HP ProLiant BL660c Gen9 Server Blade User Guide

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.

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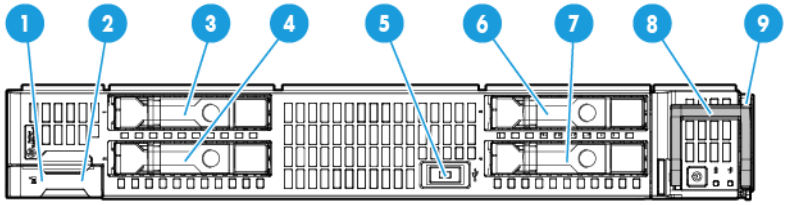
Component identification

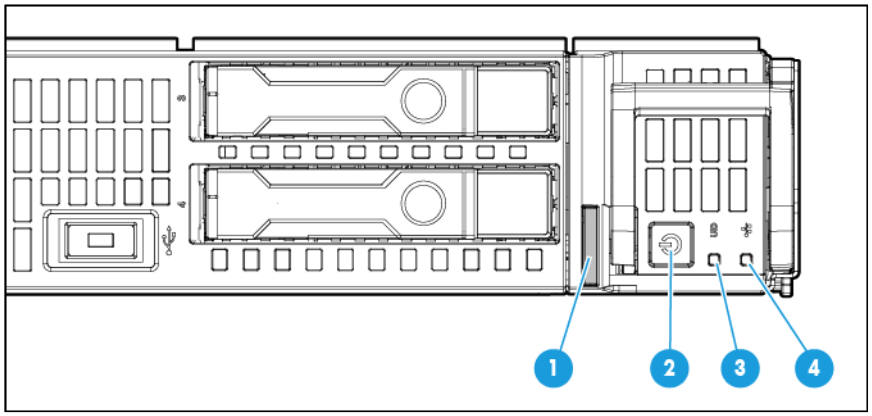
Front panel components



Item	Description
1	HP c-Class Blade SUV cable connector* (behind the serial label pull tab)
2	Serial label pull tab
3	Drive bay 1
4	Drive bay 2
5	External USB
6	Drive Bay 3
7	Drive Bay 4
8	Server blade release lever
9	Server blade release button

*The SUV connector and the HP c-Class Blade SUV Cable are used for some server blade configuration and diagnostic procedures.

Front panel LEDs and buttons



Item	Description	Status
1	Health status LED bar*	Solid Green = Normal (System is powered on.) Flashing Green = Power On/Standby button service is being initialized.

Item	Description	Status
		Flashing Amber = Degraded condition Flashing Red = Critical condition Off = Normal (System is in standby.)
2	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 is in standby. Off = No power present**
3	UID button/LED*	Solid blue = Activated Flashing blue: • 1 Hz/cycle per sec = Remote management or firmware upgrade in progress • 4 Hz/cycle per sec = iLO manual reboot sequence initiated • 8 Hz/cycle per sec = iLO manual reboot sequence in progress Off = Deactivated
4	NIC activity LED*	Solid green = Link to network Flashing green (1 Hz/cycle per sec) = Network active Off = No network activity

* When all four LEDs described in this table flash simultaneously, a power fault has occurred. For more information, see "Power fault LEDs (on page 7)."

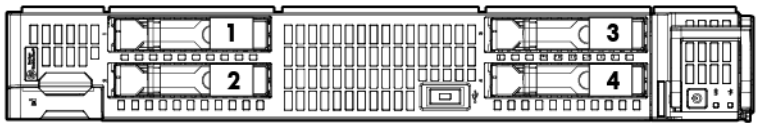
** Facility power is not present, power cord is not attached, no power supplies are installed, power supply failure has occurred, or the power button cable is disconnected.

Power fault LEDs

The following table provides a list of power fault LEDs, and the subsystems that are affected. Not all power faults are used by all servers.

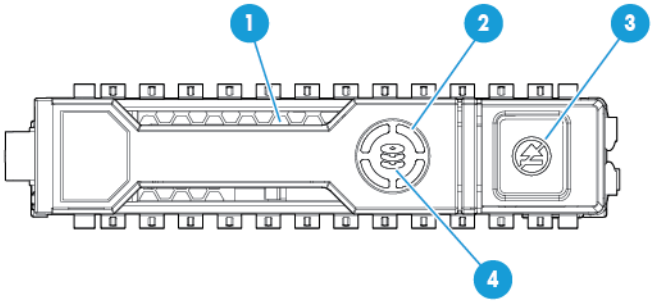
Subsystem	LED behavior
System board	1 flash
Processor	2 flashes
Memory	3 flashes
Riser board PCIe slots	4 flashes
FlexibleLOM	5 flashes
Removable HP Flexible Smart Array controller/Smart SAS HBA controller	6 flashes
System board PCIe slots	7 flashes
Power backplane or storage backplane	8 flashes
Power supply	9 flashes

Drive numbering



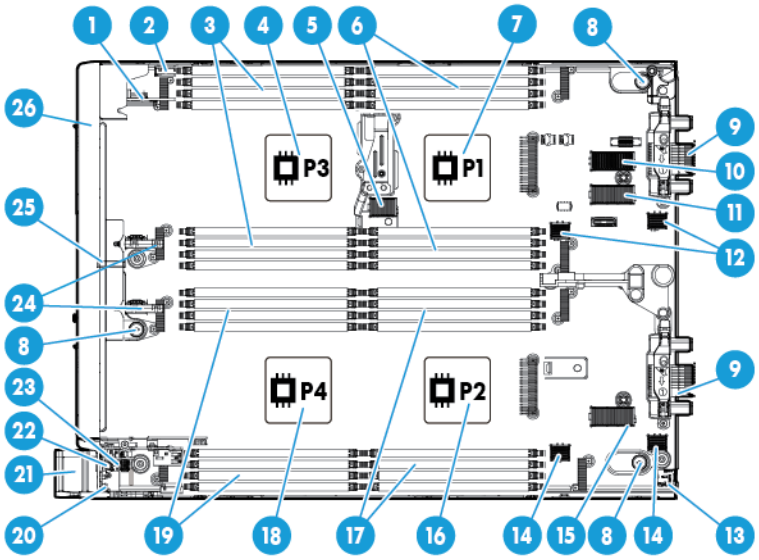
Item	Description
1	Drive bay 1
2	Drive bay 2
3	Drive bay 3
4	Drive bay 4

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.

System board components



Item	Description
1	Solid state device connector (M.2)
2	HP Smart Storage Battery connector
3	Processor 3 DIMM slots (8)
4	Processor 3
5	SAS controller connector
6	Processor 1 DIMM slots (8)
7	Processor 1
8	Board mounting screws (3)
9	Enclosure connectors (2)
10	Mezzanine connector 1 (Type A mezzanine only)
11	Mezzanine connector 2 (Type A or Type B mezzanine)
12	FlexibleLOM 2 connectors (2)
13	MicroSD connector
14	FlexibleLOM 1 connectors (2)
15	Mezzanine connector 3 (Type A or Type B mezzanine)
16	Processor 2
17	Processor 2 DIMM slots (8)
18	Processor 4
19	Processor 4 DIMM slots (8)
20	System maintenance switch
21	Server blade release lever
22	TPM module connector
23	Internal USB connector
24	Direct Connect SATA connections (2)
25	System battery
26	SUV connector

The symbols correspond to the symbols located on the interconnect bays. For more information, see the *HP ProLiant BL660c Gen9 Server Blade Installation Instructions* on the HP website (http://www.hp.com/support).

System maintenance switch

Position	Default	Function
S1	Off	Off = iLO security is enabled. On = 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	Off	Off = Set default boot mode to UEFI. On = Set default boot mode to legacy.
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.

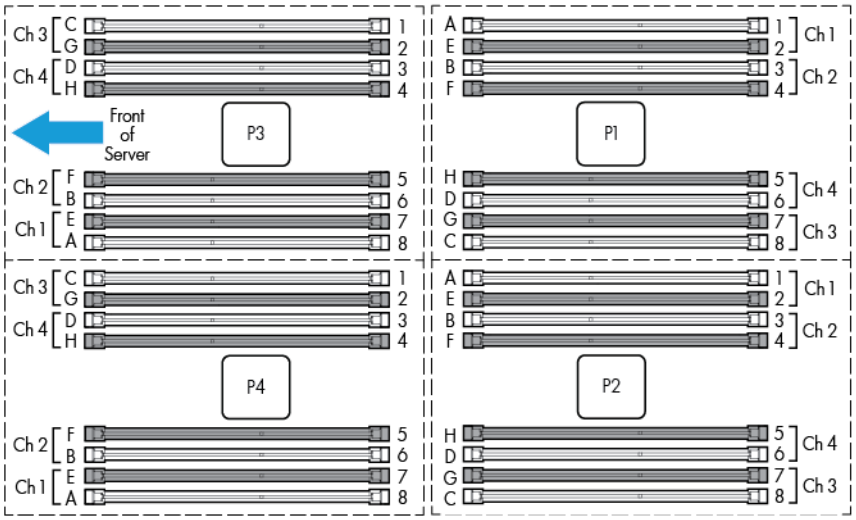
Mezzanine connector definitions

A PCIe x8 mezzanine connector supports x16 cards at up to x8 speeds.

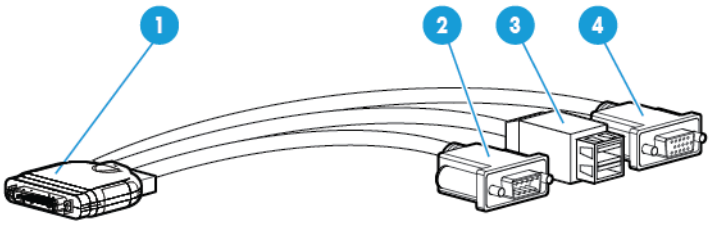
Item	PCIe
Mezzanine connector 1	x8, Type A mezzanine card only
Mezzanine connector 2	x16, Type A or B mezzanine card
Mezzanine connector 3	x16, Type A or B mezzanine card

DIMM slot locations

DIMM slots are numbered sequentially (1 through 8) for each processor. The supported AMP modes use the alpha assignments for population order, and the slot numbers designate the DIMM slot ID for spare replacement.



HP c-Class Blade SUV Cable



Item	Connector	Description
1	Server blade	For connecting to the SUV connector on the server blade front panel
2	Serial	For trained personnel to connect a null modem serial cable and perform advanced diagnostic procedures
3	USB	For connecting up to two USB devices
4	Video	For connecting a video monitor

Operations

Power up the server blade

The Onboard Administrator initiates an automatic power-up sequence when the server blade is installed. If the default setting is changed, use one of the following methods to power up the server blade:

- Use a virtual power button selection through iLO.
- Press and release the Power On/Standby button.

When the server blade goes from the standby mode to the full power mode, the system power LED changes from amber to solid green. The health status LED bar flashes green when the Power On/Standby Button service is being initialized. For more information about the system power LED status, see "Front panel LEDs and buttons."

For more information about the Onboard Administrator, see the enclosure setup and installation guide on the HP website (http://www.hp.com/support/oa).

For more information about iLO, see "HP iLO (on page 64)."

Power down the server blade

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

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

Depending on the Onboard Administrator configuration, use one of the following methods to power down the server blade:

- Press and release the Power On/Standby button.

  This method initiates a controlled shutdown of applications and the OS before the server blade enters standby mode.
- Press and hold the Power On/Standby button for more than 4 seconds to force the server blade to enter standby mode.

  This method forces the server blade 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 iLO.

  This method initiates a controlled remote shutdown of applications and the OS before the server blade enters standby mode.
- Use the Onboard Administrator CLI to execute one of the following commands:
  - `poweroff server [bay number]`

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

- `poweroff server [bay number] force`

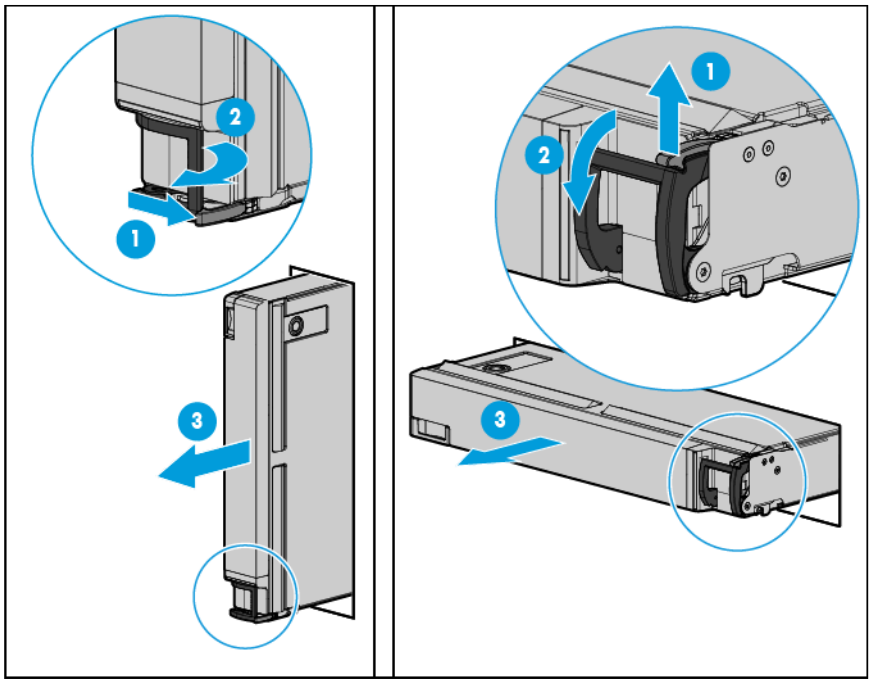
  This form of the command forces the server blade to enter standby mode without properly exiting applications and the OS. If an application stops responding, this method forces a shutdown.

- Use the Onboard Administrator GUI to initiate a shutdown:
  a. Select the **Enclosure Information** tab.
  b. In the Device Bays item, select the **Overall** checkbox.
  c. From the Virtual Power menu, initiate a shutdown of applications and the OS:
     — For a controlled shutdown, select **Momentary Press**.
     — For an emergency shutdown, select **Press and Hold**.

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

Remove the server blade

1. Identify the proper server blade ("Front panel components" on page 6).
2. Power down the server blade (on page 12).
3. Remove the server blade.



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

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 blade before beginning any installation procedure. Improper grounding can cause ESD damage.

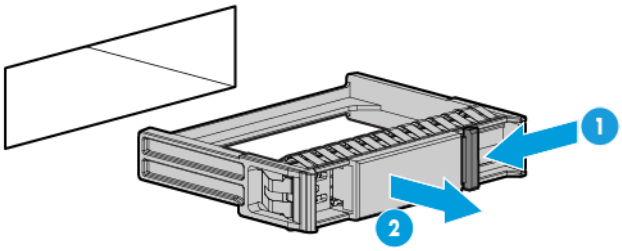
Remove the access panel

To remove the component:

1. Power down the server blade (on page 12).
2. Remove the server blade (on page 13).
3. Place the server blade on a flat, level work surface.
4. Press the access panel release button.
5. Slide the access panel towards the rear of the server blade, and then lift to remove the panel.

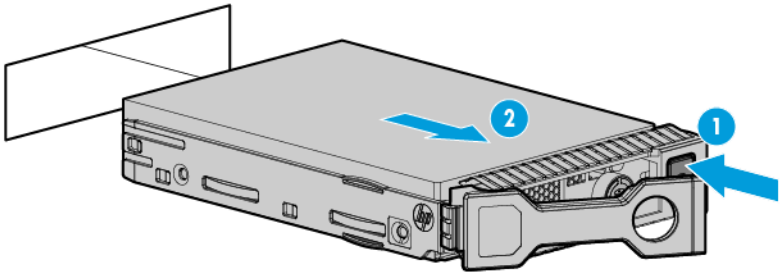
Remove a hard drive blank

Remove the component as indicated.



Remove a drive

1. Back up all server blade data on the drive.
2. Remove the drive.



Removing DIMM baffles

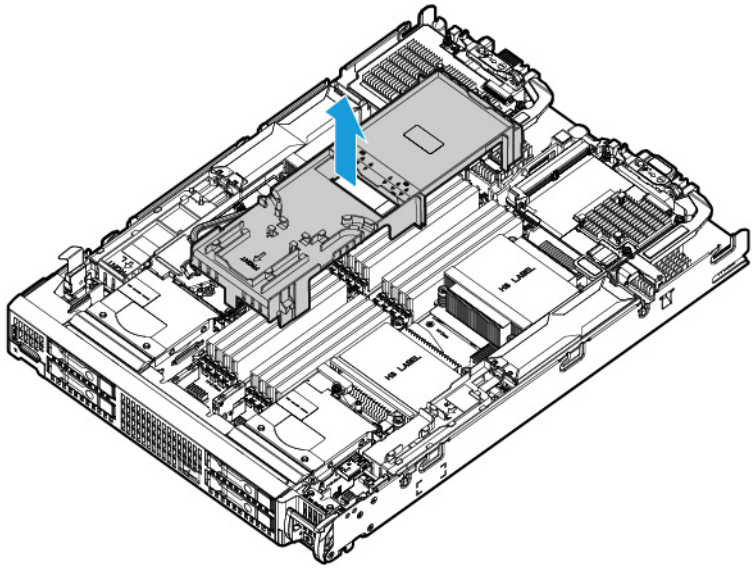
△ **CAUTION:** To avoid damage to the server blade and the enclosure, install all DIMM baffles in the proper location after adding or replacing DIMMs. DIMM baffles that are missing or installed incorrectly can compromise server blade and enclosure cooling.

The server blade contains three DIMM baffles.

Remove the center DIMM baffle

To remove the component:

1. Power down the server blade (on page 12).
2. Remove the server blade (on page 13).
3. Place the server blade on a flat, level work surface.
4. Remove the access panel (on page 14).
5. Disconnect any cables that may be routed across the DIMM baffle.
6. Remove the center DIMM baffle.



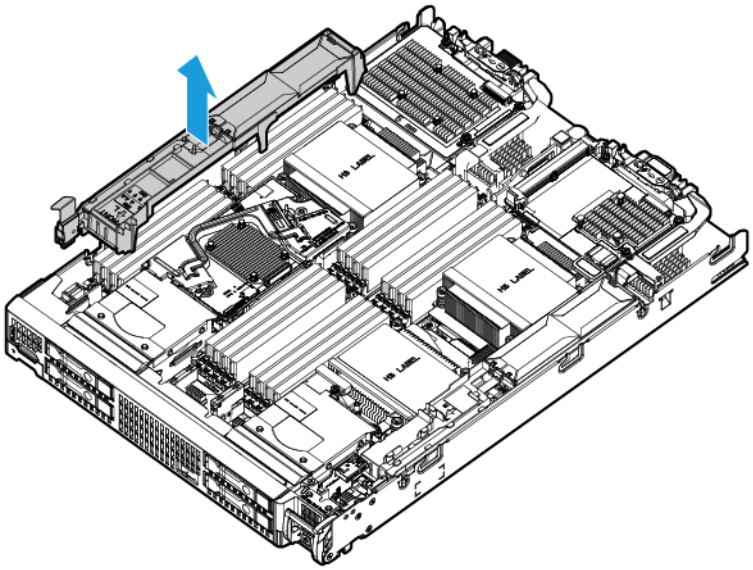
Remove the left DIMM baffle

To remove the component:

1. Power down the server blade (on page 12).
2. Remove the server blade (on page 13).
3. Place the server blade on a flat, level work surface.
4. Remove the access panel (on page 14).
5. Disconnect any cables that may be routed across the DIMM baffle.

IMPORTANT: When removing the left DIMM baffle, leave the HP Smart Storage Battery installed on the baffle. Use the blue pull tab to disconnect the HP Smart Storage Battery cable from the system board.

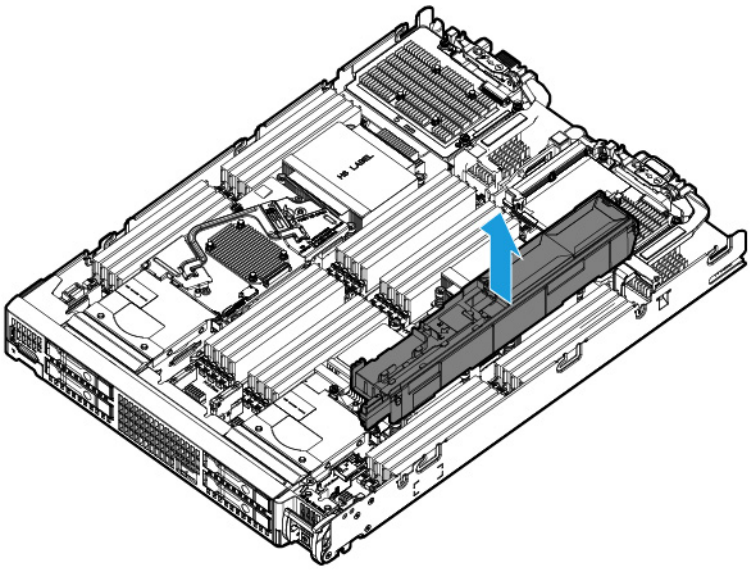
6. Remove the left DIMM baffle.



Remove the right DIMM baffle

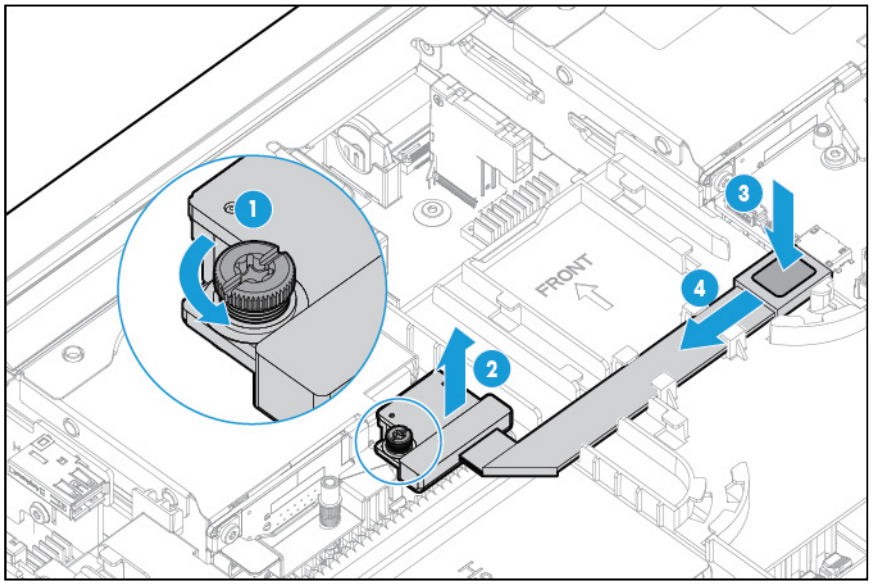
To remove the component:

1. Power down the server blade (on page 12).
2. Remove the server blade (on page 13).
3. Place the server blade on a flat, level work surface.
4. Remove the access panel (on page 14).
5. Disconnect any cables that may be routed across the DIMM baffle.
6. Remove the right DIMM baffle.

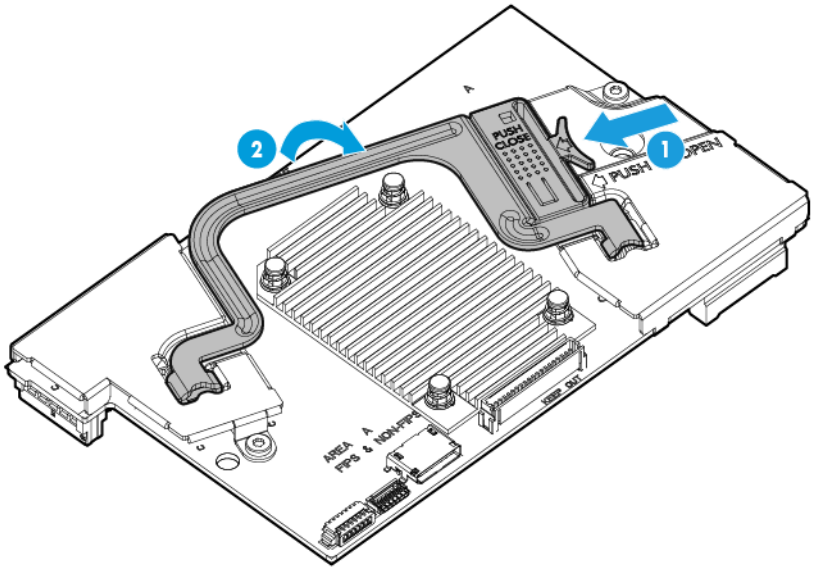


Remove the storage controller

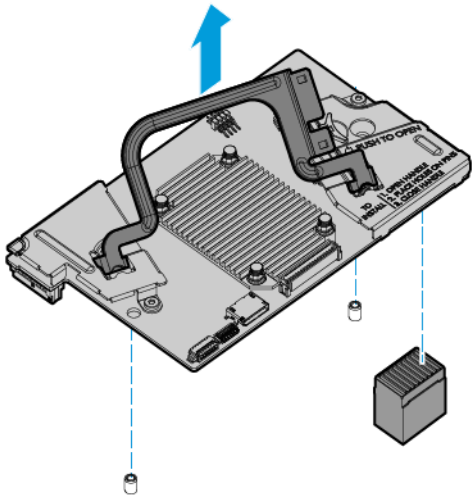
1. Power down the server blade (on page 12).
2. Remove the server blade (on page 13).
3. Place the server blade on a flat, level work surface.
4. Remove the access panel (on page 14).
5. Disconnect the SAS cable from the storage controller and the drive backplane.



6. Prepare the storage controller for removal.



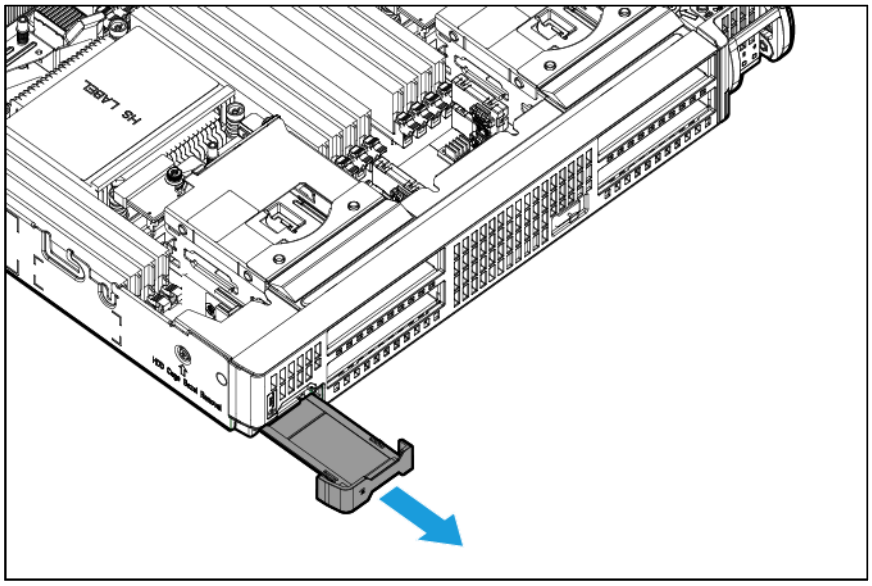
7. Remove the storage controller.



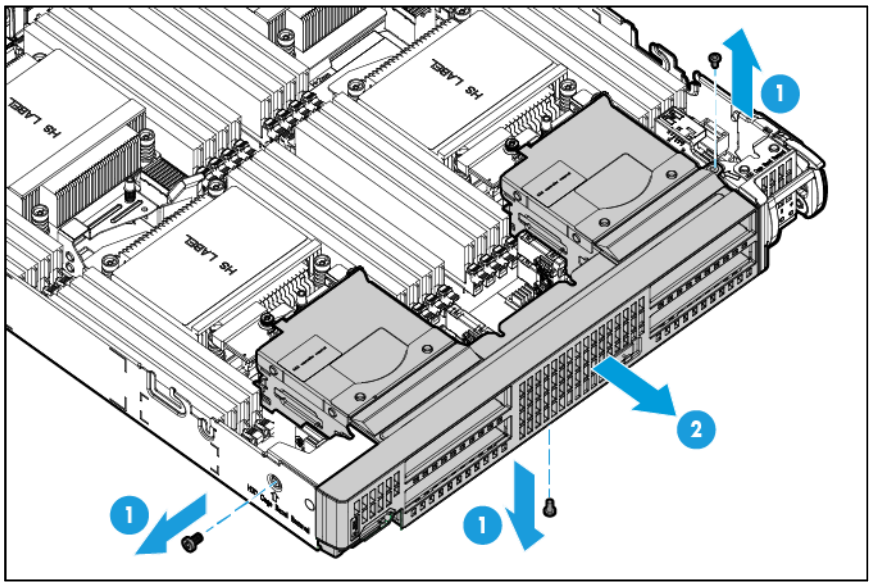
Remove the front panel/drive cage assembly

1. Power down the server blade (on page 12).
2. Remove the server blade (on page 13).
3. Place the server blade on a flat, level work surface.
4. Remove the access panel (on page 14).
5. Do one of the following:
   - Remove the storage controller (on page 17).
   - Disconnect the direct connect SATA cables ("Direct connect SATA cabling" on page 60).
6. Remove all drives ("Remove a drive" on page 14).
7. Remove all drive blanks ("Remove a hard drive blank" on page 14).
8. Remove all DIMM baffles ("Removing DIMM baffles" on page 14).

9. Extend the serial label pull tab.



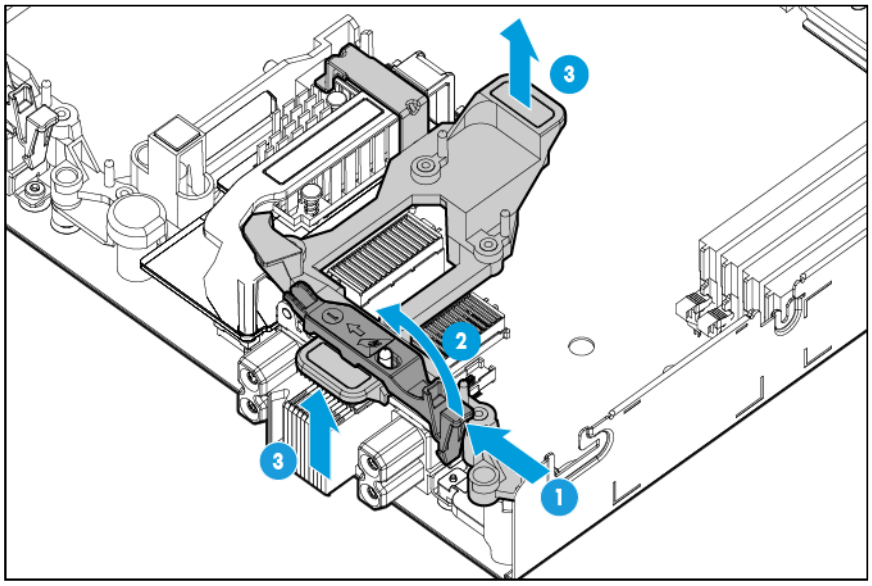
10. Remove the front panel/drive cage assembly.



Remove the mezzanine assembly

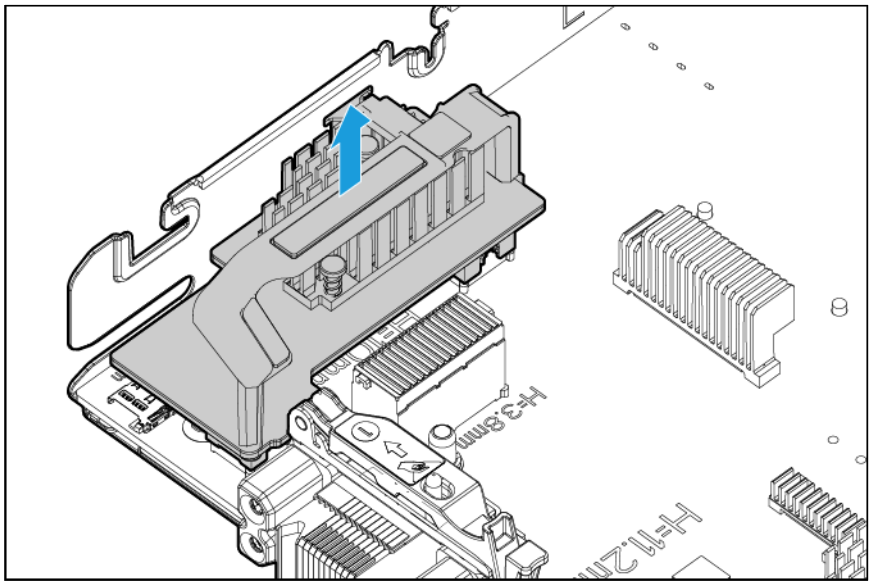
1. Power down the server blade (on page 12).
2. Remove the server blade (on page 13).
3. Place the server blade on a flat, level work surface.
4. Remove the access panel (on page 14).

5. Remove the mezzanine assembly.



Remove the FlexibleLOM

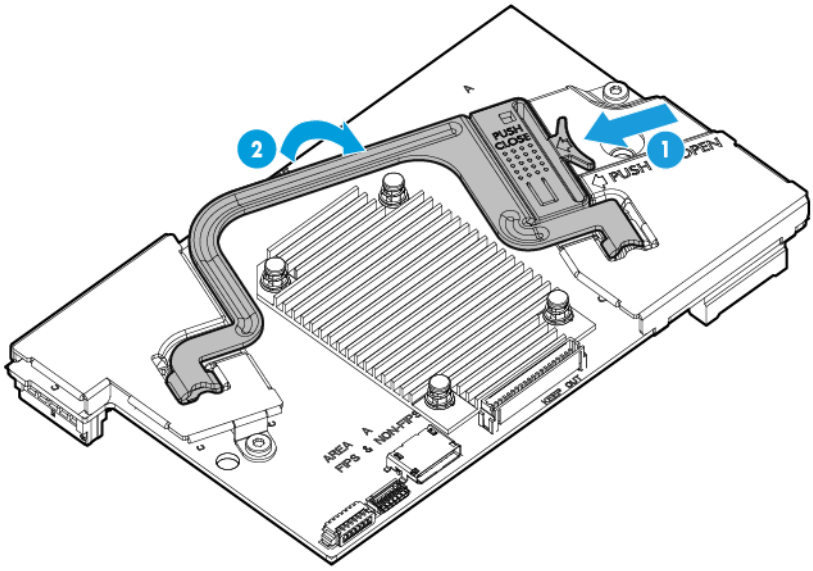
1. Power down the server blade (on page 12).
2. Remove the server blade (on page 13).
3. Place the server blade on a flat, level work surface.
4. Remove the access panel (on page 14).
5. Remove the mezzanine assembly (on page 19).
6. Use the FlexibleLOM handle to remove the FlexibleLOM from the system board.



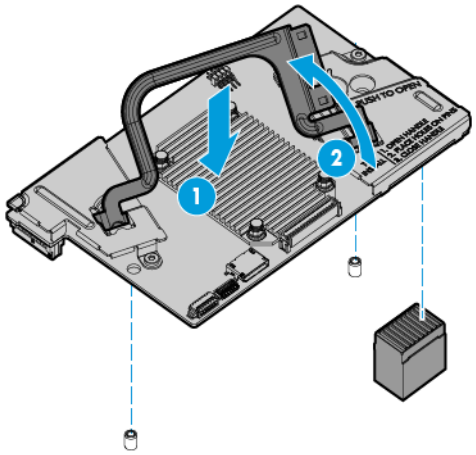
Install the storage controller

1. Power down the server blade (on page 12).

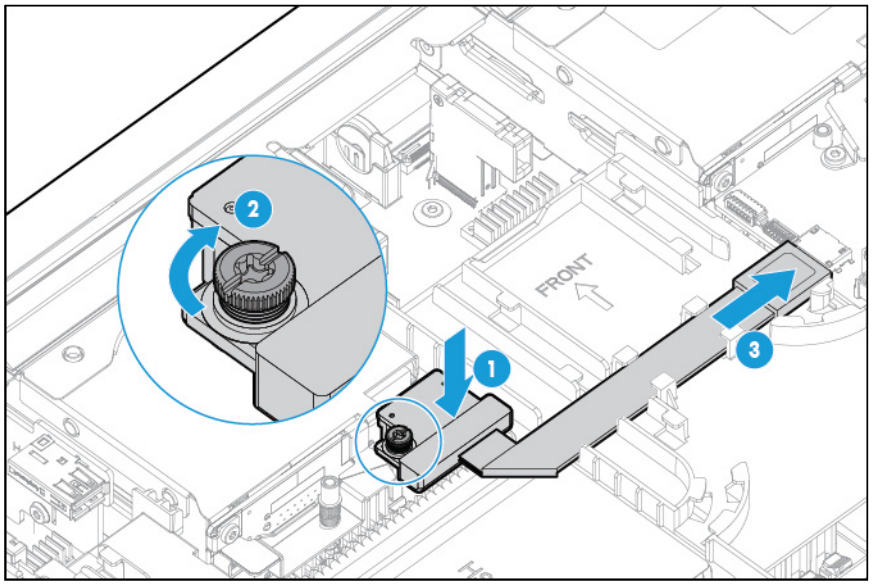
2. Remove the server blade (on page 13).
3. Place the server blade on a flat, level work surface.
4. Remove the access panel (on page 14).
5. Disconnect the direct connect SATA cable, if installed ("Direct connect SATA cabling" on page 60).
6. Prepare the storage controller for installation.



7. Align the storage controller with the alignment pins and lower it into server blade.
8. Push the handle down into the closed position to fully seat the storage controller.



9. Connect the SAS cable to the storage controller and the drive backplane.



Install the access panel

1. Place the access panel on top of the server blade.
2. Slide the access panel forward until it clicks into place.

Setup

Installing an HP BladeSystem c-Class enclosure

Before performing any server blade-specific procedures, install an HP BladeSystem c-Class enclosure.

The most current documentation for server blades and other HP BladeSystem components is available at the HP website (http://www.hp.com/go/bladesystem/documentation).

Documentation is also available in the following locations:

- Documentation CD that ships with the enclosure
- HP website (http://www.hp.com/go/hpsc)

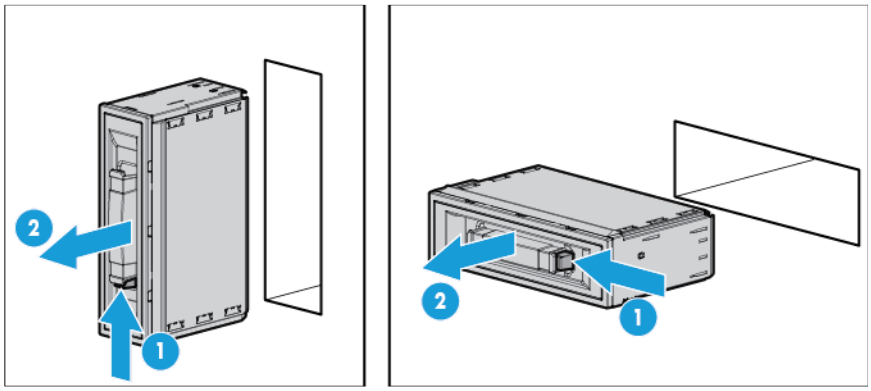
Preparing the enclosure

HP BladeSystem enclosures ship with device bay dividers to support half-height devices. To install a full-height device, remove the blanks and the corresponding device bay divider.

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

IMPORTANT: For optimal cooling and system performance, configure the c7000 enclosure with ten fans and configure the c3000 enclosure with six fans.

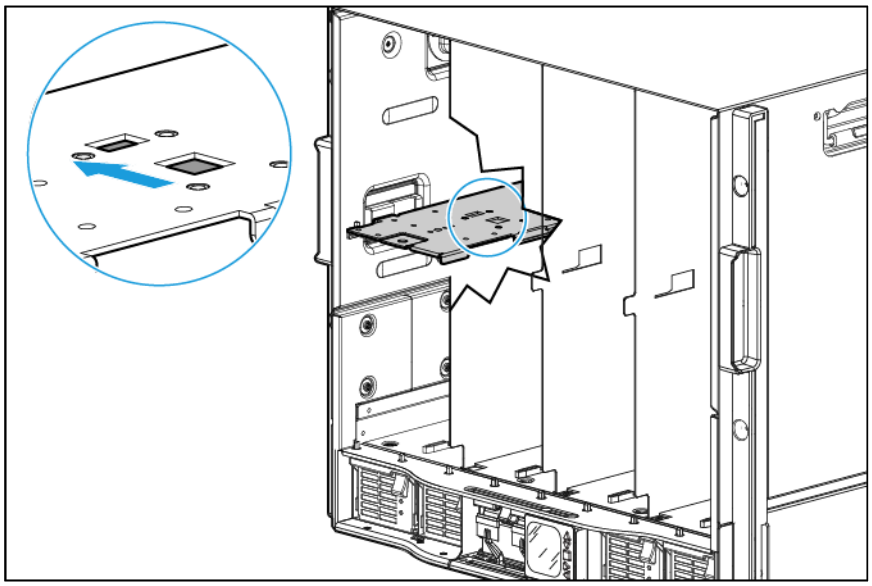
1. Remove the device bay blank.



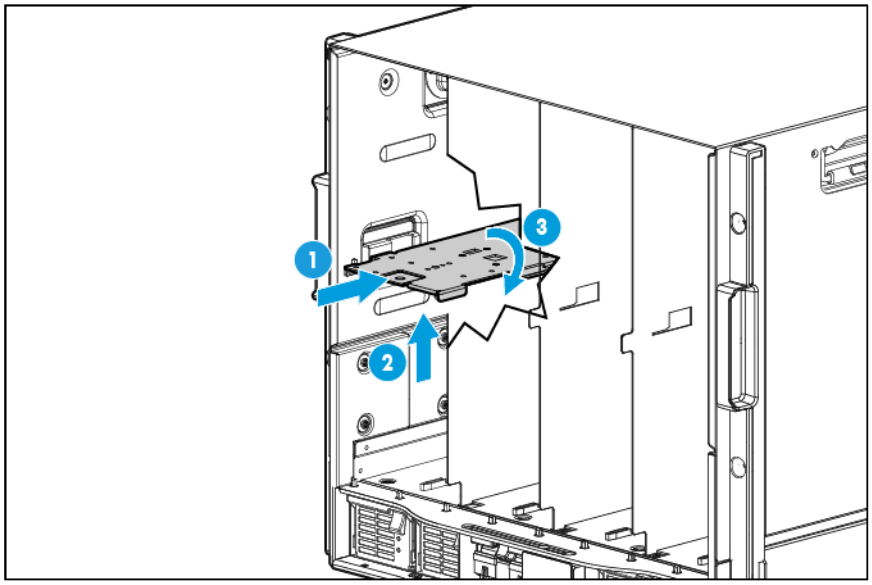
2. Remove the three adjacent blanks.

Removing a c7000 device bay divider

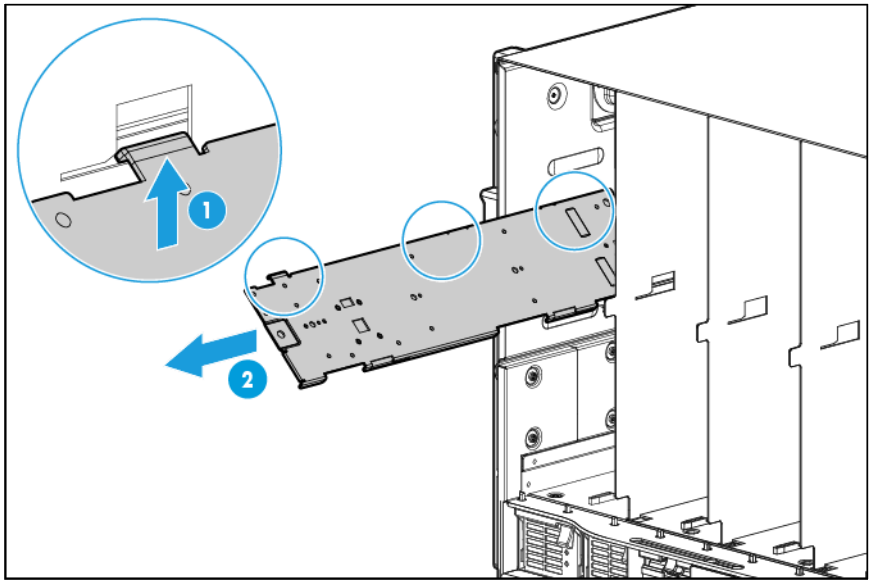
1. Slide the device bay shelf locking tab to the left to open it.



2. Push the device bay shelf back until it stops, lift the right side slightly to disengage the two tabs from the divider wall, and then rotate the right edge downward (clockwise).

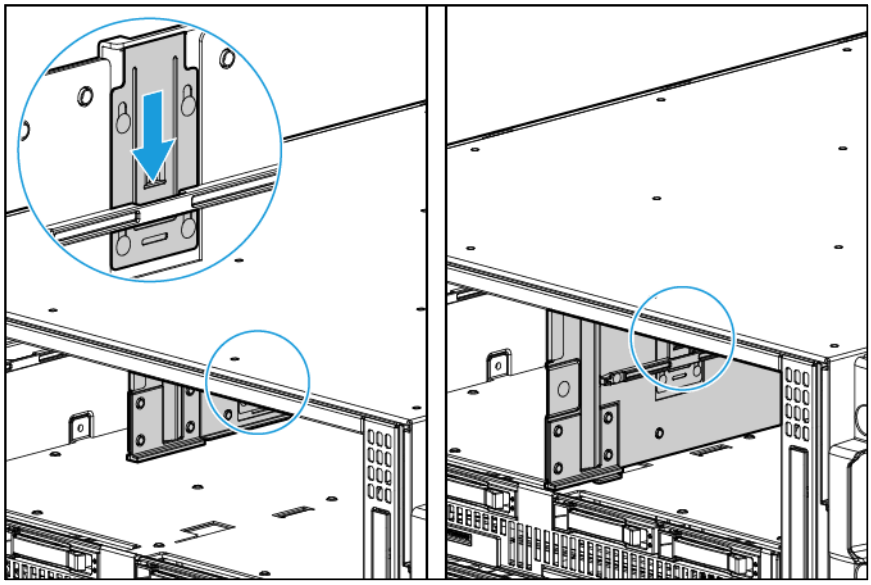


3. Lift the left side of the device bay shelf to disengage the three tabs from the divider wall, and then remove it from the enclosure.



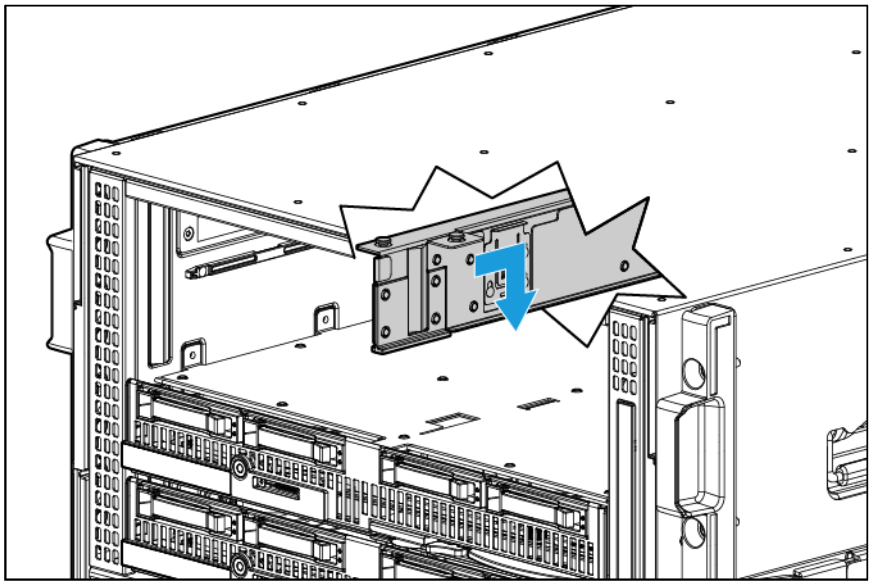
Removing a c3000 device bay mini-divider or device bay divider

1. Slide the locking tab down.

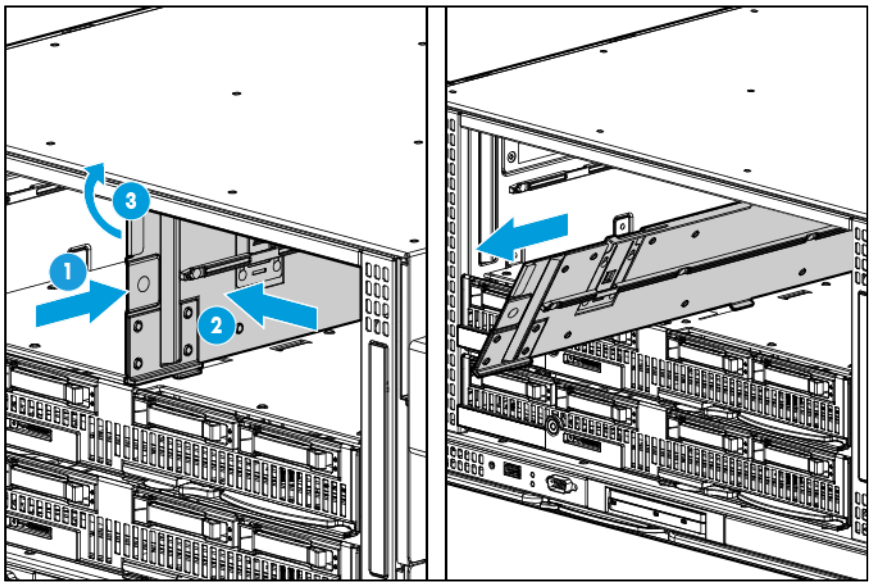


2. Remove the mini-divider or divider:
   - c3000 mini-divider:

Push the divider toward the back of the enclosure until the divider drops out of the chassis.



- c3000 divider:
  i. Push the divider toward the back of the enclosure until it stops.
  ii. Slide the divider to the left to disengage the tabs from the wall.
  iii. Rotate the divider clockwise.
  iv. Remove the divider from the enclosure.

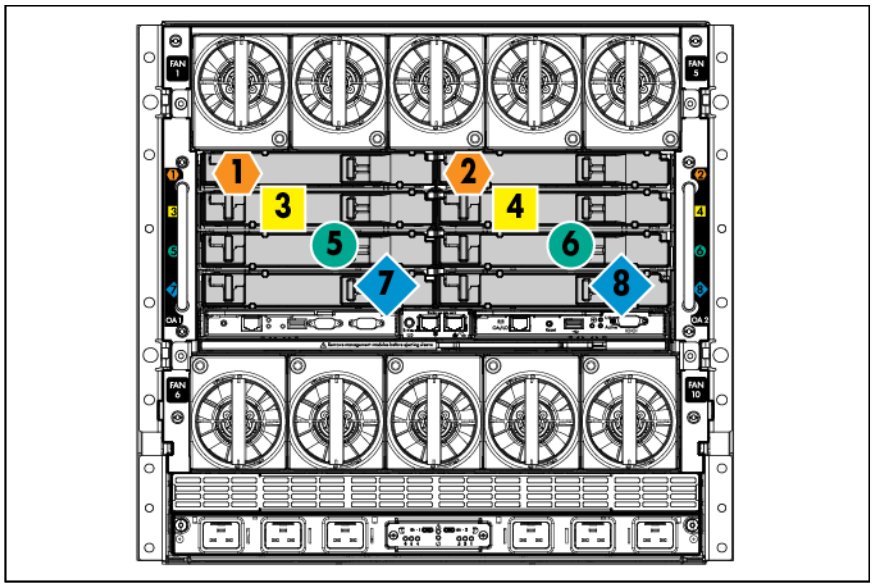


Installing interconnect modules

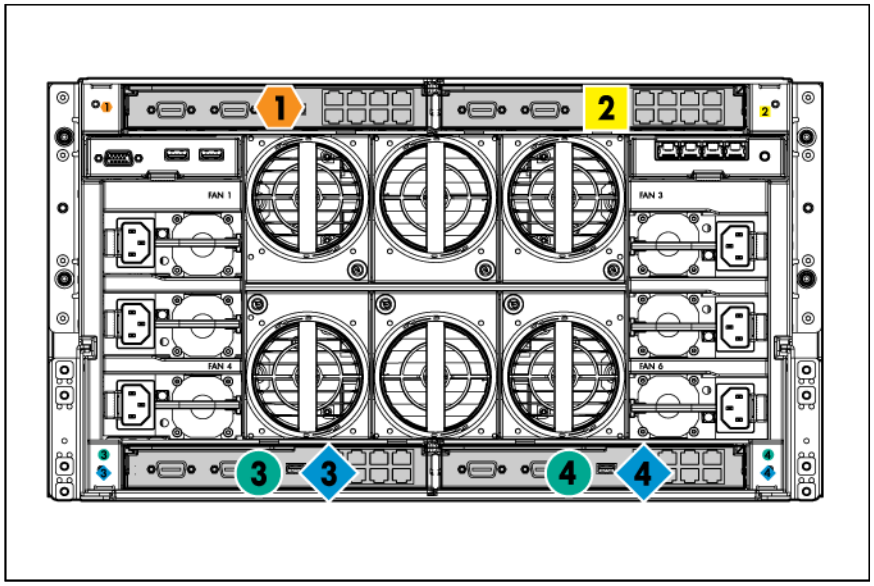
For specific steps to install interconnect modules, see the documentation that ships with the interconnect module.

Interconnect bay numbering and device mapping

- HP BladeSystem c7000 Enclosure



- HP BladeSystem c3000 Enclosure



To support network connections for specific signals, install an interconnect module in the bay corresponding to the embedded adapter or mezzanine signals.

Server blade signal	c7000 interconnect bay	c3000 interconnect bay	Interconnect bay labels
FlexibleLOM 1 (Embedded)	1 and 2	1	⬢
FlexibleLOM 2 (Embedded)	1 and 2	1	⬢
Mezzanine 1	3 and 4	2	■
Mezzanine 2	5 and 6*	3 and 4	●
	7 and 8**	3 and 4	◆

Server blade signal	c7000 interconnect bay	c3000 interconnect bay	Interconnect bay labels
Mezzanine 3	5 and 6**	3 and 4	●
	7 and 8*	3 and 4	◆

* Dual port mezzanine card ports and four-port mezzanine card ports 1 and 2
** Four-port mezzanine card ports 3 and 4

For detailed port mapping information, see the HP BladeSystem enclosure installation poster or the HP BladeSystem enclosure setup and installation guide on the HP website (http://www.hp.com/support/BladeSystem/docs).

Connecting to the network

To connect the HP BladeSystem to a network, each enclosure must be configured with network interconnect devices to manage signals between the server blades and the external network.

Two types of interconnect modules are available for HP BladeSystem c-Class enclosures: Pass-Thru modules and switch modules. For more information about interconnect module options, see the HP website (http://www.hp.com/go/bladesystem/interconnects).

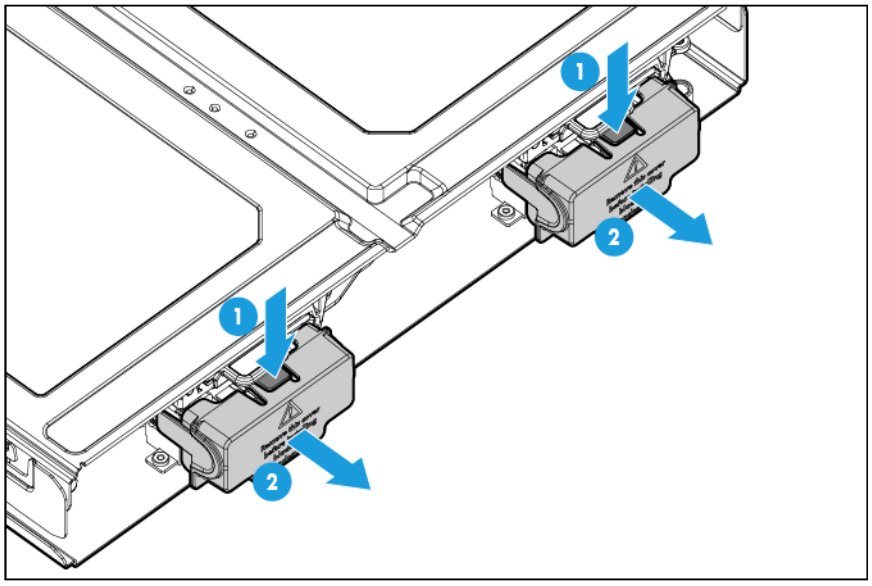
IMPORTANT: To connect to a network with a Pass-Thru module, always connect the Pass-Thru module to a network device that supports Gigabit or 10 Gb speed, depending on the corresponding Pass-Thru model.

Installing server blade options

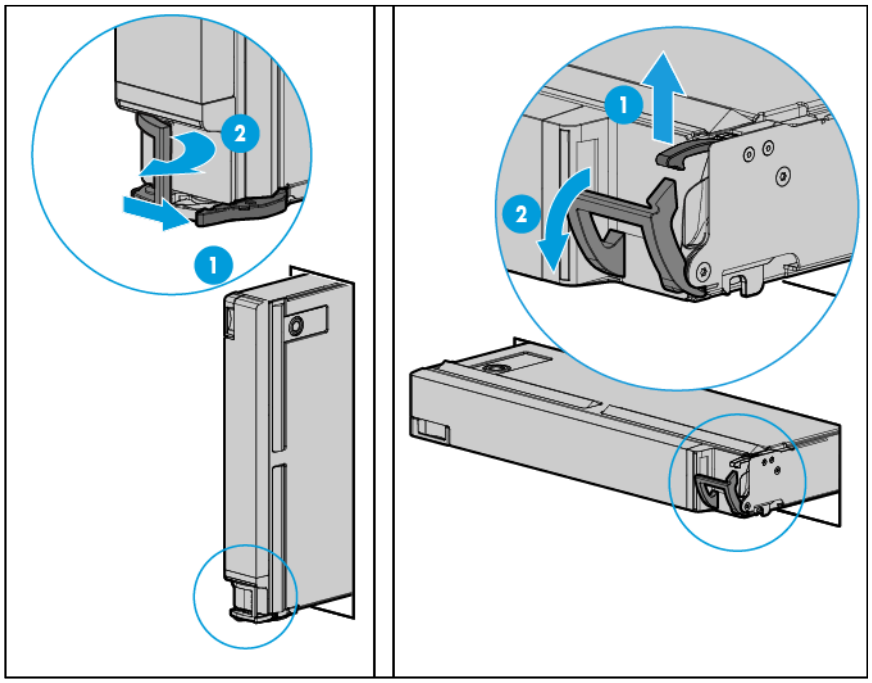
Before installing and initializing the server blade, install any server blade options, such as an additional processor, hard drive, or mezzanine card.

Installing a server blade

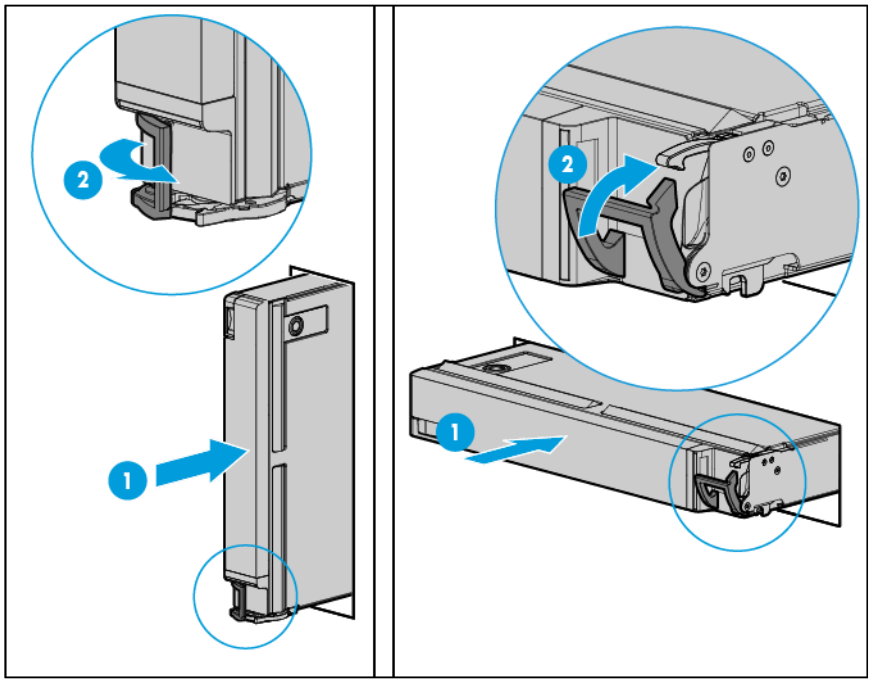
1. Remove the connector covers.



2. Open the server blade latch.



3. Install the server blade.



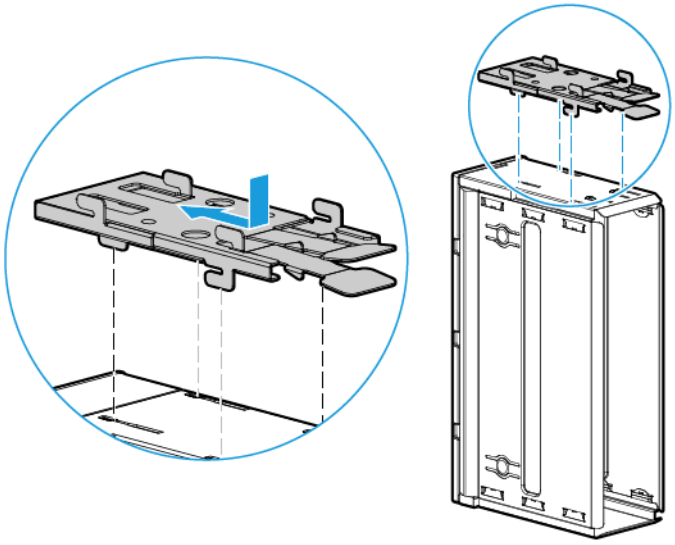
Assembling a full height blank

△ **CAUTION:** To prevent improper cooling and thermal damage, do not operate the server blade or the enclosure unless all drive and device bays are populated with either a component or a blank.

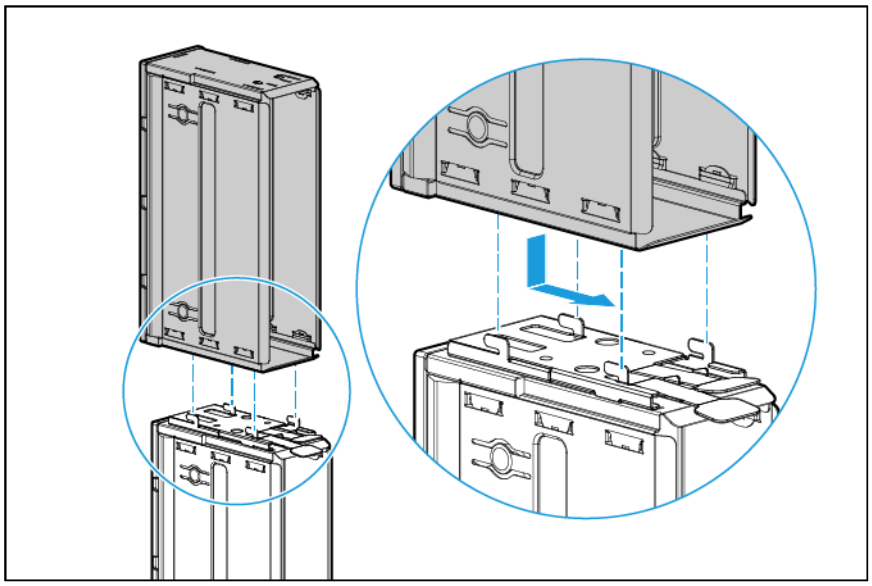
1. Obtain the coupler plate:

- If you are using a device bay blank that came with the enclosure, the coupler plate can be found with the contents of the full-height device shipping box.
- If you are using a device bay blank that you purchased as an option, remove the coupler plate from inside the blank.

2. Fit the coupler plate into the slots on top of the blank, and then slide the coupler plate back until it snaps into place.



3. Fit the slots on the bottom of the second blank on to the tabs on the coupler plate, and then slide the second blank forward until it snaps in place.



4. Install the full-height blank into the device bay.

Completing the configuration

To complete the server blade and HP BladeSystem configuration, see the overview card that ships with the enclosure.

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.

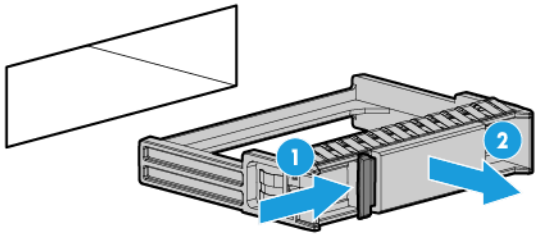
△ **CAUTION:** To prevent damage to electrical components, properly ground the server before beginning any installation procedure. Improper grounding can cause electrostatic discharge.

Drive option

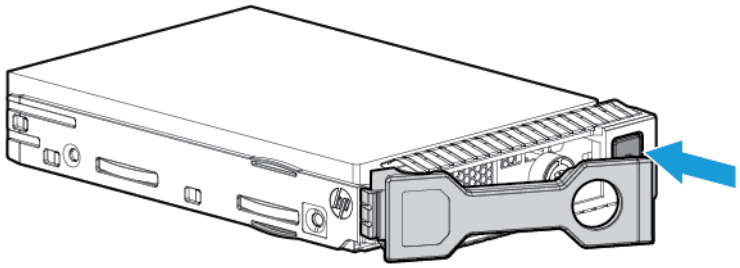
The server blade supports up to four SAS, SATA, or solid state drives.

△ **CAUTION:** To prevent improper cooling and thermal damage, do not operate the server blade or the enclosure unless all drive and device bays are populated with either a component or a blank.

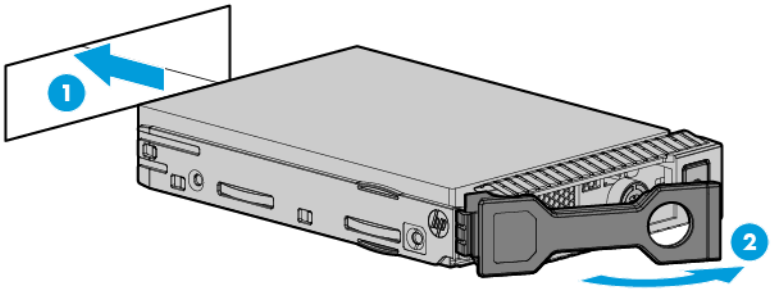
1. Remove the drive blank.



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 8).

Processor option

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

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

CAUTION: The heatsink thermal interface media is not reusable and must be replaced if the heatsink is removed from the processor after it has been installed.

CAUTION: To prevent possible server blade overheating, always populate processor sockets with a processor and a heatsink or a heatsink blank.

CAUTION: To prevent damage to electrical components, properly ground the server blade before beginning any installation procedure. Improper grounding may cause ESD damage.

IMPORTANT: Processor sockets 1 and 2 must always be populated. If either processor socket is empty, the server blade does not power up.

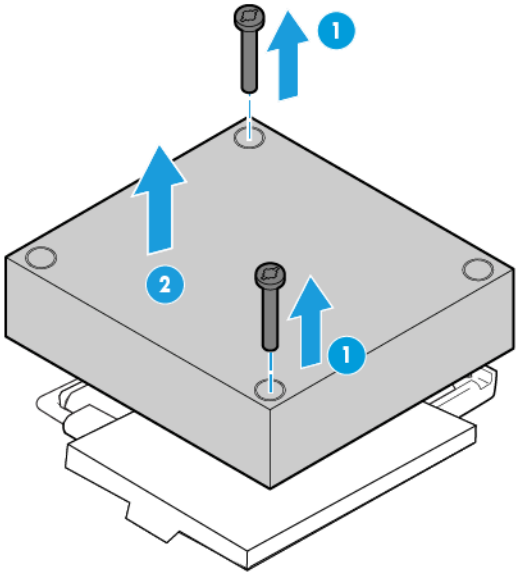
To install a processor:

1. Update the system ROM.

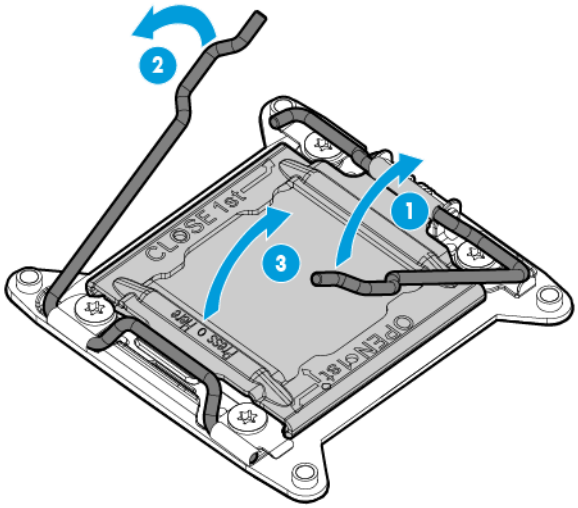
   Locate and download the latest ROM version from the HP website (http://www.hp.com/support). Follow the instructions on the website to update the system ROM.
2. Power down the server blade (on page 12).
3. Remove the server blade (on page 13).
4. Place the server blade on a flat, level work surface.
5. Remove the access panel (on page 14).
6. Remove all drives ("Remove a drive" on page 14).
7. Remove all DIMM baffles ("Removing DIMM baffles" on page 14).
8. Remove the front panel/drive cage assembly (on page 18).

9. Using a no. 2 Phillips screwdriver, remove the heatsink blank.

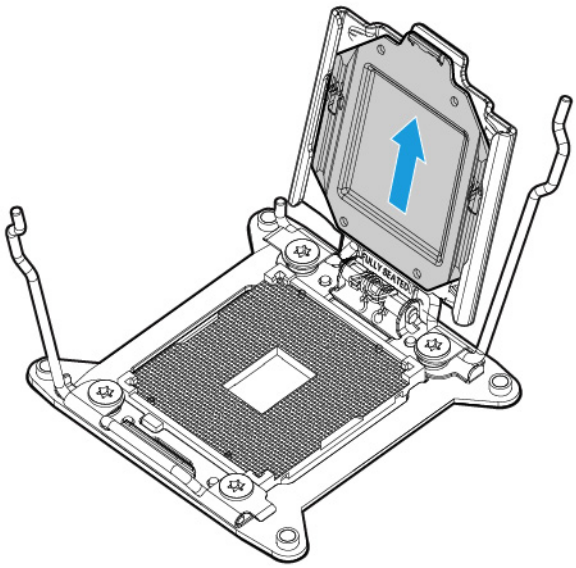
   Retain the heatsink blank for future use.



10. Open each of the processor locking levers in the order indicated in the following illustration, and then open the processor retaining bracket.

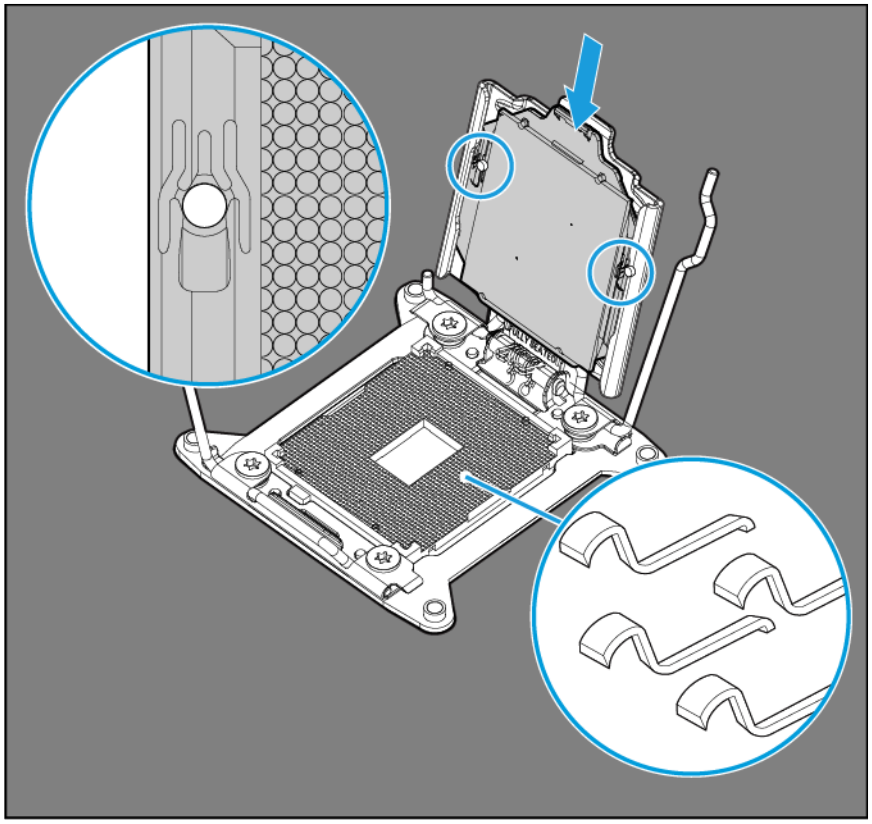


11. Remove the clear processor socket cover. Retain the processor socket cover for future use.



△ **CAUTION: THE PINS ON THE SYSTEM BOARD ARE VERY FRAGILE AND EASILY DAMAGED.** To avoid damage to the system board, do not touch the processor or the processor socket contacts.

12. Install the processor. Verify that the processor is fully seated in the processor retaining bracket by visually inspecting the processor installation guides on either side of the processor. **THE PINS ON THE SYSTEM BOARD ARE VERY FRAGILE AND EASILY DAMAGED.**

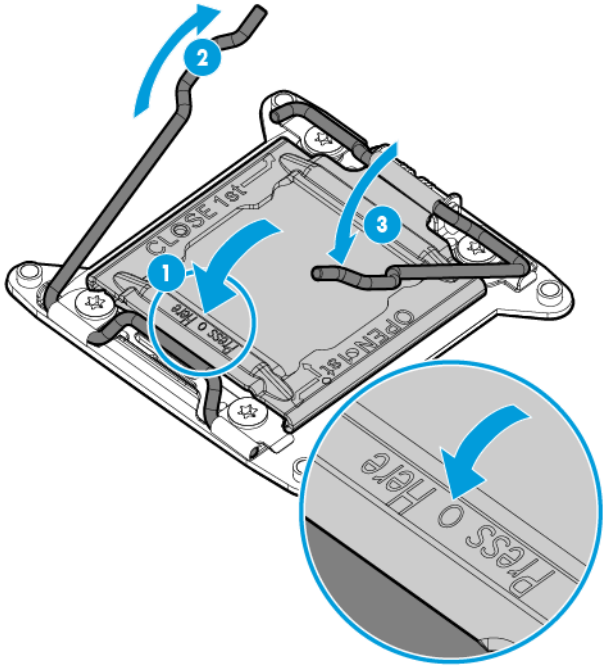


13. Close the processor retaining bracket. When the processor is installed properly inside the processor retaining bracket, the processor retaining bracket clears the flange on the front of the socket.

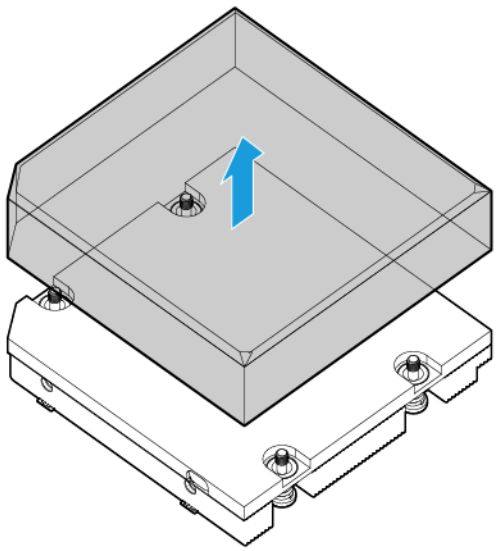
△ **CAUTION:** Do not press down on the processor. Pressing down on the processor may cause damage to the processor socket and the system board. Press only in the area indicated on the processor retaining bracket.

△ **CAUTION:** Close and hold down the processor cover socket while closing the processor locking levers. The levers should close without resistance. Forcing the levers closed can damage the processor and socket, requiring system board replacement.

14. Press and hold the processor retaining bracket in place, and then close each processor locking lever. Press only in the area indicated on the processor retaining bracket.

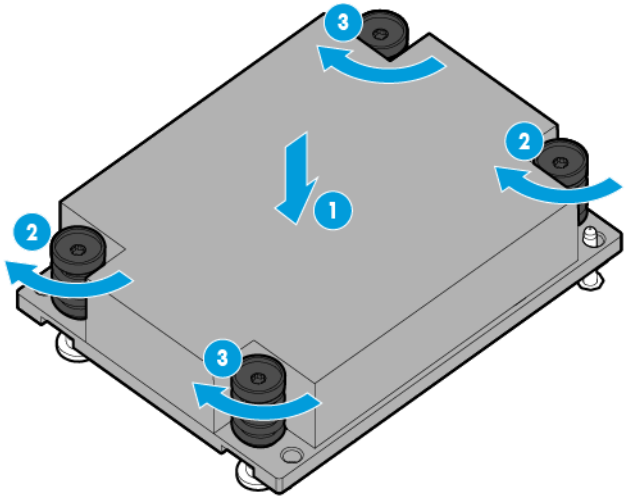


15. Remove the thermal interface protective cover from the heatsink.

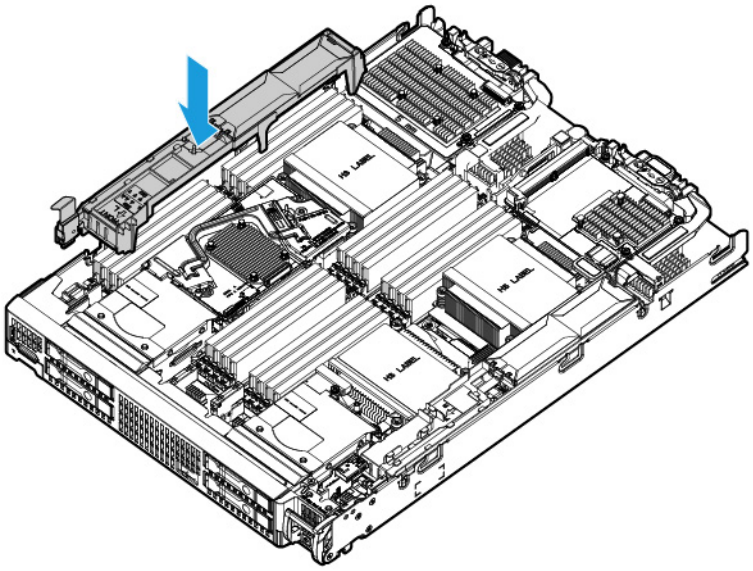


△ **CAUTION:** To avoid damage to the system board, processor socket, and screws, do not overtighten the heatsink screws.

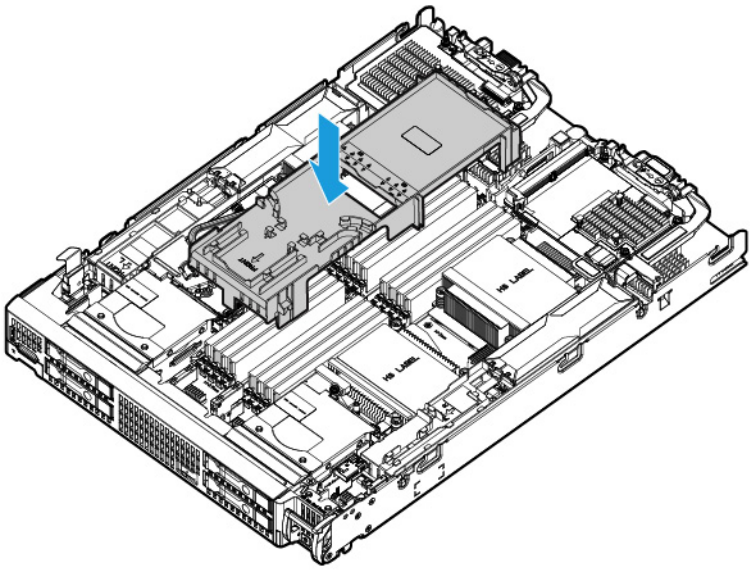
16. Align and install the heatsink. Alternate tightening the screws until the heatsink is seated properly.



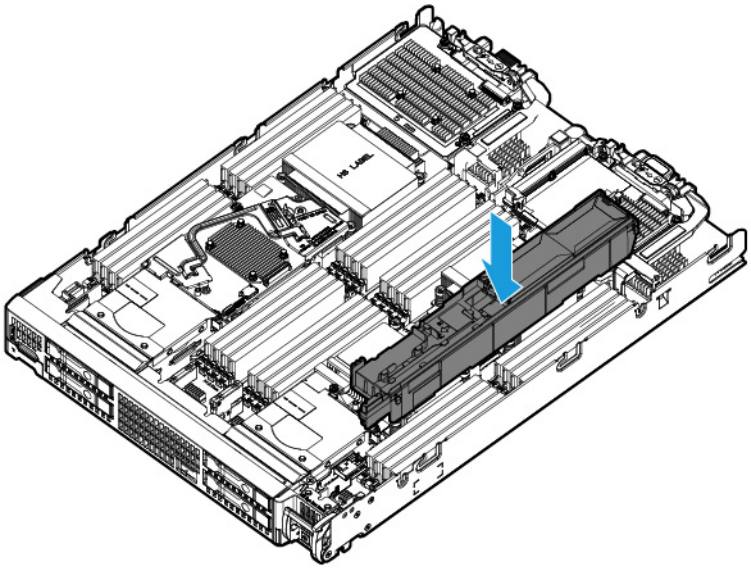
17. Install all DIMM baffles.
    - Left DIMM baffle



- Center DIMM baffle

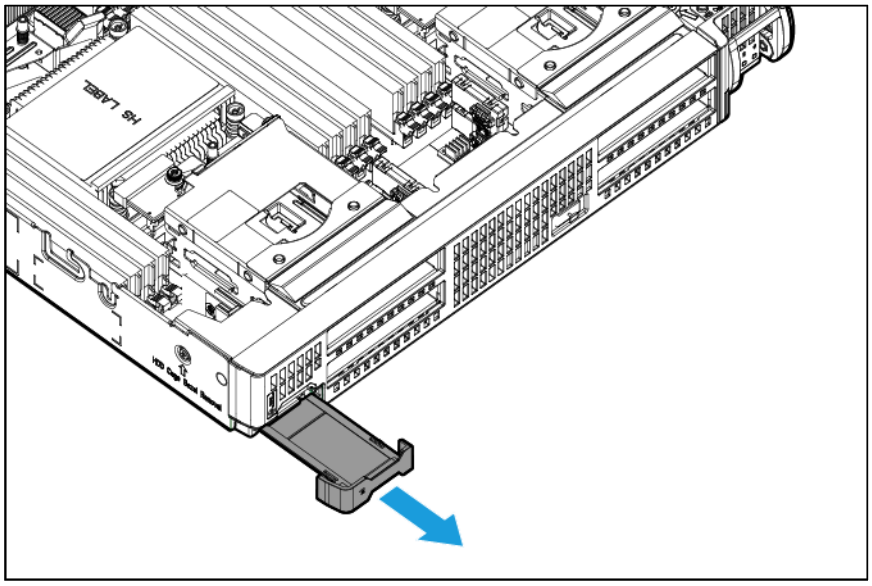


- Right DIMM baffle

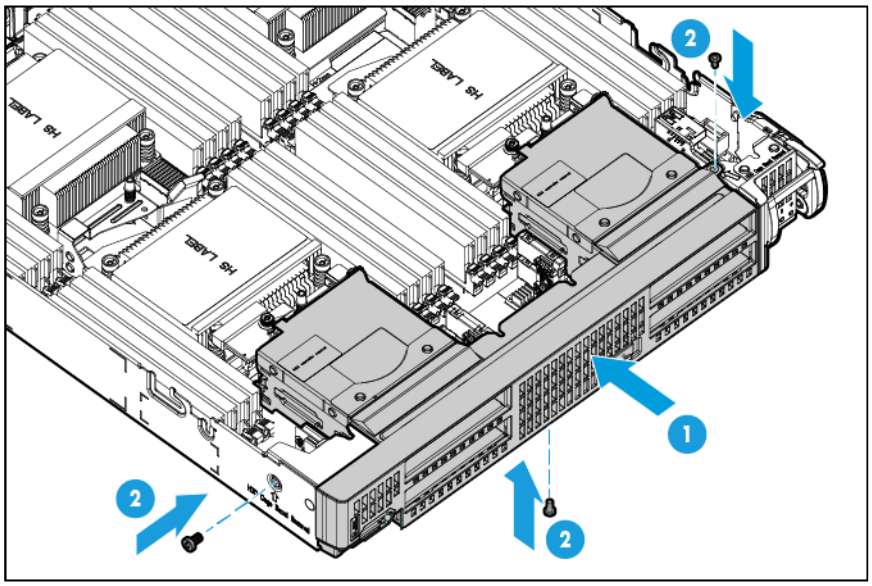


18. Install the front panel/drive cage assembly.

a. Extend the serial label pull tab.



b. Install the front panel/drive cage assembly to the server blade and secure with three screws.



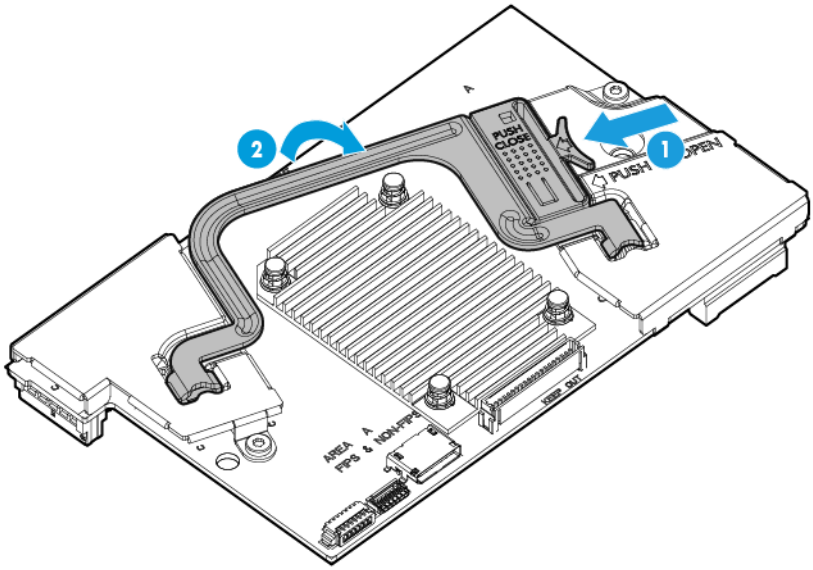
19. Install all drives ("Drive option" on page 31).
20. Install the access panel (on page 22).

Storage controller option

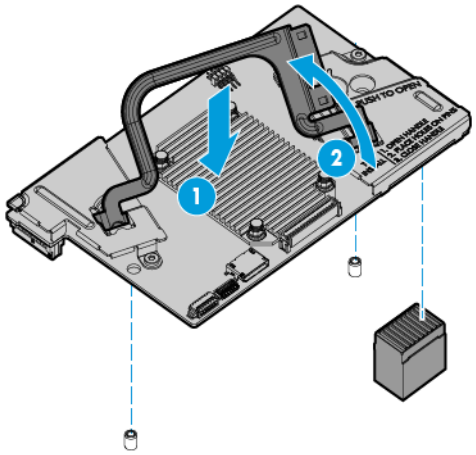
To install the component:

1. Back up all server blade data.
2. Power down the server blade (on page 12).
3. Remove the server blade (on page 13).
4. Place the server blade on a flat, level work surface.
5. Remove the access panel (on page 14).

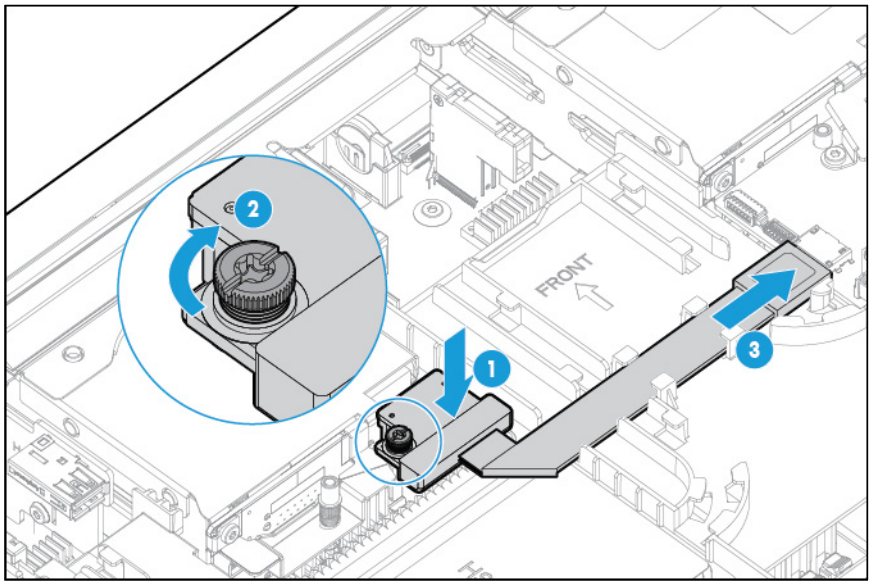
6. Disconnect the direct connect SATA cable, if installed ("Direct connect SATA cabling" on page 60).
7. Prepare the storage controller for installation.



8. Align the storage controller with the alignment pins and lower it into server blade.
9. Push the handle down into the closed position to fully seat the storage controller.



10. Connect the SAS cable to the storage controller and the drive backplane.



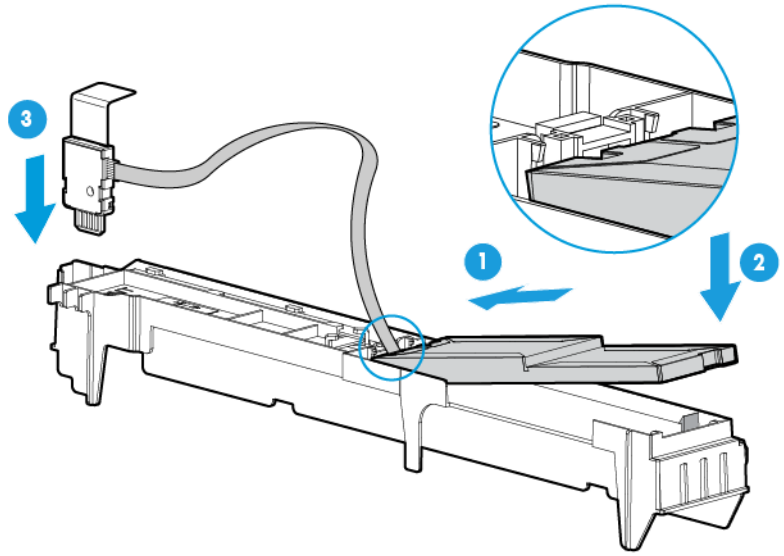
11. Install the access panel (on page 22).
12. Install the server blade ("Installing a server blade" on page 28).
13. Power up the server blade (on page 12).

HP Smart Storage Battery option

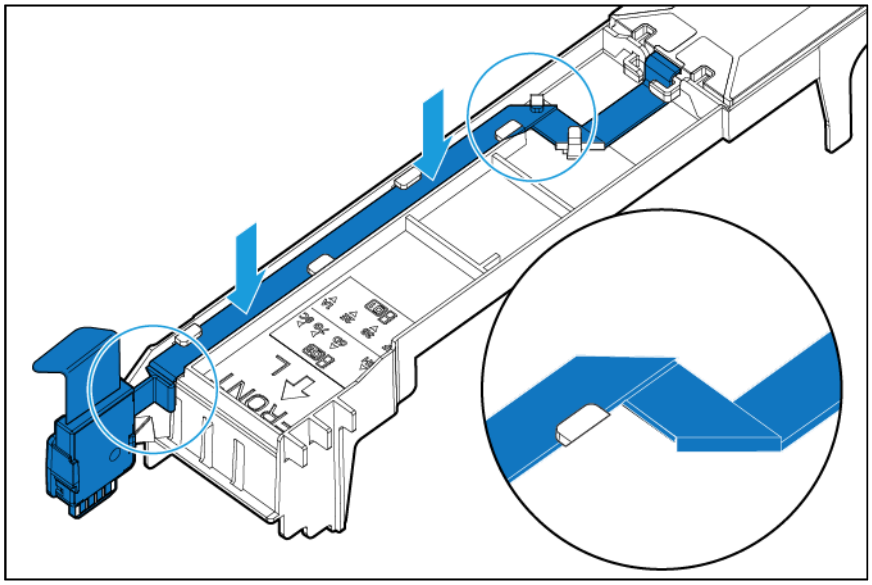
To install the component:

1. Power down the server blade (on page 12).
2. Remove the server blade (on page 13).
3. Place the server blade on a flat, level work surface.
4. Remove the access panel (on page 14).
5. Disconnect the direct connect SATA cable, if installed ("Direct connect SATA cabling" on page 60).
6. Remove the internal USB drive, if installed. To locate the internal USB connector, see "System board components (on page 9)."
7. Remove the left DIMM baffle (on page 15).

8. Install the HP Smart Storage Battery on the DIMM baffle.

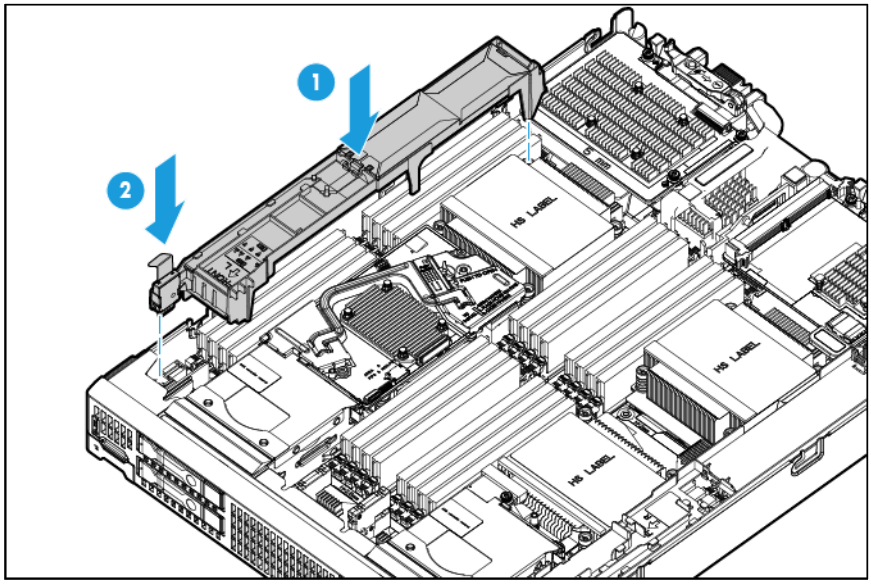


9. Route the cable on the DIMM baffle.



10. Install the DIMM baffle.
    a. Align and install the DIMM baffle.

b. Press down on the cable connector to fully seat the HP Smart Storage Battery cable connector to the system board.



11. Route and connect the direct connect SATA cable, if installed ("Direct connect SATA cabling" on page 60).
12. Install the access panel (on page 22).
13. Install the server blade ("Installing a server blade" on page 28).
14. Power up the server blade (on page 12).

Memory options

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

The memory subsystem in this server blade can support LRDIMMs and RDIMMs:

- RDIMMs offer 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.

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

The server supports the following DIMM speeds:

- Single- and dual-rank PC4-2133 (DDR4-2133) RDIMMs operating at up to 2133 MT/s
- Dual- and quad-rank PC4-2133 (DDR4-2133) LRDIMMs operating at up to 2133 MT/s

Speed and capacity

DIMM type	DIMM rank	DIMM capacity	Native speed (MT/s)
RDIMM	Single-rank	8 GB	2133

DIMM type	DIMM rank	DIMM capacity	Native speed (MT/s)
RDIMM	Dual-rank	16 GB	2133
LRDIMM	Dual-rank	16 GB	2133
LRDIMM	Quad-rank	32 GB	2133

Depending on the processor model, the number of DIMMs installed, and whether LRDIMMs or RDIMMs are installed, the memory clock speed can be reduced to 1600 MT/s.

Populated DIMM speed (MT/s)

DIMM type	DIMM rank	1 DIMM per channel	2 DIMMs per channel
RDIMM	Single-rank (8 GB)	2133	2133
RDIMM	Dual-rank (16 GB)	2133	2133
LRDIMM	Dual-rank (16 GB)	2133	2133
LRDIMM	Quad-rank (32 GB)	2133	2133

HP SmartMemory

HP SmartMemory 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.

Memory subsystem architecture

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

Processors	Channel	Slot	Slot number
P1 and P2	1	A E	1 2
P1 and P2	2	B F	3 4
P1 and P2	3	C G	8 7
P1 and P2	4	D H	6 5
P3 and P4	1	E A	7 8
P3 and P4	2	F B	5 6
P3 and P4	3	C G	1 2
P3 and P4	4	D H	3 4

For the location of the slot numbers, see "DIMM slot locations (on page 11)."

This multi-channel architecture provides enhanced performance in Advanced ECC mode.

DIMM slots in this server blade 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.

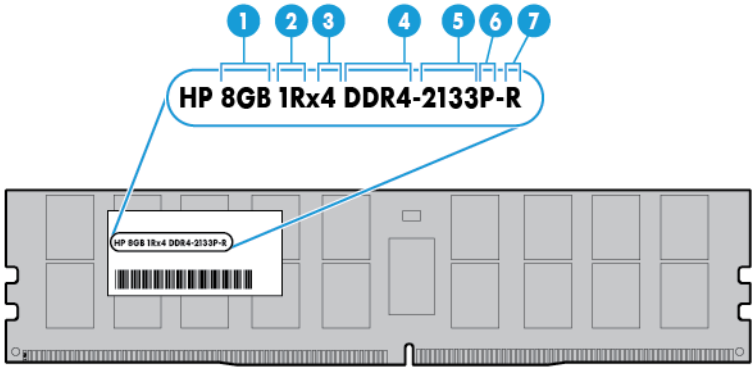
A single-rank DIMM has one set of memory chips that is accessed while writing to or reading from the memory. A dual-rank DIMM is similar to having two single-rank DIMMs on the same module, with only one rank accessible at a time. A quad-rank DIMM is, effectively, two dual-rank DIMMs on the same module. Only one rank is accessible at a time. The server blade 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 dual- or quad-rank DIMMs. There are two or four ranks of DRAM on the DIMM, but the LRDIMM buffer creates an abstraction that allows the DIMM to always appear as a dual-rank DIMM to the system. The LRDIMM buffer isolates the electrical loading of the DRAM from the system to allow for faster operation. This allows 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	Capacity	8 GB 16 GB 32 GB
2	Rank	1R = Single-rank 2R = Dual-rank 4R = Quad-rank
3	Data width	x4 = 4-bit x8 = 8-bit

Item	Description	Definition
4	Memory generation	DDR4
5	Maximum memory speed	2133 MT/s
6	CAS latency	P=15
7	DIMM type	R = RDIMM (registered) L = LRDIMM (load reduced)

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

Memory configurations

To optimize server blade availability, the server blade 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 blade.

Online spare memory

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.

Mirrored memory

Errors that are not corrected by ECC or SDDC cannot be corrected by Online spare memory. Mirrored memory provides the greatest protection against memory failure beyond ECC, SDDC, and Online spare memory by providing added redundancy in the memory sub-system. Upon detecting an uncorrectable memory error from a DIMM in a memory cartridge, the processor avoids a system crash by reading the mirrored DIMM. In this case, the system management routine disables the failed DIMM. Further memory reads and writes will only occur on the mirrored DIMM.

Limitations to Mirrored Memory mode are as follows:

- In Mirrored Memory mode, half of the memory is allocated to memory protection.
- The available memory bandwidth is reduced by up to 50% in this mode.
- Mirrored Memory, Online Spare mode cannot be enabled simultaneously.

Advanced Memory Protection options are configured in the BIOS/Platform Configuration (RBSU). If the requested AMP mode is not supported by the installed DIMM configuration, the server blade boots in Advanced ECC mode. For more information, see the *HP UEFI System Utilities User Guide for HP ProLiant Gen9 Servers* on the HP website (http://www.hp.com/go/ProLiantUEFI/docs).

Maximum capacity

DIMM type	DIMM rank	One processor	Two processors	Three processors	Four processors
RDIMM	Single-rank (8 GB)	64 GB	128 GB	192 GB	256 GB
RDIMM	Dual-rank (16 GB)	128 GB	256 GB	384 GB	512 GB
LRDIMM	Dual-rank (16 GB)	128 GB	256 GB	384 GB	512 GB
LRDIMM	Quad-rank (32 GB)	256 GB	512 GB	768 GB	1024 GB

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

Advanced ECC memory configuration

Advanced ECC memory is the default memory protection mode for this server blade. 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 blade and causes the server blade to halt.

Advanced ECC protects the server blade 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 blade failure. Using HP Advanced Memory Error Detection technology, the server blade 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 blade automatically copies the memory contents of the degraded rank to the online spare rank. The server blade then deactivates the failing rank and automatically switches over to the online spare rank.

Mirrored memory configuration

Mirroring provides protection against uncorrected memory errors that would otherwise result in server blade downtime. Mirroring is performed at the channel level.

Data is written to both memory channels. Data is read from one of the two memory channels. If an uncorrectable error is detected in the active memory channel, data is retrieved from the mirror channel. This channel becomes the new active channel, and the system disables the channel with the failed DIMM.

General DIMM slot population guidelines

Observe the following guidelines for all AMP modes:

- Install DIMMs only if the corresponding processor is installed.

- Balance the DIMMs across the installed 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 RDIMMs and LRDIMMs.
- When two processors are installed, install the DIMMs in sequential alphabetic order balanced between the two processors: P1-A, P2-A, P1-B, P2-B, P1-C, P2-C, and so forth.
- When four processors are installed, install the DIMMs in sequential alphabetic order balanced across the four processors: P1-A, P2-A, P3-A, P4-A, P1-B, P2-B, P3-B, P4-B, P1-C, and so forth.
- For DIMM spare replacement, install the DIMMs per slot number as instructed by the system software.

For detailed memory configuration rules and guidelines, use the Online DDR4 Memory Configuration Tool on the HP website (http://www.hp.com/go/DDR4memoryconfig).

DIMM speeds are supported as indicated in the following table.

Populated slots (per channel)	**Rank**	**Speeds supported (MT/s)**
1, 2	Single or dual	2133
1, 2	Quad	2133

Advanced ECC population guidelines

For Advanced ECC mode configurations, observe the following guidelines:

- Observe the general DIMM slot population guidelines (on page 46).
- DIMMs may be installed individually.

Online spare population guidelines

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

- Observe the general DIMM slot population guidelines (on page 46).
- 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.

Mirrored Memory population guidelines

For Mirrored Memory mode configurations, observe the following guidelines:

- Observe the general DIMM slot population guidelines (on page 46).
- Always install DIMMs in all channels for each installed processor.
- DIMMs installed on all channels of an installed processor must be identical.
- In multi-processor configurations, each processor must have a valid Mirrored Memory configuration.
- In multi-processor configurations, each processor may have a different valid Mirrored 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 H)
- RDIMM: Sequentially in alphabetical order (A through H)

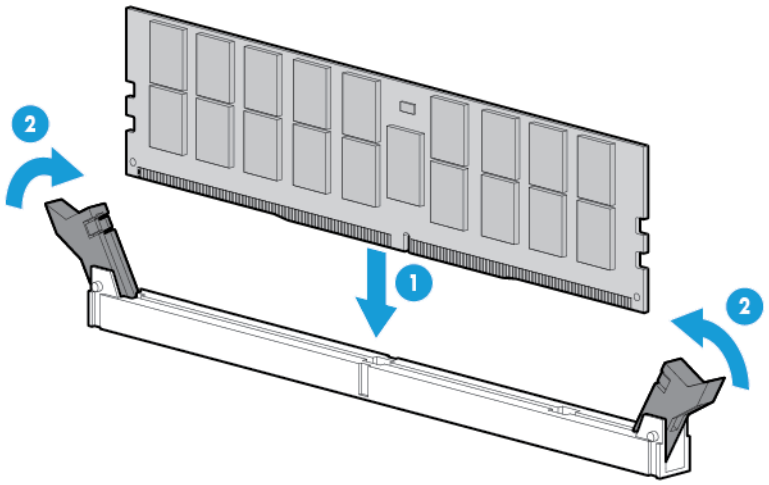
After installing the DIMMs, use HP UEFI System Utilities (on page 70) to configure supported AMP modes.

Installing a DIMM

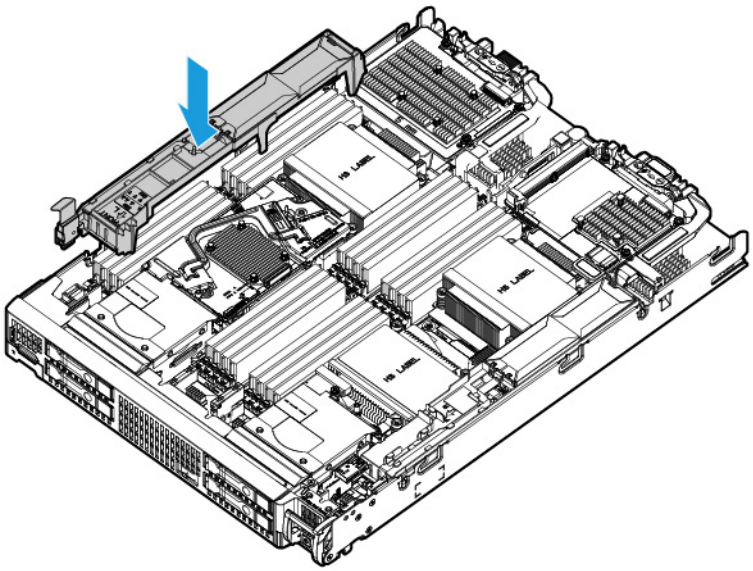
CAUTION: To avoid damage to the hard drives, memory, and other system components, the air baffle, drive blanks, and access panel must be installed when the server is powered up.

CAUTION: To avoid damage to the hard drives, memory, and other system components, be sure to install the correct DIMM baffles for your server model.

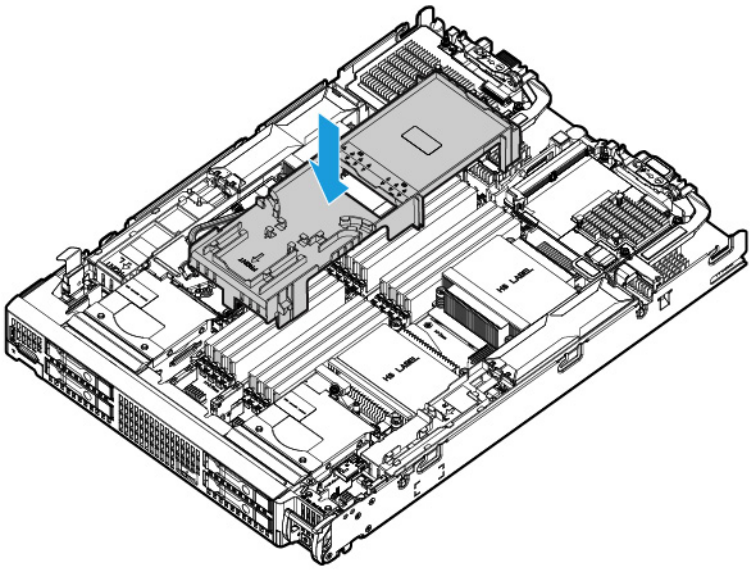
1. Power down the server blade (on page 12).
2. Remove the server blade (on page 13).
3. Place the server blade on a flat, level work surface.
4. Remove the access panel (on page 14).
5. If installing processor 1 DIMMs, remove the mezzanine assembly ("Remove the mezzanine assembly" on page 19).
6. If installing processor 1 DIMMs number 5-8, remove the FlexibleLOM ("Remove the FlexibleLOM" on page 20).
7. If DIMM installation requires removing the right DIMM baffle, do the following:
   a. Disconnect the direct connect SATA cable, if installed ("Direct connect SATA cabling" on page 60).
   b. Remove the internal USB drive, if installed. To locate the internal USB connector, see "System board components (on page 9)."
8. Remove the appropriate DIMM baffle ("Removing DIMM baffles" on page 14).
9. Install the DIMM.



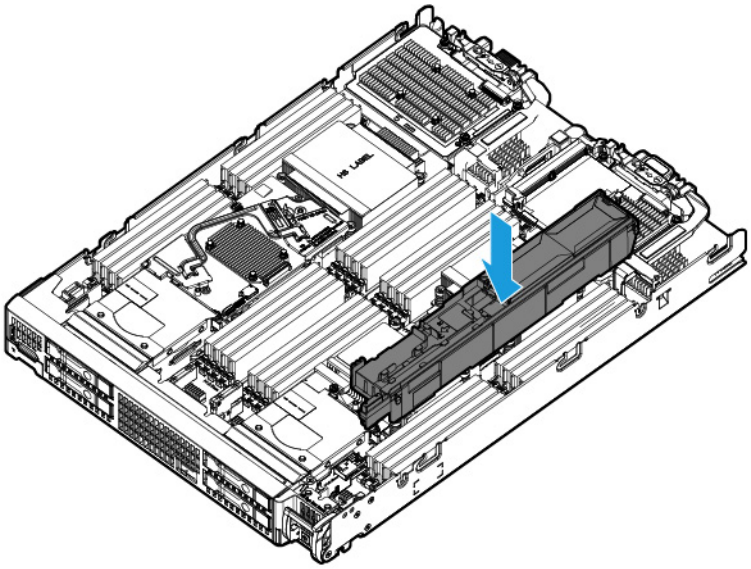
10. Route and connect the direct connect SATA cable, if installed ("Direct connect SATA cabling" on page 60).
11. Install all DIMM baffles.
    - Left DIMM baffle



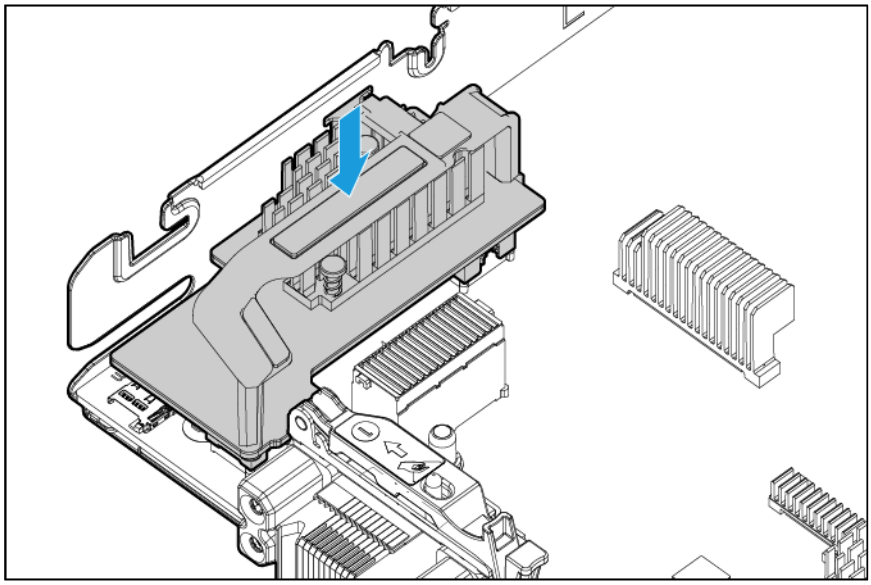
    - Center DIMM baffle



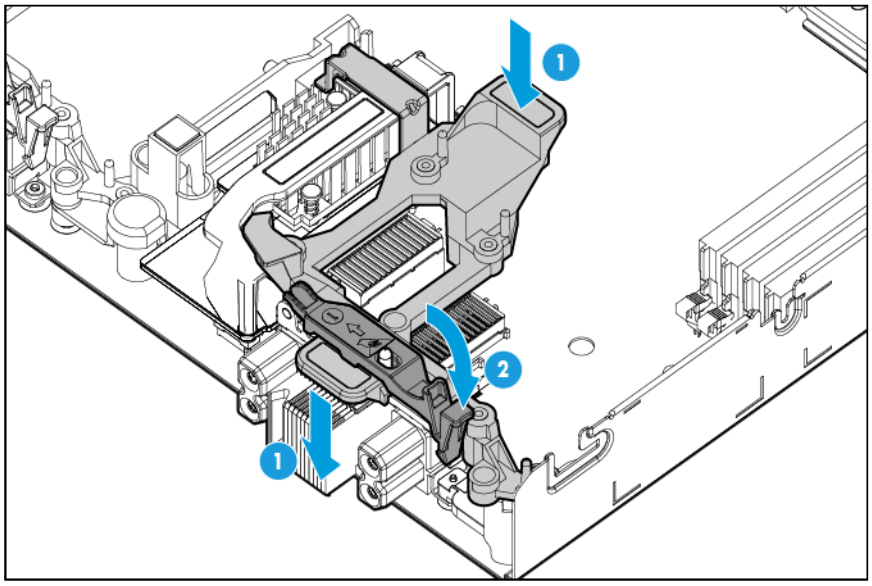
- Right DIMM baffle



12. Install the FlexibleLOM.



13. Install the mezzanine assembly.



14. Install the access panel (on page 22).
15. Install the server blade ("Installing a server blade" on page 28).
16. Power up the server blade (on page 12).

To configure the memory mode, use HP UEFI System Utilities (on page 70).

Mezzanine card option

Optional mezzanine cards are classified as Type A mezzanine cards and Type B mezzanine cards. The type of the mezzanine card determines where it can be installed in the server blade.

- Install Type A mezzanine cards on Mezzanine 1 connector, Mezzanine 2 connector, or Mezzanine 3 connector.
- Install Type B mezzanine cards on either Mezzanine 2 connector or Mezzanine 3 connector.

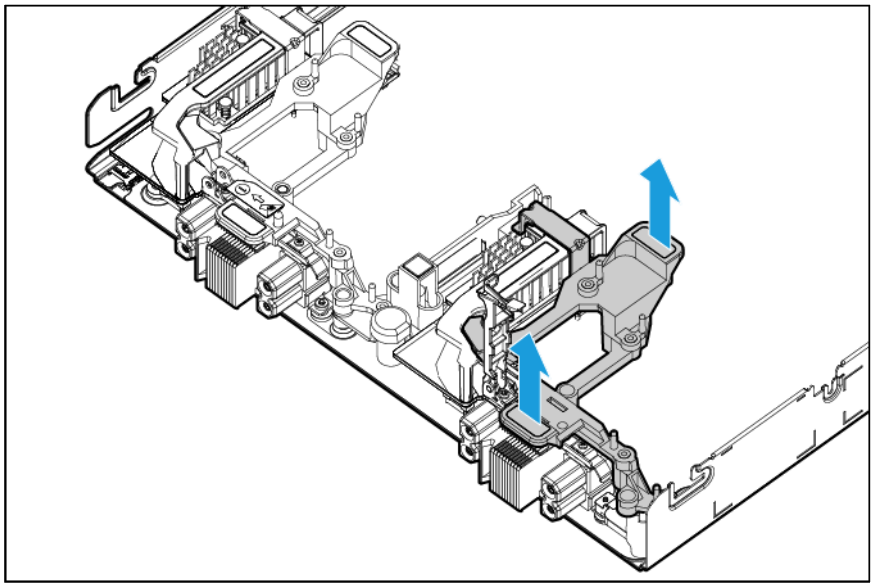
Optional mezzanine cards enable network connectivity or provide Fibre Channel support. For mezzanine card locations, see the system board components (on page 9).

For mezzanine card mapping, see the *HP ProLiant BL660c Gen9 Server Blade Installation Instructions* or see "Interconnect bay numbering and device mapping (on page 27)."

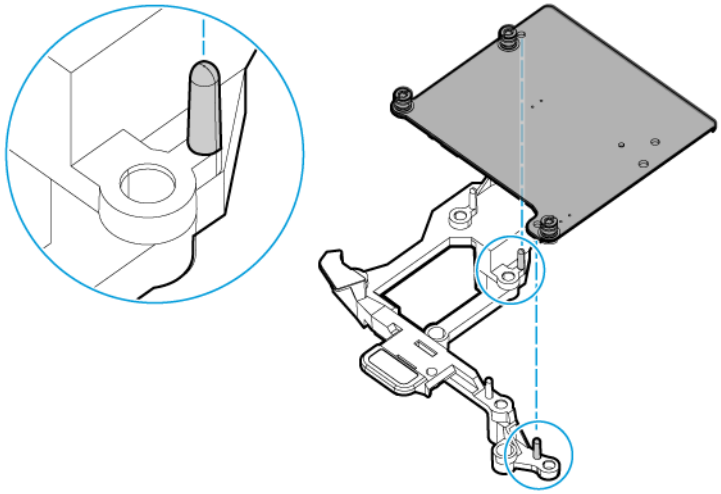
To install the component:

1. Power down the server blade (on page 12).
2. Remove the server blade (on page 13).
3. Remove the access panel (on page 14).

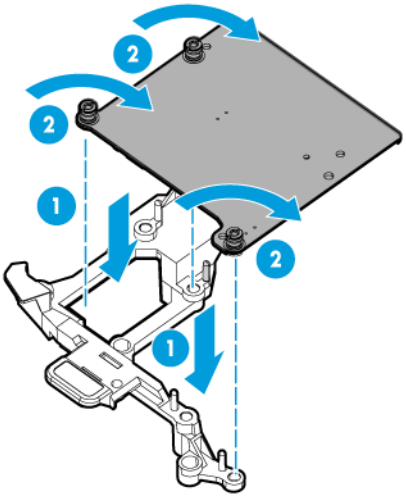
4. Remove the mezzanine assembly from the server blade.



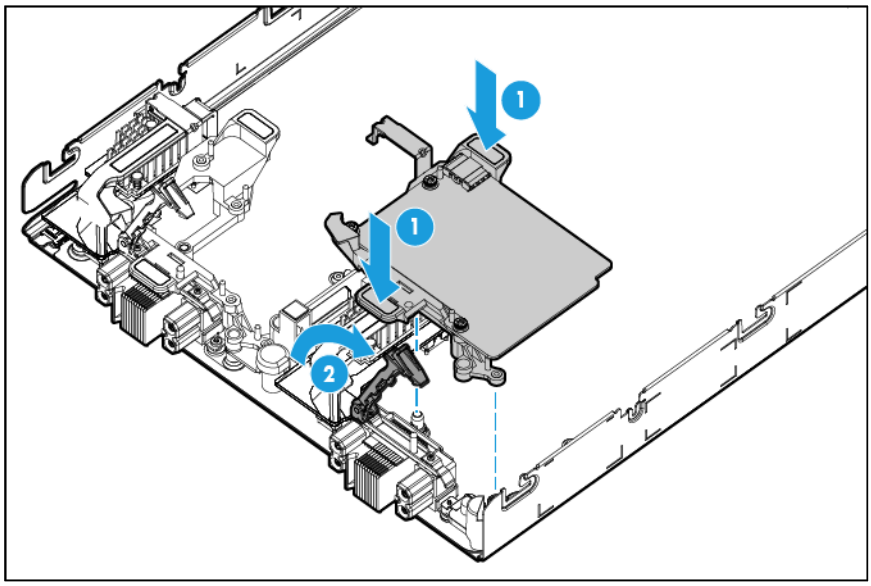
5. Align the mezzanine card with the guide pins on the mezzanine assembly.



6. Install the mezzanine card in the mezzanine assembly, and then tighten the mezzanine card screws to secure the card to the mezzanine assembly.



7. Align the mezzanine assembly with the guide pins on the system board, and then install the mezzanine assembly on the system board.
8. Press down firmly on the mezzanine assembly handles, and then close the mezzanine assembly latch.



9. Install the access panel (on page 22).
10. Install the server blade ("Installing a server blade" on page 28).
11. Power up the server blade (on page 12).

HP Trusted Platform Module option

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

Use these instructions to install and enable a TPM on a supported server blade. This procedure includes three sections:

1. Installing the Trusted Platform Module board.
2. Retaining the recovery key/password (on page 57).
3. Enabling the Trusted Platform Module (on page 57).

   Enabling the TPM requires accessing BIOS/Platform Configuration (RBSU) in HP UEFI System Utilities (on page 70).

TPM installation requires the use of drive encryption technology, such as the Microsoft Windows BitLocker Drive Encryption feature. For more information on BitLocker, see the Microsoft website (http://www.microsoft.com).

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.
- When using BitLocker, always retain the recovery key/password. The recovery key/password is required to enter Recovery Mode after BitLocker detects a possible compromise of system integrity.
- 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

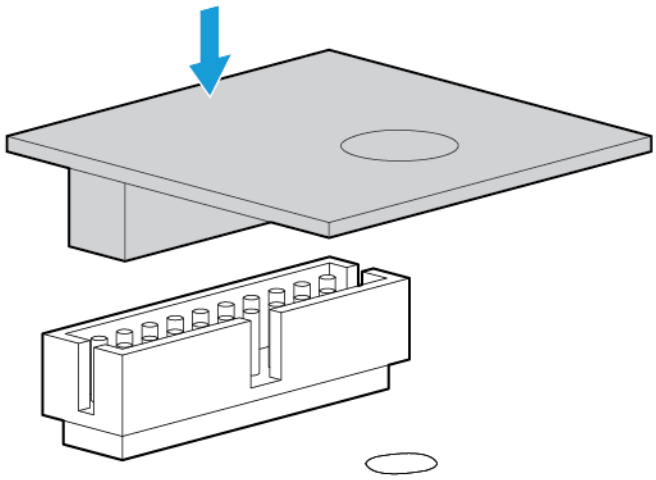
WARNING: To reduce the risk of personal injury from hot surfaces, allow the drives and the internal system components to cool before touching them.

1. Power down the server blade (on page 12).
2. Remove the server blade (on page 13).
3. Place the server blade on a flat, level work surface.
4. Remove the access panel (on page 14).
5. Disconnect the direct connect SATA cable, if installed ("Direct connect SATA cabling" on page 60).
6. Remove the internal USB drive, if installed. To locate the internal USB connector, see "System board components (on page 9)."
7. Remove the DIMM baffle ("Removing DIMM baffles" on page 14).
8. Remove the storage controller (on page 17).
9. Remove the front panel/drive cage assembly (on page 18).

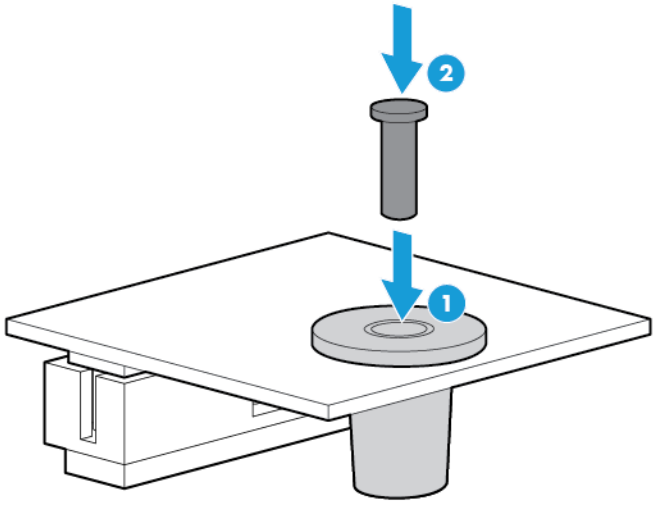
10. Locate the TPM connector ("System board components" on page 9).

> **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.

11. Install the TPM board. Press down on the connector to seat the board ("System board components" on page 9).

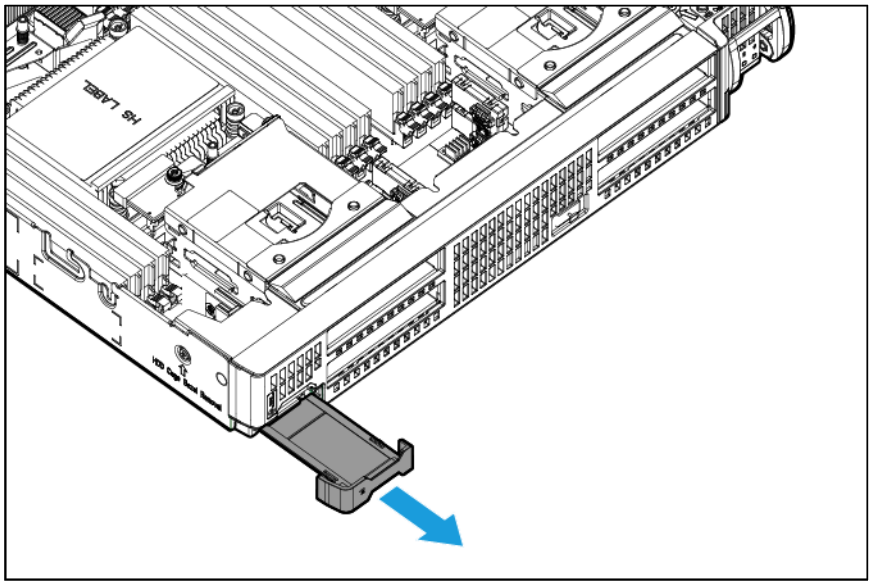


12. Install the TPM security rivet by pressing the rivet firmly into the system board.

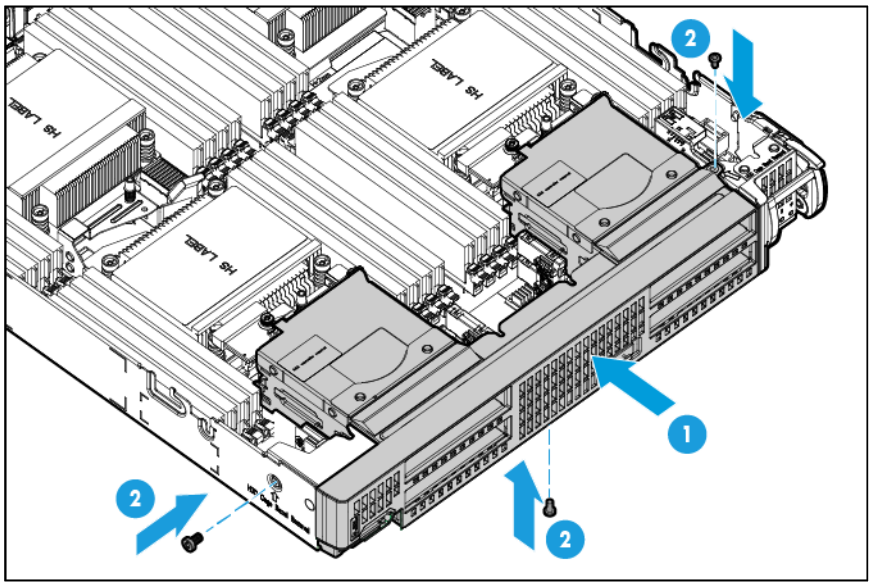


13. Install the front panel/drive cage assembly.

a. Extend the serial label pull tab.

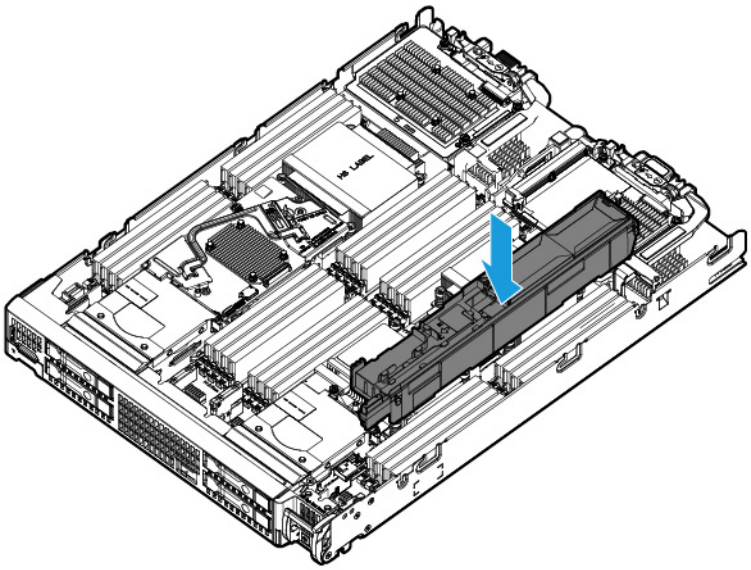


b. Install the front panel/drive cage assembly to the server blade and secure with three screws.



14. Install the storage controller (on page 20).

15. Install the DIMM baffle.



16. Route and connect the direct connect SATA cable, if installed ("Direct connect SATA cabling" on page 60).
17. Install the USB drive, if removed.
18. Install the access panel (on page 22).
19. Install the server blade ("Installing a server blade" on page 28).
20. Power up the server blade (on page 12).

Retaining the recovery key/password

The recovery key/password is generated during BitLocker setup, and can be saved and printed after BitLocker is enabled. When using BitLocker, always retain the recovery key/password. The recovery key/password is required to enter Recovery Mode after BitLocker detects a possible compromise of system integrity.

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 blade.
- 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 blade.
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 blade, 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).

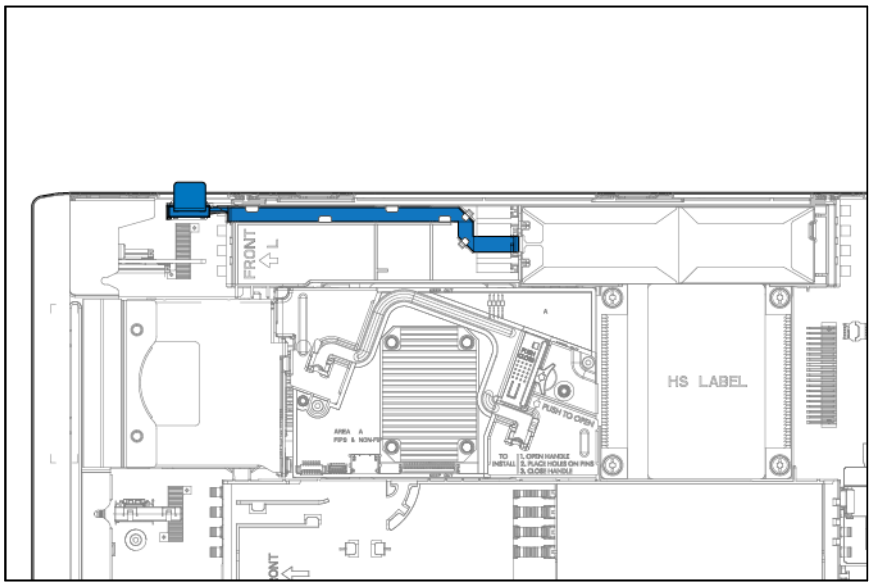
For more information on adjusting TPM usage in BitLocker™, see the Microsoft website (http://technet.microsoft.com/en-us/library/cc732774.aspx).

Cabling

Cabling overview

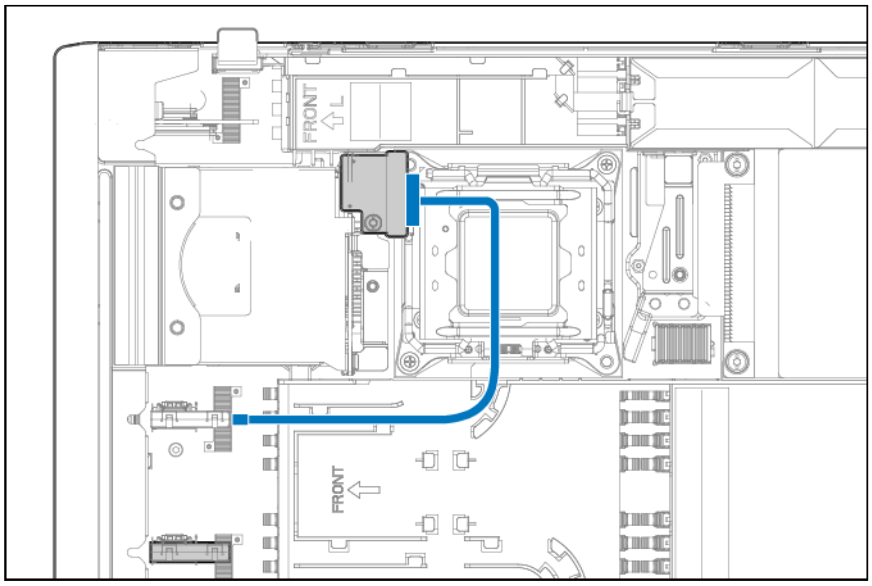
This section provides guidelines that help you make informed decisions about cabling the server blade and hardware options to optimize performance.

HP Smart Storage Battery cabling

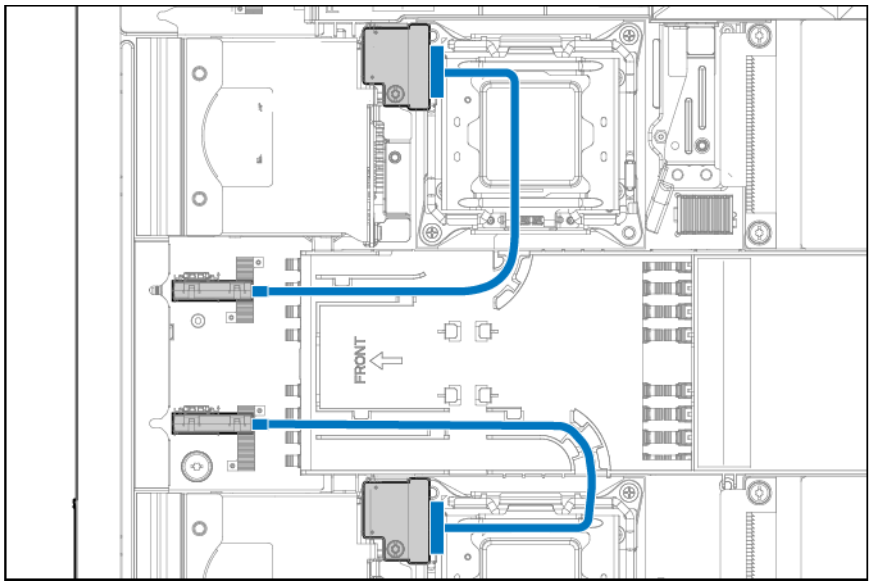


Direct connect SATA cabling

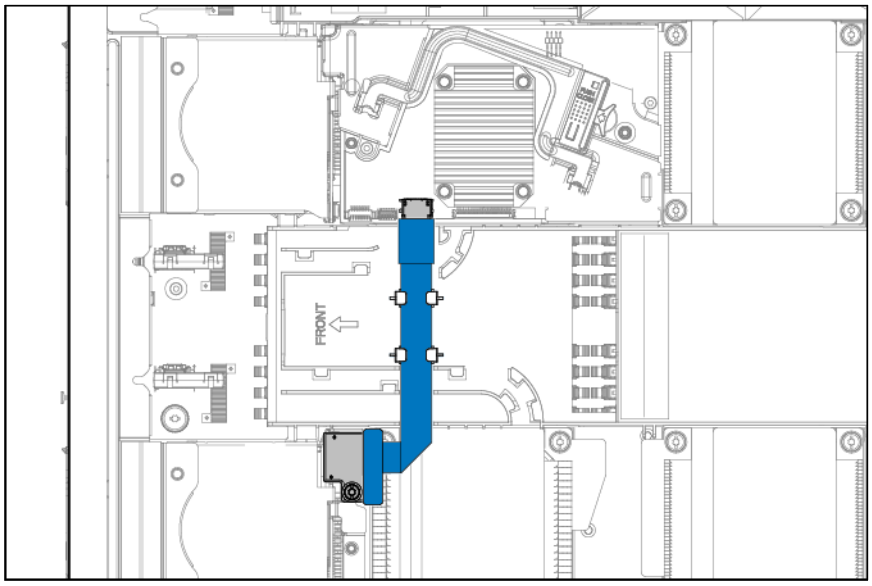
A single direct connect SATA device is cabled on the left side of the server blade.



Two direct connect SATA devices are cabled as shown in the following illustration.



SAS cabling



Using the HP c-Class Blade SUV Cable

The HP c-Class Blade SUV Cable enables the user to perform server blade administration, configuration, and diagnostic procedures by connecting video and USB devices directly to the server blade. For SUV cable connectors, see "HP c-Class Blade SUV Cable (on page 11)."

Connecting locally to a server blade with video and USB devices

Use the SUV cable to connect a monitor and any of the following USB devices:

- USB hub
- USB keyboard
- USB mouse
- USB CD/DVD-ROM drive

Numerous configurations are possible. This section offers two possible configurations. For more information, see "USB support (on page 73)."

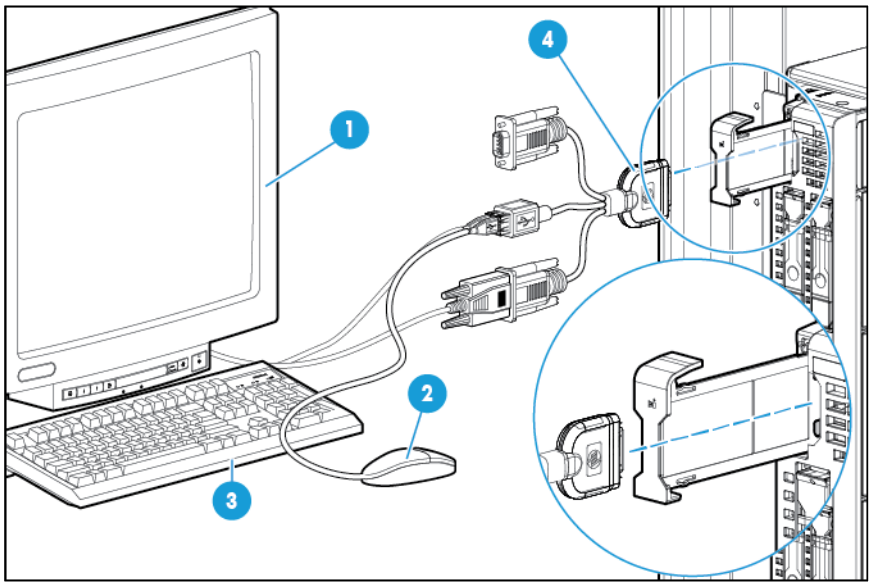
Accessing a server blade with local KVM

For this configuration, a USB hub is not necessary. To connect additional devices, use a USB hub.

△ **CAUTION:** Before disconnecting the SUV cable from the connector, always squeeze the release buttons on the sides of the connector. Failure to do so can result in damage to the equipment.

1. Open the serial label pull tab and connect the HP c-Class Blade SUV Cable to the server blade.
2. Connect the video connector to a monitor.

3. Connect a USB mouse to one USB connector.
4. Connect a USB keyboard to the second USB connector.



Item	Description
1	Monitor
2	USB mouse
3	USB keyboard
4	HP c-Class Blade SUV Cable

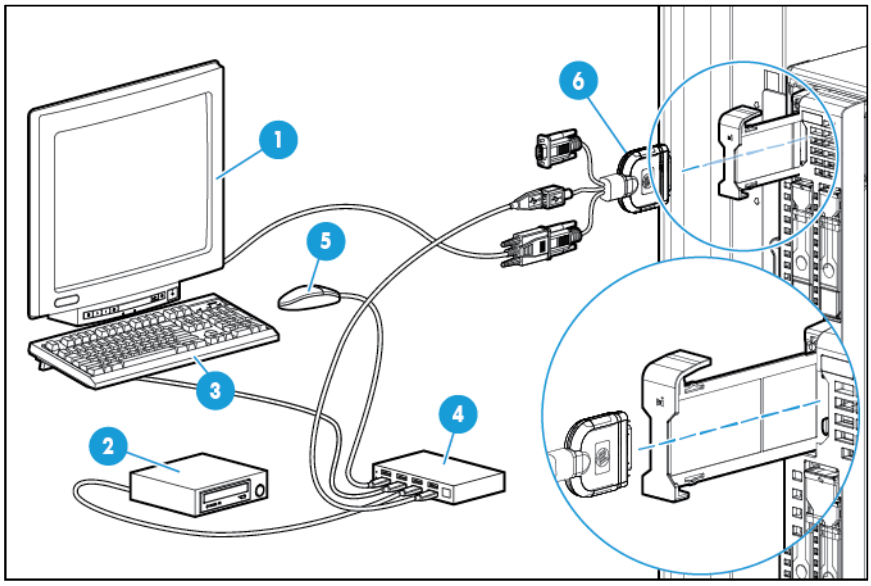
Accessing local media devices

Use the following configuration when configuring a server blade or loading software updates and patches from a USB CD/DVD-ROM.

Use a USB hub when connecting a USB CD-ROM drive to the server blade. The USB hub provides additional connections.

1. Open the serial label pull tab and connect the HP c-Class Blade SUV cable to the server blade.
2. Connect the video connector to a monitor.
3. Connect a USB hub to one USB connector.
4. Connect the following to the USB hub:
   - USB CD/DVD-ROM drive
   - USB keyboard

- USB mouse



Item	Description
1	Monitor
2	USB CD/DVD-ROM drive
3	USB keyboard
4	USB hub
5	USB mouse
6	HP c-Class Blade SUV Cable

Software and configuration utilities

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 64)	Online and Offline
Active Health System (on page 65)	Online and Offline
HP RESTful API support for HP iLO (on page 66)	Online and Offline
Integrated Management Log (on page 66)	Online and Offline
HP Insight Remote Support (on page 67)	Online
HP Insight Online (on page 67)	Online
Intelligent Provisioning (on page 68)	Offline
HP Insight Diagnostics (on page 68)	Online and Offline
Erase Utility (on page 68)	Offline
Scripting Toolkit for Windows and Linux (on page 69)	Online
HP Service Pack for ProLiant (on page 69)	Online and Offline
HP Smart Update Manager (on page 69)	Online and Offline
HP UEFI System Utilities (on page 70)	Offline
HP Smart Storage Administrator (on page 73)	Online and Offline
FWUPDATE utility (on page 75)	Offline

Product QuickSpecs

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

HP iLO

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

iLO enables and manages the Active Health System (on page 65) and also features Agentless Management. All key internal subsystems are monitored by iLO. If enabled, SNMP alerts are sent directly by iLO regardless of the host operating system or even if no host operating system is installed.

Embedded remote support software is available on HP ProLiant Gen8 and later servers with iLO 4, regardless of the operating system software and without installing OS agents on the server.

Using iLO, you can do the following:

- Access a high-performance and secure Integrated Remote Console to the server from anywhere in the world if you have a network connection to the server.
- Use the shared .NET Integrated Remote Console to collaborate with up to four server administrators.
- Remotely mount high-performance Virtual Media devices to the server blade.
- Securely and remotely control the power state of the managed server blade.
- Implement true Agentless Management with SNMP alerts from HP iLO, regardless of the state of the host server.
- Download the Active Health System log.
- Register for HP Insight Remote Support.
- Use iLO Federation to manage multiple servers from one system running the iLO web interface.
- Use Virtual Power and Virtual Media from the GUI, the CLI, or the iLO scripting toolkit for many tasks, including the automation of deployment and provisioning.
- Control iLO by using a remote management tool.

For more information about iLO features, see the iLO documentation on the HP website (http://www.hp.com/go/ilo/docs).

The HP iLO 4 hardware and firmware features and functionality, such as NAND size and embedded user partition, vary depending on the server blade model. For a complete list of supported features and functionality, see the HP iLO 4 QuickSpecs on the HP website (http://h18000.www1.hp.com/products/quickspecs/14276_div/14276_div.pdf).

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 if server failures occur.

The Active Health System collects the following types of data:

- Server model
- Serial number
- Processor model 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, 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 can be downloaded from the HP website (http://www.hp.com/go/spp/download). The Active Health System log can be downloaded manually from iLO or HP Intelligent Provisioning and sent to HP.

For more information, see the following documents:

- *HP iLO User Guide* on the HP website (http://www.hp.com/go/ilo/docs)
- *HP Intelligent Provisioning User Guide* on the HP website (http://www.hp.com/go/intelligentprovisioning/docs)

HP RESTful API support for HP iLO

HP iLO 4 firmware version 2.00 and later includes the HP RESTful API. The HP RESTful API is a management interface that server management tools can use to perform configuration, inventory, and monitoring of an HP ProLiant server via iLO. A REST client sends HTTPS operations to the iLO web server to GET and PATCH JSON-formatted data, and to configure supported iLO and server settings, such as the UEFI BIOS settings.

HP iLO 4 supports the HP RESTful API with HP ProLiant Gen8 and later servers. For more information about the HP RESTful API, see the HP website (http://www.hp.com/support/restfulinterface/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 HP UEFI System Utilities (on page 70)
- From within the Embedded UEFI shell (on page 72)
- From within operating system-specific IML viewers:
  - For Windows: IML Viewer
  - For Linux: IML Viewer Application
- From within the iLO web interface
- From within HP Insight Diagnostics (on page 68)

HP Insight Remote Support

HP strongly recommends that you register your device for remote support 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 can be sent to your authorized HP Channel Partner for onsite service, if configured and available in your country.

For more information, see *HP Insight Remote Support and Insight Online Setup Guide for ProLiant Servers and BladeSystem c-Class Enclosures* on the HP website (http://www.hp.com/go/insightremotesupport/docs). HP Insight Remote Support is available as part of HP Warranty, HP Care Pack Service, or HP contractual support agreement.

HP Insight Remote Support central connect

When you use the embedded Remote Support functionality with HP ProLiant Gen8 and later server models and HP BladeSystem c-Class enclosures, you can register a server blade or enclosure to communicate to HP through an HP Insight Remote Support centralized Hosting Device in your local environment. All configuration and service event information is routed through the Hosting Device. This information can be viewed by using the local HP Insight Remote Support user interface or the web-based view in HP Insight Online.

For more information, see *HP Insight Remote Support Release Notes* on the HP website (http://www.hp.com/go/insightremotesupport/docs).

HP Insight Online direct connect

When you use the embedded Remote Support functionality with HP ProLiant Gen8 and later server models and HP BladeSystem c-Class enclosures, you can register a server blade or enclosure to communicate directly to HP Insight Online without the need to set up an HP Insight Remote Support centralized Hosting Device in your local environment. HP Insight Online will be your primary interface for remote support information.

For more information, see the product documentation on the HP website (http://www.hp.com/go/insightremotesupport/docs).

HP Insight Online

HP Insight Online is a capability of the HP Support Center portal. Combined with HP Insight Remote Support central connect or HP Insight Online direct connect, it automatically aggregates device health, asset, and support information with contract and warranty information, and then secures it in a single, personalized dashboard that is viewable from anywhere at any time. The dashboard organizes your IT and service data to help you understand and respond to that information more quickly. With specific authorization from you, an authorized HP Channel Partner can also view your IT environment remotely using HP Insight Online.

For more information about using HP Insight Online, see the *HP Insight Online User's Guide* on the HP website (http://www.hp.com/go/insightremotesupport/docs).

Intelligent Provisioning

Intelligent Provisioning is a single-server deployment tool embedded in HP ProLiant Gen8 and later 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" and HP branded versions of operating system software and integrating optimized HP ProLiant server support software.
- Intelligent Provisioning provides maintenance-related tasks using the Perform Maintenance window.
- Intelligent Provisioning provides installation help for Microsoft Windows, Red Hat and SUSE Linux, and VMware operating systems. 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 Intelligent Provisioning recovery media downloads, see the Resources tab on the HP website (http://www.hp.com/go/ilo). For consolidated drive and firmware update packages, see the HP Smart Update: Server Firmware and Driver Updates page on the HP website (http://www.hp.com/go/SmartUpdate).

HP Insight Diagnostics

HP Insight Diagnostics is a proactive server blade management tool, available in both offline and online versions, that provides diagnostics and troubleshooting capabilities to assist IT administrators who verify server blade installations, troubleshoot problems, and perform repair validation.

HP Insight Diagnostics Offline Edition performs various in-depth system and component testing while the OS is not running. To run this utility, boot the server blade using Intelligent Provisioning (on page 68).

HP Insight Diagnostics Online Edition is a web-based application that captures system configuration and other related data needed for effective server blade management. Available in Microsoft Windows and Linux versions, the utility helps to ensure proper system operation.

For more information or to download the utility, see the HP website (http://www.hp.com/servers/diags). HP Insight Diagnostics Online Edition is also available in the SPP ("HP Service Pack for ProLiant" on page 69).

HP Insight Diagnostics survey functionality

HP Insight Diagnostics (on page 68) provides survey functionality that gathers critical hardware and software information on ProLiant server blades.

This functionality supports operating systems that are supported by the server blade. For operating systems supported by the server blade, see the HP website (http://www.hp.com/go/supportos).

If a significant change occurs between data-gathering intervals, the survey function marks the previous information and overwrites the survey data files to reflect the latest changes in the configuration.

Survey functionality is installed with every Intelligent Provisioning-assisted HP Insight Diagnostics installation, or it can be installed through the SPP ("HP Service Pack for ProLiant" on page 69).

Erase Utility

△ **CAUTION:** Perform a backup before running the 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. Before using this utility, see the instructions in the *HP Intelligent Provisioning User Guide*.

Use the Erase Utility to erase drives and Active Health System logs, and to reset UEFI System Utilities 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 blade 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**.

For more information about the Erase Utility, see the *HP Intelligent Provisioning User Guide* on the HP website (http://www.hp.com/go/intelligentprovisioning/docs).

Scripting Toolkit for Windows and Linux

The Scripting Toolkit for Windows and Linux is a server deployment product that delivers 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/ProLiant/STK).

HP Service Pack for ProLiant

SPP is a comprehensive systems software (drivers and firmware) solution delivered as a single package with major server releases. This solution uses HP SUM as the deployment tool and is tested on all supported HP ProLiant servers including HP ProLiant Gen8 and later servers.

SPP can be used in an online mode on a Windows or Linux hosted operating system, or in an offline mode where the server is booted to an operating system included on the ISO file 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 one of the following pages on the HP website:

- HP Service Pack for ProLiant download page (http://www.hp.com/go/spp)
- HP Smart Update: Server Firmware and Driver Updates page (http://www.hp.com/go/SmartUpdate)

HP Smart Update Manager

HP SUM is a product used to install and update firmware, drivers, and systems software on HP ProLiant servers. HP SUM provides a GUI and a command-line scriptable interface for deployment of systems 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.

For more information about HP SUM, see the product page on the HP website (http://www.hp.com/go/hpsum).

To download HP SUM, see the HP website (http://www.hp.com/go/hpsum/download).

To access the *HP Smart Update Manager User Guide*, see the HP SUM Information Library (http://www.hp.com/go/hpsum/documentation).

HP UEFI System Utilities

The HP UEFI System Utilities is embedded in the system ROM. The UEFI System Utilities enable you to perform a wide range of configuration activities, including:

- Configuring system devices and installed options
- Enabling and disabling system features
- Displaying system information
- Selecting the primary boot controller
- Configuring memory options
- Selecting a language
- Launching other pre-boot environments such as the Embedded UEFI Shell and Intelligent Provisioning

For more information on the HP UEFI System Utilities, see the *HP UEFI System Utilities User Guide for HP ProLiant Gen9 Servers* on the HP website (http://www.hp.com/go/ProLiantUEFI/docs).

Scan the QR code located at the bottom of the screen to access mobile-ready online help for the UEFI System Utilities and UEFI Shell. For on-screen help, press **F1**.

Using HP UEFI System Utilities

To use the System Utilities, use the following keys.

Action	**Key**
Access System Utilities	F9 during server POST
Navigate menus	Up and Down arrows
Select items	Enter
Save selections	F10
Access Help for a highlighted configuration option*	F1

*Scan the QR code on the screen to access online help for the UEFI System Utilities and UEFI Shell.

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 typical server operations; however, you can modify configuration settings as needed. The system prompts you for access to the System Utilities each time the system is powered up.

Flexible boot control

This feature enables you to do the following:

- Add Boot Options
  - Browse all FAT16 and FAT32 file systems.
  - Select an X64 UEFI application with an .EFI extension to add as a new UEFI boot option, such as an OS boot loader or other UEFI application.

    The new boot option is appended to the boot order list. When you select a file, you are prompted to enter the boot option description (which is then displayed in the Boot menu), as well as any optional data to be passed to an .EFI application.
- Boot to System Utilities

  After pre-POST, the boot options screen appears. During this time, you can access the System Utilities by pressing the **F9** key.
- Choose between supported modes: Legacy BIOS Boot Mode or UEFI Boot Mode

IMPORTANT: If the default boot mode settings are different than the user defined settings, the system may not boot the OS installation if the defaults are restored. To avoid this issue, use the User Defined Defaults feature in UEFI System Utilities to override the factory default settings.

For more information, see the *HP UEFI System Utilities User Guide for HP ProLiant Gen9 Servers* on the HP website (http://www.hp.com/go/ProLiantUEFI/docs).

Restoring and customizing configuration settings

You can reset all configuration settings to the factory default settings, or you can restore system default configuration settings, which are used instead of the factory default settings.

You can also configure default settings as necessary, and then save the configuration as the custom default configuration. When the system loads the default settings, it uses the custom default settings instead of the factory defaults.

Secure Boot configuration

Secure Boot is integrated in the UEFI specification on which the HP implementation of UEFI is based. Secure Boot is completely implemented in the BIOS and does not require special hardware. It ensures that each component launched during the boot process is digitally signed and that the signature is validated against a set of trusted certificates embedded in the UEFI BIOS. Secure Boot validates the software identity of the following components in the boot process:

- UEFI drivers loaded from PCIe cards
- UEFI drivers loaded from mass storage devices
- Pre-boot UEFI shell applications
- OS UEFI boot loaders

Once enabled, only firmware components and operating systems with boot loaders that have an appropriate digital signature can execute during the boot process. Only operating systems that support Secure Boot and have an EFI boot loader signed with one of the authorized keys can boot when Secure Boot is enabled. For

more information about supported operating systems, see the *HP UEFI System Utilities and Shell Release Notes* on the HP website (http://www.hp.com/go/ProLiantUEFI/docs).

A physically present user can customize the certificates embedded in the UEFI BIOS by adding/removing their own certificates.

Embedded UEFI shell

The system BIOS in all HP ProLiant Gen9 servers includes an Embedded UEFI Shell in the ROM. The UEFI Shell environment provides an API, a command line prompt, and a set of CLIs that allow scripting, file manipulation, and system information. These features enhance the capabilities of the UEFI System Utilities.

For more information, see the following documents:

- *HP UEFI Shell User Guide for HP ProLiant Gen9 Servers* on the HP website (http://www.hp.com/go/ProLiantUEFI/docs)
- *UEFI Shell Specification* on the UEFI website (http://www.uefi.org/specifications)

Embedded Diagnostics option

The system BIOS in all HP ProLiant Gen9 servers includes an Embedded Diagnostics option in the ROM. The Embedded Diagnostics option can run comprehensive diagnostics of the server hardware, including processors, memory, drives, and other server components.

For more information on the Embedded Diagnostics option, see the *HP UEFI System Utilities User Guide for HP ProLiant Gen9 Servers* on the HP website (http://www.hp.com/go/ProLiantUEFI/docs).

HP RESTful API support for UEFI

HP ProLiant Gen9 servers include support for a UEFI compliant System BIOS, along with UEFI System Utilities and Embedded UEFI Shell pre-boot environments. HP ProLiant Gen9 servers also support configuring the UEFI BIOS settings using the HP RESTful API, a management interface that server management tools can use to perform configuration, inventory, and monitoring of an HP ProLiant server. A REST client uses HTTPS operations to configure supported server settings, such as UEFI BIOS settings.

For more information about the HP RESTful API and the HP RESTful Interface Tool, see the HP website (http://www.hp.com/support/restfulinterface/docs).

Re-entering the server serial number and product ID

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

1. During the server blade startup sequence, press the **F9** key to access UEFI System Utilities.
2. Select the **System Configuration** > **BIOS/Platform Configuration (RBSU)** > **Advanced Options** > **Advanced System ROM Options** > **Serial Number**, and then press the **Enter** key.
3. Enter the serial number and press the **Enter** key. The following message appears:

   ```
   The serial number should only be modified by qualified service personnel.
   This value should always match the serial number located on the chassis.
   ```
4. Press the **Enter** key to clear the warning.
5. Enter the serial number and press the **Enter** key.
6. 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 located on the
chassis.
```

7. Enter the product ID and press the **Enter** key.
8. Press the **F10** key to confirm exiting System Utilities. The server blade automatically reboots.

Utilities and features

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).

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, 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. You can disable ASR from the System Management Homepage or through UEFI System Utilities.

USB support

HP server blades support both USB 2.0 ports and USB 3.0 ports. Both types of ports support installing all types of USB devices (USB 1.0, USB 2.0, and USB 3.0), but may run at lower speeds in specific situations:

- USB 3.0 capable devices operate at USB 2.0 speeds when installed in a USB 2.0 port.
- When the server blade is configured for UEFI Boot Mode, HP provides legacy USB support in the pre-boot environment prior to the operating system loading for USB 1.0, USB 2.0 , and USB 3.0 speeds.
- When the server blade is configured for Legacy BIOS Boot Mode, HP provides legacy USB support in the pre-boot environment prior to the operating system loading for USB 1.0 and USB 2.0 speeds. While USB 3.0 ports can be used with all devices in Legacy BIOS Boot Mode, they are not available at USB

3.0 speeds in the pre-boot environment. Standard USB support (USB support from within the operating system) is provided by the OS through the appropriate USB device drivers. Support for USB 3.0 varies by operating system.

For maximum compatibility of USB 3.0 devices with all operating systems, HP provides a configuration setting for USB 3.0 Mode. Auto is the default setting. This setting impacts USB 3.0 devices when connected to USB 3.0 ports in the following manner:

- **Auto (default)**—If configured in Auto Mode, USB 3.0 capable devices operate at USB 2.0 speeds in the pre-boot environment and during boot. When a USB 3.0 capable OS USB driver loads, USB 3.0 devices transition to USB 3.0 speeds. This mode provides compatibility with operating systems that do not support USB 3.0 while still allowing USB 3.0 devices to operate at USB 3.0 speeds with state-of-the art operating systems.
- **Enabled**—If Enabled, USB 3.0 capable devices operate at USB 3.0 speeds at all times (including the pre-boot environment) when in UEFI Boot Mode. This mode should not be used with operating systems that do not support USB 3.0. If operating in Legacy Boot BIOS Mode, the USB 3.0 ports cannot function in the pre-boot environment and are not bootable.
- **Disabled**—If configured for Disabled, USB 3.0 capable devices function at USB 2.0 speeds at all times.

The pre-OS behavior of the USB ports is configurable in System Utilities, so that the user can change the default operation of the USB ports. For more information, see the *HP UEFI System Utilities User Guide for HP ProLiant Gen9 Servers* on the HP website (http://www.hp.com/go/ProLiantUEFI/docs).

External USB functionality

HP provides external USB support to enable local connection of USB devices for server blade administration, configuration, and diagnostic procedures.

For additional security, external USB functionality can be disabled through USB options in UEFI System Utilities.

Redundant ROM support

The server blade enables you to upgrade or configure the ROM safely with redundant ROM support. The server blade 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, the flashing mechanism 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

Access to HP Support Materials

Access to some updates for HP ProLiant Servers may require product entitlement when accessed through the HP Support Center support portal. HP recommends that you have an HP Passport set up with relevant entitlements. For more information, see the HP website (http://h20564.www2.hp.com/portal/site/hpsc/public/kb/docDisplay/?docId=c03859703).

Updating firmware or System ROM

Multiple methods exist to update the firmware or System ROM:

- HP Service Pack for ProLiant (on page 69)
- FWUPDATE utility (on page 75)
- FWUpdate command from within the Embedded UEFI shell (on page 76)
- Firmware Update application in System Utilities (on page 76)
- Online Flash components (on page 76)

Product entitlement is required to perform updates. For more information, see "Access to HP Support Materials (on page 75)."

FWUPDATE utility

The FWUPDATE utility enables you to upgrade the system firmware (BIOS).

To use the utility to upgrade the firmware:

1. Download the FWUPDATE flash component from the HP website (http://www.hp.com/go/hpsc).
2. Save the FWUPDATE flash components to a USB key.
3. Set the boot order so the USB key will boot first using one of the following options:
   - Configure the boot order so the USB key is the first bootable device.
   - Press **F11** (Boot Menu) when prompted during system boot to access the **One-Time Boot Menu**. This menu allows you to select the boot device for a specific boot and does not modify the boot order configuration settings.
4. Insert the USB key into an available USB port.
5. Boot the system.

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

To download the flash components, see the HP website (http://www.hp.com/go/hpsc).

For more information about the One-Time Boot Menu, see the *HP UEFI System Utilities User Guide for HP ProLiant Gen9 Servers* on the HP website (http://www.hp.com/go/ProLiantUEFI/docs).

FWUpdate command from within the Embedded UEFI Shell

For systems configured in either boot mode, update the firmware:

1. Access the System ROM Flash Binary component for your server blade from the HP Support Center (http://www.hp.com/go/hpsc). When searching for the component, always select **OS Independent** to locate the binary file.
2. Copy the binary file to a USB media or iLO virtual media.
3. Attach the media to the server blade.
4. Boot to Embedded Shell.
5. To obtain the assigned file system volume for the USB key, enter `Map –r` . For more information about accessing a file system from the shell, see the *HP UEFI Shell User Guide for HP ProLiant Gen9 Servers* on the HP website (http://www.hp.com/go/ProLiantUEFI/docs).
6. Change to the file system that contains the System ROM Flash Binary component for your server blade. Enter one of the fsx file systems available, such as `fs0` or `fs1`, and press **Enter**.
7. Use the `cd` command to change from the current directory to the directory that contains the binary file.
8. Enter `fwupdate –d BIOS –f <filename>` to flash the system ROM.

   For help on the FWUPDATE command, enter the command:

   ```
   help fwupdate -b
   ```
9. Reboot the server blade. A reboot is required after the firmware update for the updates to take effect and for hardware stability to be maintained.

For more information about the commands used in this procedure, see the *HP UEFI Shell User Guide for HP ProLiant Gen9 Servers* on the HP website (http://www.hp.com/go/ProLiantUEFI/docs).

Firmware Update application in System Utilities

For systems configured in either boot mode, update the firmware:

1. Access the System ROM Flash Binary component for your server blade from the HP Support Center (http://www.hp.com/go/hpsc). When searching for the component, always select **OS Independent** to find the component.
2. Copy the binary file to a USB media or iLO virtual media.
3. Attach the media to the server blade.
4. During POST, press **F9** to enter System Utilities.
5. Select **Embedded Applications** → **Firmware Update** → **System ROM** → **Select Firmware File**.
6. Select the device containing the flash file.
7. Select the flash file. This step may take a few moments to complete.
8. Select **Start firmware update** and allow the process to complete.
9. Reboot the server blade. A reboot is required after the firmware update for the updates to take effect and for hardware stability to be maintained.

Online Flash components

This component provides updated system firmware that can be installed directly on supported Operating Systems. Additionally, when used in conjunction with HP SUM ("HP Smart Update Manager" on page 69), this Smart Component allows the user to update firmware on remote servers from a central location. This

remote deployment capability eliminates the need for the user to be physically present at the server to perform a firmware update.

Drivers

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

The server blade 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 68) 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 blade supports. To verify that your server blade 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, use one of the following sources:

- Download the SPP ("HP Service Pack for ProLiant" on page 69) from the HP Service Pack for ProLiant download page (http://www.hp.com/go/spp).
- Download individual drivers, firmware, or other systems software components from the server blade product page in the HP Support Center (http://www.hp.com/go/hpsc).

Operating System Version Support

For information about specific versions of a supported operating system, refer to the operating system support matrix (http://www.hp.com/go/supportos).

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 Manager User Guide* on the HP website (http://www.hp.com/go/enterprise/docs).

1. Select **HP Insight Management** from the available options in Products and Solutions.
2. Select **HP Version Control** from the available options in HP Insight Management.
3. Download the latest document.

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

Connect to HP for assistance on the journey to the new style of IT. HP Technology Services delivers confidence and reduces risk to help you realize agility and stability in your IT infrastructure.

Utilize our consulting expertise in the areas of private or hybrid cloud computing, big data and mobility requirements, improving data center infrastructure and better use of today's server, storage and networking technology. For more information, see the HP website (http://www.hp.com/services/consulting).

Our support portfolio covers services for HP server, storage and networking hardware and software plus the leading industry standard operating systems. Let us work proactively with you to prevent problems. Our flexible choices of hardware and software support coverage windows and response times help resolve problems faster, reduce unplanned outages and free your staff for more important tasks. For more information, see the HP website (http://www.hp.com/services/support).

Tap into our knowledge, expertise, innovation and world-class services to achieve better results. Access and apply technology in new ways to optimize your operations and you'll be positioned for success.

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).

Troubleshooting

Troubleshooting resources

The *HP ProLiant Gen9 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/Gen9_TSG_en)
- French (http://www.hp.com/support/Gen9_TSG_fr)
- Spanish (http://www.hp.com/support/Gen9_TSG_es)
- German (http://www.hp.com/support/Gen9_TSG_de)
- Japanese (http://www.hp.com/support/Gen9_TSG_ja)
- Simplified Chinese (http://www.hp.com/support/Gen9_TSG_zh_cn)

The *HP ProLiant Gen9 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/Gen9_EMG_en)
- French (http://www.hp.com/support/Gen9_EMG_fr)
- Spanish (http://www.hp.com/support/Gen9_EMG_es)
- German (http://www.hp.com/support/Gen9_EMG_de)
- Japanese (http://www.hp.com/support/Gen9_EMG_ja)
- Simplified Chinese (http://www.hp.com/support/Gen9_EMG_zh_cn)

Battery replacement

If the server blade no longer automatically displays the correct date and time, then replace the battery that provides power to the real-time clock. Under normal use, battery life is 5 to 10 years.

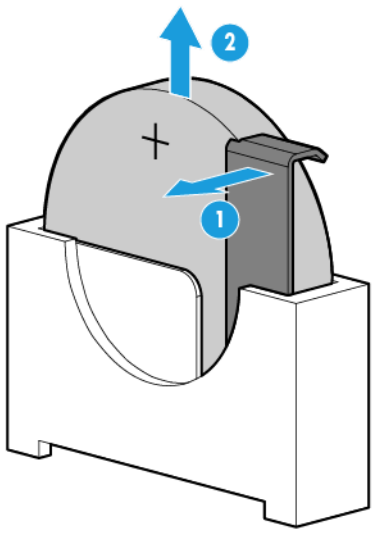
WARNING: The computer contains an internal lithium manganese dioxide, a vanadium pentoxide, or an alkaline battery pack. A risk of fire and burns exists if the battery pack is not properly handled. To reduce the risk of personal injury:

- Do not attempt to recharge the battery.
- Do not expose the battery to temperatures higher than 70°C (158°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.

IMPORTANT: Replacing the system board battery resets the system ROM to its default configuration. After replacing the battery, reconfigure the system through RBSU.

To remove the component:

1. Power down the server blade (on page 12).
2. Remove the server blade (on page 13).
3. Place the server blade on a flat, level work surface.
4. Remove the access panel (on page 14).
5. Locate the battery on the system board ("System board components" on page 9).
6. 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.

Regulatory information

Safety and regulatory compliance

For safety, environmental, and regulatory information, see *Safety and Compliance Information for Server, Storage, Power, Networking, and Rack Products*, available at the HP website (http://www.hp.com/support/Safety-Compliance-EnterpriseProducts).

Belarus Kazakhstan Russia marking

Manufacturer

Hewlett-Packard Company, Address: 3000 Hanover Street, Palo Alto, California 94304, U.S.

Local representative information (Russian)

- HP Russia

  ЗАО "Хьюлетт-Паккард А.О.", 125171, Россия, г. Москва, Ленинградское шоссе, 16А, стр.3, тел/факс: +7 (495) 797 35 00, +7 (495) 287 89 05

- HP Belarus

  ИООО «Хьюлетт-Паккард Бел», 220030, Беларусь, г. Минск, ул. Интернациональная, 36-1, офис 722-723, тел.: +375 (17) 392 28 18, факс: +375 (17) 392 28 21

- HP Kazakhstan

  ТОО «Хьюлетт-Паккард (К), 050040, Казахстан, г. Алматы, Бостандыкский район, ул. Тимирязева, 28В, 1 этаж, тел./факс: +7 (727) 355 35 50, +7 (727) 355 35 51

Local representative information (Kazakh)

ЖШС «Хьюлетт-Паккард (К)», Қазақстан, Алматы қ., Бостандық ауданы, Тимирязев к-сі, 28В, тел./факс: +7 (727) 355 35 50, +7 (727) 355 35 51

Manufacturing date

The manufacturing date is defined by the serial number (HP serial number format for this product):
CCSYWWZZZZ

Valid date formats include the following:

- `YWW`, where `Y` indicates the year counting from within each new decade, with 2000 as the starting point. For example, 238: 2 for 2002 and 38 for the week of September 9. In addition, 2010 is indicated by 0, 2011 by 1, 2012 by 2, 2013 by 3, and so forth.
- `YYWW`, where `YY` indicates the year, using a base year of 2000. For example, 0238: 02 for 2002 and 38 for the week of September 9.

Turkey RoHS material content declaration

Türkiye Cumhuriyeti: EEE Yönetmeliğine Uygundur

Ukraine RoHS material content declaration

Обладнання відповідає вимогам Технічного регламенту щодо обмеження використання деяких небезпечних речовин в електричному та електронному обладнанні, затвердженого постановою Кабінету Міністрів України від 3 грудня 2008 № 1057

Warranty information

HP ProLiant and X86 Servers and Options (http://www.hp.com/support/ProLiantServers-Warranties)

HP Enterprise Servers (http://www.hp.com/support/EnterpriseServers-Warranties)

HP Storage Products (http://www.hp.com/support/Storage-Warranties)

HP Networking Products (http://www.hp.com/support/Networking-Warranties)

Electrostatic discharge

Preventing electrostatic discharge

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

To prevent electrostatic damage:

- Avoid hand contact by transporting and storing products in static-safe containers.
- Keep electrostatic-sensitive parts in their containers until they arrive at static-free workstations.
- Place parts on a grounded surface before removing them from their containers.
- Avoid touching pins, leads, or circuitry.
- Always be properly grounded when touching a static-sensitive component or assembly.

Grounding methods to prevent electrostatic discharge

Several methods are used for grounding. Use one or more of the following methods when handling or installing electrostatic-sensitive parts:

- Use a wrist strap connected by a ground cord to a grounded workstation or computer chassis. Wrist straps are flexible straps with a minimum of 1 megohm ±10 percent resistance in the ground cords. To provide proper ground, wear the strap snug against the skin.
- Use heel straps, toe straps, or boot straps at standing workstations. Wear the straps on both feet when standing on conductive floors or dissipating floor mats.
- Use conductive field service tools.
- Use a portable field service kit with a folding static-dissipating work mat.

If you do not have any of the suggested equipment for proper grounding, have an authorized reseller install the part.

For more information on static electricity or assistance with product installation, contact an authorized reseller.

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)
Non-operating	5% to 95% @ 38.7°C (101.7°F)
Altitude†	—
Operating	3050 m (10,000 ft)
Non-operating	9144 m (30,000 ft)

* The following temperature conditions and limitations apply:
  - 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) up to 3048 m (10,000 ft) applies.
  - No direct sunlight is allowed.
  -The maximum permissible rate of change is 10°C/hr (18°F/hr).
  - The type and number of options installed may reduce the upper temperature and humidity limits.
  - Operating with a fan fault or above 30°C (86°F) may reduce system performance.

** Storage maximum humidity of 95% is based on a maximum temperature of 45°C (113°F).

†Maximum storage altitude corresponds to a minimum pressure of 70 kPa (10.1 psia).

Server blade specifications

Specification	Value
Height	5.08 cm (2.00 in)
Depth	50.65 cm (19.94 in)
Width	36.68 cm (14.44 in)
Weight (maximum)	7.54 kg (20.20 lb)
Weight (minimum)	10.11 kg (27.10 lb)

Support and other resources

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 7 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://pro-aq-sama.houston.hp.com/services/cache/10950-0-0-225-121.html).

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).

Réparation par le client (CSR)

Les produits HP comportent de nombreuses pièces CSR (Customer Self Repair = réparation par le client) afin de minimiser les délais de réparation et faciliter le remplacement des pièces défectueuses. Si pendant la période de diagnostic, HP (ou ses partenaires ou mainteneurs agréés) détermine que la réparation peut être effectuée à l'aide d'une pièce CSR, HP vous l'envoie directement. Il existe deux catégories de pièces CSR:

Obligatoire - Pièces pour lesquelles la réparation par le client est obligatoire. Si vous demandez à HP de remplacer ces pièces, les coûts de déplacement et main d'œuvre du service vous seront facturés.

Facultatif - Pièces pour lesquelles la réparation par le client est facultative. Ces pièces sont également conçues pour permettre au client d'effectuer lui-même la réparation. Toutefois, si vous demandez à HP de remplacer ces pièces, l'intervention peut ou non vous être facturée, selon le type de garantie applicable à votre produit.

REMARQUE: Certaines pièces HP ne sont pas conçues pour permettre au client d'effectuer lui-même la réparation. Pour que la garantie puisse s'appliquer, HP exige que le remplacement de la pièce soit effectué par un Mainteneur Agréé. Ces pièces sont identifiées par la mention "Non" dans le Catalogue illustré.

Les pièces CSR sont livrées le jour ouvré suivant, dans la limite des stocks disponibles et selon votre situation géographique. Si votre situation géographique le permet et que vous demandez une livraison le jour même ou dans les 4 heures, celle-ci vous sera facturée. Pour bénéficier d'une assistance téléphonique, appelez le Centre d'assistance technique HP. Dans les documents envoyés avec la pièce de rechange CSR, HP précise s'il est nécessaire de lui retourner la pièce défectueuse. Si c'est le cas, vous devez le faire dans le délai indiqué, généralement cinq (5) jours ouvrés. La pièce et sa documentation doivent être retournées dans l'emballage fourni. Si vous ne retournez pas la pièce défectueuse, HP se réserve le droit de vous facturer les coûts de remplacement. Dans le cas d'une pièce CSR, HP supporte l'ensemble des frais d'expédition et de retour, et détermine la société de courses ou le transporteur à utiliser.

Pour plus d'informations sur le programme CSR de HP, contactez votre Mainteneur Agrée local. Pour plus d'informations sur ce programme en Amérique du Nord, consultez le site Web HP (http://www.hp.com/go/selfrepair).

Riparazione da parte del cliente

Per abbreviare i tempi di riparazione e garantire una maggiore flessibilità nella sostituzione di parti difettose, i prodotti HP sono realizzati con numerosi componenti che possono essere riparati direttamente dal cliente (CSR, Customer Self Repair). Se in fase di diagnostica HP (o un centro di servizi o di assistenza HP) identifica il guasto come riparabile mediante un ricambio CSR, HP lo spedirà direttamente al cliente per la sostituzione. Vi sono due categorie di parti CSR:

Obbligatorie – Parti che devono essere necessariamente riparate dal cliente. Se il cliente ne affida la riparazione ad HP, deve sostenere le spese di spedizione e di manodopera per il servizio.

Opzionali – Parti la cui riparazione da parte del cliente è facoltativa. Si tratta comunque di componenti progettati per questo scopo. Se tuttavia il cliente ne richiede la sostituzione ad HP, potrebbe dover sostenere spese addizionali a seconda del tipo di garanzia previsto per il prodotto.

NOTA: alcuni componenti HP non sono progettati per la riparazione da parte del cliente. Per rispettare la garanzia, HP richiede che queste parti siano sostituite da un centro di assistenza autorizzato. Tali parti sono identificate da un "No" nel Catalogo illustrato dei componenti.

In base alla disponibilità e alla località geografica, le parti CSR vengono spedite con consegna entro il giorno lavorativo seguente. La consegna nel giorno stesso o entro quattro ore è offerta con un supplemento di costo solo in alcune zone. In caso di necessità si può richiedere l'assistenza telefonica di un addetto del centro di supporto tecnico HP. Nel materiale fornito con una parte di ricambio CSR, HP specifica se il cliente deve restituire dei componenti. Qualora sia richiesta la resa ad HP del componente difettoso, lo si deve spedire ad HP entro un determinato periodo di tempo, generalmente cinque (5) giorni lavorativi. Il componente difettoso deve essere restituito con la documentazione associata nell'imballo di spedizione fornito. La mancata restituzione del componente può comportare la fatturazione del ricambio da parte di HP. Nel caso di riparazione da parte del cliente, HP sostiene tutte le spese di spedizione e resa e sceglie il corriere/vettore da utilizzare.

Per ulteriori informazioni sul programma CSR di HP contattare il centro di assistenza di zona. Per il programma in Nord America fare riferimento al sito Web HP (http://www.hp.com/go/selfrepair).

Customer Self Repair

HP Produkte enthalten viele CSR-Teile (Customer Self Repair), um Reparaturzeiten zu minimieren und höhere Flexibilität beim Austausch defekter Bauteile zu ermöglichen. Wenn HP (oder ein HP Servicepartner) bei der Diagnose feststellt, dass das Produkt mithilfe eines CSR-Teils repariert werden kann, sendet Ihnen HP dieses Bauteil zum Austausch direkt zu. CSR-Teile werden in zwei Kategorien unterteilt:

Zwingend – Teile, für die das Customer Self Repair-Verfahren zwingend vorgegeben ist. Wenn Sie den Austausch dieser Teile von HP vornehmen lassen, werden Ihnen die Anfahrt- und Arbeitskosten für diesen Service berechnet.

Optional – Teile, für die das Customer Self Repair-Verfahren optional ist. Diese Teile sind auch für Customer Self Repair ausgelegt. Wenn Sie jedoch den Austausch dieser Teile von HP vornehmen lassen möchten, können bei diesem Service je nach den für Ihr Produkt vorgesehenen Garantiebedingungen zusätzliche Kosten anfallen.

HINWEIS: Einige Teile sind nicht für Customer Self Repair ausgelegt. Um den Garantieanspruch des Kunden zu erfüllen, muss das Teil von einem HP Servicepartner ersetzt werden. Im illustrierten Teilekatalog sind diese Teile mit „No“ bzw. „Nein“ gekennzeichnet.

CSR-Teile werden abhängig von der Verfügbarkeit und vom Lieferziel am folgenden Geschäftstag geliefert. Für bestimmte Standorte ist eine Lieferung am selben Tag oder innerhalb von vier Stunden gegen einen Aufpreis verfügbar. Wenn Sie Hilfe benötigen, können Sie das HP technische Support Center anrufen und sich von einem Mitarbeiter per Telefon helfen lassen. Den Materialien, die mit einem CSR-Ersatzteil geliefert werden, können Sie entnehmen, ob das defekte Teil an HP zurückgeschickt werden muss. Wenn es erforderlich ist, das defekte Teil an HP zurückzuschicken, müssen Sie dies innerhalb eines vorgegebenen Zeitraums tun, in der Regel innerhalb von fünf (5) Geschäftstagen. Das defekte Teil muss mit der zugehörigen Dokumentation in der Verpackung zurückgeschickt werden, die im Lieferumfang enthalten ist. Wenn Sie das defekte Teil nicht zurückschicken, kann HP Ihnen das Ersatzteil in Rechnung stellen. Im Falle von Customer Self Repair kommt HP für alle Kosten für die Lieferung und Rücksendung auf und bestimmt den Kurier-/Frachtdienst.

Weitere Informationen über das HP Customer Self Repair Programm erhalten Sie von Ihrem Servicepartner vor Ort. Informationen über das CSR-Programm in Nordamerika finden Sie auf der HP Website unter (http://www.hp.com/go/selfrepair).

Reparaciones del propio cliente

Los productos de HP incluyen muchos componentes que el propio usuario puede reemplazar (*Customer Self Repair*, CSR) para minimizar el tiempo de reparación y ofrecer una mayor flexibilidad a la hora de realizar sustituciones de componentes defectuosos. Si, durante la fase de diagnóstico, HP (o los proveedores o socios de servicio de HP) identifica que una reparación puede llevarse a cabo mediante el uso de un componente CSR, HP le enviará dicho componente directamente para que realice su sustitución. Los componentes CSR se clasifican en dos categorías:

- **Obligatorio:** componentes para los que la reparación por parte del usuario es obligatoria. Si solicita a HP que realice la sustitución de estos componentes, tendrá que hacerse cargo de los gastos de desplazamiento y de mano de obra de dicho servicio.
- **Opcional:** componentes para los que la reparación por parte del usuario es opcional. Estos componentes también están diseñados para que puedan ser reparados por el usuario. Sin embargo, si precisa que HP realice su sustitución, puede o no conllevar costes adicionales, dependiendo del tipo de servicio de garantía correspondiente al producto.

NOTA: Algunos componentes no están diseñados para que puedan ser reparados por el usuario. Para que el usuario haga valer su garantía, HP pone como condición que un proveedor de servicios autorizado realice la sustitución de estos componentes. Dichos componentes se identifican con la palabra "No" en el catálogo ilustrado de componentes.

Según la disponibilidad y la situación geográfica, los componentes CSR se enviarán para que lleguen a su destino al siguiente día laborable. Si la situación geográfica lo permite, se puede solicitar la entrega en el mismo día o en cuatro horas con un coste adicional. Si precisa asistencia técnica, puede llamar al Centro de asistencia técnica de HP y recibirá ayuda telefónica por parte de un técnico. Con el envío de materiales para la sustitución de componentes CSR, HP especificará si los componentes defectuosos deberán devolverse a HP. En aquellos casos en los que sea necesario devolver algún componente a HP, deberá hacerlo en el periodo de tiempo especificado, normalmente cinco días laborables. Los componentes defectuosos deberán devolverse con toda la documentación relacionada y con el embalaje de envío. Si no enviara el componente defectuoso requerido, HP podrá cobrarle por el de sustitución. En el caso de todas

sustituciones que lleve a cabo el cliente, HP se hará cargo de todos los gastos de envío y devolución de componentes y escogerá la empresa de transporte que se utilice para dicho servicio.

Para obtener más información acerca del programa de Reparaciones del propio cliente de HP, póngase en contacto con su proveedor de servicios local. Si está interesado en el programa para Norteamérica, visite la página web de HP siguiente (http://www.hp.com/go/selfrepair).

Customer Self Repair

Veel onderdelen in HP producten zijn door de klant zelf te repareren, waardoor de reparatieduur tot een minimum beperkt kan blijven en de flexibiliteit in het vervangen van defecte onderdelen groter is. Deze onderdelen worden CSR-onderdelen (Customer Self Repair) genoemd. Als HP (of een HP Service Partner) bij de diagnose vaststelt dat de reparatie kan worden uitgevoerd met een CSR-onderdeel, verzendt HP dat onderdeel rechtstreeks naar u, zodat u het defecte onderdeel daarmee kunt vervangen. Er zijn twee categorieën CSR-onderdelen:

Verplicht: Onderdelen waarvoor reparatie door de klant verplicht is. Als u HP verzoekt deze onderdelen voor u te vervangen, worden u voor deze service reiskosten en arbeidsloon in rekening gebracht.

Optioneel: Onderdelen waarvoor reparatie door de klant optioneel is. Ook deze onderdelen zijn ontworpen voor reparatie door de klant. Als u echter HP verzoekt deze onderdelen voor u te vervangen, kunnen daarvoor extra kosten in rekening worden gebracht, afhankelijk van het type garantieservice voor het product.

OPMERKING: Sommige HP onderdelen zijn niet ontwikkeld voor reparatie door de klant. In verband met de garantievoorwaarden moet het onderdeel door een geautoriseerde Service Partner worden vervangen. Deze onderdelen worden in de geïllustreerde onderdelencatalogus aangemerkt met "Nee".

Afhankelijk van de leverbaarheid en de locatie worden CSR-onderdelen verzonden voor levering op de eerstvolgende werkdag. Levering op dezelfde dag of binnen vier uur kan tegen meerkosten worden aangeboden, indien dit mogelijk is gezien de locatie. Indien assistentie gewenst is, belt u een HP Service Partner om via de telefoon technische ondersteuning te ontvangen. HP vermeldt in de documentatie bij het vervangende CSR-onderdeel of het defecte onderdeel aan HP moet worden geretourneerd. Als het defecte onderdeel aan HP moet worden teruggezonden, moet u het defecte onderdeel binnen een bepaalde periode, gewoonlijk vijf (5) werkdagen, retourneren aan HP. Het defecte onderdeel moet met de bijbehorende documentatie worden geretourneerd in het meegeleverde verpakkingsmateriaal. Als u het defecte onderdeel niet terugzendt, kan HP u voor het vervangende onderdeel kosten in rekening brengen. Bij reparatie door de klant betaalt HP alle verzendkosten voor het vervangende en geretourneerde onderdeel en kiest HP zelf welke koerier/transportonderneming hiervoor wordt gebruikt.

Neem contact op met een Service Partner voor meer informatie over het Customer Self Repair programma van HP. Informatie over Service Partners vindt u op de HP website (http://www.hp.com/go/selfrepair).

Reparo feito pelo cliente

Os produtos da HP são projetados com muitas peças para reparo feito pelo cliente (CSR) de modo a minimizar o tempo de reparo e permitir maior flexibilidade na substituição de peças com defeito. Se, durante o período de diagnóstico, a HP (ou fornecedores/parceiros de serviço da HP) concluir que o reparo pode ser efetuado pelo uso de uma peça CSR, a peça de reposição será enviada diretamente ao cliente. Existem duas categorias de peças CSR:

Obrigatória – Peças cujo reparo feito pelo cliente é obrigatório. Se desejar que a HP substitua essas peças, serão cobradas as despesas de transporte e mão-de-obra do serviço.

Opcional – Peças cujo reparo feito pelo cliente é opcional. Essas peças também são projetadas para o reparo feito pelo cliente. No entanto, se desejar que a HP as substitua, pode haver ou não a cobrança de taxa adicional, dependendo do tipo de serviço de garantia destinado ao produto.

OBSERVAÇÃO: Algumas peças da HP não são projetadas para o reparo feito pelo cliente. A fim de cumprir a garantia do cliente, a HP exige que um técnico autorizado substitua a peça. Essas peças estão identificadas com a marca "No" (Não), no catálogo de peças ilustrado.

Conforme a disponibilidade e o local geográfico, as peças CSR serão enviadas no primeiro dia útil após o pedido. Onde as condições geográficas permitirem, a entrega no mesmo dia ou em quatro horas pode ser feita mediante uma taxa adicional. Se precisar de auxílio, entre em contato com o Centro de suporte técnico da HP para que um técnico o ajude por telefone. A HP especifica nos materiais fornecidos com a peça CSR de reposição se a peça com defeito deve ser devolvida à HP. Nos casos em que isso for necessário, é preciso enviar a peça com defeito à HP dentro do período determinado, normalmente cinco (5) dias úteis. A peça com defeito deve ser enviada com a documentação correspondente no material de transporte fornecido. Caso não o faça, a HP poderá cobrar a reposição. Para as peças de reparo feito pelo cliente, a HP paga todas as despesas de transporte e de devolução da peça e determina a transportadora/serviço postal a ser utilizado.

Para obter mais informações sobre o programa de reparo feito pelo cliente da HP, entre em contato com o fornecedor de serviços local. Para o programa norte-americano, visite o site da HP (http://www.hp.com/go/selfrepair).

カスタマーセルフリペア

修理時間を短縮し、故障部品の交換における高い柔軟性を確保するために、HP製品には多数のCSR部品があります。診断の際に、CSR部品を使用すれば修理ができるとHP（HPまたはHP正規保守代理店）が判断した場合、HPはその部品を直接、お客様に発送し、お客様に交換していただきます。CSR部品には以下の2通りがあります。

- **必須 -** カスタマーセルフリペアが必須の部品。当該部品について、もしもお客様がHPに交換作業を依頼される場合には、その修理サービスに関する交通費および人件費がお客様に請求されます。
- **任意 -** カスタマーセルフリペアが任意である部品。この部品もカスタマーセルフリペア用です。当該部品について、もしもお客様がHPに交換作業を依頼される場合には、お買い上げの製品に適用される保証サービス内容の範囲内においては、別途費用を負担していただくことなく保証サービスを受けることができます。

注： HP製品の一部の部品は、カスタマーセルフリペア用ではありません。製品の保証を継続するためには、HPまたはHP正規保守代理店による交換作業が必須となります。部品カタログには、当該部品がカスタマーセルフリペア除外品である旨が記載されています。

部品供給が可能な場合、地域によっては、CSR部品を翌営業日に届くように発送します。また、地域によっては、追加費用を負担いただくことにより同日または4時間以内に届くように発送することも可能な場合があります。サポートが必要なときは、HPの修理受付窓口に電話していただければ、技術者が電話でアドバイスします。交換用のCSR部品または同梱物には、故障部品をHPに返送する必要があるかどうかが表示されています。故障部品をHPに返送する必要がある場合は、指定期限内（通常は5営業日以内）に故障部品をHPに返送してください。故障部品を返送する場合は、届いた時の梱包箱に関連書類とともに入れてください。故障部品を返送しない場合、HPから部品費用が請求されます。カスタマーセルフリペアの際には、HPは送料および部品返送費を全額負担し、使用する宅配便会社や運送会社を指定します。

客户自行维修

HP 产品提供许多客户自行维修 (CSR) 部件，以尽可能缩短维修时间和在更换缺陷部件方面提供更大的灵活性。如果在诊断期间 HP（或 HP 服务提供商或服务合作伙伴）确定可以通过使用 CSR 部件完成维修，HP 将直接把该部件发送给您进行更换。有两类 CSR 部件：

- **强制性的** — 要求客户必须自行维修的部件。如果您请求 HP 更换这些部件，则必须为该服务支付差旅费和人工费用。
- **可选的** — 客户可以选择是否自行维修的部件。这些部件也是为客户自行维修设计的。不过，如果您要求 HP 为您更换这些部件，则根据为您的产品指定的保修服务类型，HP 可能收取或不再收取任何附加费用。

注：某些 HP 部件的设计并未考虑客户自行维修。为了满足客户保修的需要，HP 要求授权服务提供商更换相关部件。这些部件在部件图解目录中标记为“否”。

CSR 部件将在下一个工作日发运（取决于备货情况和允许的地理范围）。在允许的地理范围内，可在当天或四小时内发运，但要收取额外费用。如果需要帮助，您可以致电 HP 技术支持中心，将会有技术人员通过电话为您提供帮助。HP 会在随更换的 CSR 部件发运的材料中指明是否必须将有缺陷的部件返还给 HP。如果要求您将有缺陷的部件返还给 HP，那么您必须在规定期限内（通常是五 (5) 个工作日）将缺陷部件发给 HP。有缺陷的部件必须随所提供的发运材料中的相关文件一起返还。如果未能送还有缺陷的部件，HP 可能会要求您支付更换费用。客户自行维修时，HP 将承担所有相关运输和部件返回费用，并指定快递商/承运商。

有关 HP 客户自行维修计划的详细信息，请与您当地的服务提供商联系。有关北美地区的计划，请访问 HP 网站 (http://www.hp.com/go/selfrepair)。

客戶自行維修

HP 產品設計了許多「客戶自行維修」(CSR) 的零件以減少維修時間，並且使得更換瑕疵零件時能有更大的彈性。如果在診斷期間 HP（或 HP 服務供應商或維修夥伴）辨認出此項維修工作可以藉由使用 CSR 零件來完成，則 HP 將直接寄送該零件給您作更換。CSR 零件分為兩種類別：

- **強制的** — 客戶自行維修所使用的零件是強制性的。如果您要求 HP 更換這些零件，HP 將會向您收取此服務所需的外出費用與勞動成本。
- **選購的** — 客戶自行維修所使用的零件是選購的。這些零件也設計用於客戶自行維修之用。不過，如果您要求 HP 為您更換，則可能需要也可能不需要負擔額外的費用，端視針對此產品指定的保固服務類型而定。

備註：某些 HP 零件沒有消費者可自行維修的設計。為符合客戶保固，HP 需要授權的服務供應商更換零件。這些零件在圖示的零件目錄中，被標示為「否」。

基於材料取得及環境允許的情況下，CSR 零件將於下一個工作日以快遞寄送。在環境的允許下當天或四小時內送達，則可能需要額外的費用。若您需要協助，可致電「HP 技術支援中心」，會有一位技術人員透過電話來協助您。不論損壞的零件是否必須退回，HP 皆會在與 CSR 替換零件一起運送的材料中註明。若要將損壞的零件退回 HP，您必須在指定的一段時間內（通常為五 (5) 個工作天），將損壞的零件寄回 HP。損壞的零件必須與寄送資料中隨附的相關技術文件一併退還。如果無法退還損壞的零件，HP 可能要向您收取替換費用。針對客戶自行維修情形，HP 將負責所有運費及零件退還費用並指定使用何家快遞/貨運公司。

如需 HP 的「客戶自行維修」方案詳細資訊，請連絡您當地的服務供應商。至於北美方案，請參閱 HP 網站 (http://www.hp.com/go/selfrepair)。

고객 셀프 수리

HP 제품은 수리 시간을 최소화하고 결함이 있는 부품 교체 시 더욱 융통성을 발휘할 수 있도록 하기 위해 고객 셀프 수리(CSR) 부품을 다량 사용하여 설계되었습니다. 진단 기간 동안 HP(또는 HP 서비스 공급업체 또는 서비스 협력업체)에서 CSR 부품을 사용하여 수리가 가능하다고 판단되면 HP는 해당 부품을 바로 사용자에게 보내어 사용자가 교체할 수 있도록 합니다. CSR 부품에는 두 가지 종류가 있습니다.

- **고객 셀프 수리가 의무 사항인 필수 부품.** 사용자가 HP에 이 부품의 교체를 요청할 경우 이 서비스에 대한 출장비 및 작업비가 청구됩니다.
- **고객 셀프 수리가 선택 사항인 부품.** 이 부품들도 고객 셀프 수리가 가능하도록 설계되었습니다. 하지만 사용자가 HP에 이 부품의 교체를 요청할 경우 사용자가 구입한 제품에 해당하는 보증 서비스 유형에 따라 추가 비용 없이 교체가 가능할 수 있습니다.

참고: 일부 HP 부품은 고객 셀프 수리가 불가능하도록 설계되었습니다. HP는 만족스러운 고객 보증을 위해 공인 서비스 제공업체를 통해 부품을 교체하도록 하고 있습니다. 이러한 부품들은 Illustrated Parts Catalog에 "No"라고 표시되어 있습니다.

CSR 부품은 재고 상태와 지리적 조건이 허용하는 경우 다음 영업일 납품이 가능하도록 배송이 이루어집니다. 지리적 조건이 허용하는 경우 추가 비용이 청구되는 조건으로 당일 또는 4시간 배송이 가능할 수도 있습니다. 도움이 필요하시면 HP 기술 지원 센터로 전화하십시오. 전문 기술자가 전화로 도움을 줄 것입니다. HP는 결함이 발생한 부품을 HP로 반환해야 하는지 여부를 CSR 교체 부품과 함께 배송된 자료에 지정합니다. 결함이 발생한 부품을 HP로 반환해야 하는 경우에는 지정된 기간 내(통상 영업일 기준 5일)에 HP로 반환해야 합니다. 이 때 결함이 발생한 부품은 제공된 포장 재료에 넣어 관련 설명서와 함께 반환해야 합니다. 결함이 발생한 부품을 반환하지 않는 경우 HP가 교체 부품에 대해 비용을 청구할 수 있습니다. 고객 셀프 수리의 경우, HP는 모든 운송 및 부품 반환 비용을 부담하며 이용할 운송업체 및 택배 서비스를 결정합니다.

HP 고객 셀프 수리 프로그램에 대한 자세한 내용은 가까운 서비스 제공업체에 문의하십시오. 북미 지역의 프로그램에 대해서는 HP 웹 사이트(http://www.hp.com/go/selfrepair)를 참조하십시오.

Acronyms and abbreviations

ABEND

abnormal end

AMP

Advanced Memory Protection

API

application program interface

ASR

Automatic Server Recovery

CSR

Customer Self Repair

ESD

electrostatic discharge

HBA

host bus adapter

HP SIM

HP Systems Insight Manager

HP SSA

HP Smart Storage Administrator

HP SUM

HP Software Update Manager

iLO

Integrated Lights-Out

iLO 4

Integrated Lights-Out 4

IML

Integrated Management Log

JSON

JavaScript Object Notation

KVM

kernel-based virtual machine

LRDIMM

load reduced dual in-line memory module

NAND

Not AND

NVRAM

nonvolatile memory

PCIe

Peripheral Component Interconnect Express

POST

Power-On Self Test

RBSU

ROM-Based Setup Utility

RDIMM

registered dual in-line memory module

REST

representational state transfer

RoHS

Restriction of Hazardous Substances

SAS

serial attached SCSI

SATA

serial ATA

SD

Secure Digital

SDDC

Single Device Data Correction

SPP

HP Service Pack for ProLiant

SSD

solid-state drive

STD

standard (DIMM voltage)

SUV

serial, USB, video

TPM

Trusted Platform Module

UDIMM

unregistered dual in-line memory module

UEFI

Unified Extensible Firmware Interface

UID

unit identification

USB

universal serial bus

VCA

Version Control Agent

VCRM

Version Control Repository Manager

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