove the battery from the side marked “+” first. If your battery holder does not have the “+” marking, the side of the holder with springs will be the “+” end.

5. Using a nonconductive tool small enough to fit into the battery slot as leverage, gently remove the battery from the holder from the end marked “---”.

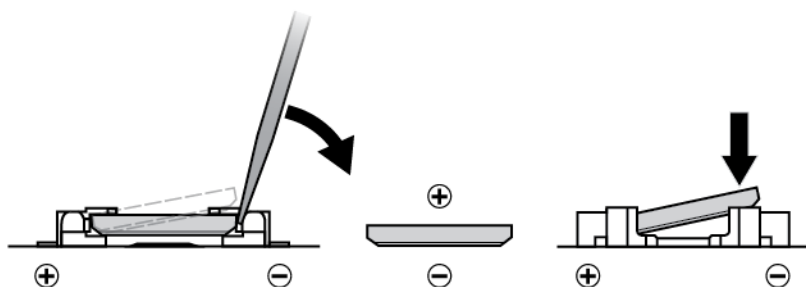
NOTE:

Hewlett Packard Enterprise recommends using ESD safe, non-conductive tweezers or a similar tool.

To replace the component, reverse the removal procedure.

**IMPORTANT:**

Ensure that the new battery is fully seated and that all locking tabs are correctly engaged.

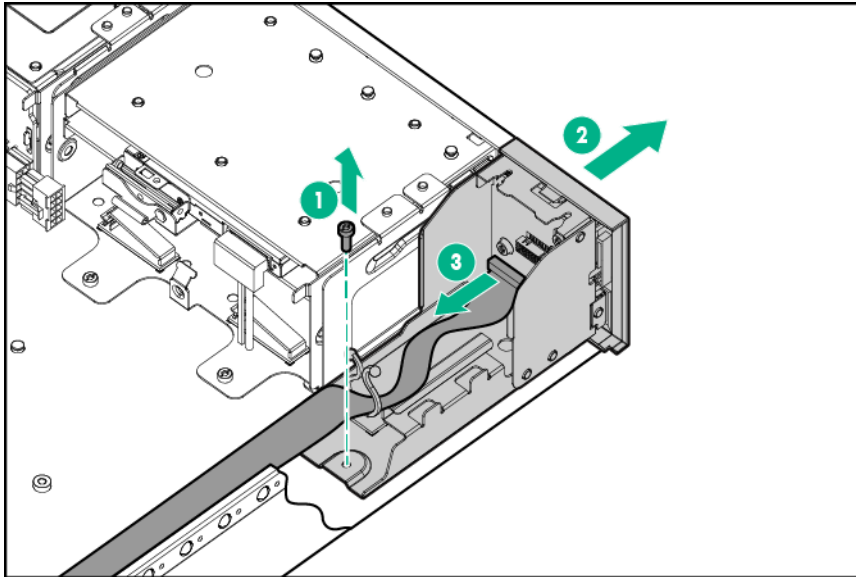


For more information about battery replacement or proper disposal, contact an authorized reseller or an authorized service provider.

Removing and replacing the SID

Procedure

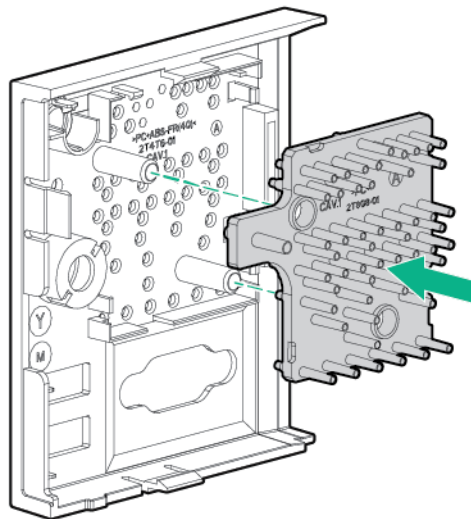
1. Power off the server (**Powering off the server** on page 128).
2. Extend the server from the rack (**Extending the server from the rack** on page 124).
3. Remove the access panel (**Removing and replacing the access panel** on page 137).
4. Remove necessary fans 1 and 2.
5. Remove the screw securing the SID inside the chassis.
6. Disconnect the cable clip.
7. Pull the Systems Insight Display module halfway out of the server.
8. Disconnect the Systems Insight Display cable.
9. Remove the Systems Insight Display module.



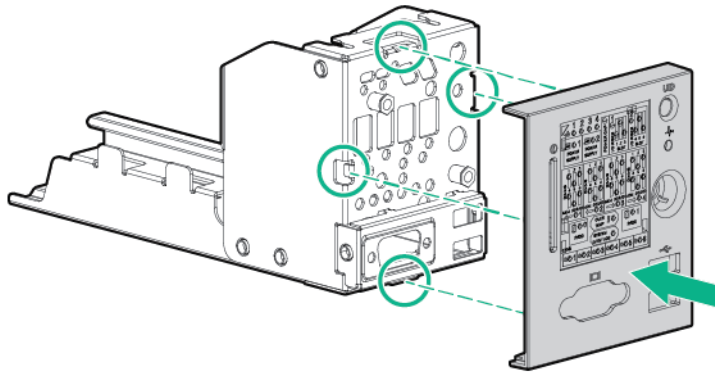
To replace the component, reverse the removal procedure.

If installing a replacement SID module:

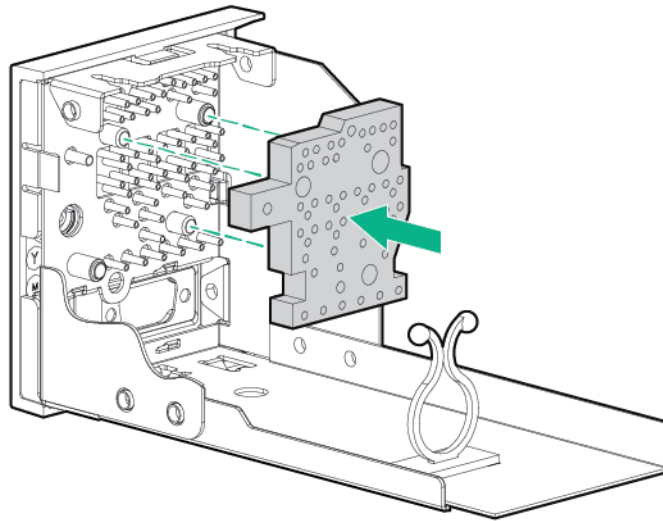
- Retain the SID bezel, the transparent light pipe, and the black rubber light pipe.
- Install the transparent plastic light pipe onto the SID bezel.



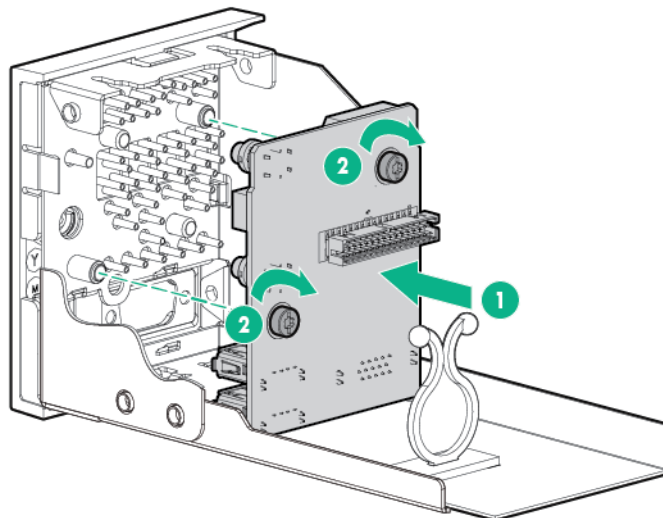
- Install the SID bezel onto the metal chassis, ensuring the four latches all lock.



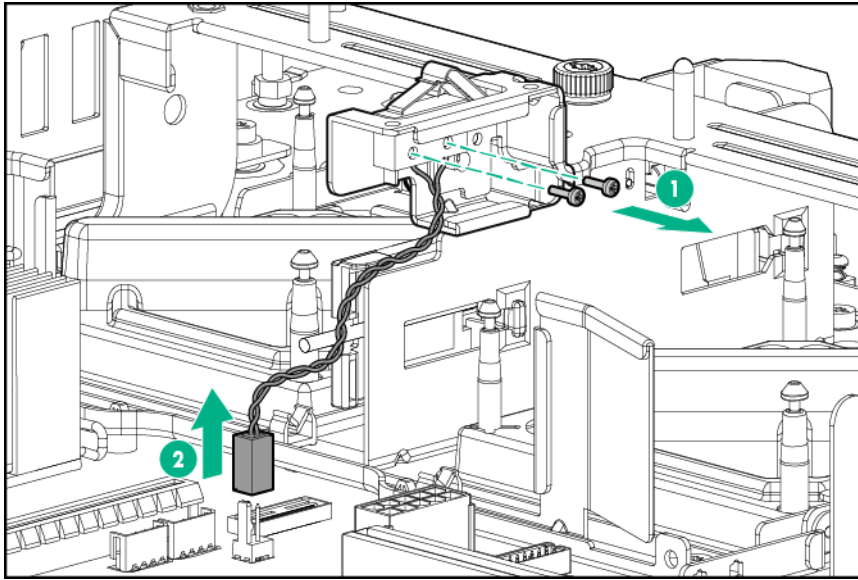
- Put the black rubber light pipe onto the plastic light pipe.



- Install the SID board by securing it with the two screws.



- Fasten the two hexagon screws on the front of SID bezel to the VGA port.



To replace the component, reverse the removal procedure.

Removing and replacing the system board

❗ IMPORTANT:

If your system board has a TPM installed, you must order a new TPM when you order a replacement system board.

Before replacing the system board, you must first back up the current TPM settings. See the HP-UX operating system documentation for more information.

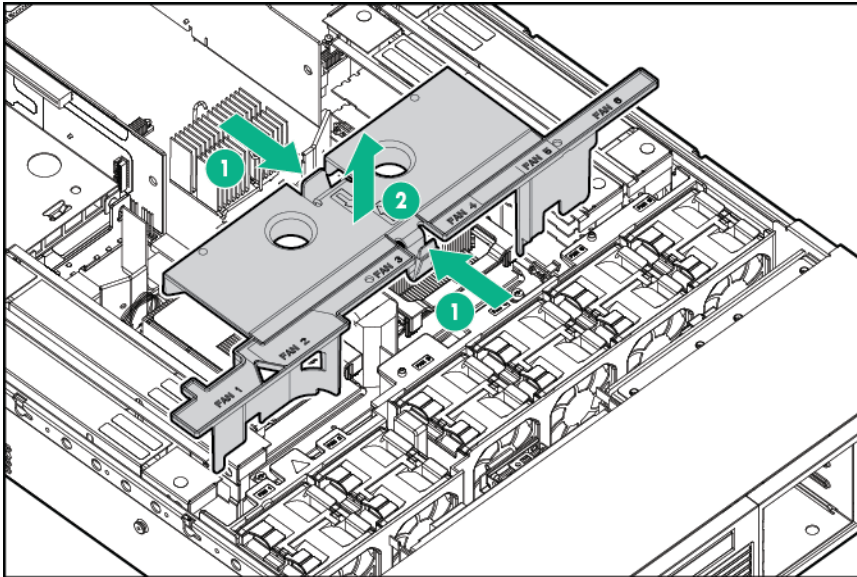
The TPM is not a customer-installable component. If you need to replace a TPM on a replacement system board, contact an Hewlett Packard Enterprise authorized service provider.

⚠ WARNING:

Once the TPM is installed on your system board, it cannot be removed. If the TPM fails, the system board needs to be replaced. Attempting to remove the TPM from the system board will void any existing Hewlett Packard Enterprise service contract and cause the server to fail.

Procedure

1. Power off the server (**Powering off the server**).
2. Remove all power supplies (**Removing and replacing a hot-swap power supply**).
3. Remove all hot-plug hard drives (**Removing and replacing a hot-plug SAS hard drive**).
4. Extend or remove the server from the rack (**Removing the server from the rack**) or (**Extending the server from the rack**).
5. Remove the access panel (**Removing and replacing the access panel**).
6. Remove the air baffle.



7. Remove the PCI riser cage (**Removing and replacing the PCI riser cage**).



CAUTION:

To prevent damage to the server or expansion boards, power off the server and remove all AC power cords before removing or installing the PCI riser cage.

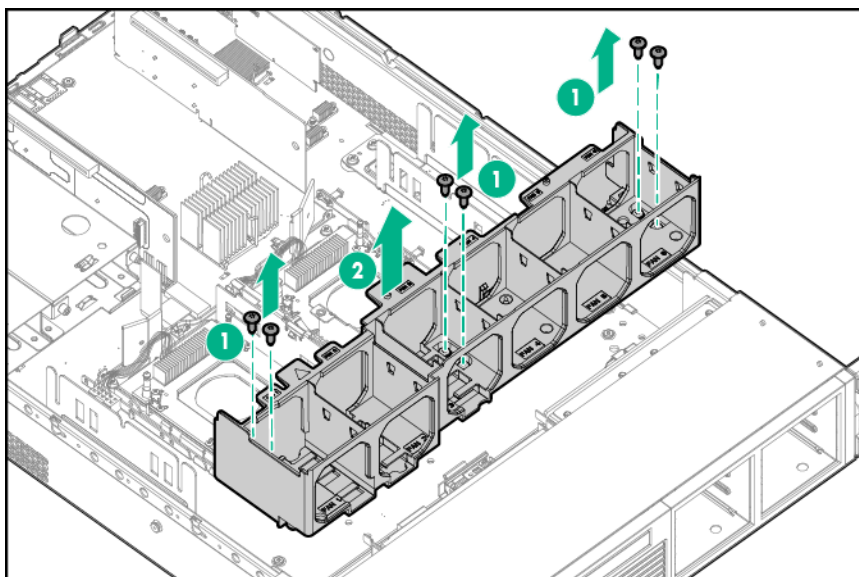
8. Remove all DIMMs risers (**Removing and replacing DIMMs**).
9. Remove all processor heat sink modules (**Removing and replacing a processor and heat sink module**).



IMPORTANT:

Place processor pin covers over the sockets to protect the pins.

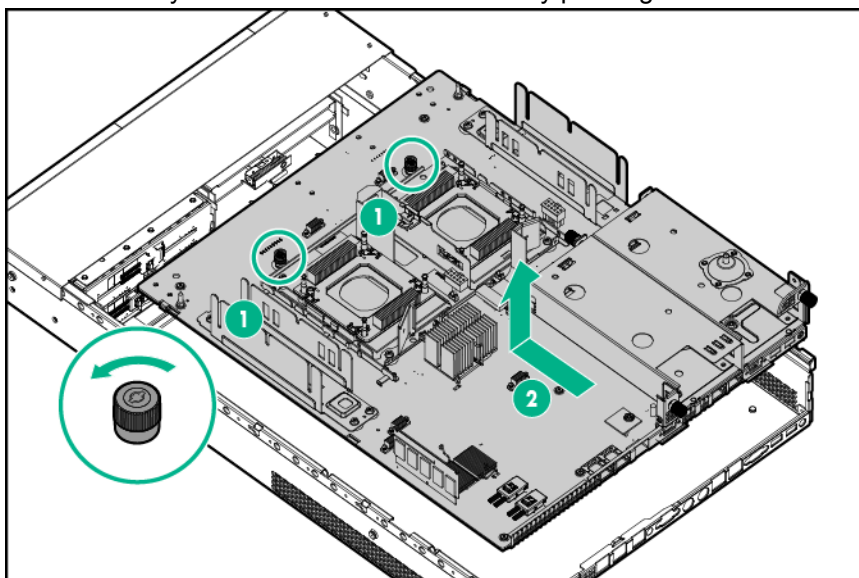
10. Remove the intrusion switch cable (**Removing and replacing the intrusion switch cable**).
11. Disconnect all cables connected to the system board.
12. Remove the hot-swap fans from the fan cage (**Removing and replacing a hot-swap power supply**).
13. Remove the fan cage.
14. Remove the SAS cache module (**Removing and replacing the cache module**).
15. Remove the super capacitor pack (**Removing and replacing the super capacitor pack**).
16. Remove the power supply backplane (**Removing and replacing the power supply backplane**).
17. Remove hex screws from the rear video connector and serial connector.



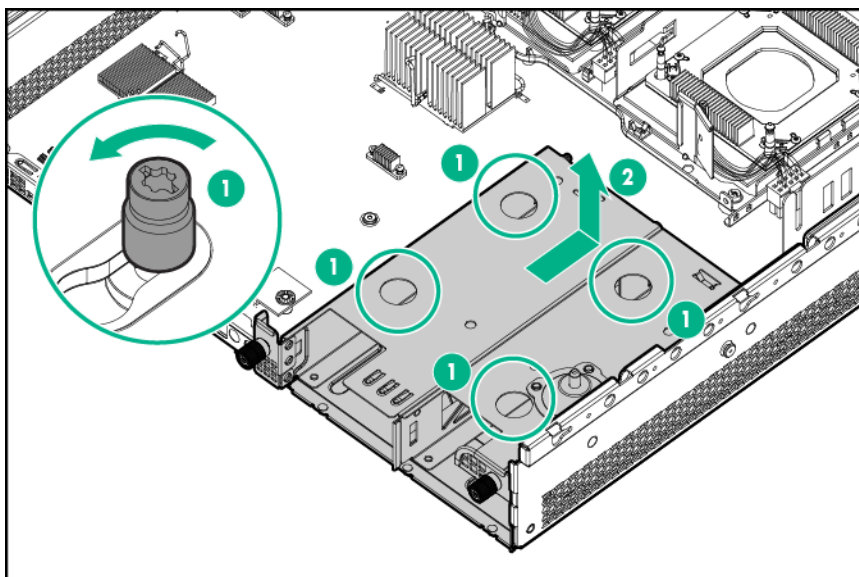
18. Remove the rear retaining screw.

19. Loosen the two system board thumbscrews.

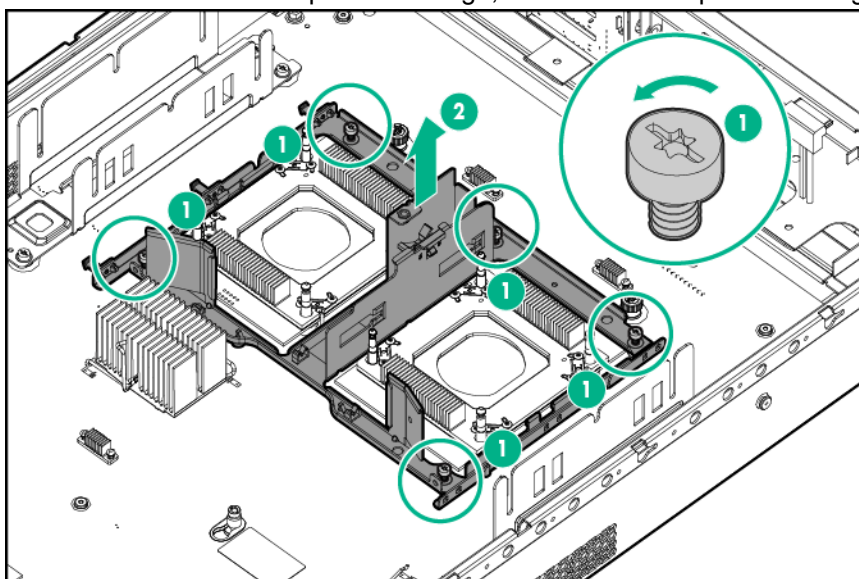
20. Remove the system board from the chassis by pushing it toward the front and then lifting it.



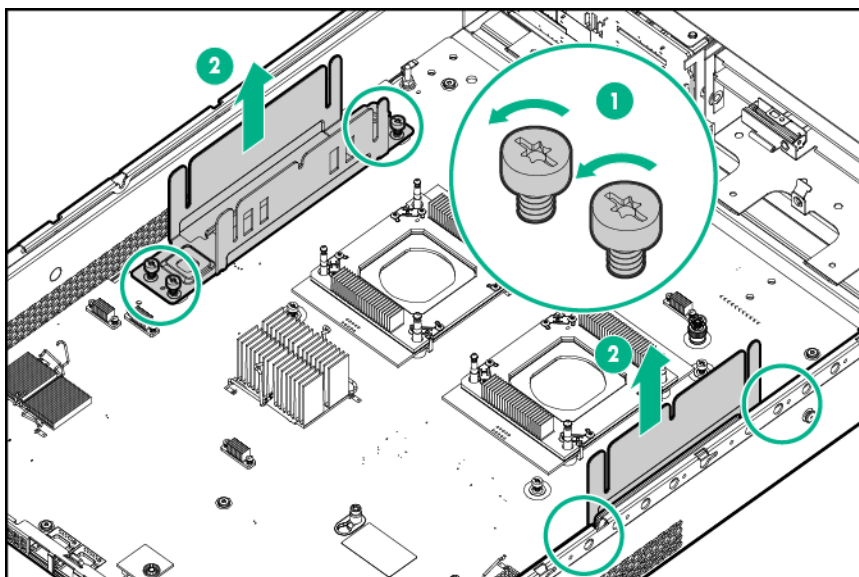
21. Remove four screws on the power supply cage, and remove power supply cage.



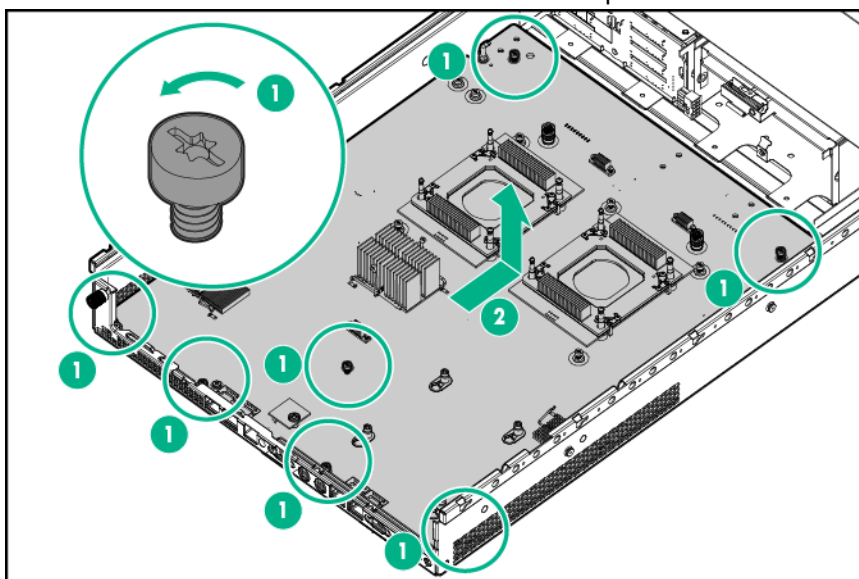
- 22.** Loosen the screws of the processor cage, and remove the processor cage.



- 23.** Remove the two memory riser assemblies.



24. Remove the seven screws on the main board to separate it from the sub pan.



To migrate the processor to the spare system board:

- Take the iLO label off the system board information label and place it over the iLO information pull tab on the front panel.
- Install the spare system board.

⚠ CAUTION:

The pins on the processor socket are very fragile. Any damage to them may require replacing the system board.

- Install the processors and heat sink or processor heat sink module on the system board (**Removing and replacing a processor and heat sink module**).
- Install all components removed from the failed system board.

⚠ CAUTION:

Do not replace hot-plug hard drives until you have configured the RAID controller as detailed below.

- Install the access panel (**Removing and replacing the access panel**).
 - Install the power supplies (**Removing and replacing a hot-swap power supply**).
 - Power up the server.
-

NOTE:

Install all components with the same configuration that was used on the failed system board.

⚠ CAUTION:

Replacement system boards are shipped with the RAID controller in HBA mode by default. When the original components are re-installed on the replacement board and the system is booted to UEFI, the `saupdate` utility must be used to re-enable the RAID configuration if the original server was using the RAID functionality. See **SAS disk setup** on page 172 for instructions on using the `saupdate` utility.

After you replace the system board, you must set the SAS mode to RAID if that was your previous configuration.

- During the server startup, wait for UEFI Front Page, and then press **S** to launch the UEFI Shell.
- Get the `saupdate.efi` utility tool.
- Enter `saupdate.efi set_mode 0:1:0:0 raid` to change the SAS mode to RAID.
- Enter `saupdate.efi get_mode 0:1:0:0` to verify the SAS mode is set to RAID.

After you replace the system board, you must port over the server serial number, product number and UUID. Labels on the server indicate these numbers.

- Log in to ILO 3 MP, by using SSH, for example.
 - Access the MP Main Menu.
-

NOTE:

Use **Ctrl-B** at any time to return to the main menu.

- Enter `CM` at the `hpiLO->` prompt.
A `CM:hpiLO->` prompt will appear.
- Enter `pc` at the `CM:hpiLO->` to get to the Power Control menu.
- Enter `sysset` at the `CM:hpiLO>` prompt, and it will show the system information.
- To change the serial number:
 - Enter `sysset -serial <serial number>` at the `CM:hpiLO->` prompt.
 - Enter the associated password, and press **Enter**.

- To change product number (default is for the data center server):
 - Enter **sysset -prodnum <product number>** at the **CM:hpiLO->** prompt.
 - Enter the associated password, and press **Enter**.
- To change the UUID:
 - Enter **sysset -uuid <uuid>** at the **MP:CM ->** prompt.
 - Enter the associated password and press **Enter**
- Reset iLO MP by entering **xd -r -nc** at the **CM:hpiLO->** prompt.

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Support and other resources

Accessing Hewlett Packard Enterprise Support

- For live assistance, go to the Contact Hewlett Packard Enterprise Worldwide website:
www.hpe.com/assistance
- To access documentation and support services, go to the Hewlett Packard Enterprise Support Center website:
www.hpe.com/support/hpesc

Information to collect

- Technical support registration number (if applicable)
- Product name, model or version, and serial number
- Operating system name and version
- Firmware version
- Error messages
- Product-specific reports and logs
- Add-on products or components
- Third-party products or components

Accessing updates

- Some software products provide a mechanism for accessing software updates through the product interface. Review your product documentation to identify the recommended software update method.
- To download product updates, go to either of the following:
 - Hewlett Packard Enterprise Support Center **Get connected with updates** page:
www.hpe.com/support/e-updates
 - Software Depot website:
www.hpe.com/support/softwaredepot
- To view and update your entitlements, and to link your contracts and warranties with your profile, go to the Hewlett Packard Enterprise Support Center **More Information on Access to Support Materials** page:
www.hpe.com/support/AccessToSupportMaterials

**IMPORTANT:**

Access to some updates might require product entitlement when accessed through the Hewlett Packard Enterprise Support Center. You must have an HP Passport set up with relevant entitlements.

Websites

Website	Link
Hewlett Packard Enterprise Information Library	www.hpe.com/info/enterprise/docs
Hewlett Packard Enterprise Support Center	www.hpe.com/support/hpesc
Contact Hewlett Packard Enterprise Worldwide	www.hpe.com/assistance
Subscription Service/Support Alerts	www.hpe.com/support/e-updates
Software Depot	www.hpe.com/support/softwaredepot
Customer Self Repair	www.hpe.com/support/selfrepair
Insight Remote Support	www.hpe.com/info/insightremotesupport/docs
Serviceguard Solutions for HP-UX	www.hpe.com/info/hpux-serviceguard-docs
Single Point of Connectivity Knowledge (SPOCK) Storage compatibility matrix	www.hpe.com/storage/spock
Storage white papers and analyst reports	www.hpe.com/storage/whitepapers

Customer self repair

Hewlett Packard Enterprise customer self repair (CSR) programs allow you to repair your product. If a CSR part needs to be replaced, it will be shipped directly to you so that you can install it at your convenience. Some parts do not qualify for CSR. Your Hewlett Packard Enterprise authorized service provider will determine whether a repair can be accomplished by CSR.

For more information about CSR, contact your local service provider or go to the CSR website:

www.hpe.com/support/selfrepair

Documentation feedback

Hewlett Packard Enterprise is committed to providing documentation that meets your needs. To help us improve the documentation, send any errors, suggestions, or comments to Documentation Feedback (docsfeedback@hpe.com). When submitting your feedback, include the document title, part number, edition, and publication date located on the front cover of the document. For online help content, include the product name, product version, help edition, and publication date located on the legal notices page.

Standard terms, abbreviations and acronyms

ACPI

Advanced Configuration and Power Interface.

BBWC

Battery Backed Write Cache.

CEC

Consumer Electronics Control. The CEC chipset allows multiple High-Definition Multimedia Interface (HDMI) devices to control each other and allows one remote-control device to control several pieces of equipment.

CMC

Corrected machine check.

Cold-swappable

A component that requires the operating system be shut down and the server powered off before it can be removed. Cold-swappable components are signified with blue touch points.

CPE

Corrected platform error.

CRU

Customer Replaceable Unit.

CSR

The `Control and Status Register` logs data about instructions received from various devices.

DHCP

Dynamic Host Configuration Protocol.

DDNS

Dynamic DNS.

DMA

Direct memory access.

ESD

Electrostatic discharge.

FBWC

Flash Backed Write Cache.

FRU

Field Replaceable Unit.

HDD

Hard disk drive.

Hot-pluggable

A component that can be removed from the server while the server remains operational, but software intervention is required prior to removing the component. Hot-pluggable components are signified with red touch points.

Hot-swappable

A component that can be removed from the server while the server remains operational and requires no software intervention prior to removing the component. Hot-swappable components are signified with red touch points.

ILO 3

Integrated Lights Out 3.

LOM

LAN-on-motherboard.

MAC

Media Access Control.

PAL

Processor Abstraction Layer.

PDT

Page deallocation table.

PE

Protective earthing.

RDIMM

Registered DIMM.

SAL

System Abstraction Layer.

SAS

Serial-attached SCSI.

SEL

System event log.

SFF

Small form factor.

SID

System Insight Display.

SFW

System firmware.

UEFI

Unified Extensible Firmware Interface.

UDIMM

Unbuffered DIMM.

UID

Unit identification.

WBEM

Web-Based Enterprise Management.

RAID configuration and other utilities

SAS disk setup

Using the `saupdate` command

The `saupdate` command is used to query or change the mode of the Smart Array P410i and Smart Array P411 controllers to HBA or RAID. Querying or changing modes is not supported for other controllers.

The newly added commands to SAUPDATE are:

- Get Mode
- Set Mode

Get mode

This command displays the current mode of the controllers.

Syntax

```
saupdate get_mode <controller>
```

<controller> can be any one of the following strings.

Table 45: <controller> strings

<controller>	Meaning
<seg:bus:dev:func>	A controller having the PCI segment id, bus id, device id and function id is addressed
all	Addresses all controllers in the system
<model>	Controllers of a particular type indicated by the <model> string are addressed

```

fs0:\> saupdate get_mode 0:1:0:0

The controller at 0:1:0:0 is in RAID mode

fs0:\> saupdate get_mode p410i

The controller at 0:1:0:0 is in RAID mode

fs0:\> saupdate get_mode all

The controller at 0:1:0:0 is in RAID mode

The controller at 0:9:0:0 is in RAID mode

fs0:\> █

```

Figure 41: saupdate get_mode

Set mode



IMPORTANT:

If you are using HBA mode, do not install any disk that has previously been a part of a RAID volume into the system.

Set mode is used to change the mode of the controller. If the controller is already in the required mode the following message appears:

```
The controller at seg:bus:dev:func is already in HBA|RAID mode.
```

Syntax

```
saupdate set mode <controller> <hba | raid> [-f]
```

<controller> can be any one of the strings listed in [<controller> strings](#).

An alert message about the possible data loss is displayed when a mode change command is issued. A confirmation is required before the actual mode change is made. This ensures unintentional change of mode does not happen.

```

fs4:\sas578> saupdate set_mode p410i raid

WARNING:Changing controller mode could result in DATA LOSS!!!
Key in 'YES' to continue or 'NO' to quit:yes

Changing mode of the controller at 0:1:0:0 to RAID
Resetting and reinitializing controller,it may take several minutes
Controller mode change successful

fs4:\sas578> █

```

Figure 42: Controller mode change alert message

The -f option indicates the user is aware of the changes that are being made and does not require a warning message or a confirmation regarding the mode change.

```

fs0:\> saupdate set_mode all hba -f

Changing mode of the controller at 0:1:0:0 to HBA
Resetting and reinitializing controller,it may take several minutes
Controller mode change successful

Changing mode of the controller at 0:9:0:0 to HBA
Resetting and reinitializing controller,it may take several minutes
Controller mode change successful

fs0:\>

```

Figure 43: saupdate set_mode



IMPORTANT:

After changing the mode, perform a `reconnect -r` command at UEFI.

NOTE:

Commands are not case-sensitive.

Updating the firmware using saupdate

Procedure

1. Download the firmware image file into the system UEFI partition.
2. Boot the system to the UEFI Shell and change directories to the UEFI partition.
3. Use the `saupdate list` to display all detected Smart Array controllers along with the active firmware versions, the identification information from this list is used to designate which controller is to be updated.
4. Use `saupdate update <seg:bus:dev:func:index> <firmware image>` to update the firmware.
5. Restart the system.

To query the current mode of the controller use `saupdate get_mode <controller>`. The `<controller>` could be any one of the strings:

- `<seg:bus:dev:func>`
A controller having the PCI segment id, bus id, device id and function id is addressed
- `all`
Addresses all controllers in the system
- `<model>`
Controllers of a particular type indicated by the `<model>` string are addressed.

To change the mode of the controller use `saupdate set_mode <controller> <hba | raid> [-f]`.

NOTE:

A system reset or a

`reconnect-r`

is required after changing from HBA to RAID mode.

An alert message about the possible data loss is displayed when a mode change command is issued. A confirmation is required before the actual mode change is made. This ensures unintentional change of mode does not happen.

The `-f` option indicates the user is aware of the changes that are being made and does not require a warning message or a confirmation regarding the mode change.

NOTE:

Commands are not case-sensitive. A system reset or

`reconnect-r`

followed by

`map -r`

is required when changing from HBA mode to RAID mode.

Determining the Driver ID and CTRL ID

Use the `drvcfg` utility and UEFI shell commands to find the Driver ID corresponding Ctrl ID for the SAS Host Bus Adapter.

Procedure

1. At the UEFI shell, use the `drivers` command.
2. Find the SAS Host Bus Adapter in the list of drivers, and make a note of the Driver ID from the left column.
3. Use the `drvcfg` command.
4. Find the SAS Host Bus Adapter's Driver ID in the list, and make a note of the corresponding Ctrl ID.

Using the ORCA menu-driven interface

From the UEFI Shell, enter `drvcfg -s <Driver ID> <Ctrl ID>`. The ORCA main menu appears. ORCA Main Menu

```
Option Rom Configuration for Arrays, version 3.28
Copyright 2009 Hewlett-Packard Development Company, L.P.
Controller: HP Smart Array P410i

+-----Main Menu-----+
| Create Logical Drive    |
| View Logical Drive     |
| Delete Logical Drive   |
| Manage License Keys    |
+-----+

<Enter> to create a new logical drive
<UP/DOWN ARROW> to select main menu option; <ESC> to exit
```

The ORCA main menu contains the following options:

- Create Logical Drive
- View Logical Drive
- Delete Logical Drive
- Manage License Keys

Creating a logical drive

Procedure

1. At the ORCA main menu, select Create Logical Drive.
2. Select the physical disks to be included in the logical drive in the Available Physical Drives section.
3. To select the Raid Configurations section and select the RAID type for the logical drive, press **Tab**.
4. To select the Spare section and assign spare disks, as needed, press **Tab**.
5. To create the logical drive, press **Enter**. A summary of your choices appears.
6. To save the configuration, press **F8**.
7. If the function keys are disabled, press **Esc** and then press **8**.
8. To acknowledge that the configuration was saved and return to the ORCA Main Menu, press **Enter**.

Deleting a logical drive



WARNING:

Back up all necessary data before deleting the logical drive. When you delete a logical drive, data on the drive is not preserved.

Procedure

1. At the ORCA main menu, select **Delete Logical Drive**.
2. Select a logical drive to be deleted.

3. Press **F3** to delete the logical drive.
4. If the function keys are disabled, press **Esc** and then press **3**.
5. To acknowledge that the configuration was saved and return to the ORCA Main Menu, press **Enter**.

Adding a RAID Advanced Pack license key

Procedure

1. At the ORCA main menu, select **Manage License Keys**.

```
Option Rom Configuration for Arrays, version 3.28
Copyright 2009 Hewlett-Packard Development Company, L.P.
Controller: HP Smart Array P410i

+-----Main Menu-----+
| Create Logical Drive   |
| View Logical Drive    |
| Delete Logical Drive   |
| Manage License Keys    |
+-----+

<Enter> to manage license keys
<UP/DOWN ARROW> to select main menu option; <ESC> to exit
```

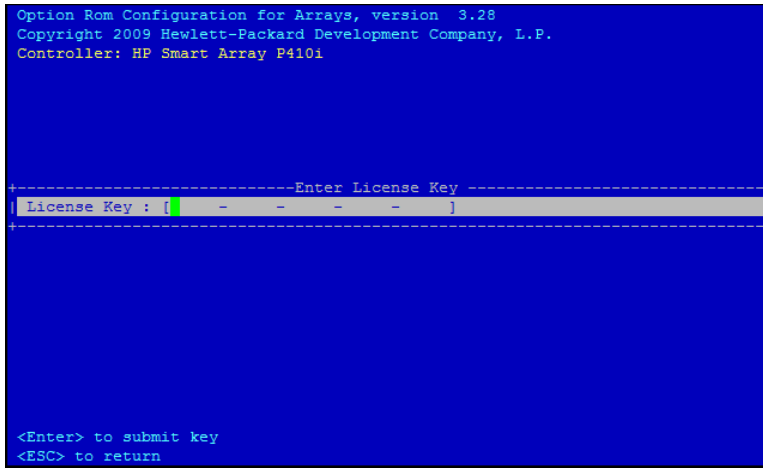
2. Select **Add License Key**.

```
Option Rom Configuration for Arrays, version 3.28
Copyright 2009 Hewlett-Packard Development Company, L.P.
Controller: HP Smart Array P410i

+-----License Key Menu-----+
| Add License Key        |
| View License Key(s)    |
| Delete License Key(s)  |
+-----+

<Enter> to add a new license key
<UP/DOWN ARROW> to select option; <ESC> to go back to main menu
```

3. Enter the license key and press **Enter**.



4. Verify your license key. See [Viewing RAID advanced pack license keys](#) on page 178.

Viewing RAID advanced pack license keys

Procedure

1. At the ORCA main menu, select **Manage License Keys**.
2. Select **View License Key(s)**.
3. All advanced pack license keys are displayed. Press **Esc** to return to the License Keys Menu.

UEFI

UEFI is an OS and platform-independent boot and preboot interface. UEFI resides between the OS and platform firmware, enabling the OS to boot without having details about the underlying hardware and firmware. UEFI supports boot devices, uses a flat memory model, and hides platform and firmware details from the OS.

NOTE:

Unified UEFI Forum, Inc. defines the specification used to implement UEFI. POSSE is an HPE extension to UEFI, which provides a common user interface architecture to better serve Hewlett Packard Enterprise customers, service, and manufacturing.

UEFI consolidates boot utilities similar to those found in PA-RISC based servers, such as the BCH, and platform firmware into a single platform firmware. UEFI enables the selection of any UEFI OS loader from any boot medium that is supported by UEFI boot services. An UEFI OS loader supports multiple options on the user interface.

UEFI supports booting from media that contain an UEFI OS loader or an UEFI-defined server partition. An UEFI-defined system partition is required by UEFI to boot from a block device.

The UEFI boot manager loads UEFI applications (including the OS first stage loader) and UEFI drivers from an UEFI-defined file system or image loading service. NVRAM variables point to the file to be loaded. These variables contain application-specific data that is passed directly to the UEFI application. UEFI variables provides system firmware a boot menu that points to all the operating systems, even multiple versions of the same operating systems.

The UEFI boot manager enables you to control the server booting environment. Depending on how you have configured the boot options, after the server is powered up the boot manager presents you with different ways to bring up the server. For example, you can boot to the UEFI shell, to an operating system

located on the network or residing on media in the server, or the Boot Maintenance Manager. For more information, see [Using the boot maintenance manager](#) on page 183.

UEFI shell and HPE POSSE commands

For details on these commands, enter `help command` at the UEFI Shell prompt.

Table 46: UEFI shell commands

UEFI shell command	Definition
?	Displays the UEFI Shell command list or verbose command help
alias	Displays, creates, or deletes UEFI Shell aliases
attrib	Displays or changes the attributes of files or directories
autoboot	Set/View autoboot timeout and retries
bcfg	Display/Modify the driver/boot configuration
boottest	Turn specific speedyboot bits on or off
cd	Displays or changes the current directory
cls	Clears standard output and optionally changes background color
comp	Compares the contents of two files
conconfig	Configure consoles and set/view primary operating system console
connect	Connects one or more UEFI drivers to a device
cp	Copies one or more files or directories to another location
cpuconfig	Deconfigure/Reconfigure processor sockets and threads
date	Displays or changes the current system date
dblk	Displays one or more blocks from a block device
dbprofile	Manage direct boot profiles
default	Set default values
devices	Displays the list of devices managed by UEFI drivers
devtree	Displays the UEFI Driver Model compliant device tree
dh	Displays UEFI handle information

Table Continued

UEFI shell command	Definition
disconnect	Disconnects one or more UEFI drivers from a device
dmem	Displays the contents of memory
dmpstore	Displays, stores, and restores all UEFI NVRAM variables
drivers	Displays the UEFI driver list
drvcfg	Invokes the Driver Configuration Protocol
drvdiag	Invokes the Driver Diagnostics Protocol
echo	Controls batch file command echoing or displays a message
edit	Full screen editor for ASCII or UNICODE files
eficompress	Compress a file
efidecompress	Decompress a file
errdump	View/Clear logs
exit	Exits the UEFI Shell environment
for	Executes commands for each item in a set of items
ftp	Perform FTP operation
goto	Forces batch file execution to jump to specified location
guid	Displays all registered UEFI GUIDs
help	Displays the UEFI Shell command list or verbose command help
hexedit	Full screen hex editor
if	Executes commands in specified conditions
ifconfig	Modify the default IP address of UEFI network stack
info	Display hardware information
input	Take user input and place in UEFI variable
ioconfig	Deconfigure/Reconfigure IO components or settings
lanaddress	Display LAN devices
lanboot	LAN boot

Table Continued

UEFI shell command	Definition
load	Loads and optionally connects one or more UEFI drivers
loadpcirom	Loads a PCI Option ROM
ls	Displays a list of files and subdirectories in a directory
map	Displays or defines mappings
memconfig	Set/View memory configuration settings
memmap	Displays the memory map
mkdir	Creates one or more directories
mm	Displays or modifies MEM/MMIO/IO/PCI/PCIE address space
mode	Displays or changes the console output device mode
mount	Mounts a file system on a block device
mv	one or more files or directories to another location
openinfo	Displays the protocols and agents associated with a handle
palproc	Make a PAL procedure call
pause	Prints a message and waits for keyboard input
pci	Displays PCI device list or PCI function configuration space
ping	Ping a target machine with UEFI network stack
reconnect	Reconnects one or more UEFI drivers to a device
reset	Resets the system
rm	Deletes one or more files or directories
salproc	Make a SAL procedure call
search	Connect drivers for bootable devices
secconfig	View/configure system security features
sermode	Sets serial port attributes
set	Displays or modifies UEFI Shell environment variables
setsize	Set the size of a file

Table Continued

UEFI shell command	Definition
shift	Shifts batch file input parameter positions
smbiosview	Displays SMBIOS information
stall	Stalls the processor for the specified number of microseconds
tapeboot	Boot from tape
tftp	Perform TFTP operation
time	Displays or changes the current system time
timezone	Displays or sets time zone information
touch	Updates filename timestamp with current system date and time
type	Displays file contents
unload	Unloads a UEFI driver
ver	Displays UEFI Firmware version information
vol	Displays or changes a file system volume label
xchar	Turn on/off extended character features

Drive paths in UEFI

Devices in the server are represented by device paths in the UEFI shell. Each internal SAS drive could be configured either as:

- RAID mode
- HBA (raw) mode

NOTE:

A SAS drive in RAID mode is identified by "Scsi" in the device path A SAS drive in HBA mode is identified by "SAS" in the device path.

NOTE:

Unlike parallel SCSI, you cannot correlate UEFI device paths to internal SAS disk drive bays with SAS regardless of RAID/HBA mode. The UEFI device paths currently do not contain any information that could be used to determine the physical location of the drives.

Device	Path format	Path example
PCIe root bridge device path node	UID	<pre>PcieRoot (0x30304352) /Pci (0x2,0x0) / Pci (0x0,0x0) /Scsi (0x0,0x0)</pre> <p>(RAID mode)</p> <pre>PcieRoot (0x30304352) /Pci (0x2,0x0) / Pci (0x0,0x0) / SAS (0x5000C500037688B9,0x0,0x1,NoTopology, 0,0,0,0x0)</pre> <p>(HBA mode)</p>
Hard drive partition device path	HD (Partition,Type,Signature)	<pre>PcieRoot (0x30304352) /Pci (0x2,0x0) / Pci (0x0,0x0) / Scsi (0x0,0x0) /HD (1,GPT,27C34F01-9F1E-11DE-A0BB-AA000400FEFF)</pre> <p>(RAID mode)</p> <pre>PcieRoot (0x30304352) /Pci (0x2,0x0) / Pci (0x0,0x0) / SAS (0x5000C500037688B9,0x0,0x1,NoTopology,0,0,0, 0x0)) /HD (1,GPT,27C34F01-9F1E-11DE-A0BB-AA000400FEFF)</pre> <p>(HBA mode)</p>
CD-ROM / DVD-ROM partition device path	CDROM(Entry)	<pre>PcieRoot (0x30304352) /Pci (0x1D,0x7) / USB (0x3,0x0) /CDROM (0x1)</pre>

NOTE:

Everything after "Scsi" or "SAS" in the output can vary because each SAS drive/partition is unique

Using the boot maintenance manager

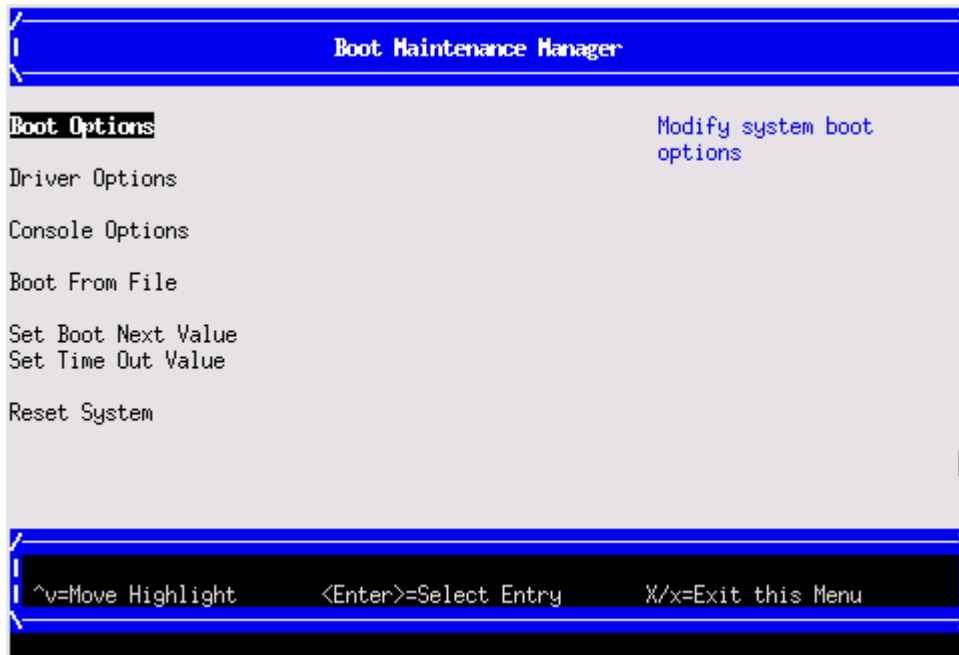
This menu enables you to change various boot options. The Boot Maintenance Manager Contains the following submenus:

- Boot Options
- Driver Options
- Console Options
- Boot From File
- Set Boot Next Value

- Set Time Out Value
- Reset System

NOTE:

Use the `dmpstore` command to back up these settings.



Boot options

The Boot Options menu contains the following options:

- Add Boot Option
- Delete Boot Option
- Change Boot Order



Add boot option

Use this option to add items to the Boot Options list.

To add a boot option:

Procedure

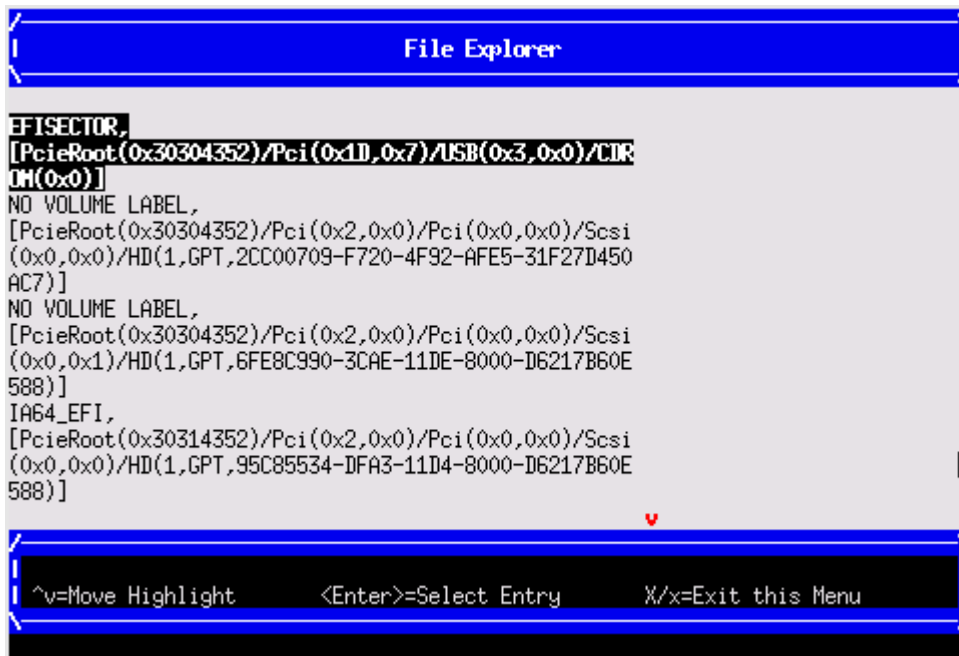
1. Select a boot device type.



2. Use the File Explorer menu to locate the correct boot device.

NOTE:

File Explorer loads with the appropriate devices for the selected boot device.



Delete boot option

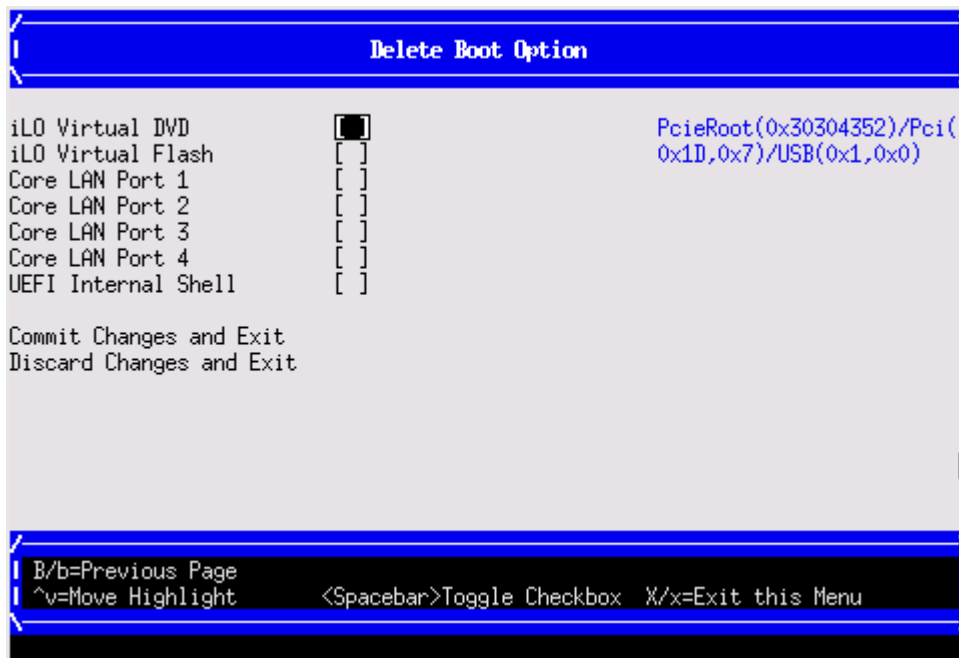
Use this option to remove boot options from the Boot Options list.

NOTE:

This does not delete any files, applications or drivers from your server.

To remove items from the boot list:

Procedure



1. Press **spacebar** to toggle the checkbox for each boot options that you want to delete.
2. Select **Commit Changes and Exit** to save the new settings and return to the Boot Maintenance Manager.

Change boot order

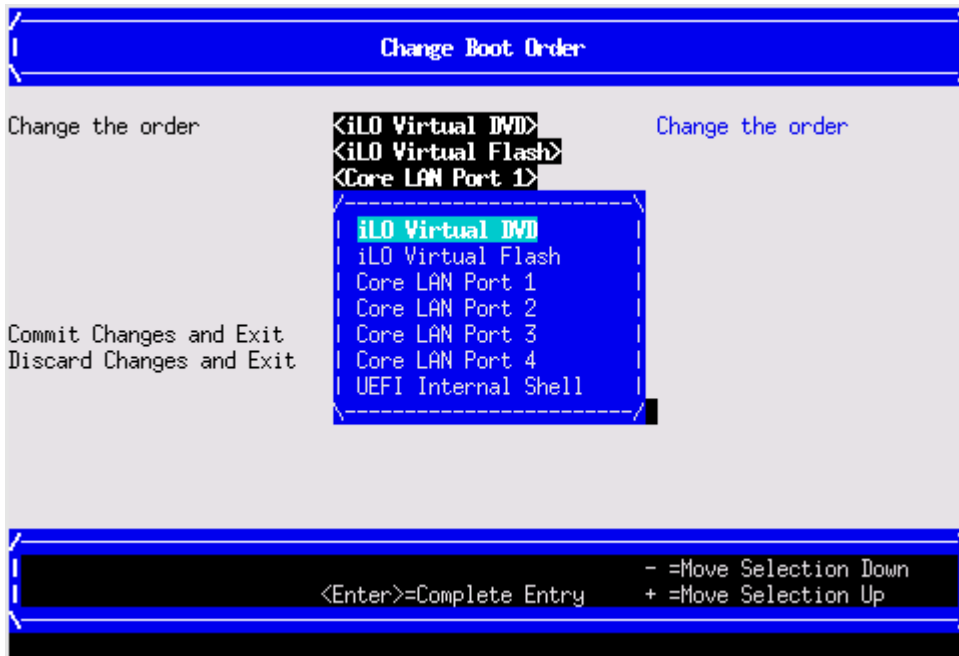
Use this option to change the order of boot options. If the first boot option fails, the server tries booting the second, then the third, and so forth, until a boot option succeeds or until all options have failed.

For example, if you normally boot using a configuration on your LAN but would like to boot from a local hard drive if the LAN is unavailable, move the LAN boot option to the top of the list, followed by the hard drive boot option.

To change the boot order:

Procedure

1. Select an item on the boot order list.
2. Using the **+** and **-** keys, move the selection to the desired position in the book order list.



3. Press **Enter** when the item is in the desired position.
4. Select **Commit Changes and Exit** to save the new settings and return to the Boot Maintenance Manager.

Driver options

The Driver Options menu contains the following options:

- Add Driver Option
- Delete Driver Option
- Change Driver Order



Add driver option

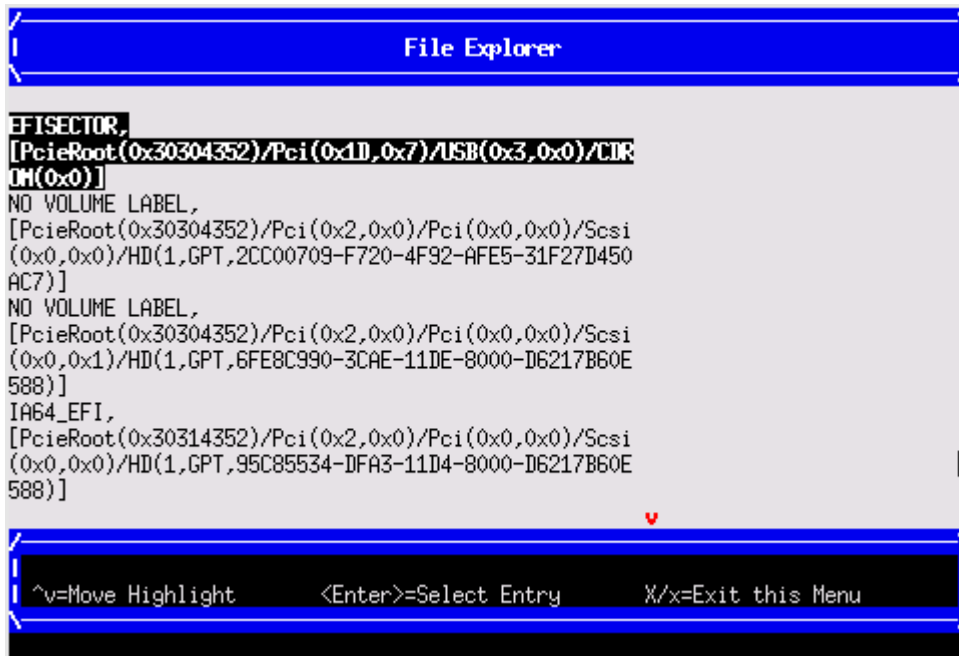
Use this option to add driver options.

Procedure

1. Select **Add Driver Using File**.



2. Use the File Explorer menu to locate the correct driver.



Delete driver option

Use this option to remove driver options.

NOTE:

This does not delete any files, applications or drivers from your server.

To remove driver options:

Procedure

1. Press **spacebar** to toggle the checkbox for each driver that you want to delete.
2. Select **Commit Changes and Exit** to save the new settings and return to the Boot Maintenance Manager.

Change driver order

Use this option to change the load order of driver options.

To change the driver load order:

Procedure

1. Select an item on the driver list.
2. Using the **+** and **-** keys, move the selection to the desired position in the book order list.
3. Press **Enter** when the item is in the desired position.
4. Select **Commit Changes and Exit** to save the new settings and return to the Boot Maintenance Manager.

Console options

The Console Options menu is not currently supported. Use the `conconfig` command from the UEFI Shell to set console options.

Boot from file

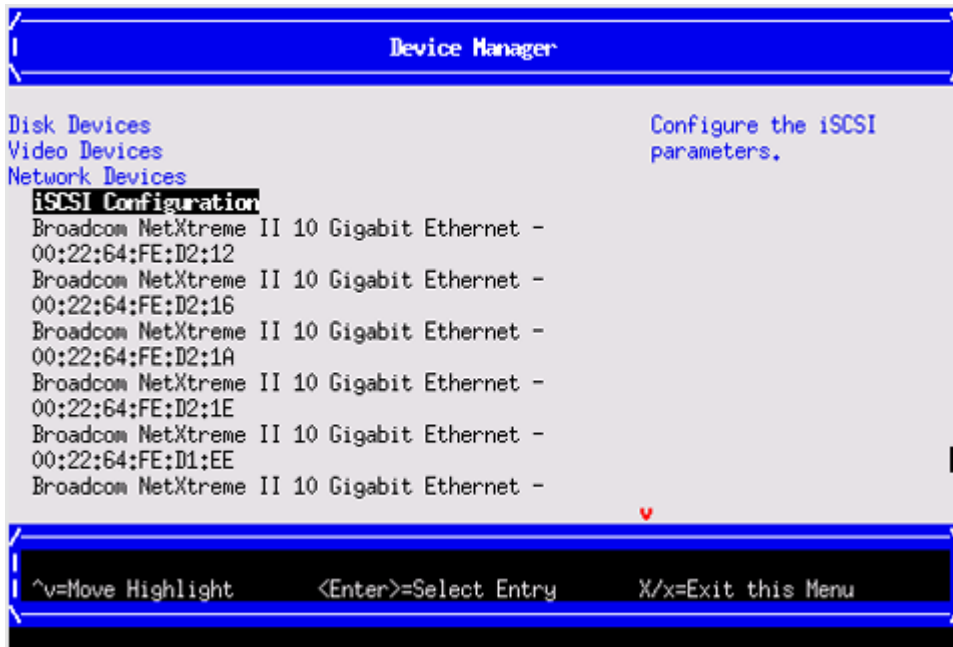
Use this option to manually run a specific application or driver.

NOTE:

This option boots the selected application or driver one time only. When you exit the application, you return to this menu.

Procedure

1. Select a boot device type.



2. Use the File Explorer menu to locate the correct driver or file.

Set boot next value

Use this option to run the selected boot option immediately upon entering the main Boot Manager menu. This option is useful for booting an option that only needs to be booted once, without changing any other setting in the main Boot Manager menu. This is a one-time operation and does not change the permanent server boot settings.



Set time out value

Use this option to set the amount of time the server pauses before attempting to launch the first item in the Boot Options list.

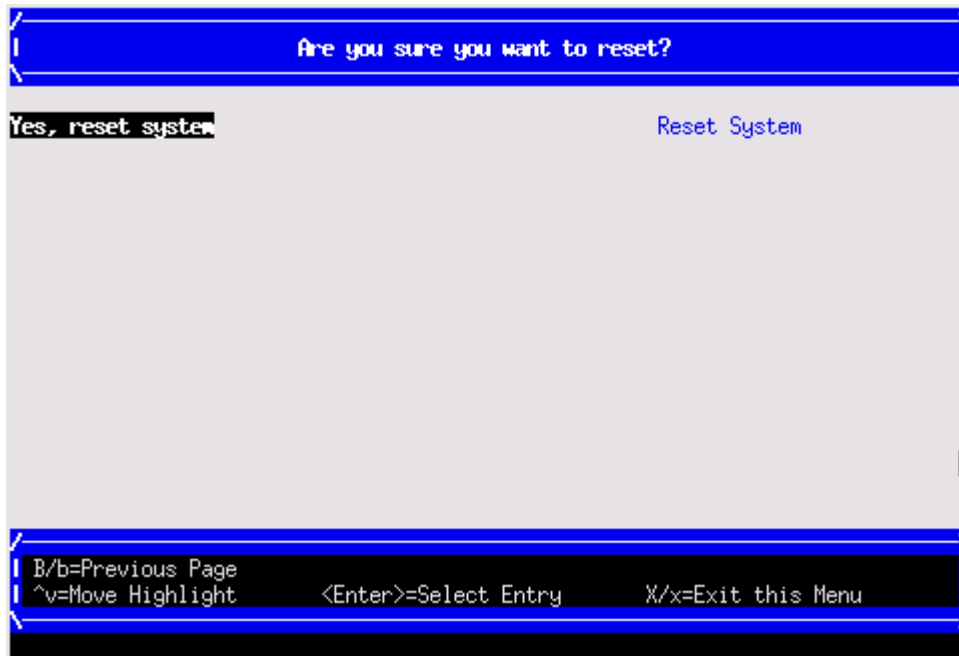
Interrupting the timeout during the countdown stops the Boot Manager from loading any boot options automatically. If there is no countdown, boot options must be selected manually.

To set the auto boot timeout value, in seconds, select Set Timeout Value and enter the desired value.



Reset system

Use this option to perform a system reset.



iLO MP

The iLO MP is an independent support system for the server. It provides a way for you to connect to a server and perform administration or monitoring tasks for the server hardware.

The iLO MP controls power, reset, ToC capabilities, provides console access, displays and records system events, and displays detailed information about the various internal subsystems. The iLO MP also provides a virtual front panel used to monitor server status and the state of front panel LEDs. All iLO MP functions are available through the LAN and the local RS-232 port.

The iLO MP is available whenever the server is connected to a power source, even if the server main power switch is off.

Access to the iLO MP can be restricted by user accounts. User accounts are password protected and provide a specific level of access to the server and MP commands.

For more information regarding the iLO MP, see the *HPE Integrity iLO 3 Operations Guide*.

http://www.hpe.com/info/integrity_servers-docs

Regulatory information

For important safety, environmental, and regulatory information, see Safety and Compliance Information for Server, Storage, Power, Networking, and Rack Products, available at www.hpe.com/support/Safety-Compliance-EnterpriseProducts.

Turkey RoHS material content declaration

Türkiye Cumhuriyeti: EEE Yönetmeliğine Uygundur

Ukraine RoHS material content declaration

Обладнання відповідає вимогам Технічного регламенту щодо обмеження використання деяких небезпечних речовин в електричному та електронному обладнанні, затвердженого постановою Кабінету Міністрів України від 3 грудня 2008 № 1057

Warranty information

HPE ProLiant and X86 Servers and Options

www.hpe.com/support/ProLiantServers-Warranties

HPE Enterprise Servers

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