HP DL380z Gen8 Virtual Workstation

User Guide

Table of contents

1   Abstract

This document is for the person who installs, administers, and troubleshoots servers and storage systems. HP assumes you are qualified in the servicing of computer equipment and trained in recognizing hazards in products with hazardous energy levels.

While some of the documentation that supports this product contains the HP Proliant and the DL380p Gen8 Server product names, most of the information in those documents is relevant to this workstation product. Since this product is supported on VMware and Citrix operating systems only, information specific to Microsoft Windows and Linux may not apply.

2 Component identification

Front panel components
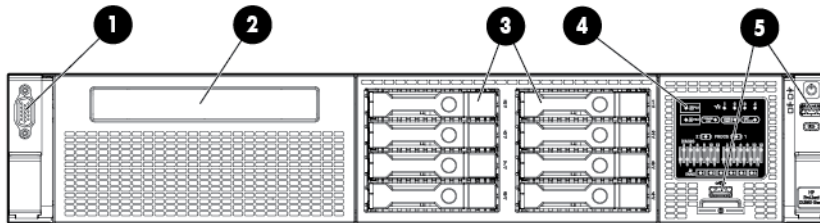
Item	Description
1	Video connector
2	SATA optical drive bay
3	Drive bays
4	Systems Insight Display
5	USB connectors (2)

Front panel LEDs and buttons
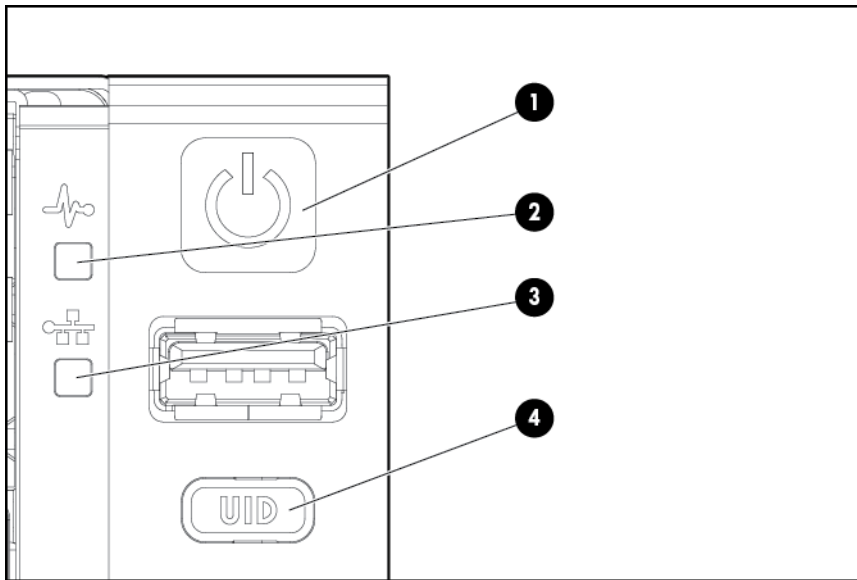
Item	Description	Status
1	Power On/Standby button and system power LED	Solid green = System on
		Flashing green (1 Hz/cycle per sec) = Performing power on sequence
		Solid amber = System in standby
		Off = No power present*
2	Health LED	Solid green = Normal
		Flashing amber = System degraded
		Flashing red (1 Hz/cycle per sec) = System critical
		Fast-flashing red (4 Hz/cycles per sec) = Power fault**
3	NIC status LED	Solid green = Link to network
		Flashing green (1 Hz/cycle per sec) = Network active
		Off = No network activity
4	UID button/LED	Solid blue = Activated
		Flashing blue (1 Hz/cycle per sec) = Remote management or firmware upgrade in progress
		Off = Deactivated

*Facility power is not present, power cord is not attached, no power supplies are installed, power supply failure has occurred, or the power button cable is disconnected.

**To identify components in a degraded or critical state, see the Systems Insight Display LEDs, check iLO/BIOS logs, and reference the server troubleshooting guide.

Access the Systems Insight Display

To access a pop-out HP Systems Insight Display:

1. Press and release the panel.

2. After the display fully ejects, rotate the display downward to view the LEDs.
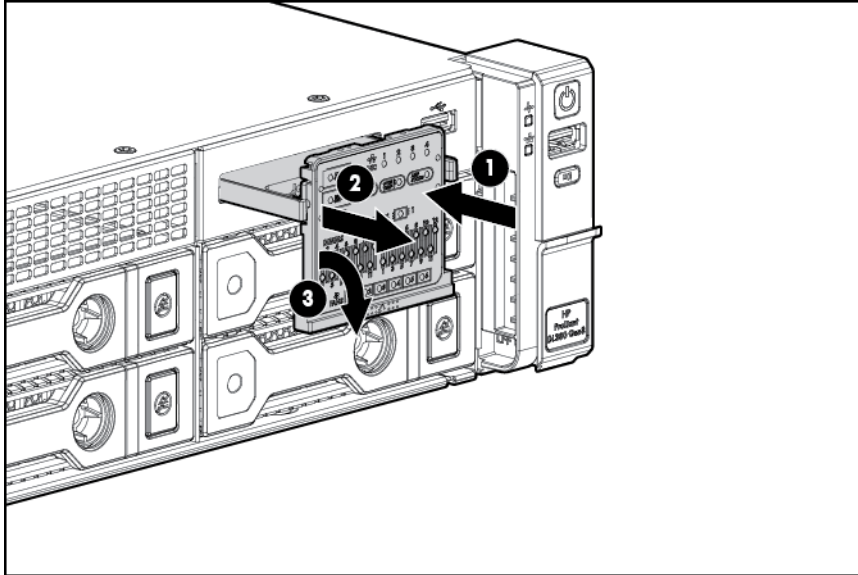
Systems Insight Display LEDs

The HP Systems Insight Display LEDs represent the system board layout. The display enables diagnosis with the access panel installed.
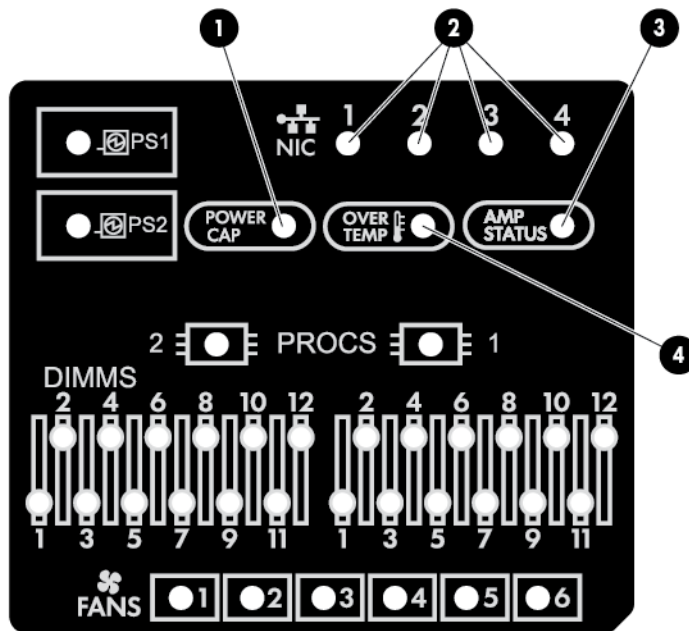
Item	Description	Status
1	Power cap	Off = System is in standby, or no cap is set.
		Solid green = Power cap applied
2	NIC link/activity	Off = No link to network. If the power is off, view the rear panel RJ-45 LEDs for status ("Rear panel LEDs and buttons on page 8).
		Flashing green = Network link and activity
		Solid green = Network link
3	AMP status	Off = AMP modes disabled
		Solid green = AMP mode enabled
		Solid amber = Failover
		Flashing amber = Invalid configuration
4	Over temp	Off = Normal
		Solid amber = High system temperature detected
—	All other LEDs	Off = Normal
		Amber = Failure
		For more information on the activation of these LEDs, see "Systems Insight Display LED combinations on page 5."

Systems Insight Display LED combinations

When the health LED on the front panel illuminates either amber or red, the server is experiencing a health event. Combinations of illuminated Systems Insight Display LEDs, the system power LED, and the health LED indicate system status.

Systems Insight Display LED and color	Health LED	System power LED	Status
Processor (amber)	Red	Amber	One or more of the following conditions may exist: ● Processor in socket X has failed. ● Processor X is not installed in the socket. ● Processor X is unsupported. ● ROM detects a failed processor during POST.
Processor (amber)	Amber	Green	Processor in socket X is in a pre-failure condition.
DIMM (amber)	Red	Green	One or more DIMMs have failed.
DIMM (amber)	Amber	Green	DIMM in slot X is in a pre-failure condition.

Systems Insight Display LED and color	Health LED	System power LED	Status
Over temp (amber)	Amber	Green	The Health Driver has detected a cautionary temperature level.
Over temp (amber)	Red	Amber	The server has detected a hardware critical temperature level.
PCI riser (amber)	Red	Green	The PCI riser cage is not seated properly.
Fan (amber)	Amber	Green	One fan has failed or has been removed.
Fan (amber)	Red	Green	Two or more fans have failed or been removed.
Power supply (amber)	Red	Amber	One or more of the following conditions may exist: ● Only one power supply is installed and that power supply is in standby. ● Power supply fault ● System board fault
Power supply (amber)	Amber	Green	One or more of the following conditions may exist: ● Redundant power supply is installed and only one power supply is functional. ● AC power cord is not plugged into redundant power supply. ● Redundant power supply fault ● Power supply mismatch at POST or power supply mismatch through hot-plug addition
Power cap (off)	—	Amber	Standby
Power cap (green)	—	Flashing green	Waiting for power
Power cap (green)	—	Green	Power is available.
Power cap (flashing amber)	—	Amber	Power is not available.

☑ **IMPORTANT:** If more than one DIMM slot LED is illuminated, further troubleshooting is required. Test each bank of DIMMs by removing all other DIMMs. Isolate the failed DIMM by replacing each DIMM in a bank with a known working DIMM.

Rear panel components
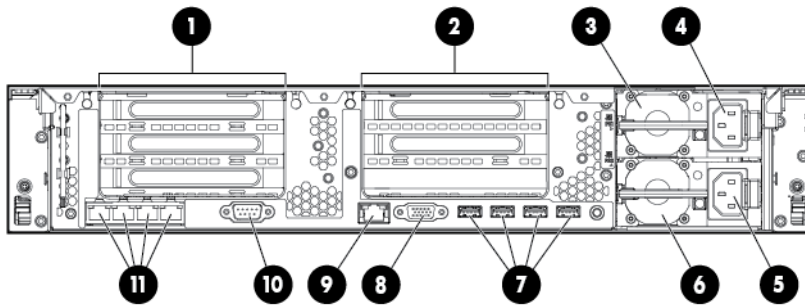
Item	Description
1	PCIe slots 2–3 (top to bottom)
2	PCIe slots 4–5 (top to bottom)
3	Power supply 1 (PS1)
4	PS1 power connector
5	PS2 power connector
6	Power supply 2 (PS2)
7	USB connectors (4)
8	Video connector
9	iLO connector
10	Serial connector
11	FlexibleLOM ports (Shown: 4 x 1 Gb/Optional: 2 x 10 Gb); port 1 on right side

Rear panel LEDs and buttons
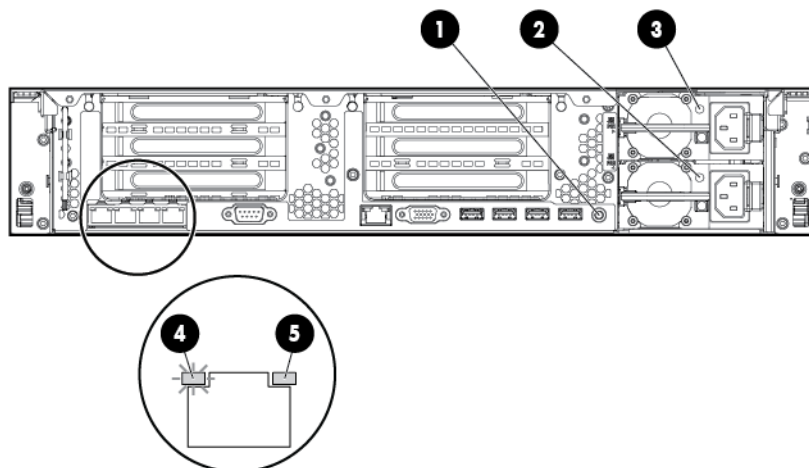
Item	Description	Status
1	UID LED/button	Off = Deactivated
		Solid blue = Activated
		Flashing blue = System being managed remotely
2	Power supply 2 LED	Off = System is off or power supply has failed.
		Solid green = Normal
3	Power supply 1 LED	Off = System is off or power supply has failed.
		Solid green = Normal
4	NIC link LED	Off = No network link
		Green = Network link
5	NIC activity LED	Off = No network activity
		Solid green = Link to network
		Flashing green = Network activity

Non-hot-plug PCI riser board slot definitions

PCIe slot descriptions	
Primary riser connector - connected to processor 1 or southbridge	
1 - FL/FH	—
2 - HL/FH	PCIe2 or PCIe3 x16 (16, 8, 4, 2, 1)
3 - HL/FH	PCIe2 x8 (4, 2, 1)*

Secondary riser connector - connected to processor 2 (processor 2 must be installed)	
4 - FL/FH	PCIe2 or PCIe3 x16 (16, 8, 4, 2, 1)
5 - HL/FH	PCIe2 or PCIe3 x16 (16, 8, 4, 2, 1)
6 - HL/FH	—

FL/FH = full-length, full-height

HL/FH = half-length, full-height

For PCIe slot power capabilities, riser board installation instructions, and riser cage installation instructions, see the user guide.

*PCIe slot 3 is connected to the southbridge, and runs at Gen2 signaling rate.

Notes:

- "Primary" denotes the riser cage is installed in the primary riser connector.

- "Secondary" denotes the riser cage is installed in the secondary riser connector.

- Slots can generally run at 8 GT/s signaling rate in either PCIe2 or PCIe3 mode, depending on the capability of the installed processor.

- Installing the riser cages listed in the table above in either the primary or secondary riser connectors determines the form factor of the PCI cards supported by those riser cages.

- FL/FH denotes full-length, full-height. HL/FH denotes half-length, full-height. LP denotes low profile.

Slot description example

Slot 3 PCIe2 x8 (4,2,1)
- Negotiable link width(s)
- Physical connector link width
- Gen2 signaling rate
- Slot number
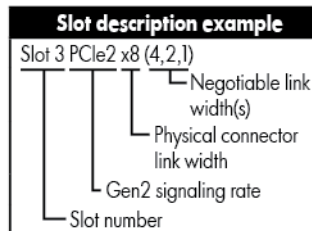
System board components
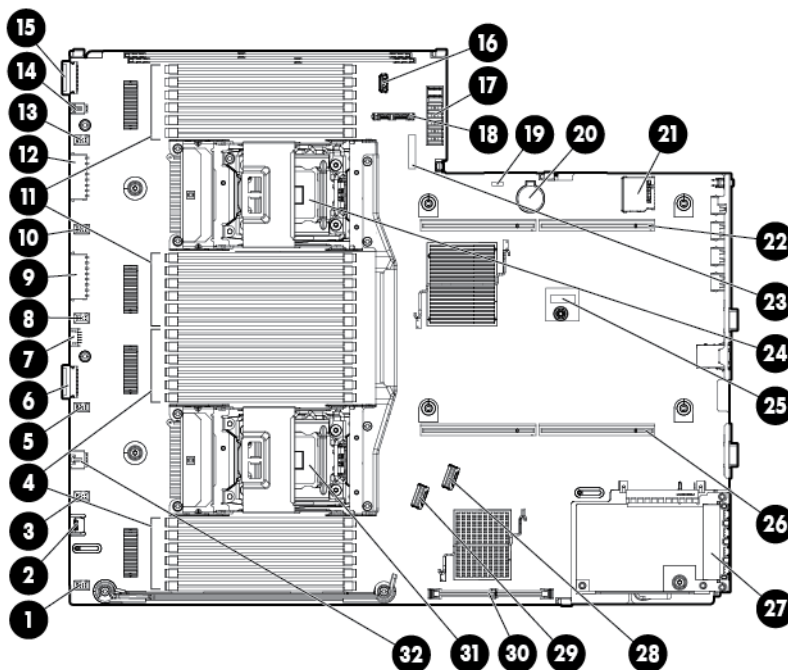
Item	Description
1	Fan connector 6
2	Systems Insight Display connector
3	Fan connector 5
4	Processor 1 DIMM slots
5	Fan connector 4
6	Front I/O connector
7	Front USB connector
8	Fan connector 3
9	First drive cage, box 2 power connector
10	Fan connector 2
11	Processor 2 DIMM slots
12	Second drive cage, box 1 power connector
13	Fan connector 1
14	Discovery services connector
15	Front video connector
16	USB connector
17	Power supply backplane connector
18	SATA optical drive connector

Item	Description
19	NMI jumper
20	System battery
21	SD card slot
22	Secondary (processor 2) PCI riser connector
23	System maintenance switch
24	Processor 2 socket
25	TPM connector
26	Primary (processor 1) PCI riser connector
27	FlexibleLOM
28	SAS connector 1
29	SAS connector 2
30	Cache module connector
31	Processor 1 socket
32	RDX power connector

System maintenance switch

Item	Default	Function
S1	Off	Off = HP iLO security is enabled.
		On = HP iLO security is disabled.
S2	Off	Off = System configuration can be changed.
		On = System configuration is locked.
S3	Off	Reserved
S4	Off	Reserved
S5	Off	Off = Power-on password is enabled.
		On = Power-on password is disabled.
S6	Off	Off = No function
		On = ROM reads system configuration as invalid.
S7	—	Reserved
S8	—	Reserved
S9	—	Reserved
S10	—	Reserved
S11	—	Reserved
S12	—	Reserved

To access the redundant ROM, set S1, S5, and S6 to on.

When the system maintenance switch position 6 is set to the On position, the system is prepared to erase all system configuration settings from both CMOS and NVRAM.

⚠ CAUTION: Clearing CMOS and/or NVRAM deletes configuration information. Be sure to properly configure the server or data loss could occur.

NMI functionality

An NMI crash dump enables administrators to create crash dump files when a system is hung and not responding to traditional debug mechanisms.

Crash dump log analysis is an essential part of diagnosing reliability problems, such as hangs in operating systems, device drivers, and applications. Many crashes freeze a system, and the only available action for administrators is to cycle the system power. Resetting the system erases any information that could support problem analysis, but the NMI feature preserves that information by performing a memory dump before a hard reset.

To force the OS to invoke the NMI handler and generate a crash dump log, the administrator can use the iLO Virtual NMI feature.

For more information, see the white paper on the HP website (http://h20000.www2.hp.com/bc/docs/support/SupportManual/c00797875/c00797875.pdf).

DIMM slot locations

DIMM slots are numbered sequentially (1 through 12) for each processor. The supported AMP modes use the letter assignments for population guidelines.
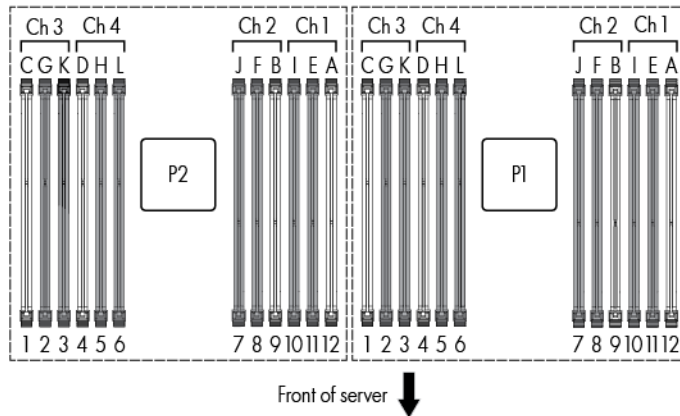
SAS and SATA device numbers
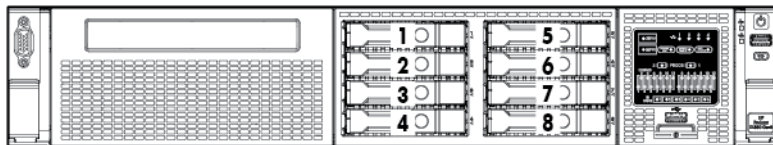
Hot-plug drive LED definitions
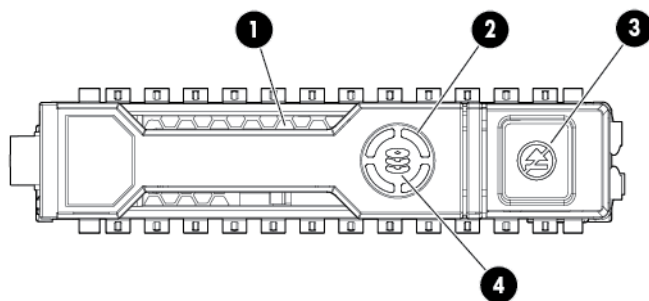
Item	LED	Status	Definition
1	Locate	Solid blue	The drive is being identified by a host application.
		Flashing blue	The drive carrier firmware is being updated or requires an update.
2	Activity ring	Rotating green	Drive activity
		Off	No drive activity
3	Do not remove	Solid white	Do not remove the drive. Removing the drive causes one or more of the logical drives to fail.
		Off	Removing the drive does not cause a logical drive to fail.
4	Drive status	Solid green	The drive is a member of one or more logical drives.
		Flashing green	The drive is rebuilding or performing a RAID migration, strip size migration, capacity expansion, or logical drive extension, or is erasing.
		Flashing amber/green	The drive is a member of one or more logical drives and predicts the drive will fail.
		Flashing amber	The drive is not configured and predicts the drive will fail.
		Solid amber	The drive has failed.
		Off	The drive is not configured by a RAID controller.

PCI riser cage LED

⚠ **CAUTION:** To prevent damage to the server or expansion boards, power down the server and remove all AC power cords before removing or installing the PCI riser cage.
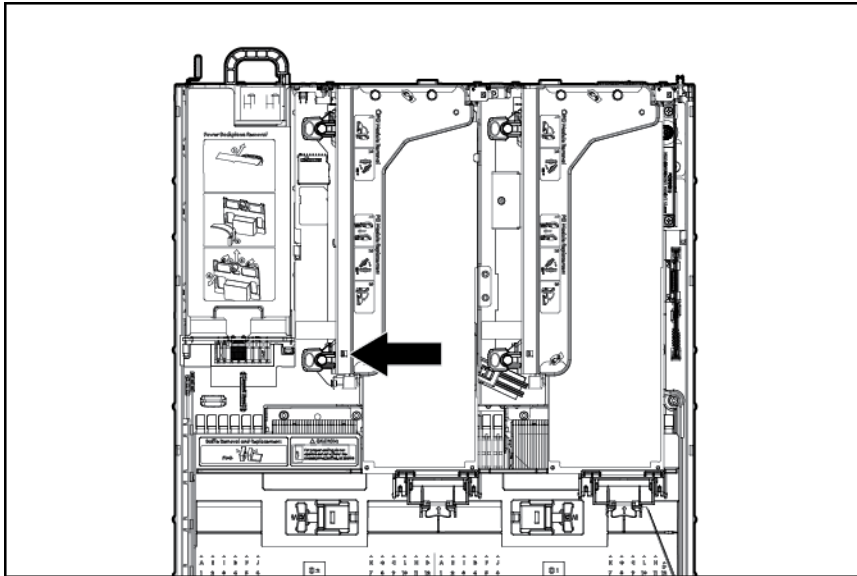
Status
On = AC power is connected.
Off = AC power is disconnected.

FBWC module LEDs (P420)

The FBWC module has three single-color LEDs (one amber and two green). The LEDs are duplicated on the reverse side of the cache module to facilitate status viewing.
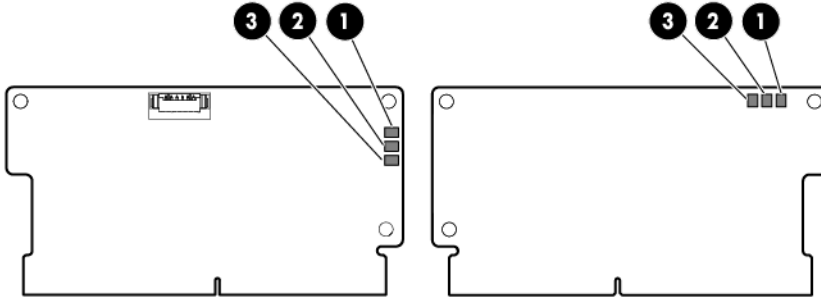
1 – Amber	2 - Green	3 - Green	Interpretation
Off	Off	Off	The cache module is not powered.
Off	Flashing 0.5 Hz	Flashing 0.5 Hz	The cache microcontroller is executing from within its boot loader and receiving new flash code from the host controller.
Off	Flashing 1 Hz	Flashing 1 Hz	The cache module is powering up, and the capacitor pack is charging.
Off	Off	Flashing 1 Hz	The cache module is idle, and the capacitor pack is charging.
Off	Off	On	The cache module is idle, and the capacitor pack is charged.
Off	On	On	The cache module is idle, the capacitor pack is charged, and the cache contains data that has not yet been written to the drives.
Off	Flashing 1 Hz	Off	A backup is in progress.
Off	On	Off	The current backup is complete with no errors.
Flashing 1 Hz	Flashing 1 Hz	Off	The current backup failed, and data has been lost.
Flashing 1 Hz	Flashing 1 Hz	On	A power error occurred during the previous or current boot. Data may be corrupt.

1 – Amber	2 - Green	3 - Green	Interpretation
Flashing 1 Hz	On	Off	An overtemperature condition exists.
Flashing 2 Hz	Flashing 2 Hz	Off	The capacitor pack is not attached.
Flashing 2 Hz	Flashing 2 Hz	On	The capacitor has been charging for 10 minutes, but has not reached sufficient charge to perform a full backup.
On	On	Off	The current backup is complete, but power fluctuations occurred during the backup.
On	On	On	The cache module microcontroller has failed.

Hot-plug fans

⚠ CAUTION: To avoid damage to server components, fan blanks must be installed in fan bays 1 and 2 in a single-processor configuration.

The only two valid fan configurations are listed in the following table.

Configuration	Fan bay 1	Fan bay 2	Fan bay 3	Fan bay 4	Fan bay 5	Fan bay 6
1 processor	Fan blank	Fan blank	Fan	Fan	Fan	Fan
2 processors	Fan	Fan	Fan	Fan	Fan	Fan
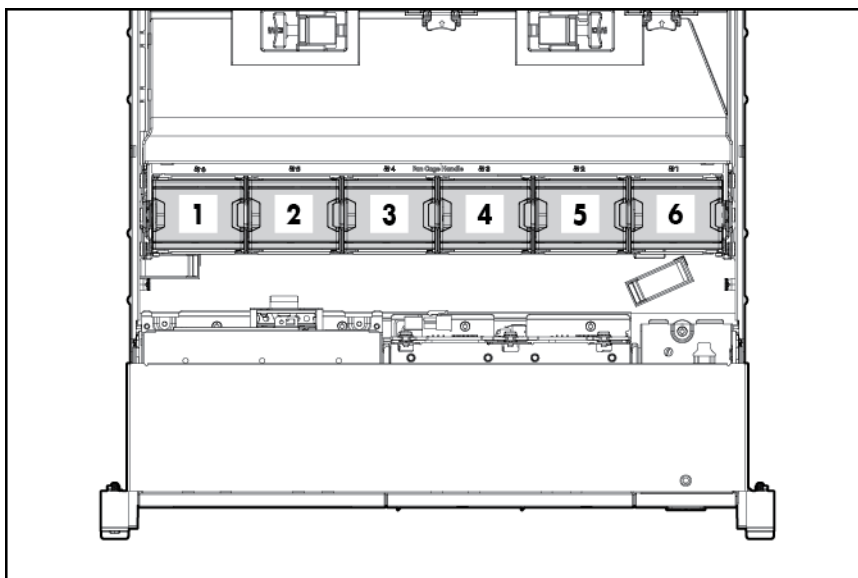
For a single-processor configuration, four fans and two blanks are required in specific fan bays for redundancy. A fan failure or missing fan causes a loss of redundancy. A second fan failure or missing fan causes an orderly shutdown of the server.

Installing more than the required number of fans in a single-processor configuration is not a supported configuration.

For a dual-processor configuration, six fans are required for redundancy. A fan failure or missing fan causes a loss of redundancy. A second fan failure or missing fan causes an orderly shutdown of the server.

The server supports variable fan speeds. The fans operate at minimum speed until a temperature change requires a fan speed increase to cool the server. The server shuts down during the following temperature-related scenarios:

- At POST and in the OS, HP iLO performs an orderly shutdown if a cautionary temperature level is detected. If the server hardware detects a critical temperature level before an orderly shutdown occurs, the server performs an immediate shutdown.

- When the Thermal Shutdown feature is disabled in RBSU, HP iLO does not perform an orderly shutdown when a cautionary temperature level is detected. Disabling this feature does not disable the server hardware from performing an immediate shutdown when a critical temperature level is detected.

⚠ CAUTION: A thermal event can damage server components when the Thermal Shutdown feature is disabled in RBSU.

3   Operations

Power up the server

To power up the server, press the Power On/Standby button.

Power down the server

Before powering down the server for any upgrade or maintenance procedures, perform a backup of critical server data and programs.

IMPORTANT: When the server is in standby mode, auxiliary power is still being provided to the system.

To power down the server, use one of the following methods:

- Press and release the Power On/Standby button.

  This method initiates a controlled shutdown of applications and the OS before the server enters standby mode.

- Press and hold the Power On/Standby button for more than 4 seconds to force the server to enter standby mode.

  This method forces the server to enter standby mode without properly exiting applications and the OS. If an application stops responding, you can use this method to force a shutdown.

- Use a virtual power button selection through HP iLO.

  This method initiates a controlled remote shutdown of applications and the OS before the server enters standby mode.

Before proceeding, verify the server is in standby mode by observing that the system power LED is amber.

Extend the server from the rack

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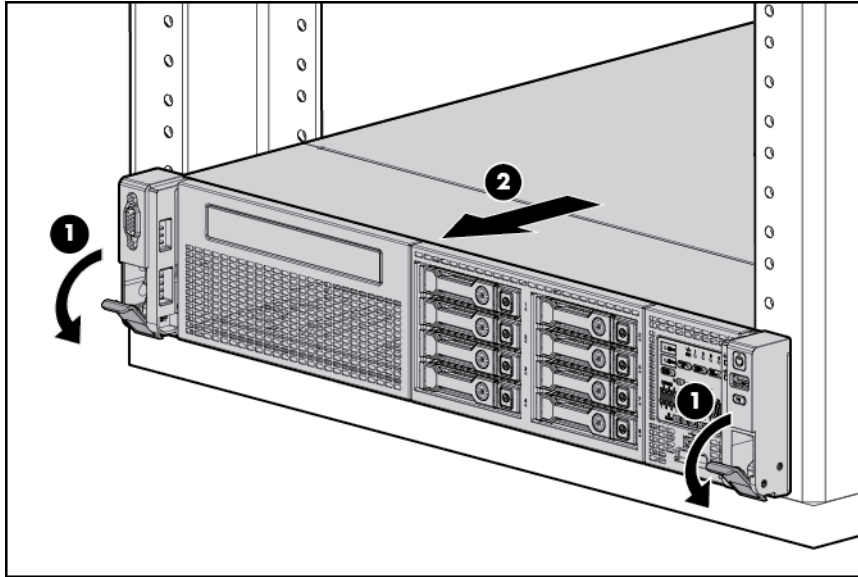
3. After performing the installation or maintenance procedure, slide the server back into the rack, and then press the server firmly into the rack to secure it in place.

   > **⚠ 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 could pinch your fingers.
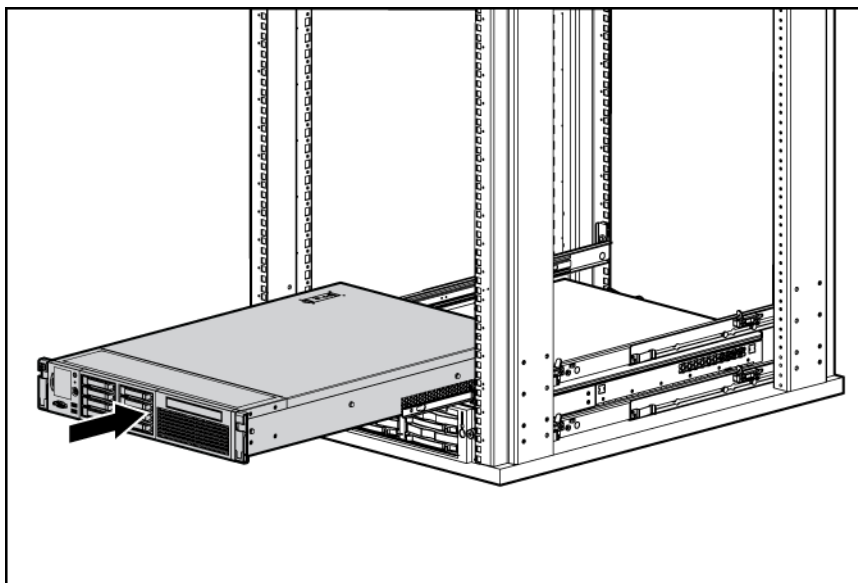
Remove the access panel

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.

To remove the component:

1. Power down the server on page 18.

2. Extend the server from the rack on page 19.

3. Open or unlock the locking latch, slide the access panel to the rear of the chassis, and remove the access panel.

Install the access panel

1. Place the access panel on top of the server with the hood latch open. Allow the panel to extend past the rear of the server approximately 1.25 cm (0.5 in).

2. Push down on the hood latch. The access panel slides to a closed position.

3. Tighten the security screw on the hood latch.

Access the product rear panel

Opening the cable management arm

To access the server rear panel:

1. Release the cable management arm.
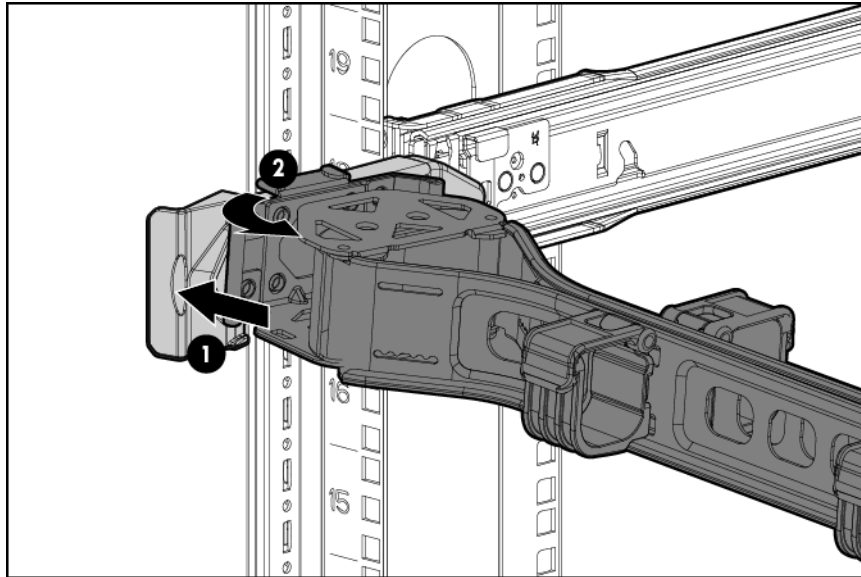
2. Open the cable management arm. Note that the cable management arm can be right-mounted or left-mounted.
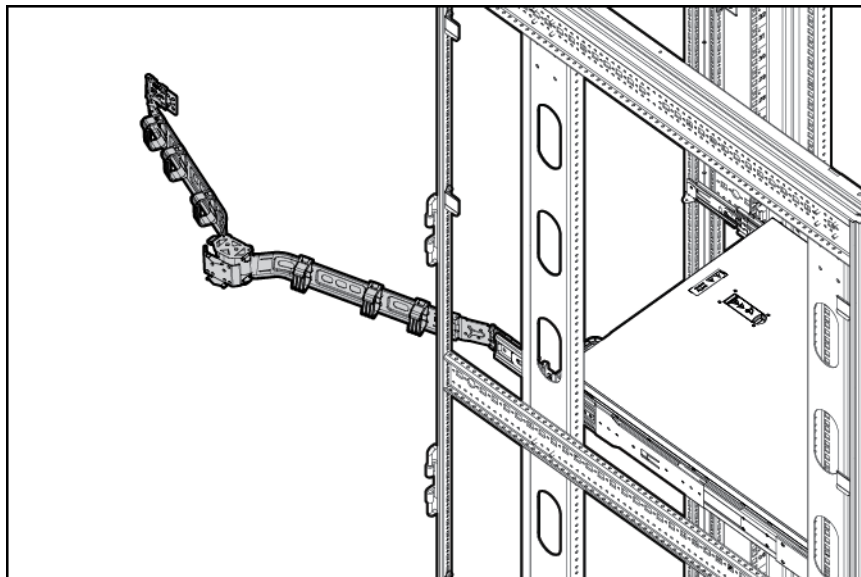
Remove the hot-plug fan cage

To remove the component:

1. [Power down the server on page 18](#).

2. Remove all power:

   a. Disconnect each power cord from the power source.

   b. Disconnect each power cord from the server.

3. Extend ([Extend the server from the rack on page 19](#)) or remove the server from the rack.

4. [Remove the access panel on page 20](#)

5. [Remove the air baffle on page 28](#).

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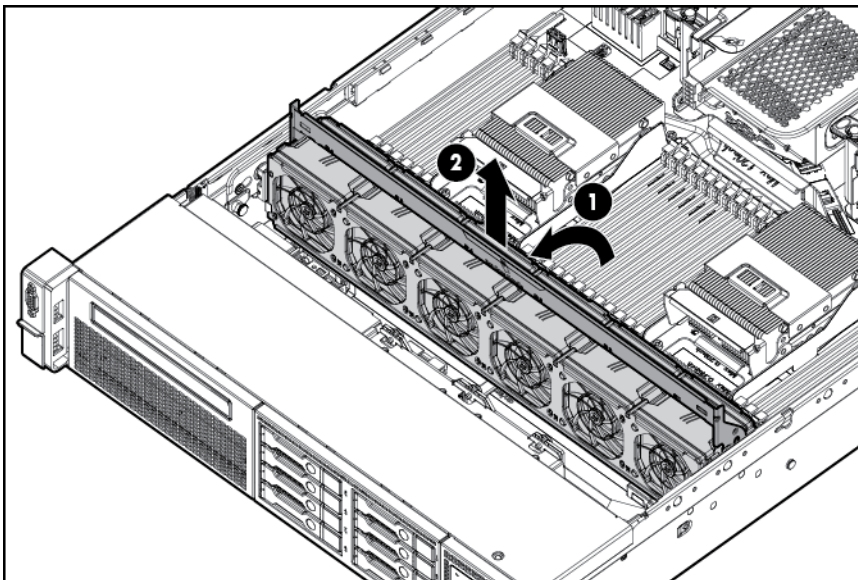
CAUTION: Do not operate the server for long periods with the access panel open or removed. Operating the server in this manner results in improper airflow and improper cooling that can lead to thermal damage.

IMPORTANT: For optimum cooling, install fans in all primary fan locations. For more information, refer to the fan locations table ([Hot-plug fans on page 16](#)).

To replace the component, reverse the removal procedure.

Remove the hot-plug fan

To remove the component:

1. Extend or remove the server from the rack (Extend the server from the rack on page 19).

2. Remove the access panel on page 20.

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.

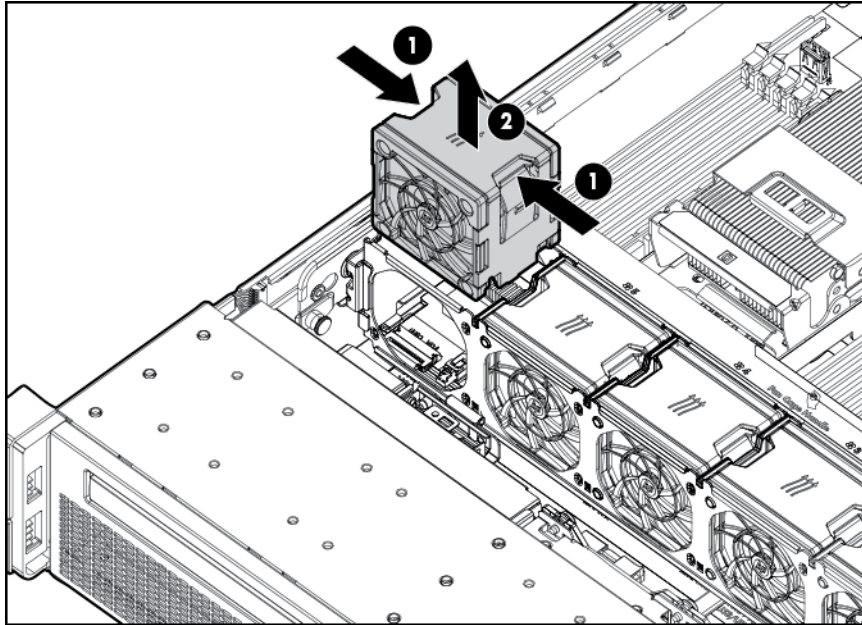> **IMPORTANT:** For optimum cooling, install fans in all primary fan locations. For more information, refer to the fan locations table (Hot-plug fans on page 16).

To replace the component, reverse the removal procedure.

Remove the full-length expansion board

⚠️ **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.

To remove the component:

1. Power down the server on page 18

2. Remove all power:

   a. Disconnect each power cord from the power source.

   b. Disconnect each power cord from the server.

3. Extend (Extend the server from the rack on page 19) or remove the server from the rack.

4. Remove the access panel on page 20

5. Disconnect any external cables that are connected to the expansion board.

6. Disconnect any internal cables that are connected to the expansion board.

7. Release the full-length expansion board retainer, and then remove the PCIe riser cage.
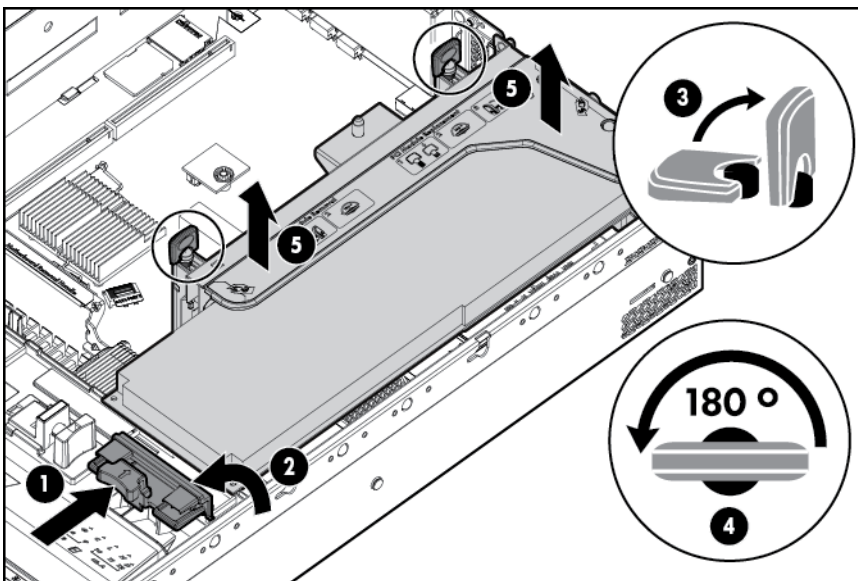
8. Remove the full-length expansion board.

To replace the component, reverse the removal procedure.

Remove the PCI riser cage

⚠ **CAUTION:** To prevent damage to the server or expansion boards, power down the server and remove all AC power cords before removing or installing the PCI riser cage.

1. Power down the server on page 18

2. Remove all power:

   a. Disconnect each power cord from the power source.

   b. Disconnect each power cord from the server.

3. Extend (Extend the server from the rack on page 19) or remove the server from the rack.

4. Remove the access panel on page 20

5. Release the full-length expansion board retainer, and then remove the PCI riser cage.
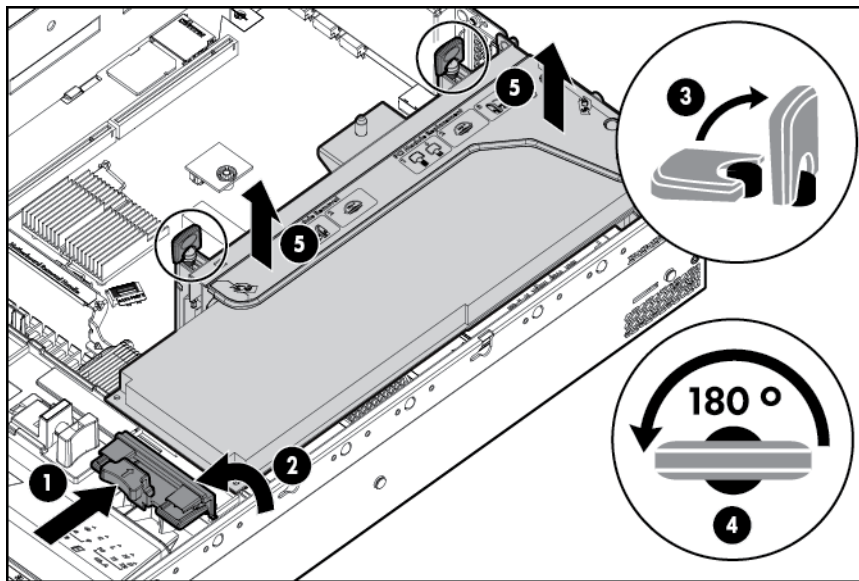
6. Remove the full-length expansion board.

Install the PCI riser cage

⚠ 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.

1. Power down the server on page 18

2. Remove all power:

   a. Disconnect each power cord from the power source.

   b. Disconnect each power cord from the server.

3. Extend (Extend the server from the rack on page 19) or remove the server from the rack.

4. Remove the access panel on page 20

5. Install the PCI riser cage.
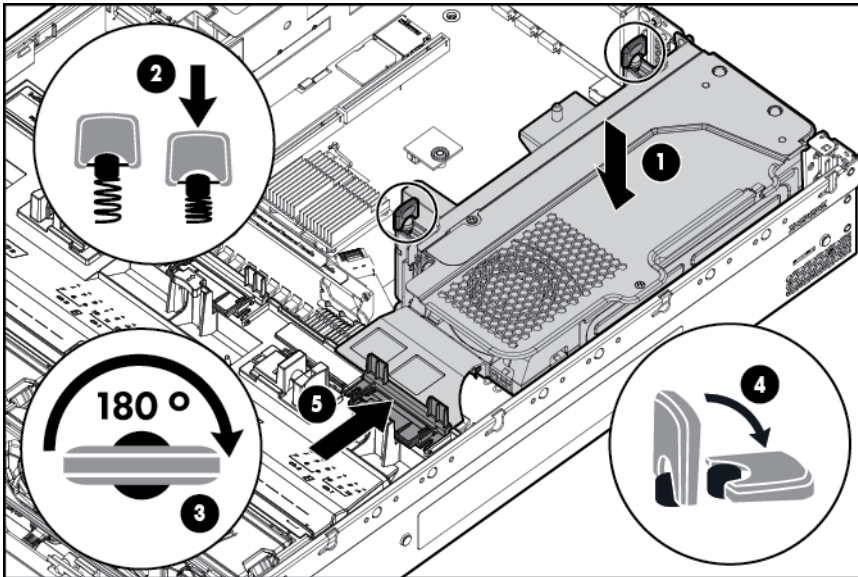
6. Install the access panel on page 20.

7. Install the server into the rack ("Installing the server into the rack" on page 37).

8. Connect each power cord to the server.

9. Connect each power cord to the power source.

10. Power down the server on page 18.

Secure the full-length expansion board retainer

1. Power down the server on page 18

2. Remove all power:

   a. Disconnect each power cord from the power source.

   b. Disconnect each power cord from the server.

3. Extend (Extend the server from the rack on page 19) or remove the server from the rack.

4. Remove the access panel on page 20

5. Install a full-length expansion board (Installing a full-length expansion board on page 65).

6. Install the PCI riser cage on page 26.

7. Secure the full-length expansion board retainer.

8. Install the access panel on page 20.

9. Install the server into the rack (Installing the server into the rack on page 35).

10. Connect each power cord to the server.

11. Connect each power cord to the power source.

12. Power down the server on page 18.

Remove the air baffle

⚠ **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.
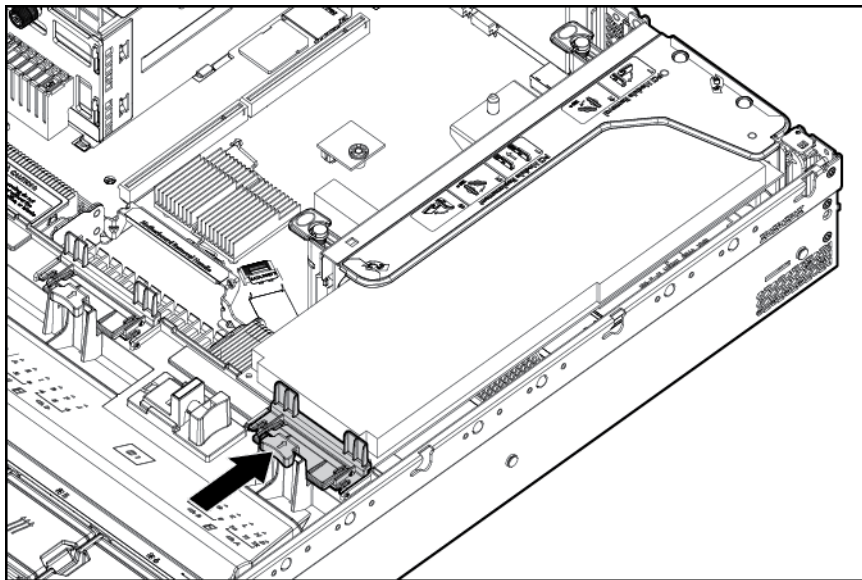
To remove the component:

1. Power down the server on page 18

2. Remove all power:

   a. Disconnect each power cord from the power source.

   b. Disconnect each power cord from the server.

3. Extend (Extend the server from the rack on page 19) or remove the server from the rack.

4. Remove the access panel on page 20

⚠ **CAUTION:** Do not detach the cable that connects the battery pack to the cache module. Detaching the cable causes any unsaved data in the cache module to be lost.

📝 **IMPORTANT:** It is necessary to remove the PCI riser cage only if there is a full-length expansion board installed.

5. Release the full-length expansion board retainer, and then remove the PCI riser cage.
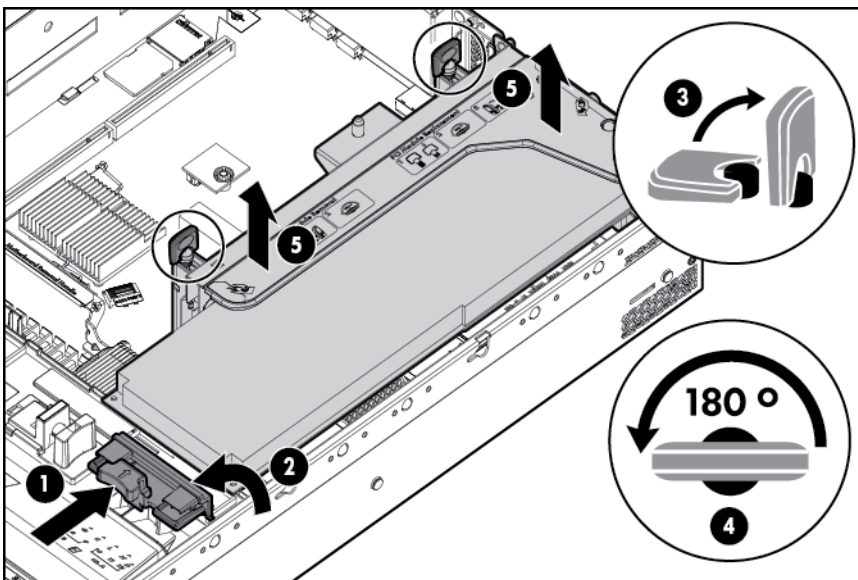
6. Remove the air baffle.
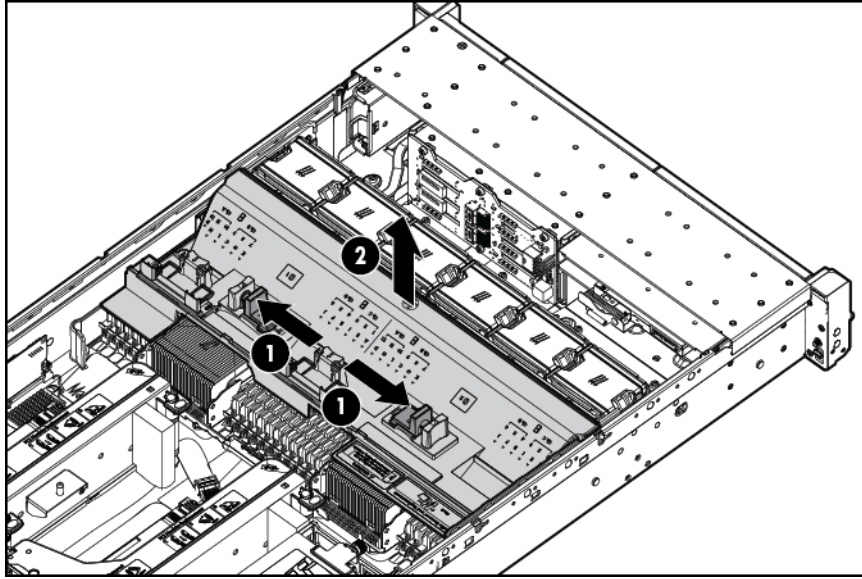
To replace the component, reverse the removal procedure.

4 Setup

Optional installation services

Delivered by experienced, certified engineers, HP Care Pack services help you keep your servers up and running with support packages tailored specifically for HP ProLiant systems. HP Care Packs let you integrate both hardware and software support into a single package. A number of service level options are available to meet your needs.

HP Care Pack Services offer upgraded service levels to expand your standard product warranty with easy-to-buy, easy-to-use support packages that help you make the most of your server investments. Some of the Care Pack services are:

- Hardware support
  - Next Business Day Foundation Care
  - 4-Hour 24x7 Foundation Care
- Software support
  - HP ProLiant Essentials (HP SIM and RDP)
  - VMware
- Startup and implementation services for both hardware and software

For more information on HP Care Pack Services, see the HP website (http://www.hp.com/services/carepack).

Optimum environment

When installing the server in a rack, select a location that meets the environmental standards described in this section.

Space and airflow requirements

To allow for servicing and adequate airflow, observe the following space and airflow requirements when deciding where to install a rack:

- Leave a minimum clearance of 63.5 cm (25 in) in front of the rack.

- Leave a minimum clearance of 76.2 cm (30 in) behind the rack.

- Leave a minimum clearance of 121.9 cm (48 in) from the back of the rack to the back of another rack or row of racks.

HP servers draw in cool air through the front door and expel warm air through the rear door. Therefore, the front and rear rack doors must be adequately ventilated to allow ambient room air to enter the cabinet, and the rear door must be adequately ventilated to allow the warm air to escape from the cabinet.

⚠ CAUTION: To prevent improper cooling and damage to the equipment, do not block the ventilation openings.

When vertical space in the rack is not filled by a server or rack component, the gaps between the components cause changes in airflow through the rack and across the servers. Cover all gaps with blanking panels to maintain proper airflow.

⚠ CAUTION: Always use blanking panels to fill empty vertical spaces in the rack. This arrangement ensures proper airflow. Using a rack without blanking panels results in improper cooling that can lead to thermal damage.

The 9000 and 10000 Series Racks provide proper server cooling from flow-through perforations in the front and rear doors that provide 64 percent open area for ventilation.

⚠ CAUTION: When using a Compaq branded 7000 series rack, install the high airflow rack door insert (PN 327281-B21 for 42U rack, PN 157847-B21 for 22U rack) to provide proper front-to-back airflow and cooling.

CAUTION: If a third-party rack is used, observe the following additional requirements to ensure adequate airflow and to prevent damage to the equipment:

- Front and rear doors—If the 42U rack includes closing front and rear doors, you must allow 5,350 sq cm (830 sq in) of holes evenly distributed from top to bottom to permit adequate airflow (equivalent to the required 64 percent open area for ventilation).

- Side—The clearance between the installed rack component and the side panels of the rack must be a minimum of 7 cm (2.75 in).

📝 IMPORTANT: The HP ProLiant DL380p Gen8 Server cable management arm is not supported on Compaq branded 7000 series racks.

Temperature requirements

To ensure continued safe and reliable equipment operation, install or position the system in a well-ventilated, climate-controlled environment.

The maximum recommended ambient operating temperature (TMRA) for most server products is 35° C (95° F). The temperature in the room where the rack is located must not exceed 35° C (95° F).

⚠ **CAUTION:** To reduce the risk of damage to the equipment when installing third-party options:

- Do not permit optional equipment to impede airflow around the server or to increase the internal rack temperature beyond the maximum allowable limits.

- Do not exceed the manufacturer's TMRA.

Power requirements

Installation of this equipment must comply with local and regional electrical regulations governing the installation of information technology equipment by licensed electricians. This equipment is designed to operate in installations covered by NFPA 70, 1999 Edition (National Electric Code) and NFPA-75, 1992 (code for Protection of Electronic Computer/Data Processing Equipment). For electrical power ratings on options, refer to the product rating label or the user documentation supplied with that option.

⚠ **WARNING!** To reduce the risk of personal injury, fire, or damage to the equipment, do not overload the AC supply branch circuit that provides power to the rack. Consult the electrical authority having jurisdiction over wiring and installation requirements of your facility.

⚠ **CAUTION:** Protect the server from power fluctuations and temporary interruptions with a regulating uninterruptible power supply. This device protects the hardware from damage caused by power surges and voltage spikes and keeps the system in operation during a power failure.

When installing more than one server, you may need to use additional power distribution devices to safely provide power to all devices. Observe the following guidelines:

- Balance the server power load between available AC supply branch circuits.

- Do not allow the overall system AC current load to exceed 80% of the branch circuit AC current rating.

- Do not use common power outlet strips for this equipment.

- Provide a separate electrical circuit for the server.

Electrical grounding requirements

The server must be grounded properly for proper operation and safety. In the United States, you must install the equipment in accordance with NFPA 70, 1999 Edition (National Electric Code), Article 250, as well as any local and regional building codes. In Canada, you must install the equipment in accordance with Canadian Standards Association, CSA C22.1, Canadian Electrical Code. In all other countries, you must install the equipment in accordance with any regional or national electrical wiring codes, such as the International Electrotechnical Commission (IEC) Code 364, parts 1 through 7. Furthermore, you must be sure that all power distribution devices used in the installation, such as branch wiring and receptacles, are listed or certified grounding-type devices.

Because of the high ground-leakage currents associated with multiple servers connected to the same power source, HP recommends the use of a PDU that is either permanently wired to the building's branch circuit or includes a nondetachable cord that is wired to an industrial-style plug. NEMA

locking-style plugs or those complying with IEC 60309 are considered suitable for this purpose. Using common power outlet strips for the server is not recommended.

Connecting a DC power cable to a DC power source

WARNING! To reduce the risk of electric shock or energy hazards:

- This equipment must be installed by trained service personnel, as defined by the NEC and IEC 60950-1, Second Edition, the standard for Safety of Information Technology Equipment.

- Connect the equipment to a reliably grounded SELV source. An SELV source is a secondary circuit that is designed so normal and single fault conditions do not cause the voltages to exceed a safe level (60 V direct current).

- The branch circuit overcurrent protection must be rated 20A.

WARNING! When installing a DC power supply, the ground wire must be connected before the positive or negative leads.

WARNING! Remove power from the power supply before performing any installation steps or maintenance on the power supply.

CAUTION: The server equipment connects the earthed conductor of the DC supply circuit to the earthing conductor at the equipment. For more information, see the *HP 750W Common Slot -48V DC Input Hot-Plug Power Supply Kit Installation Instructions*.

CAUTION: If the DC connection exists between the earthed conductor of the DC supply circuit and the earthing conductor at the server equipment, the following conditions must be met:

- This equipment must be connected directly to the DC supply system earthing electrode conductor or to a bonding jumper from an earthing terminal bar or bus to which the DC supply system earthing electrode conductor is connected.

- This equipment should be located in the same immediate area (such as adjacent cabinets) as any other equipment that has a connection between the earthed conductor of the same DC supply circuit and the earthing conductor, and also the point of earthing of the DC system. The DC system should be earthed elsewhere.

- The DC supply source is to be located within the same premises as the equipment.

- Switching or disconnecting devices should not be in the earthed circuit conductor between the DC source and the point of connection of the earthing electrode conductor.

To connect a DC power cable to a DC power source:

1. Cut the DC power cord ends no shorter than 150 cm (59.06 in).

2. If the power source requires ring tongues, use a crimping tool to install the ring tongues on the power cord wires.

   IMPORTANT: The ring tongues must be UL approved and accommodate 12 gauge wires.

   IMPORTANT: The minimum nominal thread diameter of a pillar or stud type terminal must be 3.5 mm (0.138 in); the diameter of a screw type terminal must be 4.0 mm (0.157 in).

3. Stack each same-colored pair of wires and then attach them to the same power source. The power cord consists of three wires (black, red, and green).

For more information, see the *HP 750W Common Slot -48V DC Input Hot-Plug Power Supply Installation Instructions*.

Rack warnings

⚠ **WARNING!**   To reduce the risk of personal injury or damage to the equipment, be sure that:

- The leveling jacks are extended to the floor.

- The full weight of the rack rests on the leveling jacks.

- The stabilizing feet are attached to the rack if it is a single-rack installation.

- The racks are coupled together in multiple-rack installations.

- Only one component is extended at a time. A rack may become unstable if more than one component is extended for any reason.

⚠ **WARNING!**   To reduce the risk of personal injury or equipment damage when unloading a rack:

- At least two people are needed to safely unload the rack from the pallet. An empty 42U rack can weigh as much as 115 kg (253 lb), can stand more than 2.1 m (7 ft) tall, and might become unstable when being moved on its casters.

- Never stand in front of the rack when it is rolling down the ramp from the pallet. Always handle the rack from both sides.

Identifying the contents of the server shipping carton

Unpack the server shipping carton and locate the materials and documentation necessary for installing the server. All the rack mounting hardware necessary for installing the server into the rack is included with the rack or the server.

The contents of the server shipping carton include:

- Server

- Power cord

- Hardware documentation, Documentation CD, and software products

- Rack-mounting hardware

In addition to the supplied items, you might need:

- Operating system or application software

- Hardware options

Installing hardware options

Install any hardware options before initializing the server. For options installation information, refer to the option documentation. For server-specific information, refer to "Hardware options installation on page 39."

Installing the server into the rack

⚠ **CAUTION:** Always plan the rack installation so that the heaviest item is on the bottom of the rack. Install the heaviest item first, and continue to populate the rack from the bottom to the top.

1. Install the server and cable management arm into the rack. For more information, see the installation instructions that ship with the 2U Quick Deploy Rail System.

2. Connect peripheral devices to the server. For information on identifying connectors, see "Rear panel components on page 7."

⚠ **WARNING!** To reduce the risk of electric shock, fire, or damage to the equipment, do not plug telephone or telecommunications connectors into RJ-45 connectors.

3. Connect the power cord to the rear of the server.

4. Install the power cord anchors.
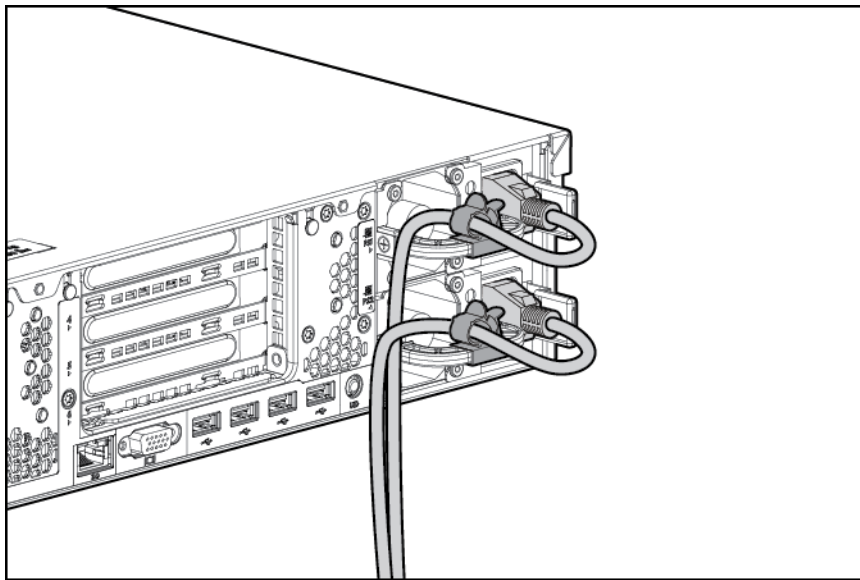
5. Secure the cables to the cable management arm.

    IMPORTANT: When using cable management arm components, be sure to leave enough slack in each of the cables to prevent damage to the cables when the server is extended from the rack.
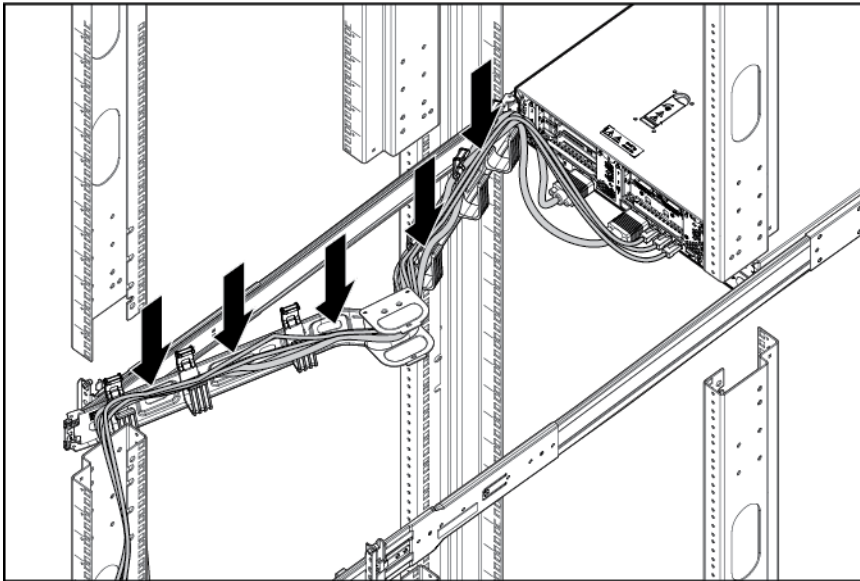

6. Connect the power cord to the AC power source.

    ⚠ 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.

Installing the operating system

As with other HP ProLiant servers, this DL380z server does not ship with provisioning media. Everything needed to manage the installation of system software and firmware is preloaded on the server.

You have a choice between two operating systems that can be installed on this HP DL380z server:

● Citrix XenServer

● VMware vSphere

Citrix XenServer

You may install Citrix XenServer using Intelligent Provisioning. Intelligent Provisioning is a single-server deployment tool embedded in all HP ProLiant Gen8 servers, and it replaces the SmartStart CDs and Smart Update Firmware DVD shipped with previous generation HP ProLiant servers. The CDs and DVD do not ship with HP ProLiant Gen8 servers. To prepare for installing the system software using Intelligent Provisioning, obtain a supported operating system on a DVD, CD, FTP server, network, or USB drive. For more information about using Intelligent Provisioning, see the HP Intelligent Provisioning User Guide (http://www.hp.com/go/intelligentprovisioning/docs).

To install Citrix XenServer on the DL380z with Intelligent Provisioning (local or remote), perform the following steps:

NOTE: An Internet connection is required to update the firmware and systems software.

1. Connect the Ethernet cable between the network connector on the server and a network jack.

2. Press the **Power On/Standby** button.

3. During server POST, press the F10 key.

4. Complete the initial **Preferences and Registration**.

5. At the first **Start** screen, click the **Configure and Install** button.

6. Follow the onscreen prompts to complete the installation.

VMware vSphere

To install VMware vSphere, you may use Insight Control server deployment for an automated solution. For more information, see the *HP Insight Control Server Deployment User Guide* in the HP Insight Software Information Library (http://www.hp.com/go/insightremotesupport/docs).

If HP Insight Remote Support 7.x is installed in the server environment, you need the following information in order to complete registration:

● Port number: default port number is 7906

● IP address (or host name) of the HP Insight Remote Support hosting device

For more information, see the HP Insight Remote Support guides in the HP Insight Remote Support Information Library (http://www.hp.com/go/insightremotesupport/docs).

Powering on and selecting boot options

1. Connect the Ethernet cable.

2. Press the Power On/Standby button.

3. During the initial boot:

   - To modify the server configuration ROM default settings, press F9 when prompted from the start up sequence to enter the RBSU. By default, RBSU runs in the English language.

   - If you do not need to modify the server configuration and are ready to install the system software, press F10 to access Intelligent Provisioning.

   NOTE: If an HP Smart Array controller has been added or is embedded in the system, the controller defaults to a RAID configuration based on the size and number of hard drives installed. For more information on modifying the controller default settings, see the documentation on the Documentation CD.

For more information on automatic configuration, see the HP ROM-Based Setup Utility User Guide on the Documentation CD or the iLO Management Engine Information Library (http://www.hp.com/go/ilomgmtengine/docs).

Registering the server

To experience quicker service and more efficient support, register the product at the HP Product Registration website (http://register.hp.com).

5 Hardware options installation

Introduction

If more than one option is being installed, read the installation instructions for all the hardware options and identify similar steps to streamline the installation process.

⚠ **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 damage to electrical components, properly ground the server before beginning any installation procedure. Improper grounding can cause electrostatic discharge.

Memory options

📝 **IMPORTANT:** This server does not support mixing LRDIMMs, RDIMMs, UDIMMs, or HDIMMs. Attempting to mix any combination of these DIMMs can cause the server to halt during BIOS initialization.

The memory subsystem in this server can support LRDIMMs, RDIMMs, UDIMMs, or HDIMMs:

- UDIMMs represent the most basic type of memory module and offer lower latency in one DIMM per channel configurations and (relatively) low power consumption, but are limited in capacity.

- RDIMMs offer larger capacities than UDIMMs and include address parity protection.

- LRDIMMs support higher densities than single- and dual-rank RDIMMs, and higher speeds than quad-rank RDIMMs. This support enables you to install more high capacity DIMMs, resulting in higher system capacities and higher bandwidth.

- HDIMMs provide faster speeds than other DIMMs. 12 DIMMs per processor are required with HDIMMs.

All types are referred to as DIMMs when the information applies to all types. When specified as LRDIMM, RDIMM, UDIMM, or HDIMM, the information applies to that type only. All memory installed in the server must be the same type.

The server supports the following DIMM speeds:

- Single- and dual-rank PC3-10600 (DDR3-1333) RDIMMs operating at up to 1333 MT/s

- Single- and dual-rank PC3-12800 (DDR3-1600) RDIMMs operating at up to 1600 MT/s

- Single- and dual-rank PC3-14900 (DDR3-1866) RDIMMs operating at up to 1866 MT/s

- Single- and dual-rank PC3-10600 (DDR3-1333) UDIMMs operating at up to 1333 MT/s

- Quad-rank PC3L-10600 (DDR3-1333) LRDIMMs, operating as dual-rank DIMMs, at up to 1333 MT/s

- Quad-rank PC3L-14900 (DDR3-1866) LRDIMMs operating as dual-rank DIMMs at up to 1866 MT/s

For the latest memory configuration information, see the product QuickSpecs on the HP Product Bulletin website (http://www.hp.com/go/productbulletin).

HP SmartMemory

HP SmartMemory, introduced for Gen8 servers, authenticates and unlocks certain features available only on HP Qualified memory and verifies whether installed memory has passed HP qualification and test processes. Qualified memory is performance-tuned for HP ProLiant and BladeSystem servers and provides future enhanced support through HP Active Health and manageability software.

Certain performance features are unique with HP SmartMemory. HP SmartMemory 1.35V DDR3-1333 Registered memory is engineered to achieve the same performance level as 1.5V memory. For example, while the industry supports DDR3-1333 RDIMM at 1.5V, this Gen8 server supports DDR3-1333 RDIMM up to 3 DIMMs per channel at 1066 MT/s running at 1.35V. This equates to up to 20% less power at the DIMM level with no performance penalty. In addition, the industry supports UDIMM at 2 DIMMs per channel at 1066 MT/s. HP SmartMemory supports 2 DIMMs per channel at 1333 MT/s, or 25% greater bandwidth.

Memory subsystem architecture

The memory subsystem in this server is divided into channels. Each processor supports four channels, and each channel supports three DIMM slots, as shown in the following table.

Channel	Population order	Slot number
1	A	12
	E	11
	I	10
2	B	9
	F	8
	J	7
3	C	1
	G	2
	K	3
4	D	4
	H	5
	L	6

For the location of the slot numbers, see "DIMM slot locations on page 12."

This multi-channel architecture provides enhanced performance in Advanced ECC mode. This architecture also enables Lockstep and Online Spare Memory modes.

DIMM slots in this server are identified by number and by letter. Letters identify the population order. Slot numbers indicate the DIMM slot ID for spare replacement.

Single-, dual-, and quad-rank DIMMs

To understand and configure memory protection modes properly, an understanding of single-, dual-, and quad-rank DIMMs is helpful. Some DIMM configuration requirements are based on these classifications.

A single-rank DIMM has one set of memory chips that is accessed while writing to or reading from the memory. A dual-rank DIMM is similar to having two single-rank DIMMs on the same module, with only one rank accessible at a time. A quad-rank DIMM is, effectively, two dual-rank DIMMs on the same module. Only one rank is accessible at a time. The server memory control subsystem selects the proper rank within the DIMM when writing to or reading from the DIMM.

Dual- and quad-rank DIMMs provide the greatest capacity with the existing memory technology. For example, if current DRAM technology supports 8-GB single-rank DIMMs, a dual-rank DIMM would be 16 GB, and a quad-rank DIMM would be 32 GB.

LRDIMMs are labeled as quad-rank DIMMs; however, they function more like dual-rank DIMMs. There are four ranks of DRAM on the DIMM, but the LRDIMM buffer creates an abstraction that allows the DIMM to appear as a dual-rank DIMM to the system. The LRDIMM buffer also isolates the electrical loading of the DRAM from the system to allow for faster operation. These two changes allow the system to support up to three LRDIMMs per memory channel, providing for up to 50% greater memory capacity and higher memory operating speed compared to quad-rank RDIMMs.

DIMM identification

To determine DIMM characteristics, use the label attached to the DIMM and the following illustration and table.
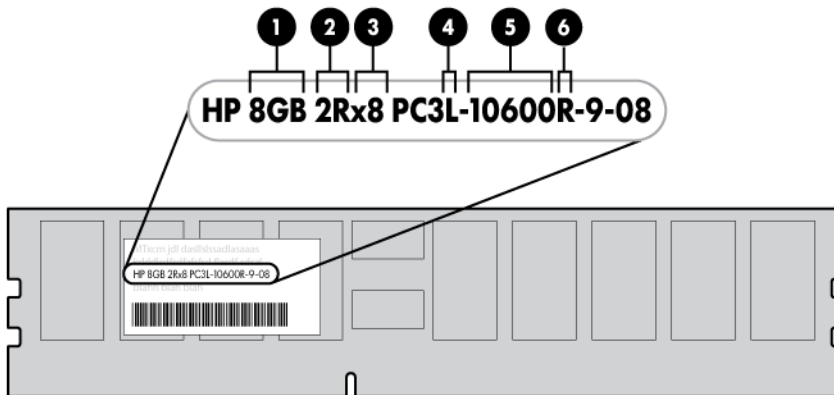
Item	Description	Definition
1	Size	—
2	Rank	1R = Single-rank
		2R = Dual-rank
		4R = Quad-rank
3	Data width	x4 = 4-bit

Item	Description	Definition
		x8 = 8-bit
4	Voltage rating	L = Low voltage (1.35v)
		U = Ultra low voltage (1.25v)
		Blank or omitted = Standard
5	Memory speed	12800 = 1600-MT/s
		10600 = 1333-MT/s
		8500 = 1066-MT/s
6	DIMM type	R = RDIMM (registered)
		E = UDIMM (unbuffered with ECC)
		L = LRDIMM (load reduced)
		H = HDIMM (HyperCloud)

For the latest supported memory information, see the QuickSpecs on the HP website (http://h18000.www1.hp.com/products/quickspecs/ProductBulletin.html). At the website, choose the geographic region, and then locate the product by name or product category.

Memory configurations

To optimize server availability, the server supports the following AMP modes:

- Advanced ECC—provides up to 4-bit error correction and enhanced performance over Lockstep mode. This mode is the default option for this server.

- Online spare memory—provides protection against failing or degraded DIMMs. Certain memory is reserved as spare, and automatic failover to spare memory occurs when the system detects a DIMM that is degrading. This allows DIMMs that have a higher probability of receiving an uncorrectable memory error (which would result in system downtime) to be removed from operation.

Advanced Memory Protection options are configured in RBSU. If the requested AMP mode is not supported by the installed DIMM configuration, the server boots in Advanced ECC mode. For more information, see "HP ROM-Based Setup Utility on page 86."

The server also can operate in independent channel mode or combined channel mode (lockstep). When running in lockstep mode, you gain reliability in one of two ways:

- If running with UDIMMs (built with x8 DRAM devices), the system can survive a complete DRAM failure (SDDC). In independent channel mode, this failure would be an uncorrectable error.

- If running with RDIMM (built with x4 DRAM devices), the system can survive the complete failure of two DRAM devices (DDDC). Running in independent mode, the server can only survive the complete failure of a single DRAM device (SDDC).

Table 5-1 Maximum capacity

DIMM type	DIMM rank	One processor	Two processors
RDIMM	Single-rank	96 GB	192 GB
RDIMM	Dual-rank	192 GB	384 GB

Table 5-1 Maximum capacity (continued)

DIMM type	DIMM rank	One processor	Two processors
LRDIMM	Quad-rank	384 GB	768 GB
UDIMM	Single-rank	32 GB	64 GB
UDIMM	Dual-rank	64 GB	128 GB
HDIMM	Dual-rank	192 GB	384 GB

For the latest memory configuration information, see the QuickSpecs on the HP website (http://www.hp.com).

Advanced ECC memory configuration

Advanced ECC memory is the default memory protection mode for this server. Standard ECC can correct single-bit memory errors and detect multi-bit memory errors. When multi-bit errors are detected using Standard ECC, the error is signaled to the server and causes the server to halt.

Advanced ECC protects the server against some multi-bit memory errors. Advanced ECC can correct both single-bit memory errors and 4-bit memory errors if all failed bits are on the same DRAM device on the DIMM.

Advanced ECC provides additional protection over Standard ECC because it is possible to correct certain memory errors that would otherwise be uncorrected and result in a server failure. Using HP Advanced Memory Error Detection technology, the server provides notification when a DIMM is degrading and has a higher probability of uncorrectable memory error.

Online Spare memory configuration

Online spare memory provides protection against degraded DIMMs by reducing the likelihood of uncorrected memory errors. This protection is available without any operating system support.

Online spare memory protection dedicates one rank of each memory channel for use as spare memory. The remaining ranks are available for OS and application use. If correctable memory errors occur at a rate higher than a specific threshold on any of the non-spare ranks, the server automatically copies the memory contents of the degraded rank to the online spare rank. The server then deactivates the failing rank and automatically switches over to the online spare rank.

Lockstep memory configuration

Lockstep mode provides protection against multi-bit memory errors that occur on the same DRAM device. Lockstep mode can correct any single DRAM device failure on x4 and x8 DIMM types. The DIMMs in each channel must have identical HP part numbers.

General DIMM slot population guidelines

Observe the following guidelines for all AMP modes:

● Install DIMMs only if the corresponding processor is installed.

● When two processors are installed, balance the DIMMs across the two processors.

● White DIMM slots denote the first slot of a channel (Ch 1-A, Ch 2-B, Ch 3-C, Ch 4-D).

● Do not mix LRDIMMs, UDIMMs, RDIMMs, or HDIMMs.

● Do not install more than two UDIMMs per channel. UDIMMs should not be installed in slots Ch 1-I, Ch 2-J, Ch 3-K, or Ch 4-L.

● HDIMMs require 12 DIMMs per processor.

● When two processors are installed, install the DIMMs in sequential alphabetical order balanced between the two processors: P1-A, P2-A, P1-B, P2-B, P1-C, P2-C, and so on.

For detailed memory configuration rules and guidelines, use the Online DDR3 Memory Configuration Tool on the HP website (http://www.hp.com/go/ddr3memory-configurator).

DIMM speeds are supported as indicated in the following table.

Populated slots (per channel)	Rank	Speeds supported (MT/s)
1	Single- or dual-rank	1333, 1600
1	Quad-rank	1333
2	Single- or dual-rank	1333
3	Single- or dual-rank	1066

Advanced ECC population guidelines

For Advanced ECC mode configurations, observe the following guidelines:

● Observe the general DIMM slot population guidelines.

● DIMMs may be installed individually.

Online spare population

For Online Spare memory mode configurations, observe the following guidelines:

● Observe the general DIMM slot population guidelines.

● Each channel must have a valid online spare configuration.

● Each channel can have a different valid online spare configuration.

● Each populated channel must have a spare rank:

  ◦ A single dual-rank DIMM is not a valid configuration.

  ◦ LRDIMMs are treated as dual-rank DIMMs.

Lockstep Memory population guidelines

For Lockstep memory mode configurations, observe the following guidelines:

- Observe the general DIMM slot population guidelines.
- DIMM configuration on all channels of a processor must be identical.
- In multi-processor configurations, each processor must have a valid Lockstep Memory configuration.
- In multi-processor configurations, each processor may have a different valid Lockstep Memory configuration.

Population order

For memory configurations with a single processor or multiple processors, populate the DIMM slots in the following order:

- LRDIMM: Sequentially in alphabetical order (A through L)
- RDIMM: Sequentially in alphabetical order (A through L)
- UDIMM: A through H, sequentially in alphabetical order. Do not populate DIMM slots I through L.
- HDIMM: All 12 DIMMs per processor must be populated.

After installing the DIMMs, use RBSU to configure Advanced ECC, online spare, or lockstep memory support.

Installing a DIMM

The server supports up to 24 DIMMs. To install a DIMM:

1. .
2. Remove all power:

   a. Disconnect each power cord from the power source.

   b. Disconnect each power cord from the server.
3. .
4. .
5. .
6. Open the DIMM slot latches.

7. Install the DIMM.
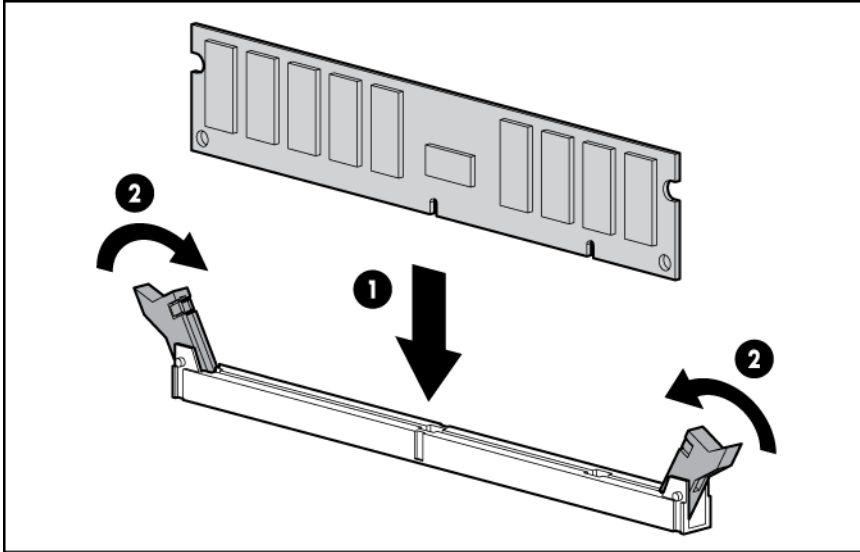
8. Install the access panel on page 20.

9. Install the server into the rack (Installing the server into the rack on page 35).

10. Connect each power cord to the server.

11. Connect each power cord to the power source.

12. Power up the server on page 18.

Use RBSU ("HP ROM-Based Setup Utility" on page 102) to configure the memory mode.

For more information about LEDs and troubleshooting failed DIMMs, see "Systems Insight Display LED combinations on page 5."

Hot-plug hard drive options

When adding hard drives to the server, observe the following general guidelines:

● The system automatically sets all device numbers.

● If only one hard drive is used, install it in the bay with the lowest device number.

● Drives should be the same capacity to provide the greatest storage space efficiency when drives are grouped together into the same drive array.

Installing a hot-plug SAS or SATA hard drive

The server can support 8 SAS or SATA hard drives in a SFF configuration.

To install the component:

1. Remove the drive blank.
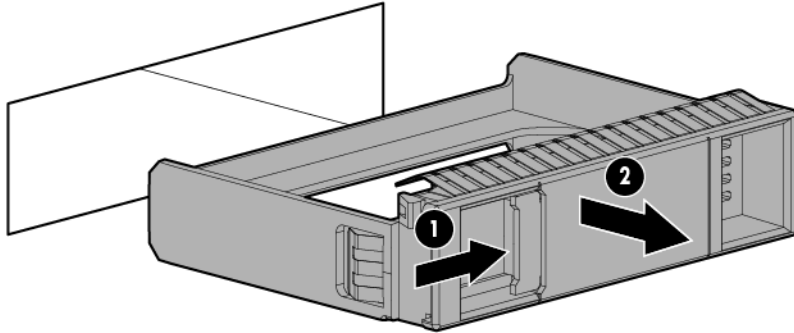
2. Prepare the drive.
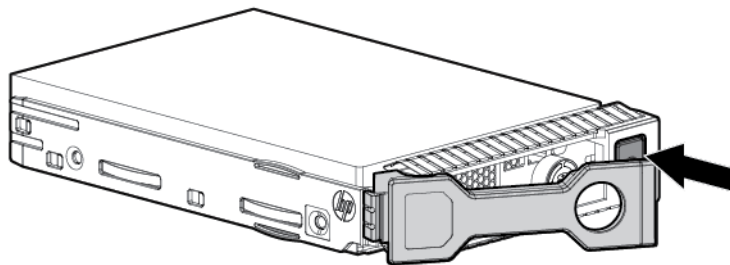
3. Install the drive.
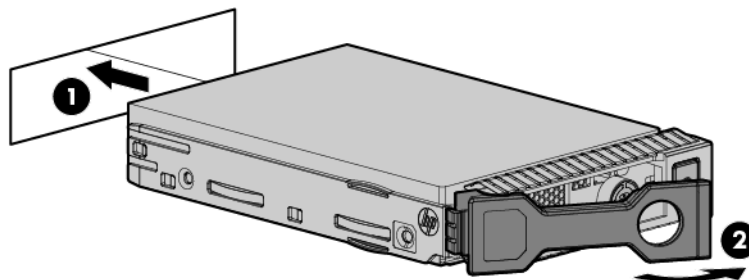
4. Determine the status of the drive from the drive LED definitions (Hot-plug drive LED definitions on page 13).

Removing a hot-plug SAS or SATA hard drive

> **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.

1. Determine the status of the drive from the hot-plug SAS drive LED combinations (Hot-plug drive LED definitions on page 13).

2. Back up all server data on the drive.

3. Remove the drive.
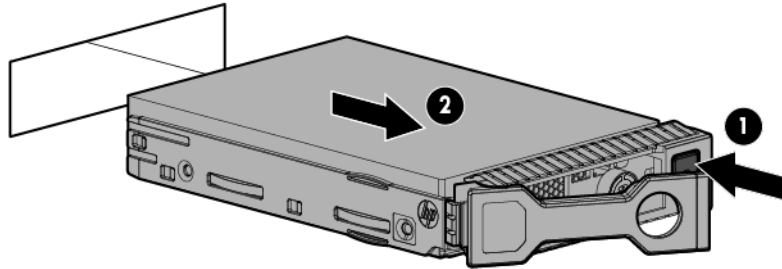
Controller options

The server ships with an embedded Smart Array P420i controller. For more information about the controller and its features, see the HP Smart Array Controllers for HP ProLiant Servers User Guide on the HP website (http://www.hp.com/support/SAC_UG_ProLiantServers_en). To configure arrays, see the Configuring Arrays on HP Smart Array Controllers Reference Guide on the HP website (http://www.hp.com/support/CASAC_RG_en).

Upgrade options exist for the integrated array controller. For a list of supported options, see the QuickSpecs on the HP website (http://www.hp.com/support).

The server supports FBWC. FBWC consists of a cache module and a capacitor pack. The DDR cache module buffers and stores data being written by the controller. When the system is powered on, the capacitor pack charges fully in about 5 minutes. In the event of a system power failure, a fully charged capacitor pack provides power for up to 80 seconds. During that interval, the controller transfers the cached data from DDR memory to flash memory, where the data remains indefinitely or until a controller retrieves the data.

> **CAUTION:** The cache module connector does not use the industry-standard DDR3 mini-DIMMs. Do not use the controller with cache modules designed for other controller models, because the controller can malfunction and you can lose data. Also, do not transfer this cache module to an unsupported controller model, because you can lose data.

> **CAUTION:** To prevent a server malfunction or damage to the equipment, do not add or remove the battery pack while an array capacity expansion, RAID level migration, or stripe size migration is in progress.

> **CAUTION:** After the server is powered down, wait 15 seconds and then check the amber LED before unplugging the cable from the cache module. If the amber LED blinks after 15 seconds, do not remove the cable from the cache module. The cache module is backing up data, and data is lost if the cable is detached.

IMPORTANT: The battery pack might have a low charge when installed. In this case, a POST error message is displayed when the server is powered up, indicating that the battery pack is temporarily disabled. No action is necessary on your part. The internal circuitry automatically recharges the batteries and enables the battery pack. This process might take up to four hours. During this time, the cache module functions properly, but without the performance advantage of the battery pack.

NOTE: The data protection and the time limit also apply if a power outage occurs. When power is restored to the system, an initialization process writes the preserved data to the hard drives.

# Installing the flash-backed write cache module

CAUTION: The cache module connector does not use the industry-standard DDR3 mini-DIMMs. Do not use the controller with cache modules designed for other controller models, because the controller can malfunction and you can lose data. Also, do not transfer this cache module to an unsupported controller model, because you can lose data.
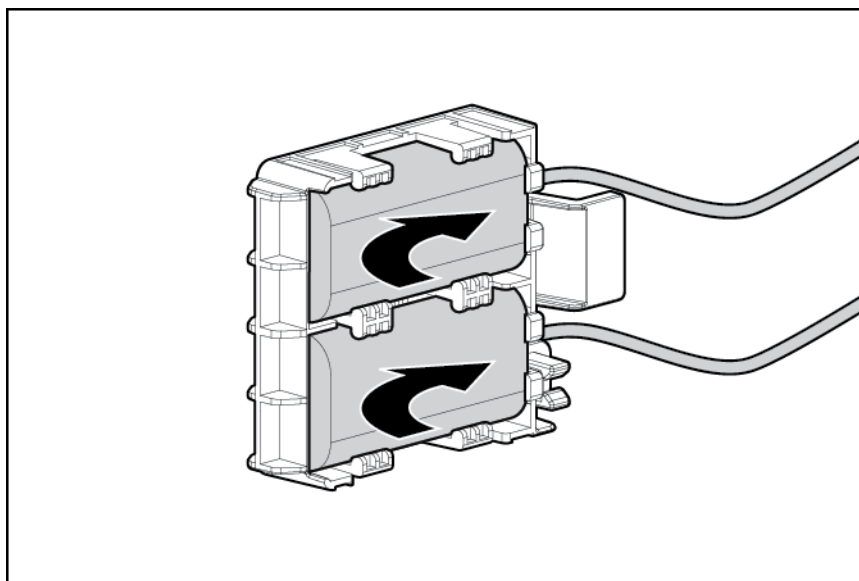
1. Back up all data.

2. Close all applications.

   CAUTION: In systems that use external data storage, be sure that the server is the first unit to be powered down and the last to be powered back up. Taking this precaution ensures that the system does not erroneously mark the drives as failed when the server is powered up.

3. Power down the server on page 18.

4. Remove all power:

   a. Disconnect each power cord from the power source.

   b. Disconnect each power cord from the server.

5. Extend the server from the rack on page 19.

6. Remove the access panel on page 20.

7. Install the cache module.
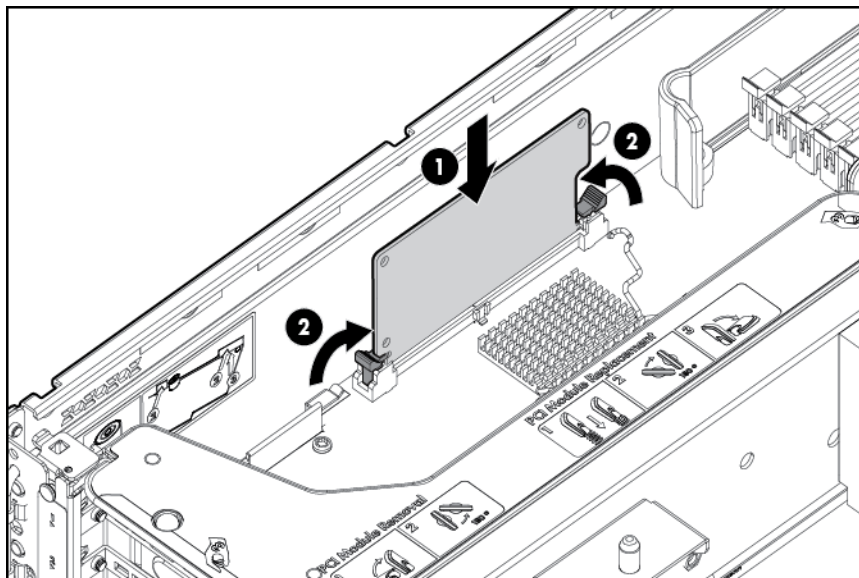
8. Connect the capacitor pack cable to the connector on the top of the cache module.
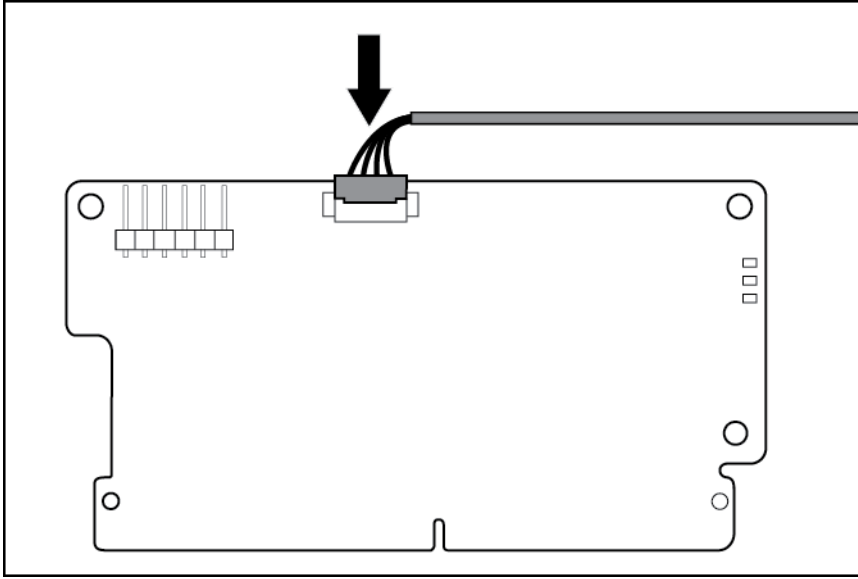
9. Install the access panel on page 20.

10. Install the server into the rack (Installing the server into the rack on page 35).

11. Connect each power cord to the server.

12. Connect each power cord to the power source.

13. Power up the server on page 18.

Installing the flash-backed write cache capacitor pack

⚠ **CAUTION:** The cache module connector does not use the industry-standard DDR3 mini-DIMMs. Do not use the controller with cache modules designed for other controller models, because the controller can malfunction and you can lose data. Also, do not transfer this cache module to an unsupported controller model, because you can lose data.

1. Back up all data.

2. Close all applications.

⚠ **CAUTION:** In systems that use external data storage, be sure that the server is the first unit to be powered down and the last to be powered back up. Taking this precaution ensures that the system does not erroneously mark the drives as failed when the server is powered up.

3. Power down the server on page 18.

4. Remove all power:

   a. Disconnect each power cord from the power source.

   b. Disconnect each power cord from the server.

5. Extend the server from the rack on page 19.

6. Remove the access panel on page 20.

7. Install the FBWC module (Installing the flash-backed write cache module on page 49), if it is not already installed.
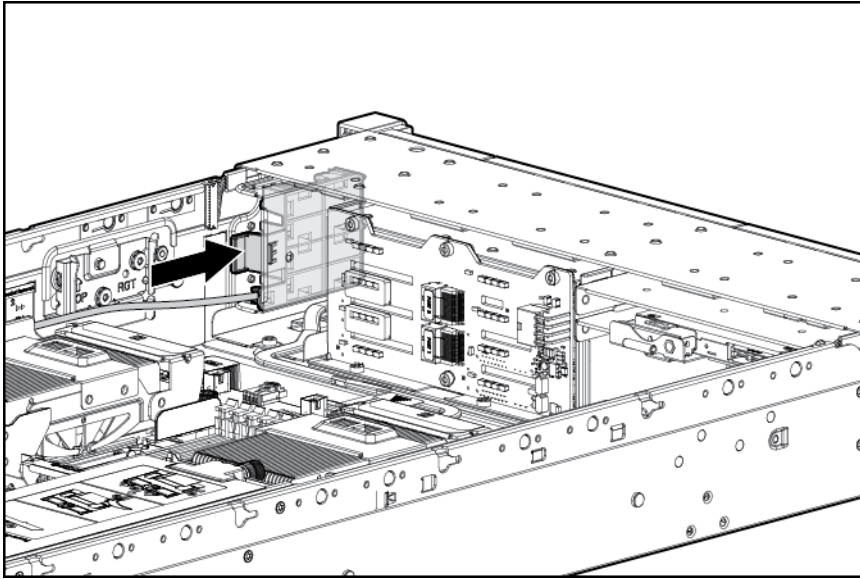
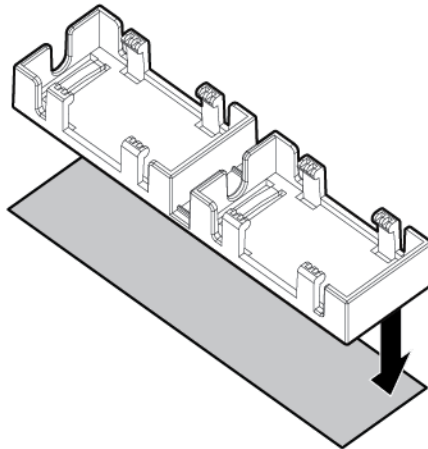8. Connect the capacitor pack cable to the connector on the top of the cache module.
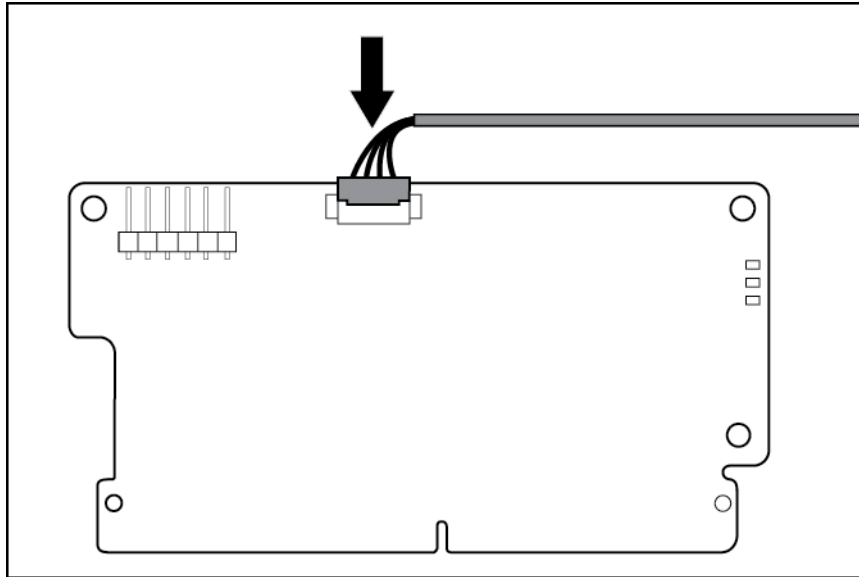
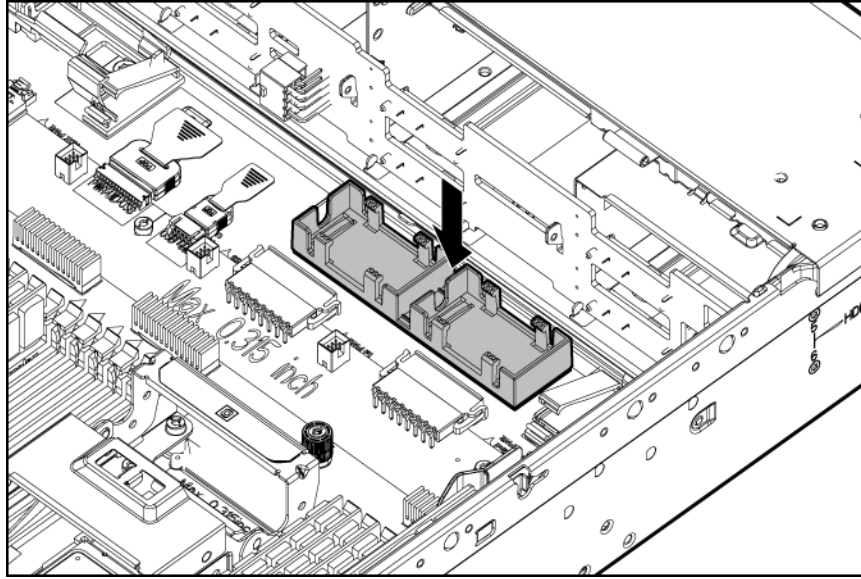9. Install one or two FBWC capacitor packs into the FBWC capacitor pack holder.

10. Install the FBWC capacitor pack holder into the server:

a. Remove the Velcro liner.

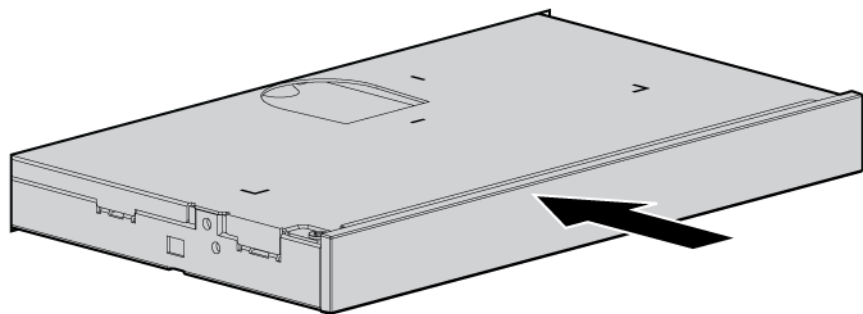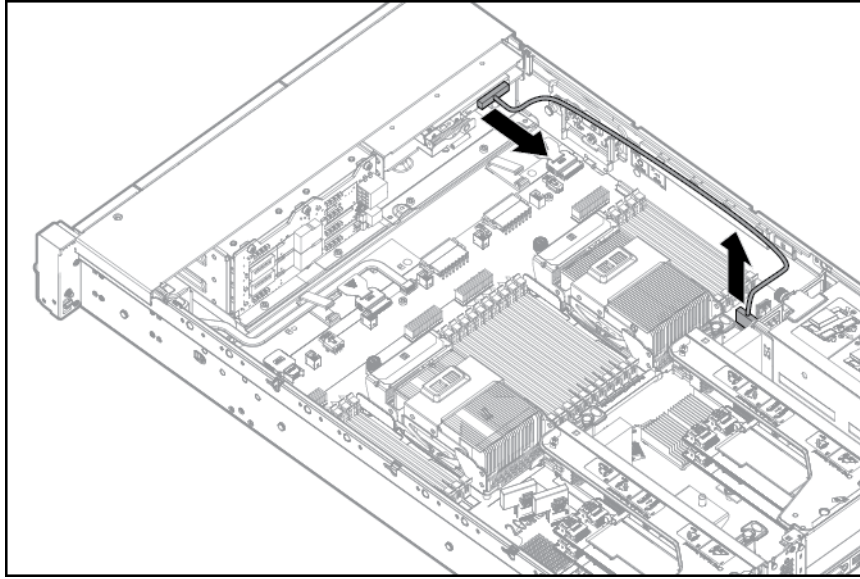**b.** Install the FBWC capacitor pack holder into the server.

11. .

12. Install the server into the rack ().

13. Connect each power cord to the server.

14. Connect each power cord to the power source.

15. .

Optical drive option

1. [Power down the server on page 18](#).

2. Remove all power:

   a. Disconnect each power cord from the power source.

   b. Disconnect each power cord from the server.

3. [Extend the server from the rack on page 19](#).

4. [Remove the access panel on page 20](#).

5. Remove the existing media drive option or blank.
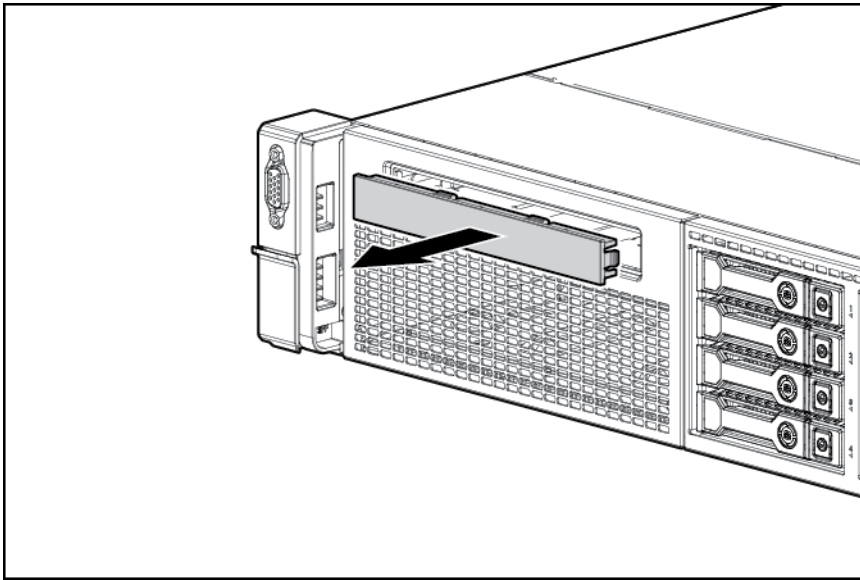
6. Slide the optical drive into the drive bay.

7. Connect the power and data cable to the system board and the optical drive.

8. Install the access panel on page 20.
9. Install the server into the rack (Installing the server into the rack on page 35).
10. Connect each power cord to the server.
11. Connect each power cord to the power source.
12. Power up the server on page 18.

48V DC power supply option

One of the following optional HP input cables with pre-fastened ring tongues may be purchased from HP or an authorized reseller:

- A5S97A—1.3-m (4.27-ft) 48V DC Power Cable Kit
- A5S98A—2.5-m (8.20-ft) 48V DC Power Cable Kit

If you are not using an optional HP input cable, use an HP-approved 10 or 12 AWG green and yellow ground cable, no shorter than 150 cm (59.06 in), and 10 or 12 AWG power cables.
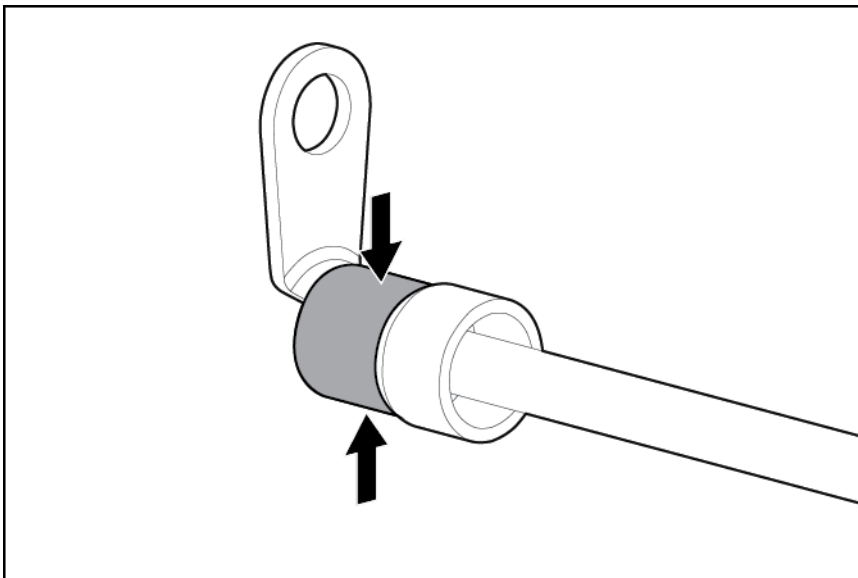
To install the component:

1. Remove the blank.
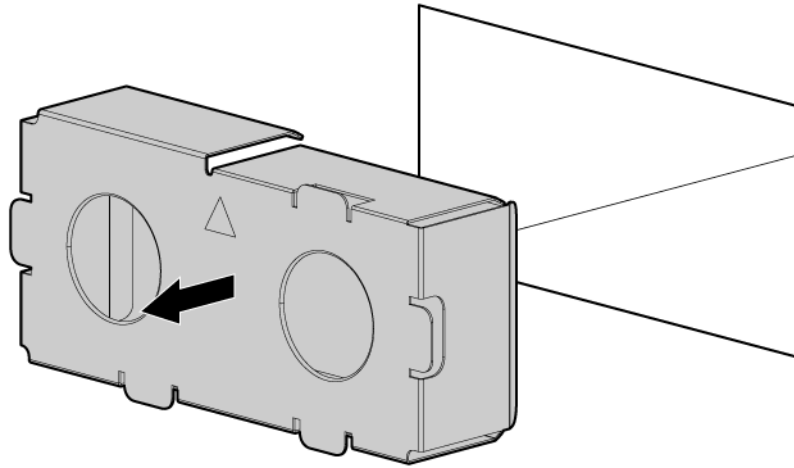
2. If you are not using an optional HP input cable, with the ground cable disconnected from the 48V power source, crimp the ring tongues to the power and ground cables coming from the 48V source.

IMPORTANT: The power supply uses two power ring tongues and one ground ring tongue. They are not interchangeable.
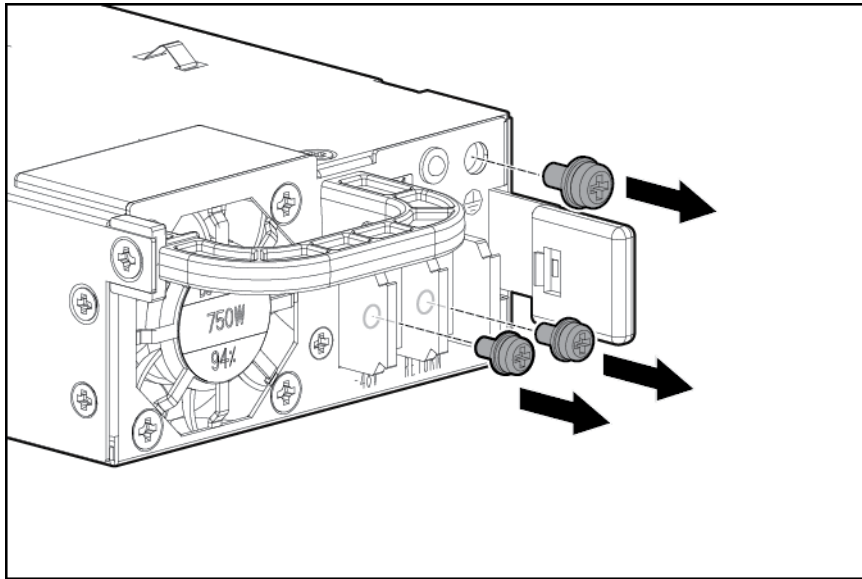
3. Remove the safety cover from the terminal block on the front of the power supply.
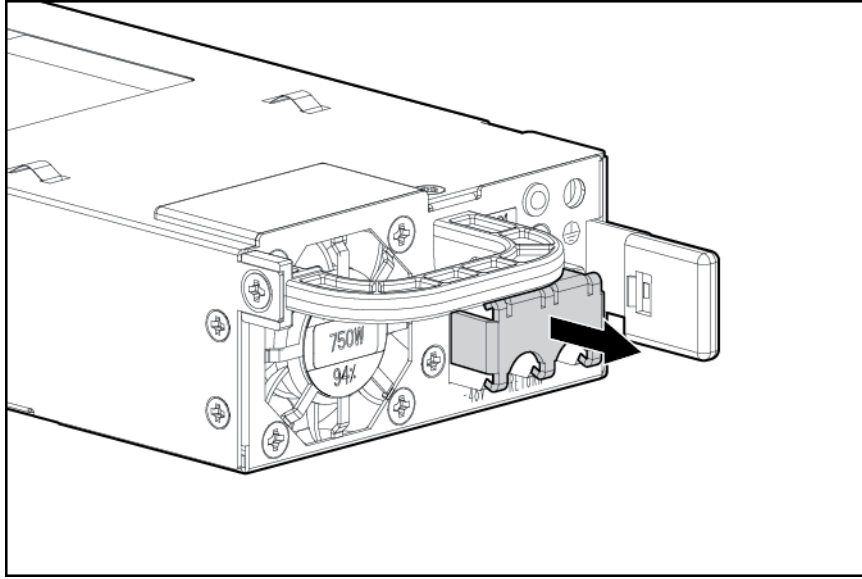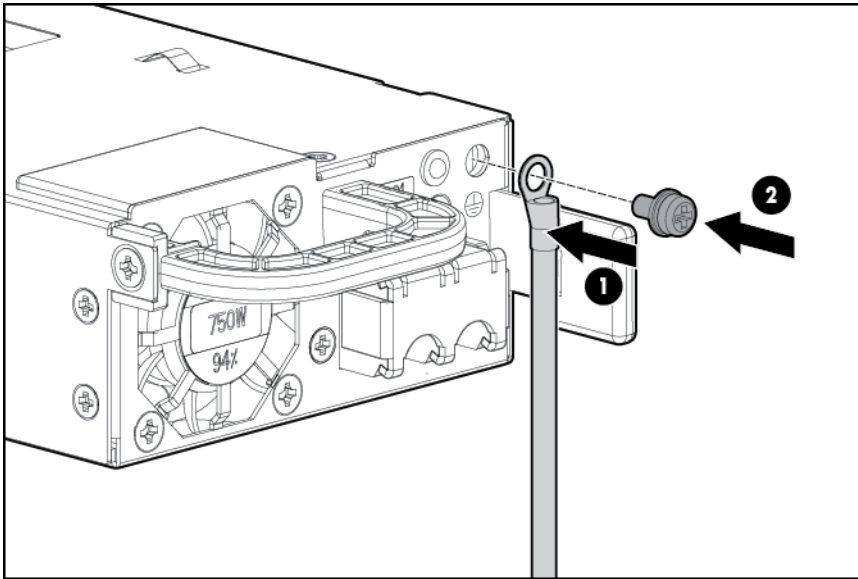

4. Remove the screws from the terminal block.

IMPORTANT: The minimum nominal thread diameter of a pillar or stud type terminal must be 3.5 mm (0.138 in); the diameter of a screw type terminal must be 4.0 mm (0.157 in).

5. Attach the ground (earthed) wire to the ground screw and washer and tighten to 1.47 N m (13 lb-in) of torque. The ground wire must be connected before the positive or negative lead wires.
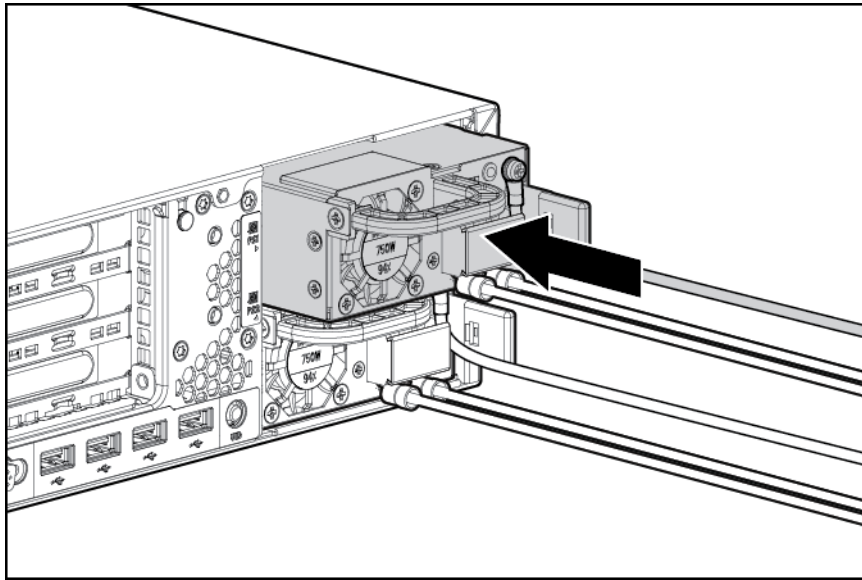
6. Attach the power ring tongues to the terminal block, following the polarity label below the terminal block, and then tighten the screws to 1.47 N m (13 lb-in) of torque.
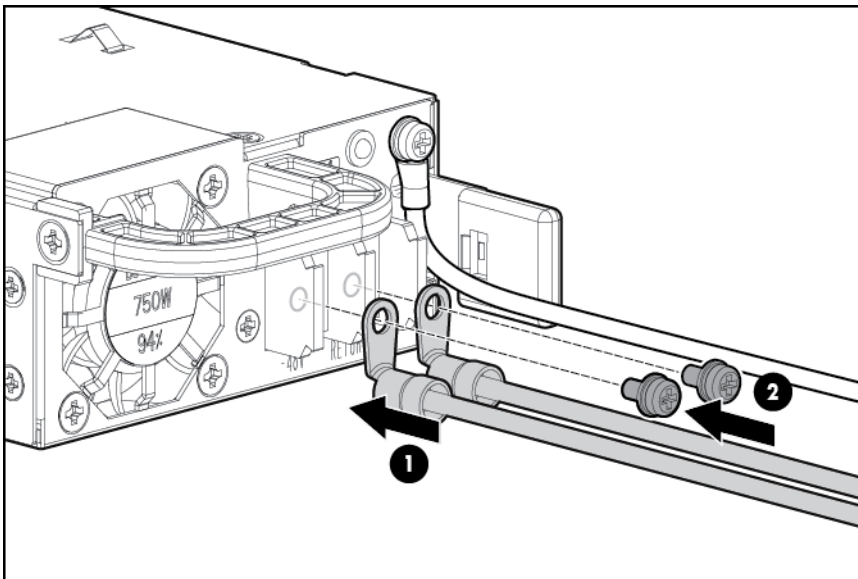
7. Replace the safety cover.
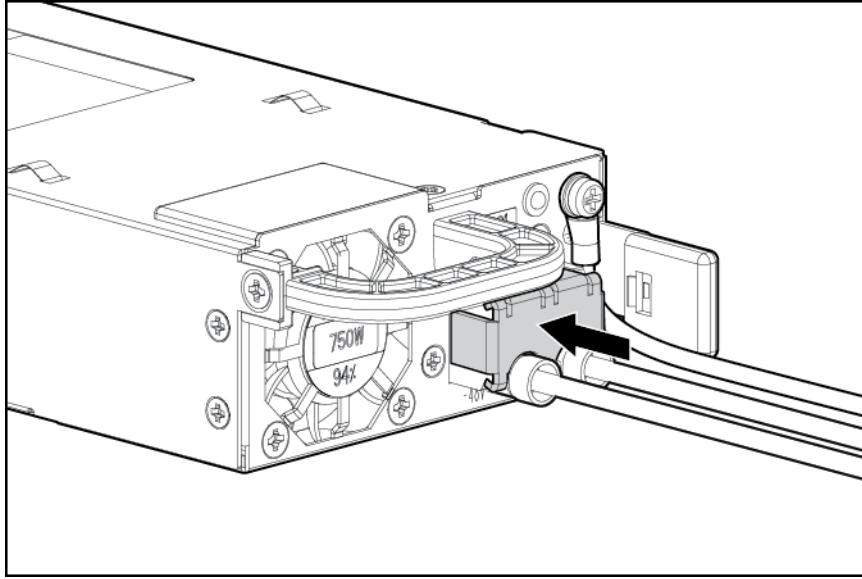
8. Insert the power supply into the power supply bay until it clicks into place.

9. Route the power cord. Use best practices when routing power cords and other cables. A cable management arm is available to help with routing. To obtain a cable management arm, contact an HP authorized reseller.

10. Make sure the 48V DC power source is off or the PDU breaker is in the off position, and then connect the power cord to the 48V DC power source or PDU.

11. Turn on the 48V power source or switch the PDU breaker to the on position to supply 48V to the power supply.

12. Be sure that the green power supply LED is on.

FlexibleLOM option

⚠️ **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.

1. .

2. Remove all power:

   a. Disconnect each power cord from the power source.

   b. Disconnect each power cord from the server.

3. Remove any attached network cables.

4. .

5. .

6. Loosen the thumbscrew.

7. Remove the existing FlexibleLOM.
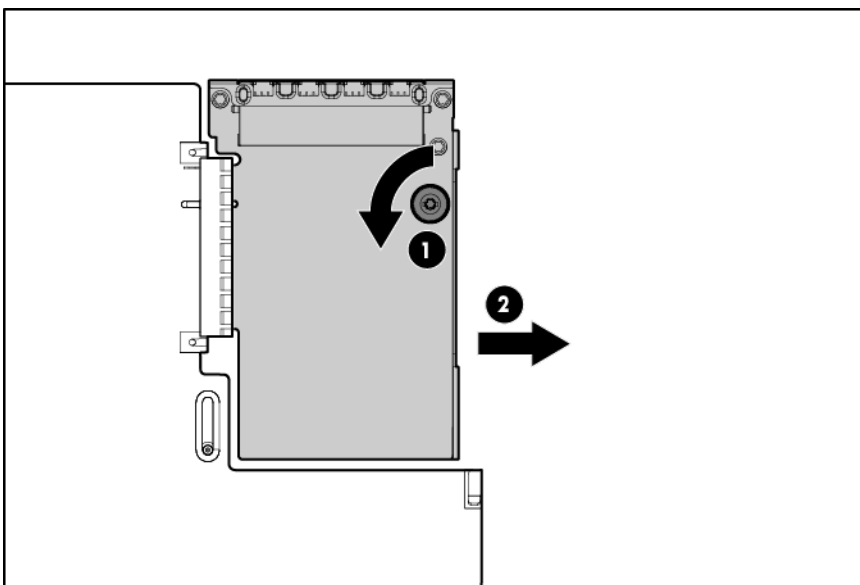
To replace the component:

1. Firmly seat the FlexibleLOM in the slot, and then tighten the thumbscrew.

2. [Install the access panel on page 20](#).

3. Slide the server into the rack.

4. Connect the LAN segment cables.

5. Connect each power cord to the server.

6. Connect each power cord to the power source.

7. [Power up the server on page 18](#).

Expansion board options

The server supports PCI Express expansion boards. The server ships with PCIe riser boards and expansion slots. PCIe expansion boards are supported with optional riser boards.
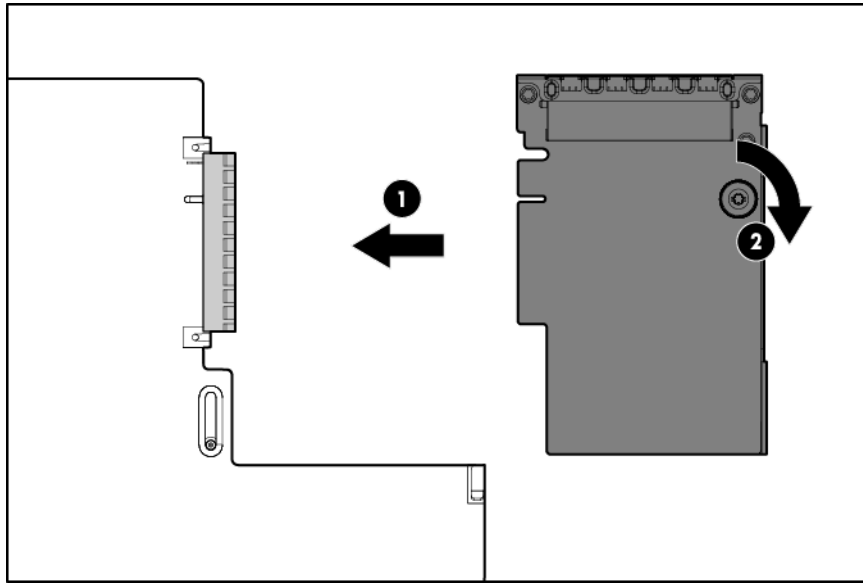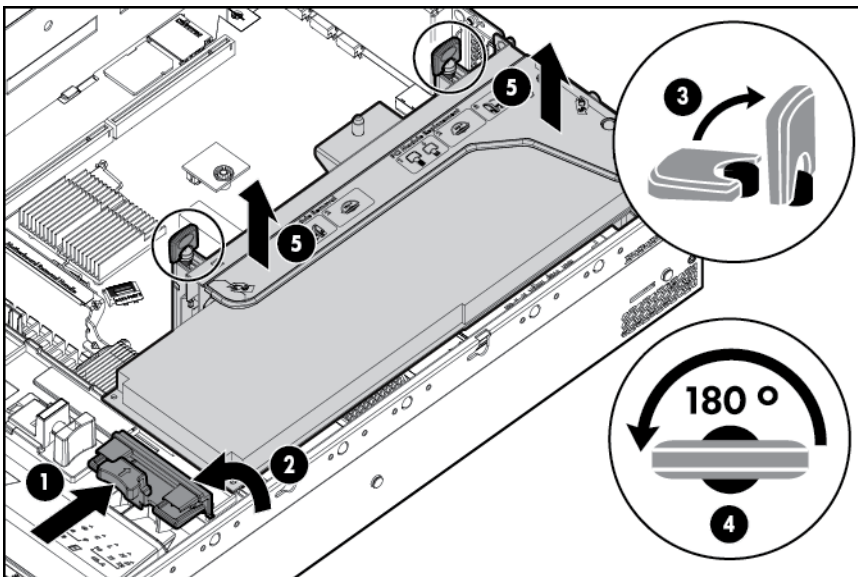
Removing the expansion slot blanks

⚠ **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:** 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.

1. Power down the server on page 18.

2. Remove all power:

   a. Disconnect each power cord from the power source.

   b. Disconnect each power cord from the server.

3. Extend (Extend the server from the rack on page 19) or remove the server from the rack.

4. Remove the access panel on page 20.

5. Disconnect any external cables that are connected to the expansion board.

6. Disconnect any internal cables that are connected to the expansion board.

7. Remove the primary PCIe riser cage (Remove the PCI riser cage on page 25).

8. Remove the cage cover.

9. Remove the expansion slot blank.
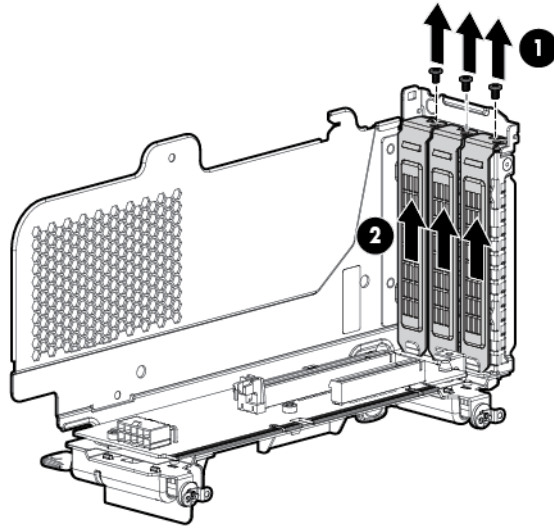
To replace the component, reverse the removal procedure.

Installing a half-length expansion board

1. .

2. Remove all power:

   a. Disconnect each power cord from the power source.

   b. Disconnect each power cord from the server.

3. .

4. .

5. .

6. Remove the expansion slot blank ().

7. Install the expansion board.

8. Connect any required internal or external cables to the expansion board. See the documentation that ships with the expansion board.

9. .

10. .

11. Install the server into the rack ().

12. Connect each power cord to the server.

13. Connect each power cord to the power source.

14. .

Installing a full-length expansion board

1. Power down the server on page 18.
2. Remove all power:

   a. Disconnect each power cord from the power source.

   b. Disconnect each power cord from the server.
3. Extend the server from the rack on page 19.
4. Remove the access panel on page 20.
5. Release the full-length expansion board retainer, and then remove the PCI riser cage.
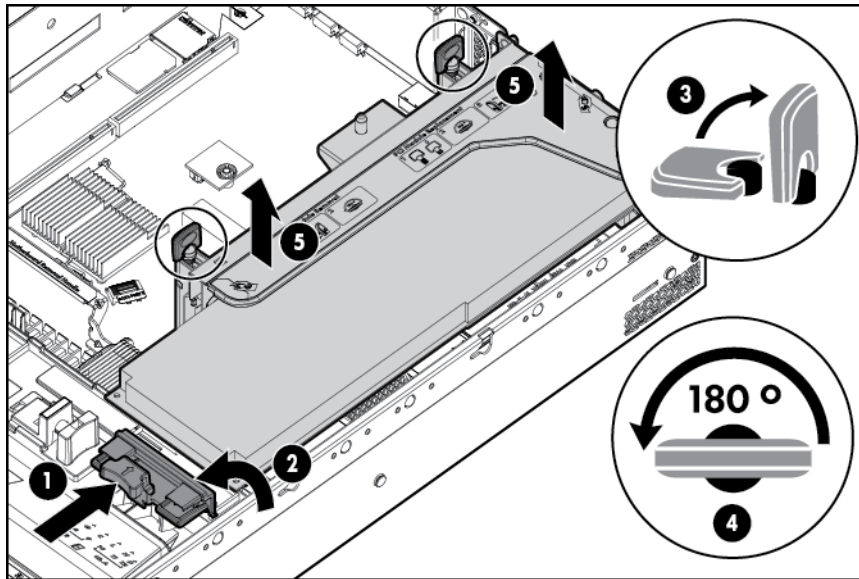
6. Remove the expansion slot cover (Removing the expansion slot blanks on page 62).
7. Install the expansion board.
8. Connect any required internal or external cables to the expansion board. See the documentation that ships with the expansion board.
9. Install the PCI riser cage on page 26.
10. Secure the full-length expansion board retainer on page 27 if any full-length expansion boards are installed.
11. Install the access panel on page 20.
12. Install the server into the rack (Installing the server into the rack on page 35).
13. Connect each power cord to the server.
14. Connect each power cord to the power source.
15. Power up the server on page 18.

Secondary PCI riser cage option

⚠ 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: To prevent improper cooling and thermal damage, do not operate the server unless all PCI slots have either an expansion slot cover or an expansion board installed.

📝 IMPORTANT: The secondary PCI riser cage option requires both processors.

To install the component:

1. Power down the server on page 18.

2. Remove all power:

   a. Disconnect each power cord from the power source.

   b. Disconnect each power cord from the server.

3. Extend the server from the rack on page 19.

4. Remove the access panel on page 20.

5. Remove the PCI riser blank.

6. Remove the secondary PCI riser cage.
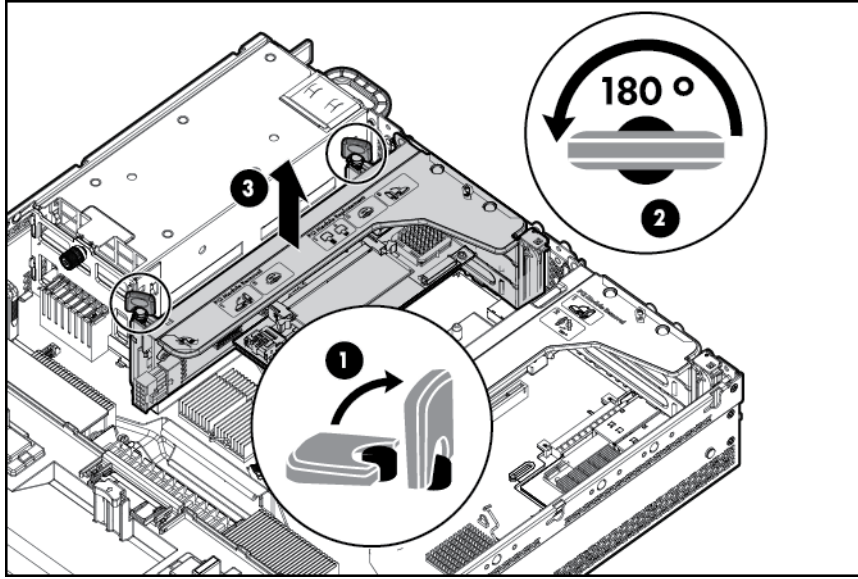
7. Remove the riser cage cover.

8. Remove the blanks from the secondary PCI riser cage.
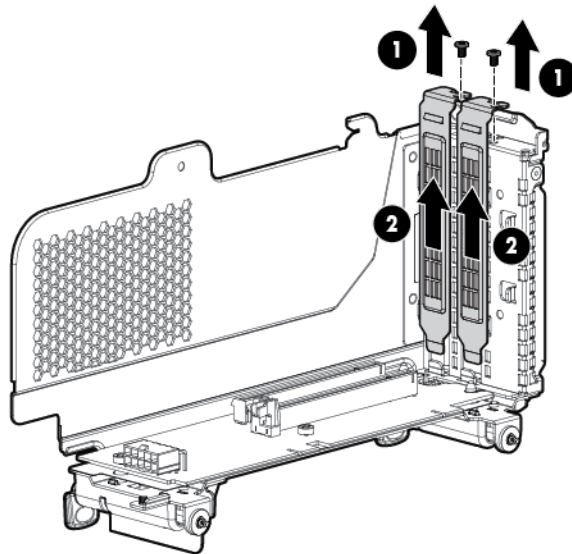
9. Install an expansion board into the PCI riser cage.

10. Install the riser cage cover.

11. Install the secondary PCI riser cage.
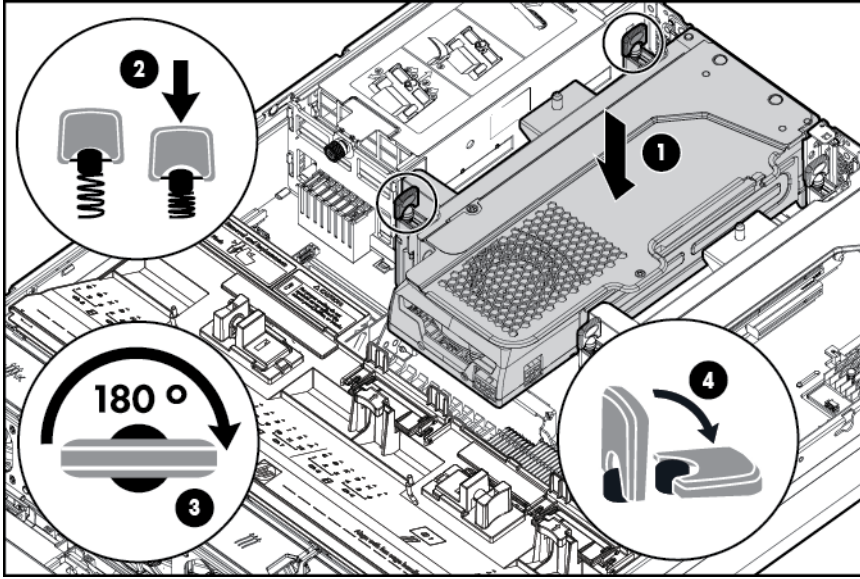
12. [Install the access panel on page 20](#).
13. Install the server into the rack ([Installing the server into the rack on page 35](#)).
14. Connect each power cord to the server.
15. Connect each power cord to the power source.
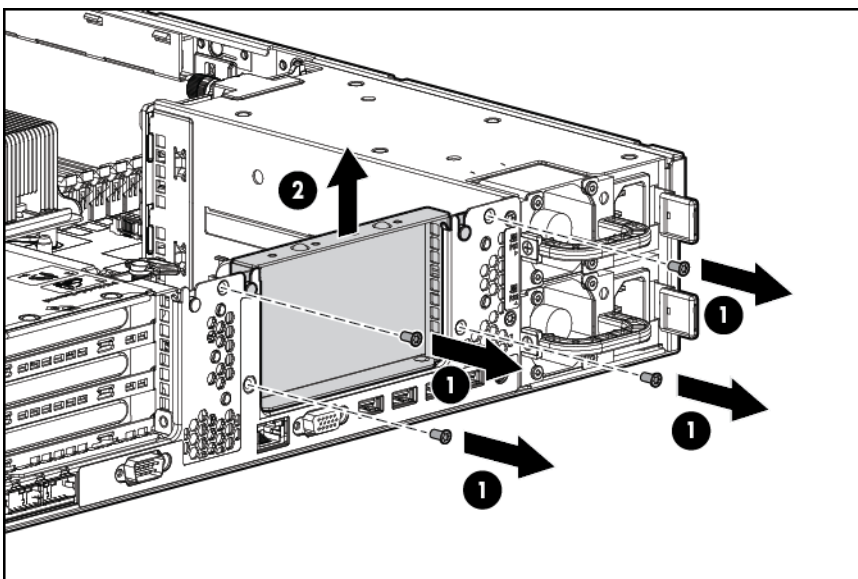16. [Power up the server on page 18](#).

2U rack bezel option

The 2U rack bezel helps prevent any unauthorized physical access to the server in the rack configuration. To access the hard drive cage, you must unlock and open the 2U rack bezel.

To unlock the 2U rack bezel, use the key provided with the kit.

Install the 2U rack bezel into the chassis, and then lock the 2U rack bezel with the key.

HP Trusted Platform Module option

For more information about product features, specifications, options, configurations, and compatibility, see the product QuickSpecs on the HP Product Bulletin website (http://www.hp.com/go/productbulletin).

Use these instructions to install and enable a TPM on a supported server. This procedure includes three sections:
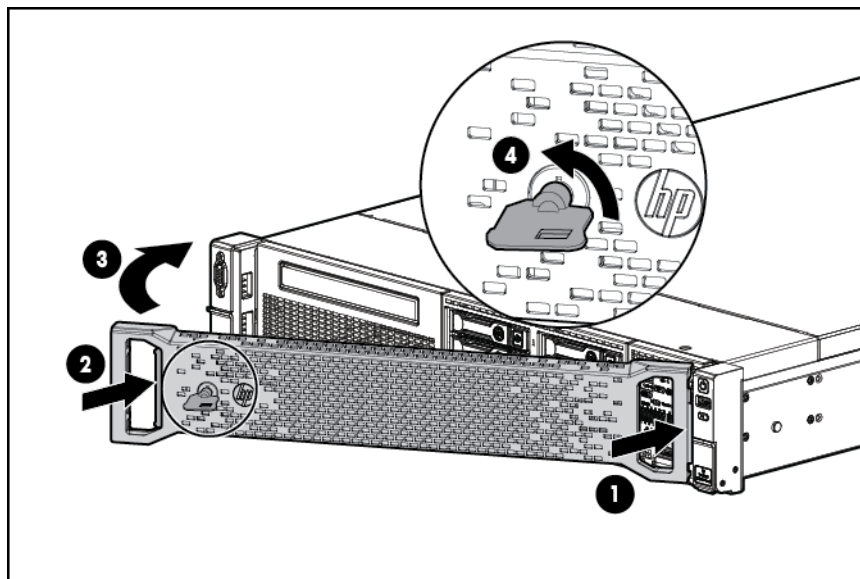
1. Installing the Trusted Platform Module board.

2. Retaining the recovery key/password on page 72.

3. Enabling the Trusted Platform Module on page 72.

   Enabling the TPM requires accessing RBSU (HP ROM-Based Setup Utility on page 86). For more information about RBSU, see the HP website (http://www.hp.com/go/ilomgmtengine/docs).

TPM installation requires the use of drive encryption technology.

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

When installing or replacing a TPM, observe the following guidelines:

- Do not remove an installed TPM. Once installed, the TPM becomes a permanent part of the system board.

- When installing or replacing hardware, HP service providers cannot enable the TPM or the encryption technology. For security reasons, only the customer can enable these features.

- When returning a system board for service replacement, do not remove the TPM from the system board. When requested, HP Service provides a TPM with the spare system board.

- 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.

- HP 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.

## Installing the Trusted Platform Module board

⚠ **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.

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

1. Power down the server on page 18

2. Remove all power:

   a. Disconnect each power cord from the power source.

   b. Disconnect each power cord from the server.

3. Remove the server from the rack, if necessary.

4. Place the server on a flat, level work surface.

5. Remove the access panel on page 20

6. Remove the PCI riser cage on page 25

7. Remove the air baffle on page 28

⚠ **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.

8. Install the TPM board. Press down on the connector to seat the board (System board components on page 10).
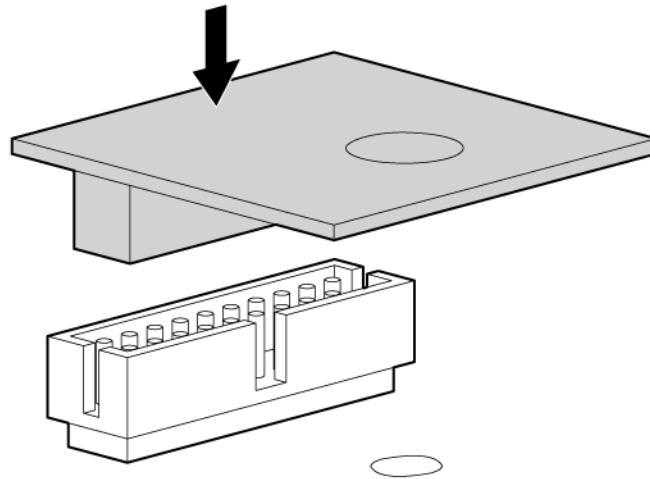
9. Install the TPM security rivet by pressing the rivet firmly into the system board.
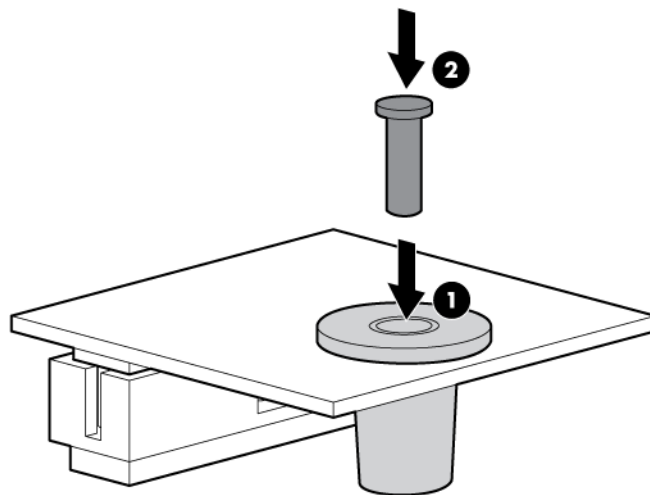
10. Install the air baffle.

11. Install the PCI riser cage on page 26

12. Install the access panel on page 20

13. Install the server into the rack (Installing the server into the rack on page 35).

14. Connect each power cord to the server.

15. Connect each power cord to the power source.

16. Power up the server on page 18

Retaining the recovery key/password

To help ensure maximum security, observe the following guidelines when retaining the recovery key/password:

- Always store the recovery key/password in multiple locations.

- Always store copies of the recovery key/password away from the server.

- Do not save the recovery key/password on the encrypted hard drive.

Enabling the Trusted Platform Module

1. When prompted during the start-up sequence, access RBSU by pressing the F9 key.

2. From the Main Menu, select **Server Security**.

3. From the Server Security Menu, select **Trusted Platform Module**.

4. From the Trusted Platform Module Menu, select **TPM Functionality**.

5. Select **Enable**, and then press the Enter key to modify the TPM Functionality setting.

6. Press the Esc key to exit the current menu, or press the F10 key to exit RBSU.

7. Reboot the server.

8. 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 modifying OS application TPM settings.

For more information on firmware updates and hardware procedures, see the *HP Trusted Platform Module Best Practices White Paper* on the HP website (http://www.hp.com/support).

6 Cabling

SAS hard drive cabling

- SFF hard drive cabling
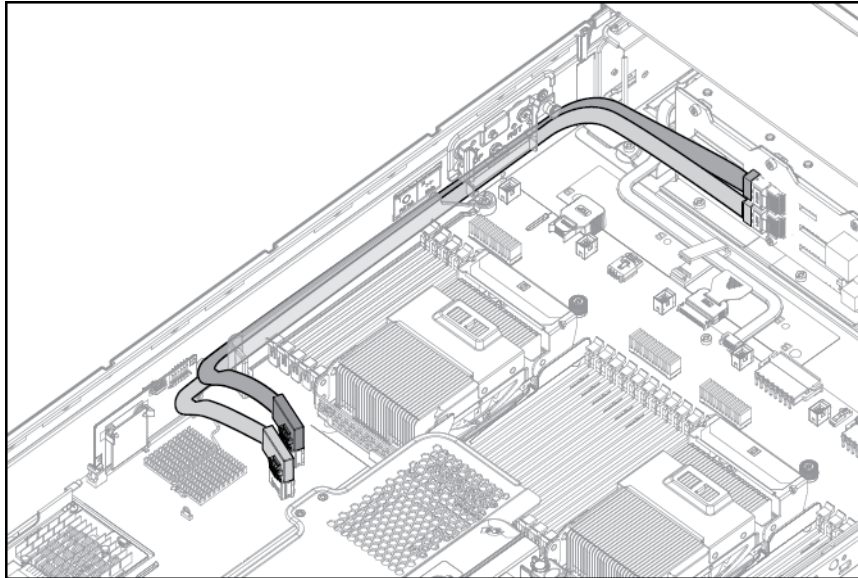
- SFF cabling, with optional drive cage

- LFF hard drive cabling

Optical drive cabling

FBWC cabling

- 8 drive SFF

- PCIe option

    Depending on the server configuration, you may need to remove the primary PCI riser cage (Remove the PCI riser cage on page 25) before cabling to a PCIe expansion board.

Chipset SATA cable option

With the chipset SATA cable option, the chipset SATA controller can be used with a single SATA hard drive that is installed in one hard drive bay of the SFF or LFF hard drive cage.
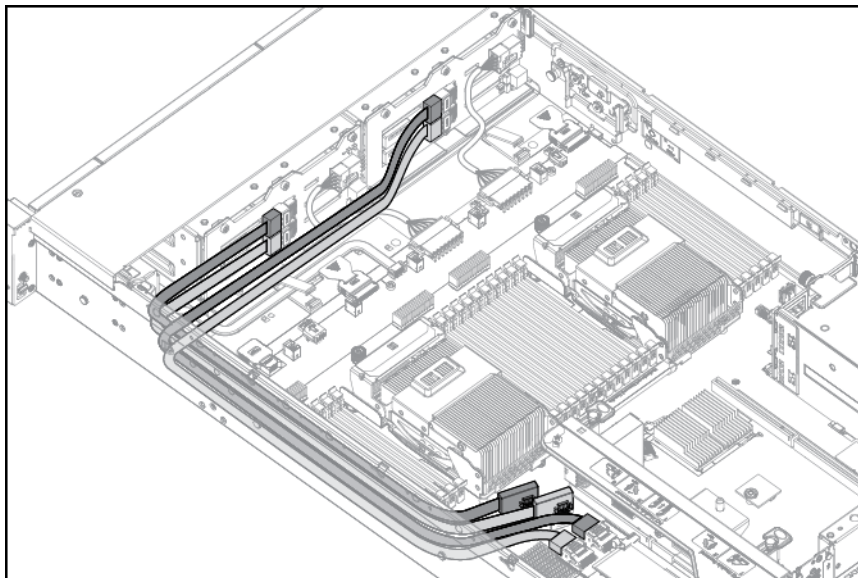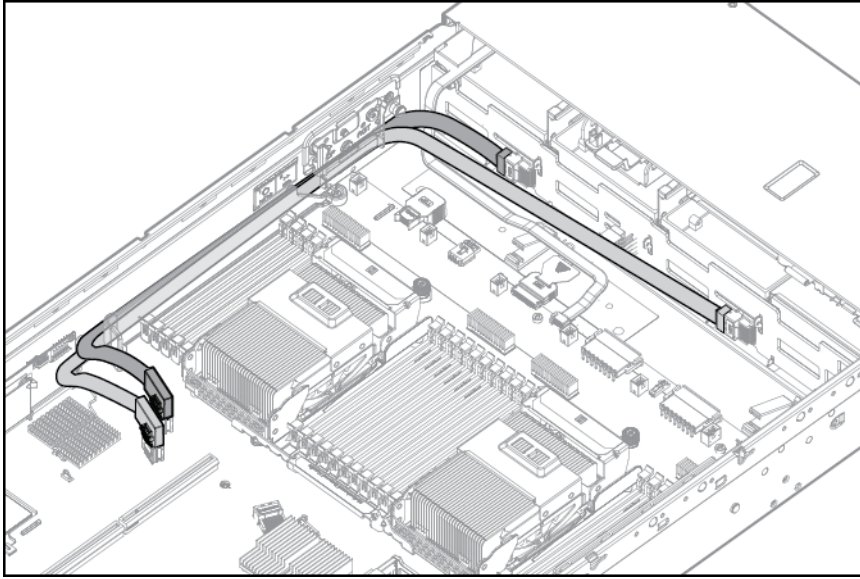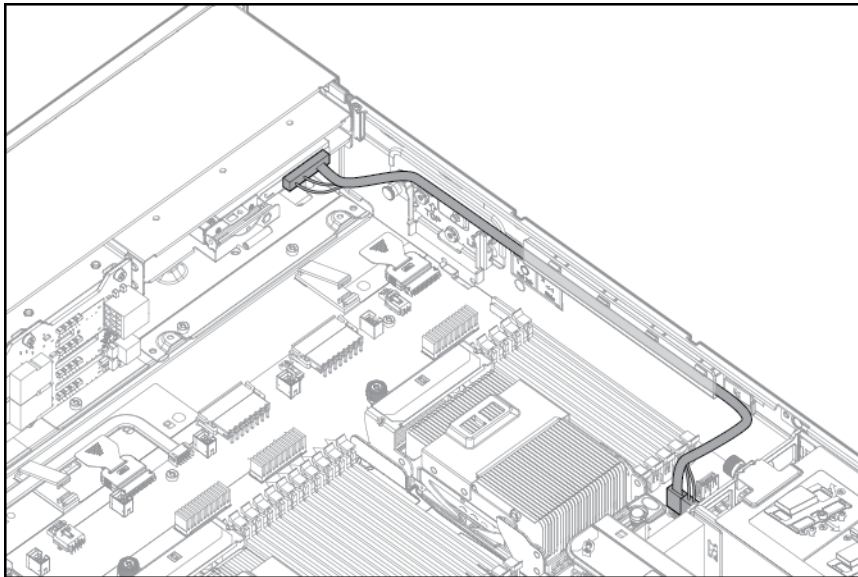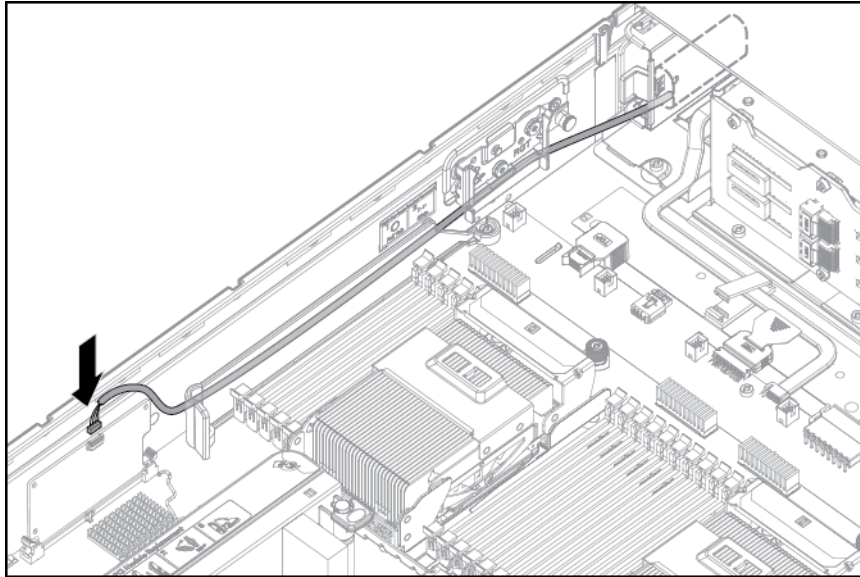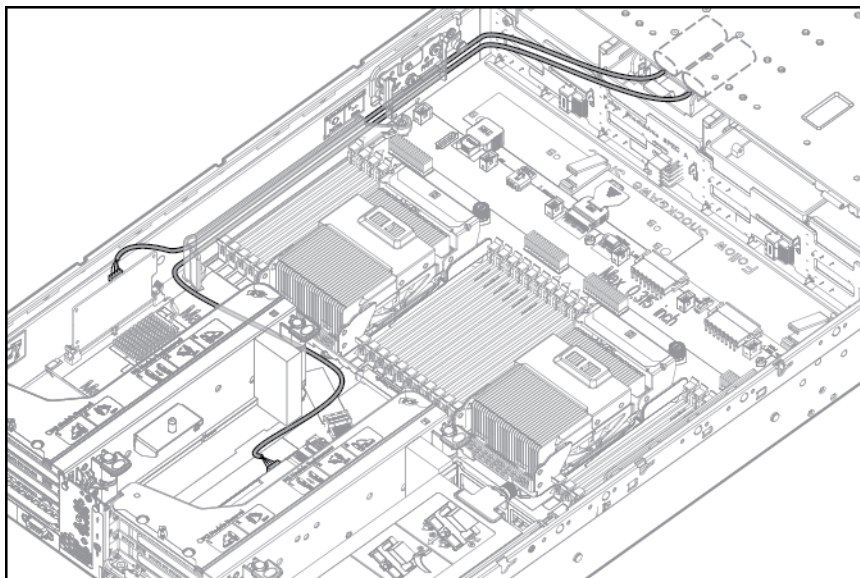
- When using the chipset SATA configuration, the following conditions apply:

  - Only drive bay 5 is enabled. The remaining drive bays are disabled.

  - The optical bay is disabled because the chipset SATA controller port on the system board is redirected from the optical bay to the drive cage.

  - Hard drive status LEDs are not supported.

  - Hard drive thermal status monitoring is not supported.

  - Hot-plug operation is not supported.

- Because only one drive bay is enabled, all remaining drives can be removed.

  For proper thermal cooling, install blanks in all bays that do not have a drive installed. Order a sufficient number of 6.35-cm (2.5-in) or 8.89-cm (3.5-in) hard drive blank option kits from an HP authorized reseller. For more information, see the server maintenance and service guide.

- The standard SATA driver is included with supported operating systems. No additional driver is required.

1. .

2. Remove all power:

   a. Disconnect each power cord from the power source.

   b. Disconnect each power cord from the server.

3. .

4. .

> ⚠ **WARNING!** Eliminate the risk of electric shock by removing all AC power from the system before installing or replacing any non-hot-plug hardware option. Disconnect all power cords to completely remove power 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.

> 📝 **IMPORTANT:** It is necessary to remove the PCI riser cage only if there is a full-length expansion board installed.

5. Release the full-length expansion board retainer, and then remove the PCI riser cage.

6.
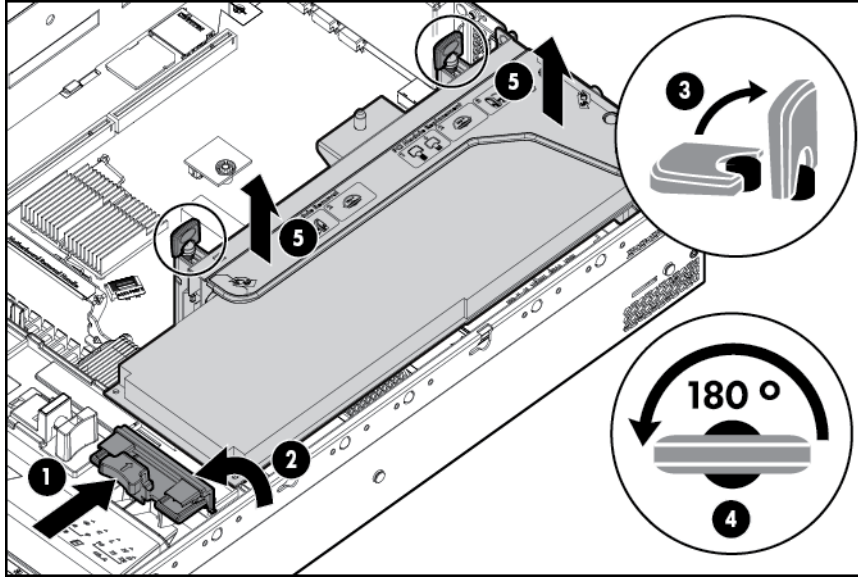
7. Remove the fan cage.

8. Disconnect any SAS cables from the hard drive cage and either the embedded SAS controller or an optional SAS controller. Do not disconnect the power cable.
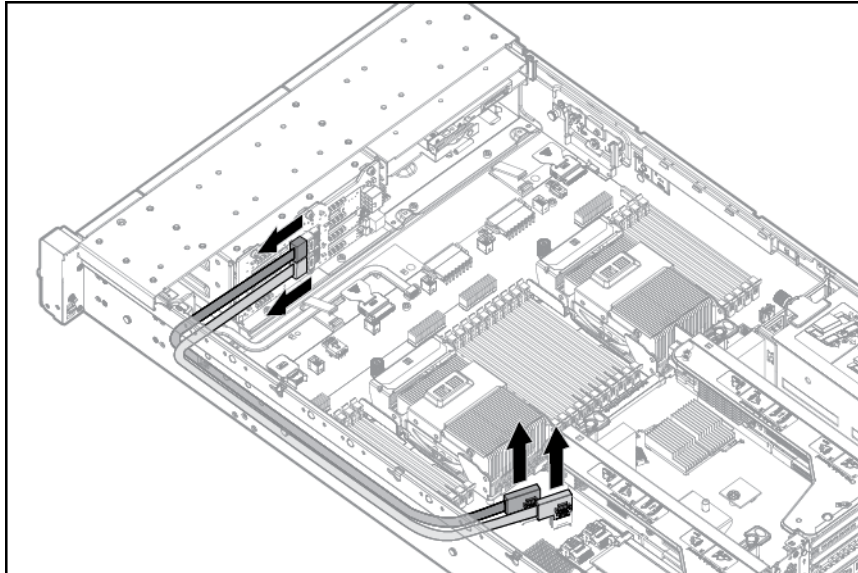
9. Disconnect the SATA cable from the optical drive and the SATA connector on the system board. The optical bay is disabled with the chipset SATA cable option.
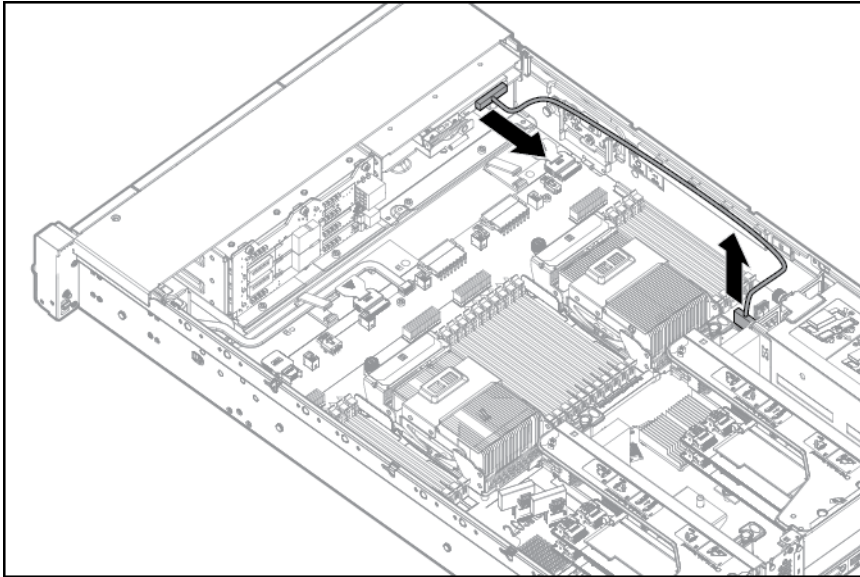
10. Connect the chipset SATA cable:

    a. Connect the chipset SATA cable connector to the chipset SATA controller port on the system board. The chipset SATA connector on the SATA cable is narrower than the chipset SATA controller port header on the system board.

    b. Connect the remaining chipset SATA cable connector to the SATA header on the hard drive cage.
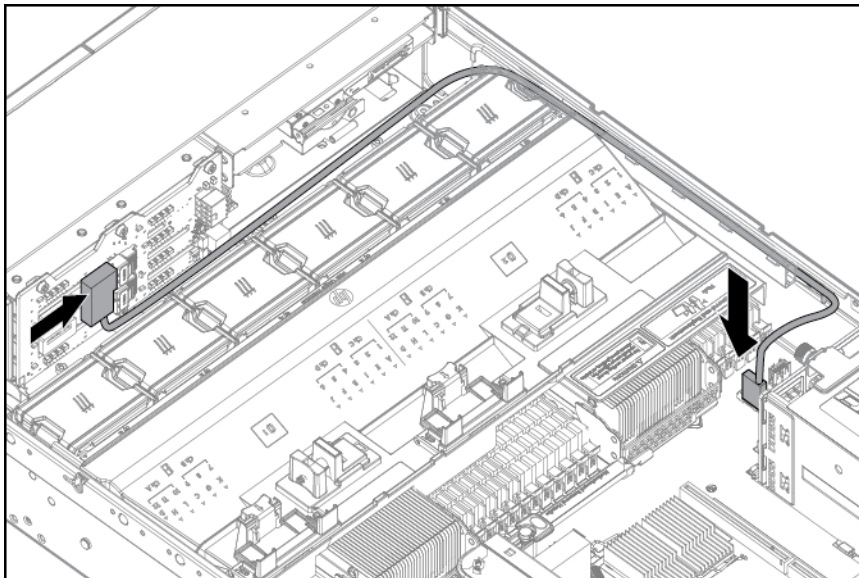
11. Coil the cables behind the hard drive backplane to minimize airflow impact.

12. Install the fan cage.

13. Install the air baffle (Remove the air baffle on page 28).

14. Install the PCI riser cage on page 26, if removed.

15. Secure any full-length PCI expansion boards with the retaining latch on the air baffle (Secure the full-length expansion board retainer on page 27).

16. Install the access panel on page 20

17. Install the server in the rack (Installing the server into the rack on page 35).

18. Remove any installed hard drives (Removing a hot-plug SAS or SATA hard drive on page 48).

19. Install a SATA hard drive (Installing a hot-plug SAS or SATA hard drive on page 47) in hard drive bay 5.

20. Install hard drive blanks in any empty hard drive bays.

21. Connect each power cord to the server.

22. Connect each power cord to the power source.

23. Power up the server on page 18

24. Using the HP ROM-Based Setup Utility on page 86, disable the embedded HP Smart Array P420i Controller, if necessary.

PCIe power cable option

⚠ **CAUTION:** CAUTION: To prevent damage to the server or expansion boards, power down the server and remove all AC power cords before removing or installing the PCI expansion cage.

Connect the cable that was provided with the PCIe card.

7   Software and configuration utilities

> **NOTE:**   While some of the documentation that supports this product contains the HP Proliant and the DL380p Gen8 Server product names, most of the information in those documents is relevant to this workstation product. Since this product is supported on VMware and Citrix operating systems only, information specific to Microsoft Windows and Linux may not apply.

Server mode

The software and configuration utilities presented in this section operate in online mode, offline mode, or in both modes.

Software or configuration utility	Server mode
HP iLO on page 81	Online and Offline
Active Health System on page 81	Online and Offline
Integrated Management Log on page 82	Online and Offline
Intelligent Provisioning on page 82	Offline
HP Insight Remote Support software	Online
HP Insight Online	Online
Erase Utility on page 83	Offline
Scripting Toolkit on page 84	Online
HP Service Pack for ProLiant on page 85	Online and Offline
HP Smart Update Manager on page 85	Online and Offline
HP ROM-Based Setup Utility on page 86	Offline
Array Configuration Utility on page 88	Online and Offline
Option ROM Configuration for Arrays on page 89	Offline
ROMPaq utility on page 90	Offline

HP product QuickSpecs

For more information about product features, specifications, options, configurations, and compatibility, see the product QuickSpecs on the HP Product Bulletin website (http://www.hp.com/go/productbulletin).

HP iLO Management Engine

The HP iLO Management Engine is a set of embedded management features supporting the complete lifecycle of the server, from initial deployment through ongoing management.

HP iLO

The HP iLO subsystem is a standard component of selected HP ProLiant servers that simplifies initial server setup, server health monitoring, power and thermal optimization, and remote server administration. The HP iLO subsystem includes an intelligent microprocessor, secure memory, and a dedicated network interface. This design makes HP iLO independent of the host server and its operating system.

HP iLO enables and manages the Active Health System on page 81 and also features Agentless Management. All key internal subsystems are monitored by HP iLO. SNMP alerts are sent directly by HP iLO regardless of the host operating system or even if no host operating system is installed.

HP Insight Remote Support software is also available in HP iLO with no operating system software, drivers, or agents.

Using HP iLO, you can do the following:

- Access a high-performance and secure Remote Console to the server from anywhere in the world.

- Use the shared HP iLO Remote Console to collaborate with up to six server administrators.

- Remotely mount high-performance Virtual Media devices to the server.

- Securely and remotely control the power state of the managed server.

- Have true Agentless Management with SNMP alerts from HP iLO regardless of the state of the host server.

- Access Active Health System troubleshooting features through the HP iLO interface.

- Subscribe to HP Insight Remote Support software without installing any drivers or agents.

For more information about HP iLO features (which may require an iLO Advanced Pack or iLO Advanced for BladeSystem license), see the HP iLO documentation on the Documentation CD or on the HP website (http://www.hp.com/go/ilo/docs).

Active Health System

HP Active Health System provides the following features:

- Combined diagnostics tools/scanners

- Always on, continuous monitoring for increased stability and shorter downtimes

- Rich configuration history

- Health and service alerts

- Easy export and upload to Service and Support

The HP Active Health System monitors and records changes in the server hardware and system configuration. The Active Health System assists in diagnosing problems and delivering rapid resolution when server failures occur.

The Active Health System collects the following types of data:

- Server model

- Serial number

- Processor number and speed

- Storage capacity and speed

- Memory capacity and speed

- Firmware/BIOS

HP Active Health System does not collect information about Active Health System users' operations, finances, customers, employees, partners, or data center, such as IP addresses, host names, user names, and passwords. HP Active Health System does not parse or change operating system data from third-party error event log activities, such as content created or passed through by the operating system.

The data that is collected is managed according to the HP Data Privacy policy. For more information see the HP website (http://www.hp.com/go/privacy).

The Active Health System log, in conjunction with the system monitoring provided by Agentless Management or SNMP Pass-thru, provides continuous monitoring of hardware and configuration changes, system status, and service alerts for various server components.

The Agentless Management Service is available in the SPP, which is a disk image (.iso) that you can download from the HP website (http://www.hp.com/go/spp/download). The Active Health System log can be downloaded manually from HP iLO or HP Intelligent Provisioning and sent to HP. For more information, see the *HP iLO User Guide* or *HP Intelligent Provisioning User Guide* on the HP website (http://www.hp.com/go/ilo/docs).

Integrated Management Log

The IML records hundreds of events and stores them in an easy-to-view form. The IML timestamps each event with 1-minute granularity.

You can view recorded events in the IML in several ways, including the following:

- From within HP SIM

- From within operating system-specific IML viewers

- From within the HP iLO user interface

Intelligent Provisioning

Several packaging changes have taken place with HP ProLiant Gen8 servers: SmartStart CDs and the Smart Update Firmware DVD will no longer ship with these new servers. Instead, the deployment capability is embedded in the server as part of HP iLO Management Engine's Intelligent Provisioning.

Intelligent Provisioning is an essential single-server deployment tool embedded in HP ProLiant Gen8 servers that simplifies HP ProLiant server setup, providing a reliable and consistent way to deploy HP ProLiant server configurations.

- Intelligent Provisioning assists with the OS installation process by preparing the system for installing "off-the-shelf" versions of leading operating system software and automatically integrating optimized HP ProLiant server support software from SPP. SPP is the installation

package for operating system-specific bundles of HP ProLiant optimized drivers, utilities, management agents, and system firmware.

- Intelligent Provisioning provides maintenance-related tasks through Perform Maintenance features.

- Intelligent Provisioning provides installation help for VMware. For specific OS support, see the *HP Intelligent Provisioning Release Notes* on the HP website (http://www.hp.com/go/intelligentprovisioning/docs).

For more information about Intelligent Provisioning software, see the HP website (http://www.hp.com/go/intelligentprovisioning). For more information about Intelligent Provisioning drivers, firmware, and SPP, see the HP website (http://www.hp.com/go/spp/download).

Erase Utility

> ⚠ **CAUTION:** Perform a backup before running the System Erase Utility. The utility sets the system to its original factory state, deletes the current hardware configuration information, including array setup and disk partitioning, and erases all connected hard drives completely. Refer to the instructions for using this utility.

Use the Erase Utility to erase hard drives and Active Health System logs, and to reset RBSU settings. Run the Erase Utility if you must erase the system for the following reasons:

- You want to install a new operating system on a server with an existing operating system.

- You encounter an error when completing the steps of a factory-installed operating system installation.

To access the Erase Utility, click the Perform Maintenance icon from the Intelligent Provisioning home screen, and then select **Erase**.

Run the Erase utility to:

- **Do not erase** — does not erase hard drive operations.

- **Reset** — erases the master boot record for the hard drives so they are no longer bootable.

- **Secure erase** —performs an overwrite pattern erase so no data is recoverable.

After selecting the appropriate option, click **Erase Selected**. A Confirm Erase window is displayed, prompting you to confirm or cancel the Erase.

HP Insight Remote Support software

HP strongly recommends that you install HP Insight Remote Support software to complete the installation or upgrade of your product and to enable enhanced delivery of your HP Warranty, HP Care Pack Service, or HP contractual support agreement. HP Insight Remote Support supplements your monitoring continuously to ensure maximum system availability by providing intelligent event diagnosis, and automatic, secure submission of hardware event notifications to HP, which will initiate a fast and accurate resolution, based on your product's service level. Notifications may be sent to your authorized HP Channel Partner for onsite service, if configured and available in your country.

For more information, see the HP website (http://www.hp.com/go/insightremotesupport). The *HP Insight Remote Support Release Notes* detail the prerequisites, supported hardware, and associated operating systems. The release notes are available on the HP website (http://www.hp.com/go/insightremotesupport/docs). HP Insight Remote Support is included as part of HP Warranty, HP Care Pack Service, or HP contractual support agreement.

Scripting Toolkit

The Scripting Toolkit is a server deployment product that enables you to build an unattended automated installation for high-volume server deployments. The Scripting Toolkit is designed to support ProLiant BL, ML, DL, and SL servers. The toolkit includes a modular set of utilities and important documentation that describes how to apply these tools to build an automated server deployment process.

The Scripting Toolkit provides a flexible way to create standard server configuration scripts. These scripts are used to automate many of the manual steps in the server configuration process. This automated server configuration process cuts time from each deployment, making it possible to scale rapid, high-volume server deployments.

For more information, and to download the Scripting Toolkit, see the HP website (http://www.hp.com/go/ProLiantSTK).

HP Service Pack for ProLiant

SPP is a release set that contains a comprehensive collection of firmware and system software components, all tested together as a single solution stack for HP ProLiant servers, their options, BladeSystem enclosures, and limited HP external storage.

SPP has several key features for updating HP ProLiant servers. Using HP SUM as the deployment tool, SPP can be used in an offline mode where the server is booted to the ISO so that the server can be updated automatically with no user interaction or updated in interactive mode.

For more information or to download SPP, see the HP website (http://www.hp.com/go/spp).

HP Smart Update Manager

HP SUM is included in many HP products for installing and updating firmware and software on HP ProLiant servers. HP SUM provides a GUI and a command-line scriptable interface for deployment of firmware and software for single or one-to-many HP ProLiant servers and network-based targets, such as iLOs, OAs, and VC Ethernet and Fibre Channel modules.

Key features of HP SUM include:

- Dependency checking, which ensures appropriate installation order and dependency checking between components

- Intelligent deployment of only required updates

- Simultaneous firmware and software deployment for multiple remote targets in both GUI and CLI modes

- Improved deployment performance

- Local online deployment of HP ProLiant servers and enclosures

- Remote (one-to-many) online deployment of HP ProLiant servers and enclosures

- Local offline firmware deployments with HP Support Pack for ProLiant deliverables

- Remote offline deployment when used with the Scripting Toolkit (HP ProLiant Gen8 and later), iLO Virtual Media, or PXE booted media

- GUI or CLI scripts with extensive logging

- Remote command-line deployment

- Support for updating firmware on network-based targets such as the OA, iLO through the Network Management Port, VC Ethernet and Fibre Channel modules, and 3Gb/6Gb SAS BL Switch interconnects on HP ProLiant servers

For more information about HP SUM and to access the HP Smart Update Manager User Guide, see the HP website (http://www.hp.com/go/hpsum/documentation).

HP ROM-Based Setup Utility

RBSU is a configuration utility embedded in HP ProLiant servers that performs a wide range of configuration activities that can include the following:

- Configuring system devices and installed options
- Enabling and disabling system features
- Displaying system information
- Selecting the primary boot controller
- Configuring memory options
- Language selection

For more information on RBSU, see the HP ROM-Based Setup Utility User Guide on the Documentation CD or the HP website (http://www.hp.com/support/rbsu).

Using RBSU

To use RBSU, use the following keys:

- To access RBSU, press the F9 key during power-up when prompted.
- To navigate the menu system, use the arrow keys.
- To make selections, press the Enter key.
- To access Help for a highlighted configuration option, press the F1 key.

> **IMPORTANT:** RBSU automatically saves settings when you press the Enter key. The utility does not prompt you for confirmation of settings before you exit the utility. To change a selected setting, you must select a different setting and press the Enter key.

Default configuration settings are applied to the server at one of the following times:

- Upon the first system power-up
- After defaults have been restored

Default configuration settings are sufficient for proper typical server operation, but configuration settings can be modified using RBSU. The system will prompt you for access to RBSU with each power-up.

Auto-configuration process

The auto-configuration process automatically runs when you boot the server for the first time. During the power-up sequence, the system ROM automatically configures the entire system without needing any intervention. During this process, the ORCA utility, in most cases, automatically configures the array to a default setting based on the number of drives connected to the server.

NOTE: If the boot drive is not empty or has been written to in the past, ORCA does not automatically configure the array. You must run ORCA to configure the array settings.

NOTE: The server may not support all the following examples.

Drives installed	Drives used	RAID level
1	1	RAID 0
2	2	RAID 1
3, 4, 5, or 6	3, 4, 5, or 6	RAID 5
More than 6	0	None

To change any ORCA default settings and override the auto-configuration process, press the F8 key when prompted.

For more information on RBSU, see the *HP ROM-Based Setup Utility User Guide* on the Documentation CD or the HP website (http://www.hp.com/support/rbsu).

Boot options

Near the end of the boot process, the boot options screen is displayed. This screen is visible for several seconds before the system attempts to boot from a supported boot device. During this time, you can do the following:

- Access RBSU by pressing the F9 key.
- Access Intelligent Provisioning Maintenance Menu by pressing the F10 key.
- Access the boot menu by pressing the F11 key.
- Force a PXE Network boot by pressing the F12 key.

Configuring AMP modes

Not all HP ProLiant servers support all AMP modes. RBSU provides menu options only for the modes supported by the server. Advanced memory protection within RBSU enables the following advanced memory modes:

- Advanced ECC Mode—Provides memory protection beyond Standard ECC. All single-bit failures and some multi-bit failures can be corrected without resulting in system downtime.
- Online Spare Mode—Provides protection against failing or degraded DIMMs. Certain memory is set aside as spare, and automatic failover to spare memory occurs when the system detects a degraded DIMM. DIMMs that are likely to receive a fatal or uncorrectable memory error are removed from operation automatically, resulting in less system downtime.

For DIMM population requirements, see the server-specific user guide.

Re-entering the server serial number and product ID

After you replace the system board, you must re-enter the server serial number and the product ID.

1. During the server startup sequence, press the F9 key to access RBSU.

2. Select the **Advanced Options** menu.

3. Select **Service Options**.

4. Select **Serial Number**. The following warnings appear:

    > **⚠ WARNING!**   The serial number is loaded into the system during the manufacturing process and should NOT be modified. This option should only be used by qualified service personnel. This value should always match the serial number sticker located on the chassis.
    >
    > The serial number should ONLY be modified by qualified service personnel. This value should always match the serial number located on the chassis.

5. Press the Enter key to clear the warning.

6. Enter the serial number and press the Enter key.

7. Select **Product ID**. The following warning appears:

    > **⚠ WARNING!**   The Product ID should ONLY be modified by qualified service personnel. This value should always match the Product ID on the chassis.

8. Enter the product ID and press the Enter key.

9. Press the Esc key to close the menu.

10. Press the Esc key to exit RBSU.

11. Press the F10 key to confirm exiting RBSU. The server automatically reboots.

Utilities and features

Array Configuration Utility

ACU is a utility with the following features:

- Runs as a local application or remote service accessed through the HP System Management Homepage

- Supports online array capacity expansion, logical drive extension, assignment of online spares, and RAID or stripe size migration

- Suggests the optimum configuration for an unconfigured system

- For supported controllers, provides access to licensed features, including:

  - Moving and deleting individual logical volumes

  - Advanced Capacity Expansion (SATA to SAS and SAS to SATA)

  - Offline Split Mirror

  - RAID 6 and RAID 60

  - RAID 1 (ADM) and RAID 10 (ADM)

- ◦ HP Drive Erase
- ◦ Video-On-Demand Advanced Controller Settings
- Provides different operating modes, enabling faster configuration or greater control over the configuration options
- Remains available any time that the server is on
- Displays on-screen tips for individual steps of a configuration procedure
- Provides context-sensitive searchable help content
- Provides diagnostic and SmartSSD Wear Gauge functionality on the Diagnostics tab

ACU is now available as an embedded utility, starting with HP ProLiant Gen8 servers. To access ACU, use one of the following methods:

- If an optional controller is not installed, press F10 during boot.
- If an optional controller is installed, when the system recognizes the controller during POST, press F5.

For optimum performance, the minimum display settings are 1024 × 768 resolution and 16-bit color.

For more information about the controller and its features, see the *HP Smart Array Controllers for HP ProLiant Servers User Guide* on the HP website (http://www.hp.com/support/SAC_UG_ProLiantServers_en). To configure arrays, see the *Configuring Arrays on HP Smart Array Controllers Reference Guide* on the HP website (http://www.hp.com/support/CASAC_RG_en).

HP Smart Storage Administrator

HP SSA is a configuration and management tool for HP Smart Array controllers. Starting with HP ProLiant Gen8 servers, HP SSA replaces ACU with an enhanced GUI and additional configuration features.

HP SSA exists in three interface formats: the HP SSA GUI, the HP SSA CLI, and HP SSA Scripting. Although all formats provide support for configuration tasks, some of the advanced tasks are available in only one format.

Some HP SSA features include the following:

- Supports online array capacity expansion, logical drive extension, assignment of online spares, and RAID or stripe size migration
- Suggests the optimal configuration for an unconfigured system
- Provides diagnostic and SmartSSD Wear Gauge functionality on the Diagnostics tab
- For supported controllers, provides access to additional features.

For more information about HP SSA, see the HP website (http://www.hp.com/go/hpssa).

Option ROM Configuration for Arrays

Before installing an operating system, you can use the ORCA utility to create the first logical drive, assign RAID levels, and establish online spare configurations.

The utility also provides support for the following functions:

- Reconfiguring one or more logical drives
- Viewing the current logical drive configuration

- Deleting a logical drive configuration

- Setting the controller to be the boot controller

- Selecting the boot volume

If you do not use the utility, ORCA will default to the standard configuration.

For more information regarding the default configurations that ORCA uses, see the *HP ROM-Based Setup Utility User Guide* on the Documentation CD or the HP website (http://www.hp.com/support/rbsu).

For more information about the controller and its features, see the *HP Smart Array Controllers for HP ProLiant Servers User Guide* on the HP website (http://www.hp.com/support/SAC_UG_ProLiantServers_en). To configure arrays, see the *Configuring Arrays on HP Smart Array Controllers Reference Guide* on the HP website (http://www.hp.com/support/CASAC_RG_en).

ROMPaq utility

The ROMPaq utility enables you to upgrade the system firmware (BIOS). To upgrade the firmware, insert a ROMPaq USB Key into an available USB port and boot the system.

The ROMPaq utility checks the system and provides a choice (if more than one exists) of available firmware revisions.

For more information, go to the HP website (http://www.hp.com/go/hpsc) and click on **Drivers, Software & Firmware**. Then, enter your product name in the **Find an HP product** field and click **Go**.

Automatic Server Recovery

ASR is a feature that causes the system to restart when a catastrophic operating system error occurs, such as a blue screen, ABEND (does not apply to HP ProLiant DL980 Servers), or panic. A system fail-safe timer, the ASR timer, starts when the System Management driver, also known as the Health Driver, is loaded. When the operating system is functioning properly, the system periodically resets the timer. However, when the operating system fails, the timer expires and restarts the server.

ASR increases server availability by restarting the server within a specified time after a system hang. At the same time, the HP SIM console notifies you by sending a message to a designated pager number that ASR has restarted the system. You can disable ASR from the System Management Homepage or through RBSU.

USB support

HP provides both standard USB 2.0 support and legacy USB 2.0 support. Standard support is provided by the OS through the appropriate USB device drivers. Before the OS loads, HP provides support for USB devices through legacy USB support, which is enabled by default in the system ROM.

Legacy USB support provides USB functionality in environments where USB support is not available normally. Specifically, HP provides legacy USB functionality for the following:

- POST
- RBSU
- Diagnostics
- DOS
- Operating environments which do not provide native USB support

Redundant ROM support

The server enables you to upgrade or configure the ROM safely with redundant ROM support. The server has a single ROM that acts as two separate ROM images. In the standard implementation, one side of the ROM contains the current ROM program version, while the other side of the ROM contains a backup version.

> **NOTE:** The server ships with the same version programmed on each side of the ROM.

Safety and security benefits

When you flash the system ROM, ROMPaq writes over the backup ROM and saves the current ROM as a backup, enabling you to switch easily to the alternate ROM version if the new ROM becomes corrupted for any reason. This feature protects the existing ROM version, even if you experience a power failure while flashing the ROM.

Keeping the system current

Drivers

> **IMPORTANT:** Always perform a backup before installing or updating device drivers.

The server includes new hardware that may not have driver support on all OS installation media.

If you are installing an Intelligent Provisioning-supported OS, use Intelligent Provisioning on page 82 and its Configure and Install feature to install the OS and latest supported drivers.

If you do not use Intelligent Provisioning to install an OS, drivers for some of the new hardware are required. These drivers, as well as other option drivers, ROM images, and value-add software can be downloaded as part of an SPP.

If you are installing drivers from SPP, be sure that you are using the latest SPP version that your server supports. To verify that your server is using the latest supported version and for more information about SPP, see the HP website (http://www.hp.com/go/spp/download).

To locate the drivers for a particular server, go to the HP website (http://www.hp.com/go/hpsc) and click on **Drivers, Software & Firmware**. Then, enter your product name in the **Find an HP product** field and click **Go**.

Software and firmware

Software and firmware should be updated before using the server for the first time, unless any installed software or components require an older version. For system software and firmware updates, download the SPP (HP Service Pack for ProLiant on page 85) from the HP website (http://www.hp.com/go/spp).

Version control

The VCRM and VCA are web-enabled Insight Management Agents tools that HP SIM uses to schedule software update tasks to the entire enterprise.

- VCRM manages the repository for SPP. Administrators can view the SPP contents or configure VCRM to automatically update the repository with internet downloads of the latest software and firmware from HP.

- VCA compares installed software versions on the node with updates available in the VCRM managed repository. Administrators configure VCA to point to a repository managed by VCRM.

For more information about version control tools, see the *HP Systems Insight Manager User Guide*, the *HP Version Control Agent User Guide*, and the *HP Version Control Repository User Guide* on the HP website (http://www.hp.com/go/hpsim).

HP operating systems and virtualization software support for ProLiant servers

For information about specific versions of a supported operating system, see the HP website (http://www.hp.com/go/ossupport).

HP Technology Service Portfolio

HP Technology Services offers a targeted set of consultancy, deployment, and service solutions to meet the support needs of most business and IT environments.

Foundation Care services—Delivers scalable hardware and software support packages for HP ProLiant server and industry-standard software. You can choose the type and level of service that is most suitable for your business needs.

HP Collaborative Support—With a single call, HP addresses initial hardware and software support needs and helps to quickly identify if a problem is related to hardware or software. If the problem is related to hardware, HP resolves the problem according to service level commitments. If the reported incident is related to an HP software product or a supported third-party software product and cannot be resolved by applying known fixes, HP contacts the third-party vendor and creates a problem incident on your behalf.

HP Proactive Care—For customers running business critical environments where downtime is not an option, HP Proactive Care helps to deliver high levels of availability. Key to these service options is the delivery of proactive service management tools to help you avoid the causes of downtime. If a problem arises, then HP offers advanced technical response from critical system support specialists for problem identification and resolution.

HP Support Center—For all service options, the HP Support Center delivers the information, tools, and experts required to support HP business products.

HP Insight Remote Support—Provides 24x7 secure remote monitoring, diagnosis, and problem resolution.

For more information, see one of the following websites:

- HP ProLiant Server Services website (http://www.hp.com/services/proliant)
- HP BladeSystem Services website (http://www.hp.com/services/bladesystem)

Change control and proactive notification

HP offers Change Control and Proactive Notification to notify customers 30 to 60 days in advance of upcoming hardware and software changes on HP commercial products.

For more information, refer to the HP website (http://www.hp.com/go/pcn).

8 Troubleshooting

Troubleshooting resources

The *HP ProLiant Gen8 Troubleshooting Guide, Volume I: Troubleshooting* provides procedures for resolving common problems and comprehensive courses of action for fault isolation and identification, issue resolution, and software maintenance on ProLiant servers and server blades. To view the guide, select a language:

- English (http://www.hp.com/support/ProLiant_TSG_v1_en)
- French (http://www.hp.com/support/ProLiant_TSG_v1_fr)
- Spanish (http://www.hp.com/support/ProLiant_TSG_v1_sp)
- German (http://www.hp.com/support/ProLiant_TSG_v1_gr)
- Japanese (http://www.hp.com/support/ProLiant_TSG_v1_jp)
- Simplified Chinese (http://www.hp.com/support/ProLiant_TSG_v1_sc)

The *HP ProLiant Gen8 Troubleshooting Guide, Volume II: Error Messages* provides a list of error messages and information to assist with interpreting and resolving error messages on ProLiant servers and server blades. To view the guide, select a language:

- English (http://www.hp.com/support/ProLiant_EMG_v1_en)
- French (http://www.hp.com/support/ProLiant_EMG_v1_fr)
- Spanish (http://www.hp.com/support/ProLiant_EMG_v1_sp)
- German (http://www.hp.com/support/ProLiant_EMG_v1_gr)
- Japanese (http://www.hp.com/support/ProLiant_EMG_v1_jp)
- Simplified Chinese (http://www.hp.com/support/ProLiant_EMG_v1_sc)

9   Battery replacement

If the server no longer automatically displays the correct date and time, you may need to replace the battery 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. A risk of fire and burns exists if the battery pack is not properly handled. 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.

To remove the component:

1.   Power down the server on page 18

2.   Remove all power.

   a.   Disconnect each power cord from the power source.

   b.   Disconnect each power cord from the server.

3.   Extend (Extend the server from the rack on page 19) or remove the server from the rack.

4.   Remove the access panel on page 20

5.   If installed, remove the secondary PCIe riser cage.

6.   Locate the battery (System board components on page 10).

7.   Remove the battery.
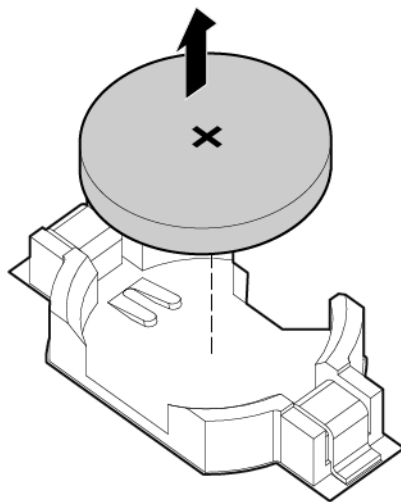
To replace the component, reverse the removal procedure.

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

10 Specifications

Environmental specifications

Specification	Value
Temperature range*	—
Operating	10° C to 35° C (50° F to 95° F)
Non-operating	-30° C to 60° C (-22° F to 140° F)
Relative humidity (noncondensing)	—
Operating	10% to 90%
	28° C (82.4° F), maximum wet bulb temperature
Non-operating	5% to 95%
	38.7° C (101.7° F), maximum wet bulb temperature

* All temperature ratings shown are for sea level. An altitude derating of 1° C per 304.8 m (1.8° F per 1,000 ft) to 3048 m (10,000 ft) is applicable. No direct sunlight allowed.

Mechanical specifications

Specification	Value
Height	8.73 cm (3.44 in)
Depth	69.85 cm (27.54 in)
Width	44.54 cm (17.54 in)
Weight (minimum—one SFF drive)	18.59 kg (41.0 lb)

Power supply specifications

Depending on installed options, the server is configured with the following power supply:

● HP 1200 W CS HE Power Supply (94% efficiency)

HP 1200 W CS HE Power Supply (94% efficiency)

Specification	Value
Input requirements	
Rated input voltage	100 to 120 VAC, 200 to 240 VAC
Rated input frequency	50 Hz to 60 Hz
Rated input current	9.1 A at 100 VAC
	6.7 A at 200 VAC
Maximum rated input power	897 W at 100V AC input
	1321 W at 200V AC input
Btus per hour	3408 at 120V AC input
	4433 at 200V to 240V AC input
Power supply output	
Rated steady-state power	800 W at 100V AC input
	900 W at 120V AC input
	1200 W at 200V to 240V AC input
Maximum peak power	800 W at 100V AC input
	900 W at 120V AC input
	1200 W at 200V to 240V AC input

11 Support and other resources

📝 **NOTE:** While some of the documentation that supports this product contains the HP Proliant and the DL380p Gen8 Server product names, most of the information in those documents is relevant to this workstation product. Since this product is supported on VMware and Citrix operating systems only, information specific to Microsoft Windows and Linux may not apply.

Before you contact HP

Be sure to have the following information available before you call HP:

- Active Health System log (HP ProLiant Gen8 or later products)

  Download and have available an Active Health System log for 3 days before the failure was detected. For more information, see the *HP iLO 4 User Guide* or *HP Intelligent Provisioning User Guide* on the HP website (http://www.hp.com/go/ilo/docs).

- Onboard Administrator SHOW ALL report (for HP BladeSystem products only)

  For more information on obtaining the Onboard Administrator SHOW ALL report, see the HP website (http://www.hp.com/go/OAlog).

- Technical support registration number (if applicable)

- Product serial number

- Product model name and number

- Product identification number

- Applicable error messages

- Add-on boards or hardware

- Third-party hardware or software

- Operating system type and revision level

HP contact information

For United States and worldwide contact information, see the Contact HP website (http://www.hp.com/go/assistance).

In the United States:

- To contact HP by phone, call 1-800-334-5144. For continuous quality improvement, calls may be recorded or monitored.

- If you have purchased a Care Pack (service upgrade), see the Support & Drivers website (http://www8.hp.com/us/en/support-drivers.html). If the problem cannot be resolved at the website, call 1-800-633-3600. For more information about Care Packs, see the HP website (http://www.hp.com/go/cpc).

Customer Self Repair

HP products are designed with many Customer Self Repair (CSR) parts to minimize repair time and allow for greater flexibility in performing defective parts replacement. If during the diagnosis period HP (or HP service providers or service partners) identifies that the repair can be accomplished by the use of a CSR part, HP will ship that part directly to you for replacement. There are two categories of CSR parts:

- **Mandatory**—Parts for which customer self repair is mandatory. If you request HP to replace these parts, you will be charged for the travel and labor costs of this service.

- **Optional**—Parts for which customer self repair is optional. These parts are also designed for customer self repair. If, however, you require that HP replace them for you, there may or may not be additional charges, depending on the type of warranty service designated for your product.

NOTE: Some HP parts are not designed for customer self repair. In order to satisfy the customer warranty, HP requires that an authorized service provider replace the part. These parts are identified as "No" in the Illustrated Parts Catalog.

Based on availability and where geography permits, CSR parts will be shipped for next business day delivery. Same day or four-hour delivery may be offered at an additional charge where geography permits. If assistance is required, you can call the HP Technical Support Center and a technician will help you over the telephone. HP specifies in the materials shipped with a replacement CSR part whether a defective part must be returned to HP. In cases where it is required to return the defective part to HP, you must ship the defective part back to HP within a defined period of time, normally five (5) business days. The defective part must be returned with the associated documentation in the provided shipping material. Failure to return the defective part may result in HP billing you for the replacement. With a customer self repair, HP will pay all shipping and part return costs and determine the courier/carrier to be used.

For more information about HP's Customer Self Repair program, contact your local service provider. For the North American program, refer to the HP website (http://www.hp.com/go/selfrepair).

12 Acronyms and abbreviations

ABEND   abnormal end

ACU   Array Configuration Utility

AMP   Advanced Memory Protection

ASR   Automatic Server Recovery

CSA   Canadian Standards Association

CSR   Customer Self Repair

DDDC   Double Device Data Correction

DDR   double data rate

FBWC   Flash-Backed Write Cache

HDIMM   HyperCloud DIMM

IEC   International Electrotechnical Commission

iLo   Integrated Lights-Out

IML   Integrated Management Log

ISEE   Instant Support Enterprise Edition

LFF   large form factor

NMI   Non-Maskable Interrupt

NVRAM   non-volatile memory

ORCA   Option ROM Configuration for Arrays

PCIe   Peripheral Component Interconnect Express

POST   Power-On Self Test

PSP   HP ProLiant Support Pack

RBSU   ROM-Based Setup Utility

RDIMM   registered dual in-line memory module

RDP   Rapid Deployment Pack

SAS   Serial Attached SCSI

SATA   serial ATA

SDDC   Single Device Data Correction

SELV   separated extra low voltage

SFF   small form factor

SIM   Systems Insight Manager

SSA   HP Systems Insight Manager

TMRA   recommended ambient operating temperature

TPM	Trusted Platform Module
UDIMM	unregistered dual in-line memory module
UID	unit identification
UPS	uninterruptible power system
USB	Universal Serial Bus
VCA	Version Control Agent

13 Documentation feedback

HP is committed to providing documentation that meets your needs. To help us improve the documentation, send any errors, suggestions, or comments to Documentation Feedback (mailto:docsfeedback@hp.com). Include the document title and part number, version number, or the URL when submitting your feedback.

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