HP ProLiant BL685c G6 Server Blade User Guide



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Intended audience

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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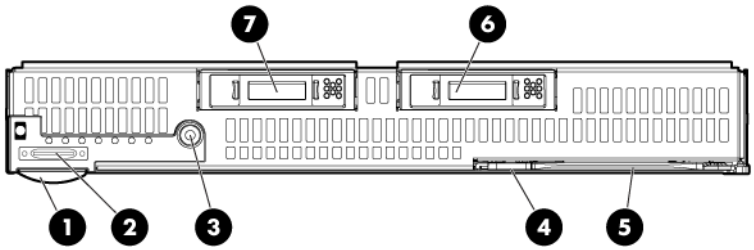
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Component identification

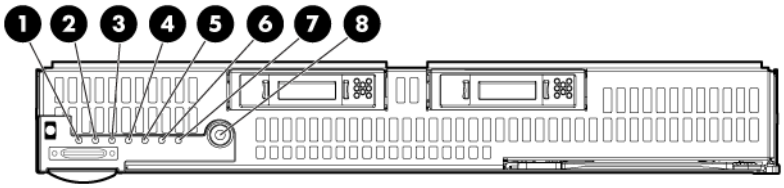
Front panel components



Item	Description
1	Serial label pull tab
2	HP c-Class Blade SUV Cable connector*
3	Power On/Standby button and LED
4	Server blade release button
5	Server blade release lever
6	Hard drive bay 2
7	Hard drive bay 1

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

Front panel LEDs

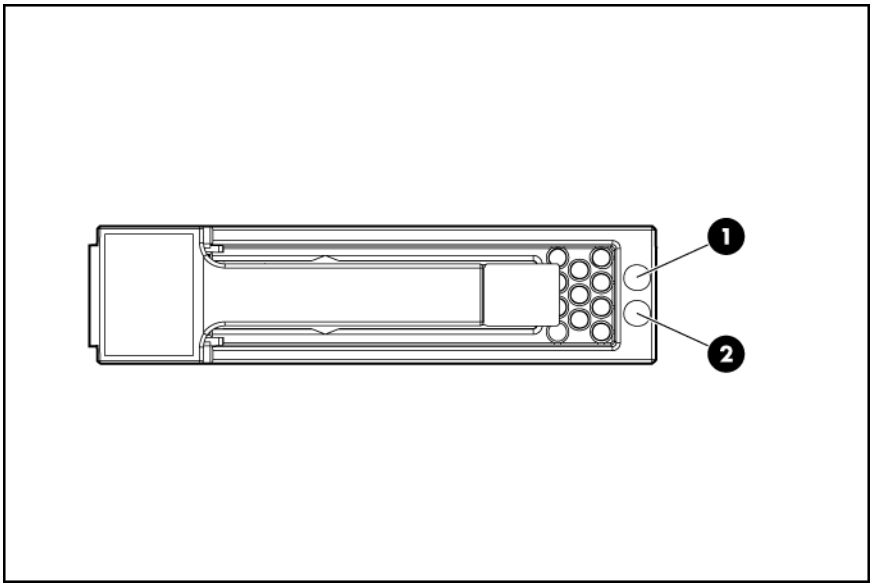


Item	Description	Status
1	UID LED	Blue = Identified Blue flashing = Active remote management Off = No active remote management

Item	Description	Status
2	Health LED	Green = Normal operation Amber flashing = Degraded condition Red flashing = Critical condition
3	Flex 1 LED	Green = Network linked Green flashing = Network activity Off = No link or activity
4	Flex 2 LED	Green = Network linked Green flashing = Network activity Off = No link or activity
5	Flex 3 LED	Green = Network linked Green flashing = Network activity Off = No link or activity
6	Flex 4 LED	Green = Network linked Green flashing = Network activity Off = No link or activity
7	SSD activity LED	Green flashing = Hard drive activity Off = No link or activity
8	System power LED	Green = On Green flashing = Server is requesting power Amber = Standby (auxiliary power available)* Off = Off

*If the Onboard Administrator denies power to the server blade, the server blade returns to Standby mode.

SAS and SATA hard drive LEDs



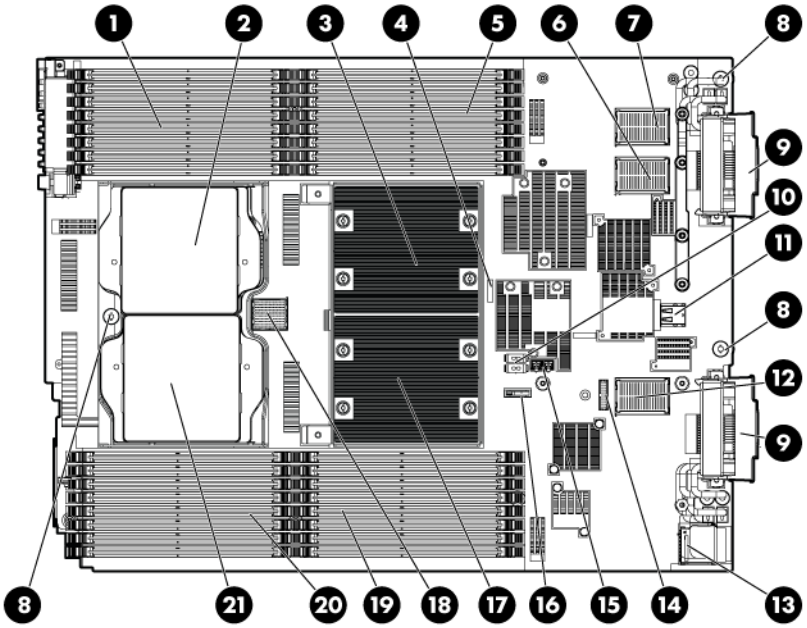
Item	Description
1	Fault/UID LED (amber/blue)
2	Online LED (green)

SAS and SATA hard drive LED combinations

NOTE: Predictive failure alerts can occur only when the hard drive is connected to a Smart Array controller.

Online/activity LED (green)	Fault/UID LED (amber/blue)	Interpretation
On, off, or flashing	Alternating amber and blue	The drive has failed, or a predictive failure alert has been received for this drive; it also has been selected by a management application.
On, off, or flashing	Steadily blue	The drive is operating normally, and it has been selected by a management application.
On	Amber, flashing regularly (1 Hz)	A predictive failure alert has been received for this drive. Replace the drive as soon as possible.
On	Off	The drive is online, but it is not active currently.
Flashing regularly (1 Hz)	Amber, flashing regularly (1 Hz)	**Do not remove the drive. Removing a drive may terminate the current operation and cause data loss.** The drive is part of an array that is undergoing capacity expansion or stripe migration, but a predictive failure alert has been received for this drive. To minimize the risk of data loss, do not replace the drive until the expansion or migration is complete.
Flashing regularly (1 Hz)	Off	**Do not remove the drive. Removing a drive may terminate the current operation and cause data loss.** The drive is rebuilding, erasing, or it is part of an array that is undergoing capacity expansion or stripe migration.
Flashing irregularly	Amber, flashing regularly (1 Hz)	The drive is active, but a predictive failure alert has been received for this drive. Replace the drive as soon as possible.
Flashing irregularly	Off	The drive is active, and it is operating normally.
Off	Steadily amber	A critical fault condition has been identified for this drive, and the controller has placed it offline. Replace the drive as soon as possible.
Off	Amber, flashing regularly (1 Hz)	A predictive failure alert has been received for this drive. Replace the drive as soon as possible.
Off	Off	The drive is offline, a spare, or not configured as part of an array.

System board components



Item	Description
1	Processor 4 DIMM slots
2	Processor socket 4
3	Processor socket 2 (populated)
4	System maintenance switch
5	Processor 2 DIMM slots
6	Mezzanine connector 1 (Type I mezzanine only)
7	Mezzanine connector 2 (Type I or Type II mezzanine)
8	System board thumbscrews (3)
9	Enclosure connectors (2)
10	SSD data connectors (2)
11	Internal USB connector
12	Mezzanine connector 3 (Type I or Type II mezzanine)
13	SD card slot
14	TPM connector
15	SSD power connectors (2)
16	System battery
17	Processor socket 1 (populated)
18	SAS controller connector
19	Processor 1 DIMM slots
20	Processor 3 DIMM slots
21	Processor socket 3

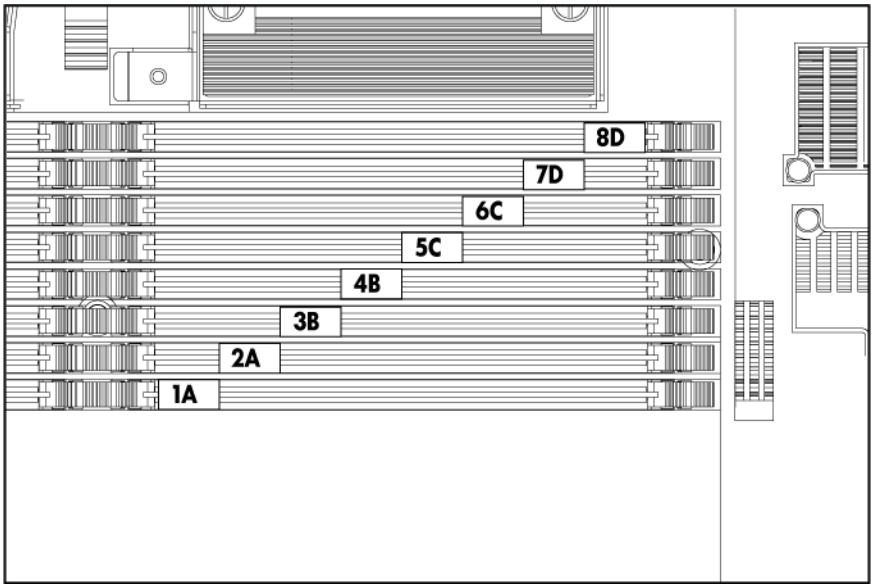
The symbols correspond to the symbols located on the interconnect bays. For more information, see the *HP ProLiant BL685c G6 Server Blade Installation Instructions* that ship with the server blade.

DIMM slots

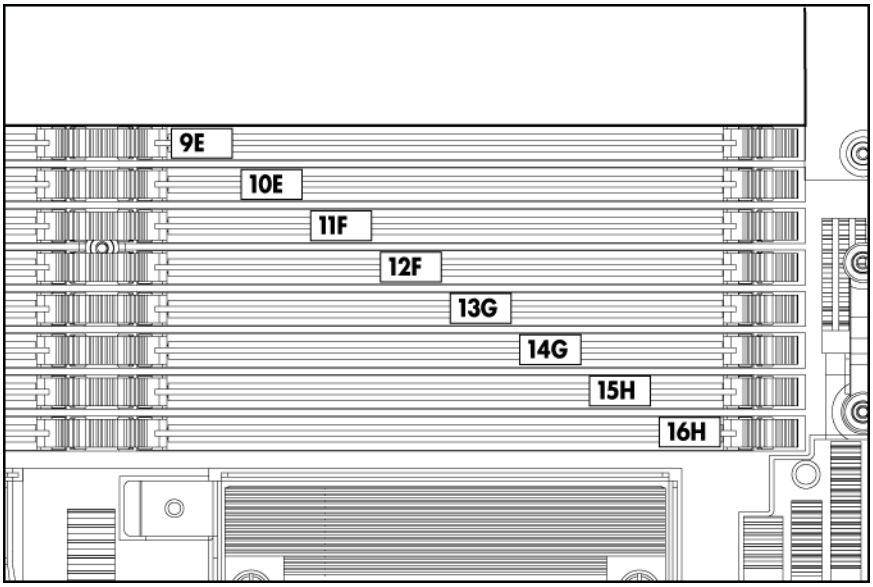
DIMM slots are identified by the numbers 1 through 32 and paired banks are identified by the letters A through P.

Each processor has eight DIMM slots associated with it:

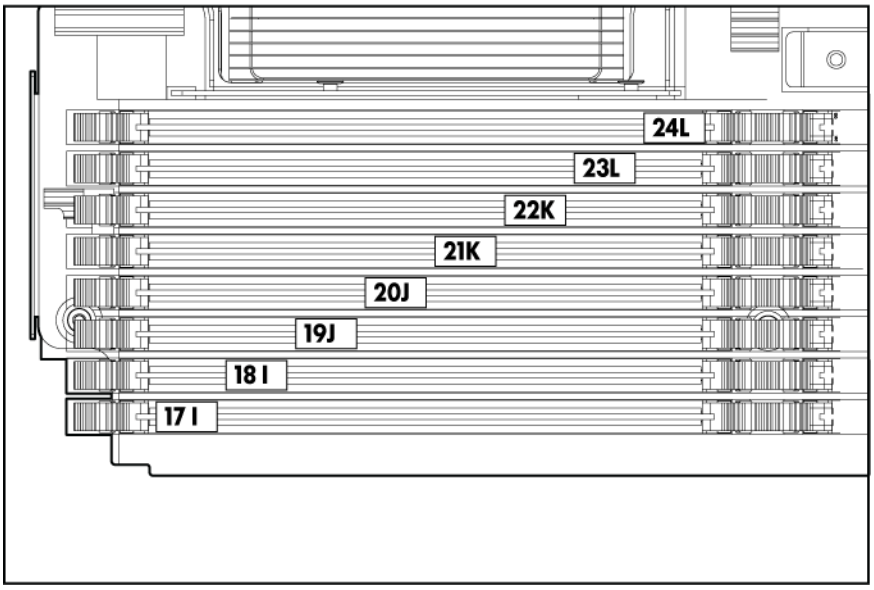
- Processor 1 DIMM slots



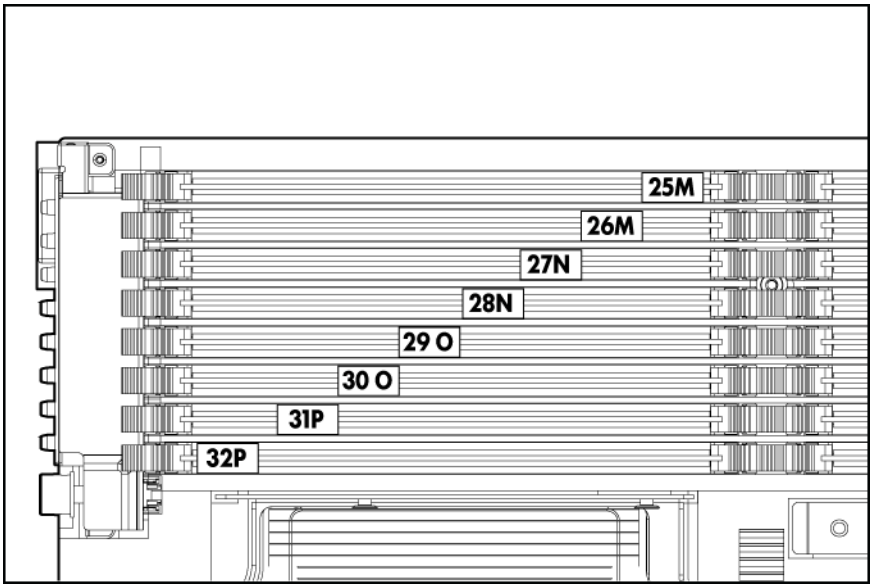
- Processor 2 DIMM slots



- Processor 3 DIMM slots



- Processor 4 DIMM slots



For installation guidelines and population order, see "Memory option (on page 37)."

Mezzanine connector definitions

PCIe x8 mezzanine connectors support x16 cards at up to x8 speeds.

Item	Connector	Card support
Mezzanine connector 1	PCIe x8	Type I mezzanine card only
Mezzanine connector 2	PCIe x8	Type I or II mezzanine card
Mezzanine connector 3	PCIe x8	Type I or II mezzanine card

System maintenance switch

Position	Function	Default
1*	iLO 2 security override	Off
2	Configuration lock	Off
3	Reserved	Off
4	Reserved	Off
5*	Password disabled	Off
6*	Reset configuration	Off
7	Reserved	Off
8	Reserved	Off

*To access redundant ROM, set S1, S5, and S6 to ON.

System maintenance switch procedures

When you perform troubleshooting steps, this guide may instruct you to perform the following procedures:

- Clear the system configuration ("Clearing the system configuration" on page 13).
- Access the redundant ROM ("Accessing the redundant ROM" on page 14).

To complete these procedures, you must change physical settings on the system maintenance switch.

Clearing the system configuration

RBSU can be used to restore the factory default configuration. For more information, see "HP ROM-Based Setup Utility (on page 63)." If the system is unable to boot into RBSU, use the following steps to clear the system configuration:

1. Power down the server blade (on page 15).
2. Remove the server blade (on page 16).
3. Remove the access panel (on page 17).
4. Change position 6 of the system maintenance switch to on.
5. Install the access panel (on page 17).
6. Install the server blade in the enclosure and power up the server blade.
7. Wait for the POST message that prompts you to change the switch setting:

   ```
   Maintenance switch detected in the "On" position.
   Power off the server and turn switch to the "Off" position.
   ```

8. Repeat steps 1 through 3.
9. Change position 6 of the system maintenance switch to off.
10. Repeat steps 5 and 6.

IMPORTANT: When the server blade boots after NVRAM is cleared, a delay of up to 2 minutes is normal. During this delay, the system appears non-functional. Do not attempt any procedures during the delay.

Accessing the redundant ROM

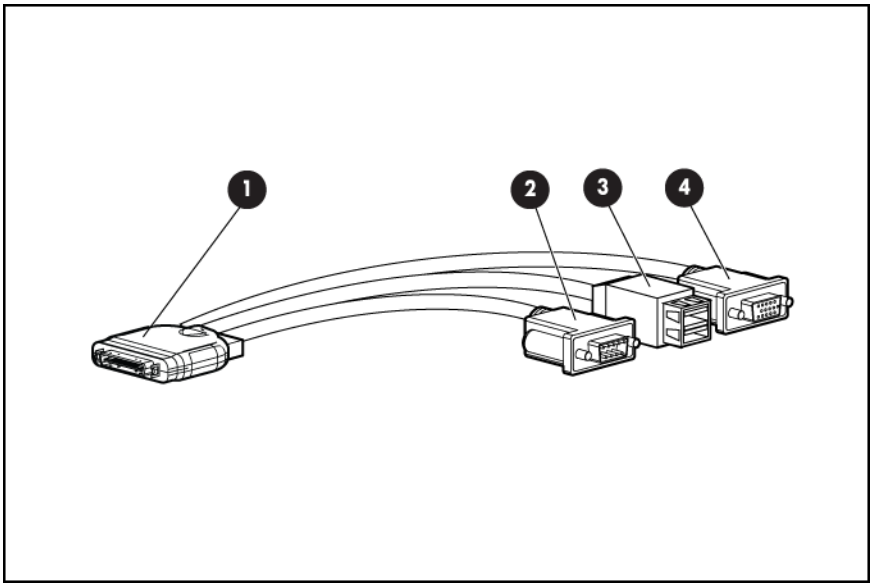
If the system ROM is corrupted, the system automatically switches to the redundant ROM in most cases. If the system does not automatically switch to the redundant ROM, perform the following steps:

1. Power down the server blade (on page 15).
2. Remove the server blade (on page 16).
3. Remove the access panel (on page 17).
4. Change positions 1, 5, and 6 of the system maintenance switch to on.
5. Install the access panel.
6. Install the server blade in the enclosure and power up the server blade.
7. After the system beeps, repeat steps 1 through 3.
8. Change positions 1, 5, and 6 of system maintenance switch to off.
9. Repeat steps 5 and 6.

If both the current and backup versions of the ROM are corrupt, return the system board for a service replacement.

To switch to the backup ROM when the System ROM is not corrupt, use RBSU.

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	Video	For connecting a video monitor
3	USB	For connecting up to two USB devices
4	Serial	For trained personnel to connect a null modem serial cable and perform advanced diagnostic procedures

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 2.
- 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 green.

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

For more information about iLO 2, see "iLO 2 Standard Blade Edition technology (on page 66)."

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.

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

- Use a virtual power button selection through iLO 2.

  This method initiates a controlled remote shutdown of applications and the OS before the server blade enter standby mode.
- Press and release the Power On/Standby button.

  This method initiates a controlled shutdown of applications and the OS before the server blade enter 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. It provides an emergency shutdown method in the event of a hung application.
- Execute one of the following commands using the Onboard Administrator CLI:

  ```
  poweroff server all
  ```

  or

  ```
  poweroff server all force
  ```

  The first command initiates a controlled shutdown of applications and the OS before the server blade enter standby mode. The second form of the command forces the server blade to enter standby mode without exiting applications and the OS. This is an emergency method to force a shutdown in the event of a hung application.

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

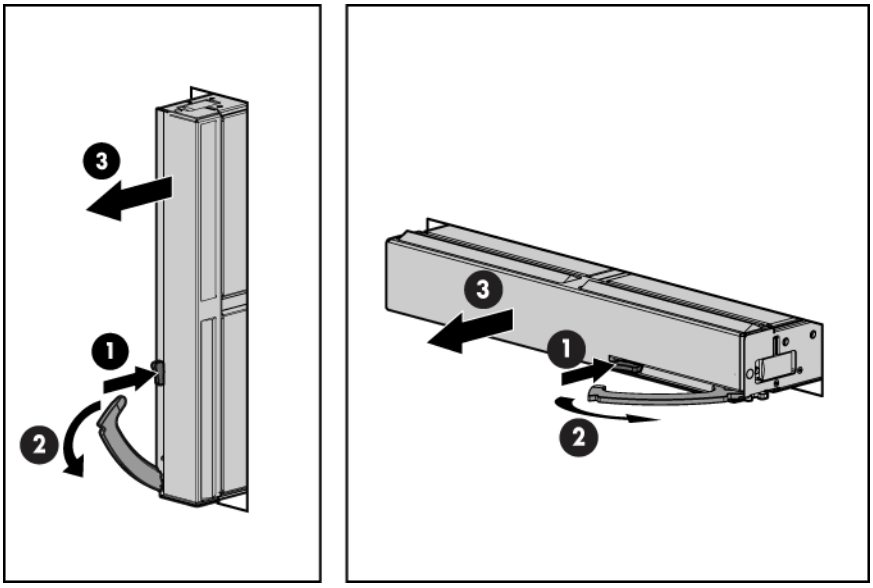
IMPORTANT: When the server blade are in standby mode, auxiliary power is still being provided. To remove all power from the server blade, remove the server blade from the enclosure.

After initiating a virtual power down command, be sure that the server blade go into standby mode by observing that the system power LED is amber.

Remove the server blade

CAUTION: Do not use the server blade release lever to lift or carry the server blade. Always support the weight of the server blade by handling the chassis directly. Improper use can damage the release lever and the server blade.

1. Identify the proper server blade ("Front panel LEDs" on page 7).
2. Power down the server blade (on page 15).
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.

Remove the access panel

To remove the component:

1. Power down the server blade (on page 15).
2. Remove the server blade (on page 16).
3. Press the access panel release button, and then slide the access panel to the rear.
4. Remove the access panel.

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

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

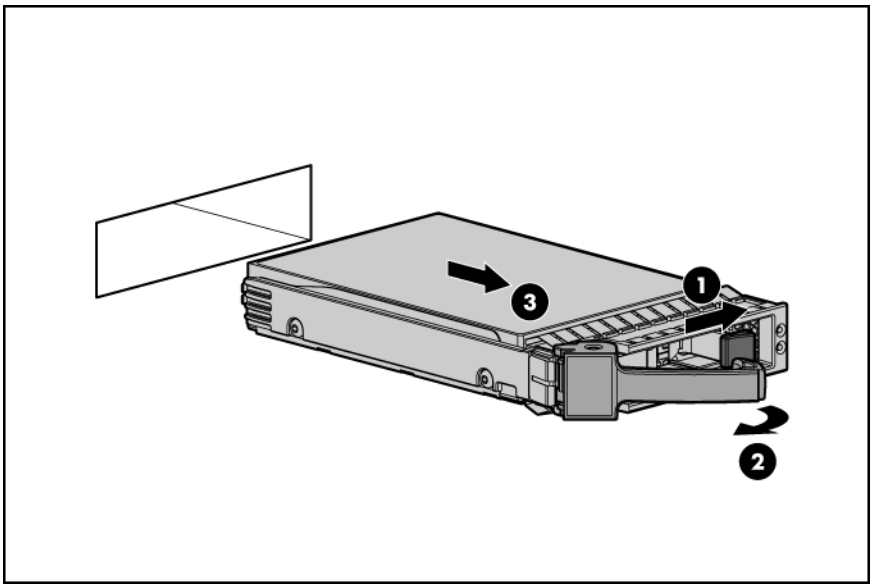
Install the access panel

1. Place the access panel on top of the server blade. Allow the panel to extend past the rear of the server blade approximately 1 cm (0.25 in).
2. Slide the access panel to the closed position.

Remove the SAS hard drive

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

Remove the component as indicated.

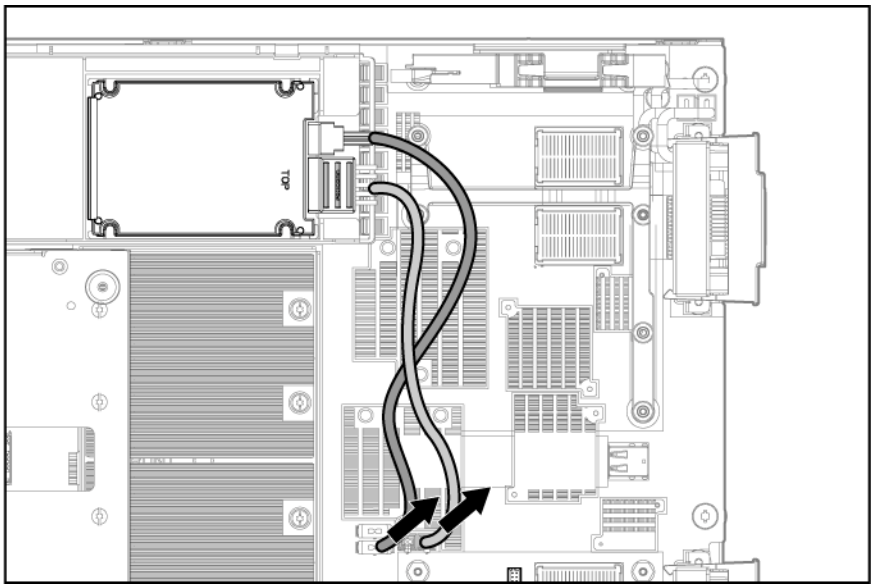


Remove the solid state drive

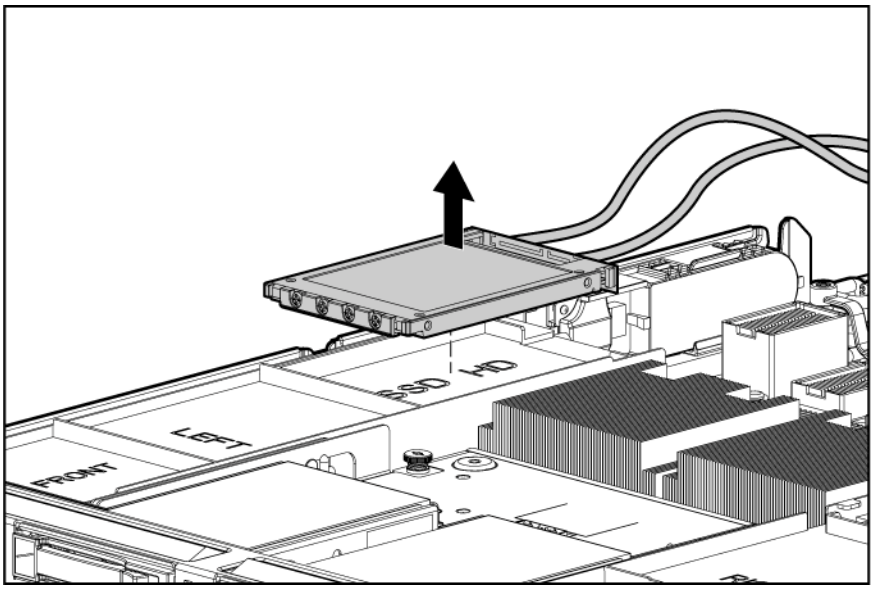
WARNING: To reduce the risk of personal injury from hot surfaces, allow the drives and the internal system components to cool before touching them.

To remove the component:

1. Power down the server blade (on page 15).
2. Remove the server blade (on page 16).
3. Remove the access panel (on page 17).
4. Disconnect the SSD cables from the system board.



5. Remove the SSD.

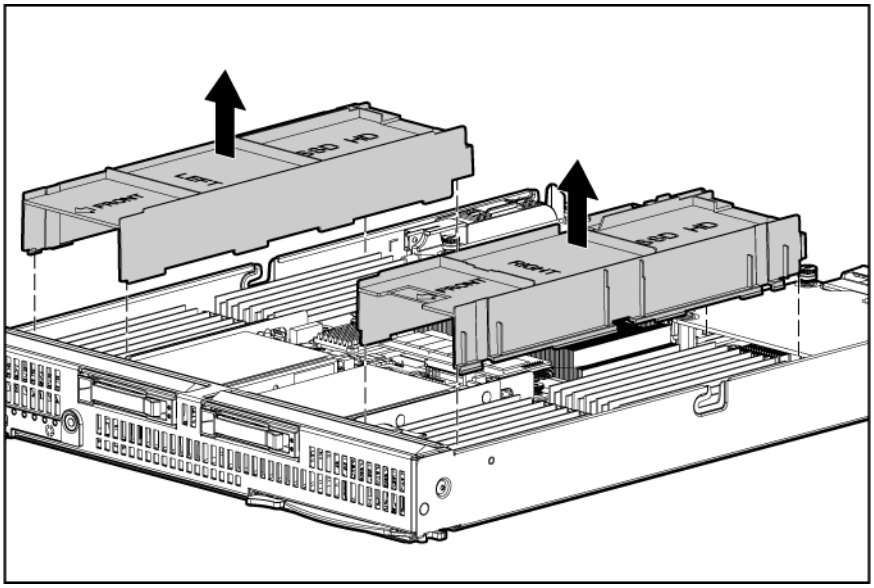


Remove the DIMM baffle

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.

To remove the component:

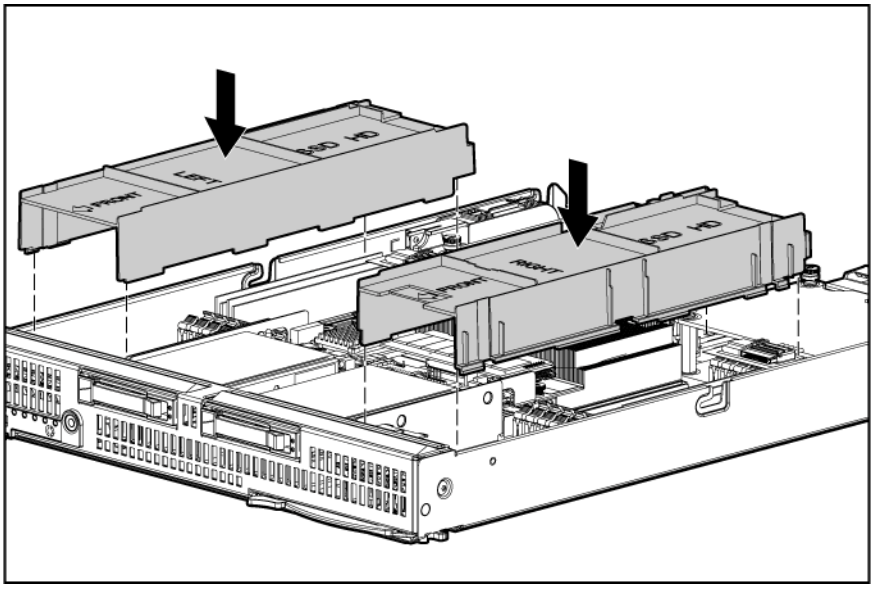
1. Power down the server blade (on page 15).
2. Remove the server blade (on page 16).
3. Remove the access panel (on page 17).
4. Remove the SSD drives, if installed ("Remove the solid state drive" on page 17).
5. Remove the DIMM baffle.



Install the DIMM baffle

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.

1. Install the DIMM baffles.



2. Install the SSD drives, if removed ("Solid state drive option" on page 39).
3. Install the access panel (on page 17).
4. Install the server blade ("Installing a server blade" on page 29, "Remove the server blade" on page 16).

Setup

Overview

Installation of a server blade requires the following steps:

1. Install and configure an HP BladeSystem c-Class enclosure.
2. Install any server blade options.
3. Install interconnect modules in the enclosure.
4. Connect the interconnect modules to the network.
5. Install a server blade.
6. Complete the server blade configuration.

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 Business Support Center website (http://www.hp.com/support)
- HP Technical Documentation website (http://docs.hp.com)

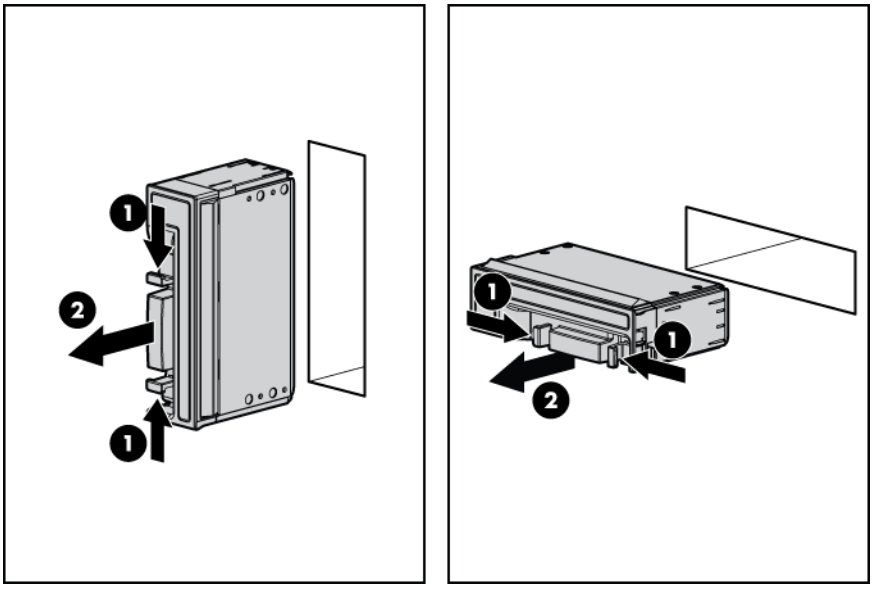
Preparing the enclosure

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 hard 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.

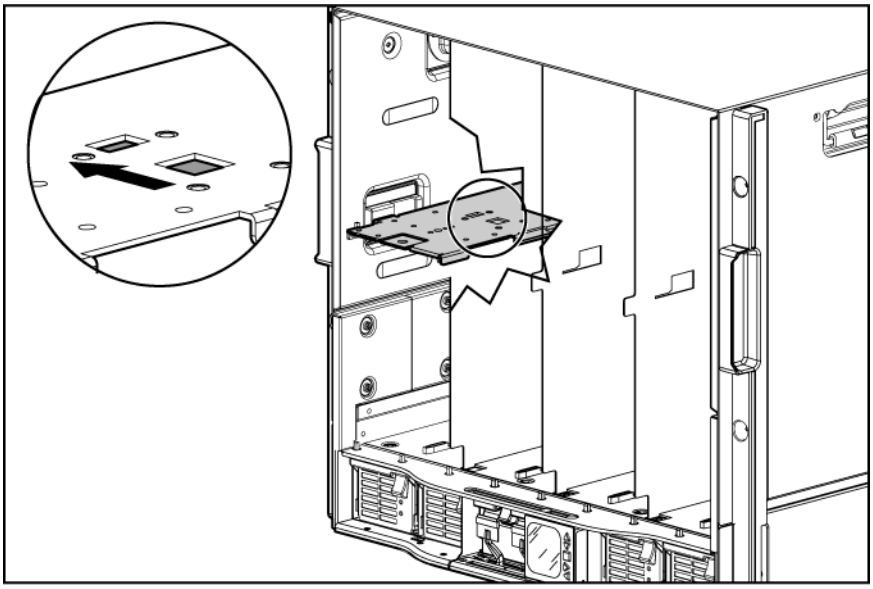
1. Remove the device bay blank.



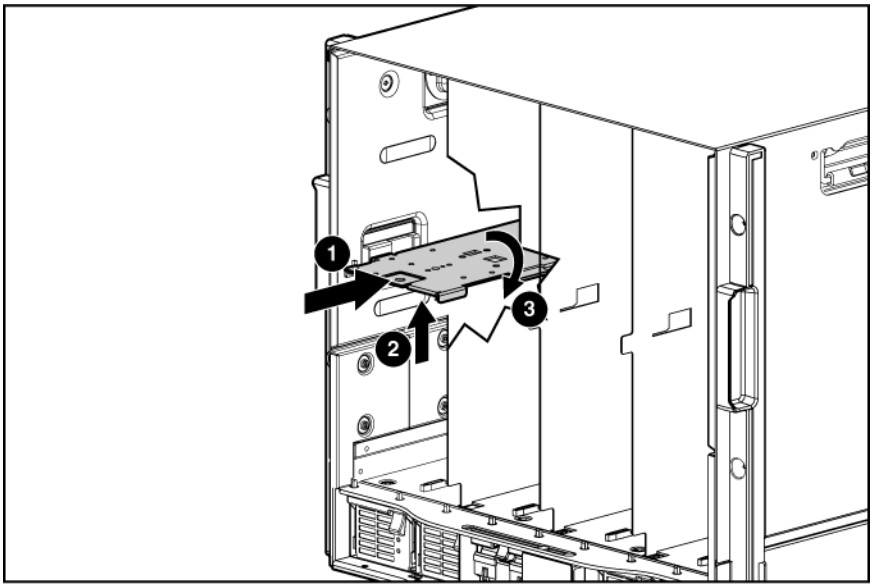
2. Remove the three adjacent blanks.

Removing a c7000 device bay divider

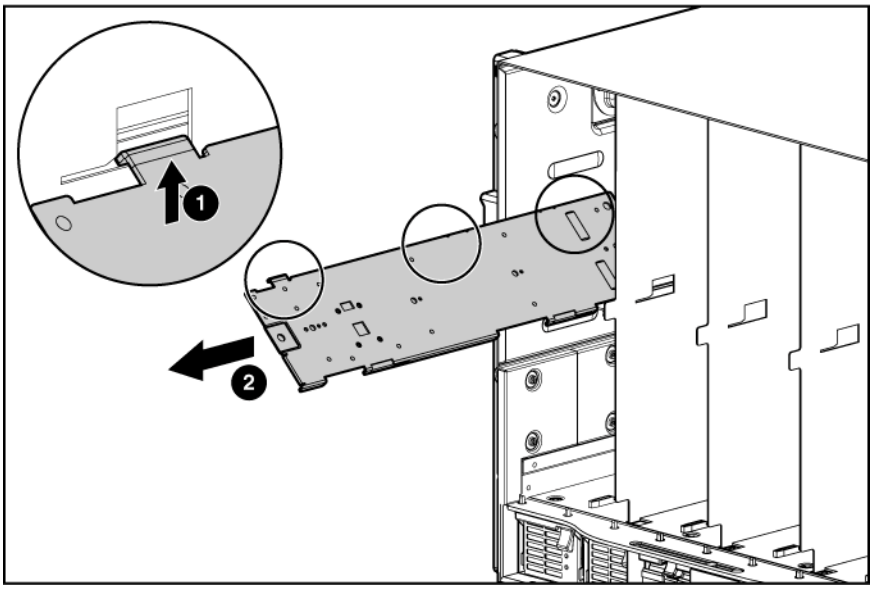
1. Slide the device bay shelf locking tab to the left to open it.



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).

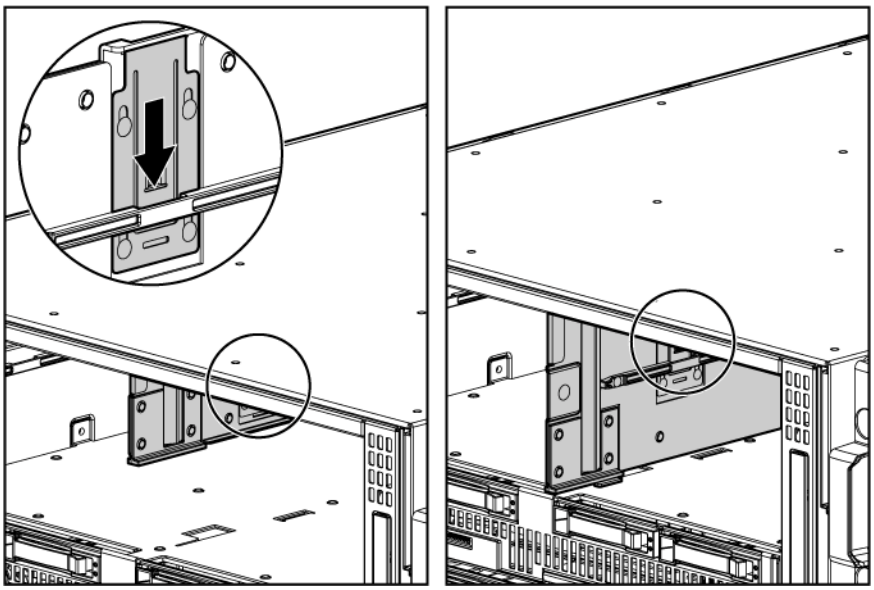


3. Lift the left side of the device bay shelf to disengage the three tabs from the divider wall, and then remove it from the enclosure.



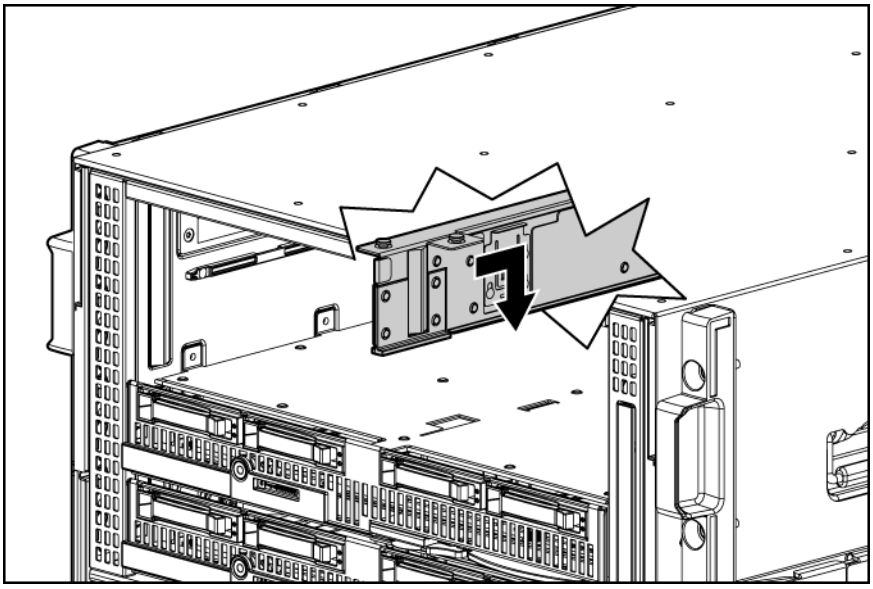
Removing a c3000 device bay mini-divider or device bay divider

1. Slide the locking tab down.



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

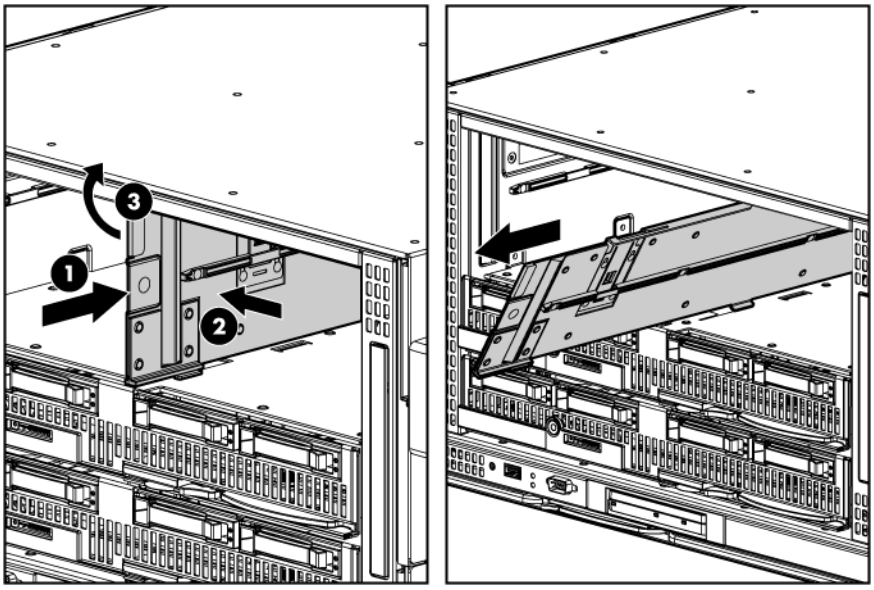
     Push the divider toward the back of the enclosure until the divider drops out of the chassis.



   - c3000 divider:

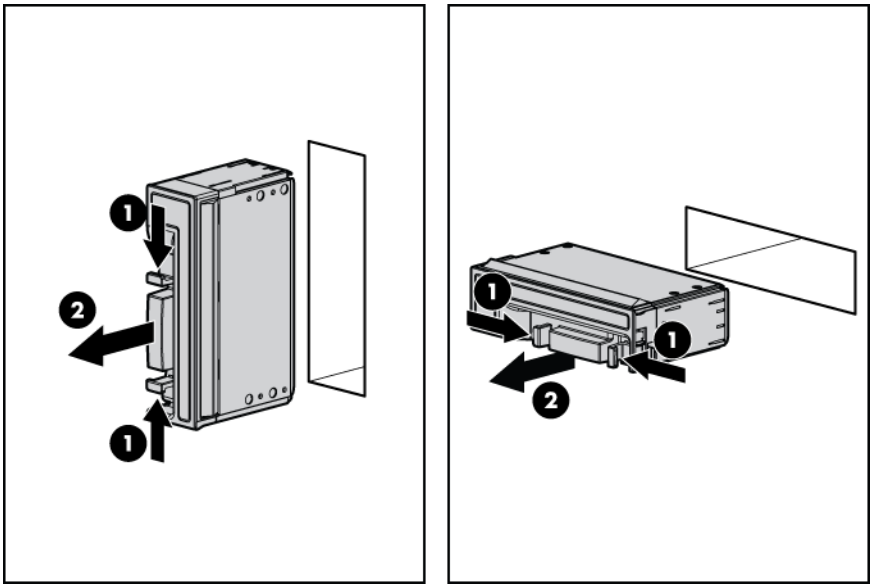
   a. Push the divider toward the back of the enclosure until it stops.
   b. Slide the divider to the left to disengage the tabs from the wall.
   c. Rotate the divider clockwise.

d. Remove the divider from the enclosure.



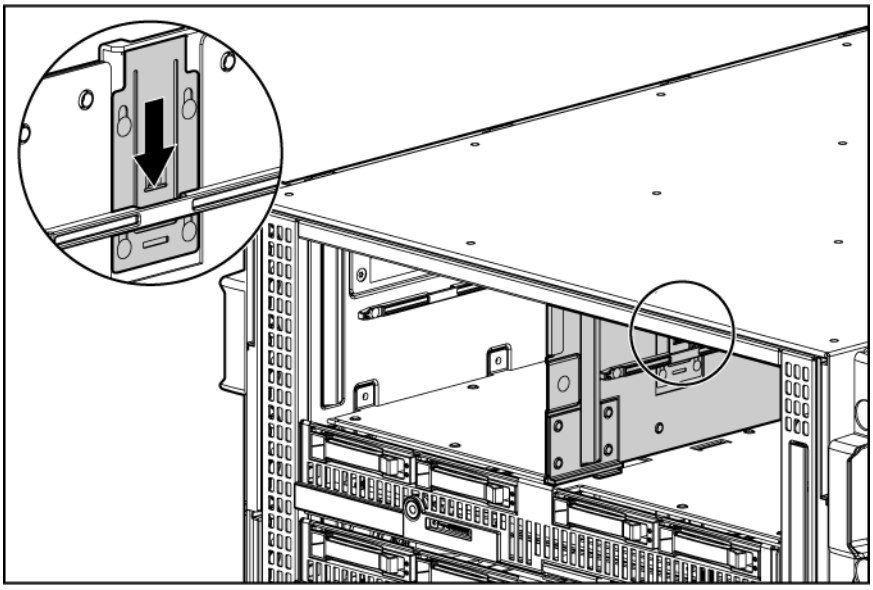
Removing a c3000 device bay divider

1. Remove the device bay blank.

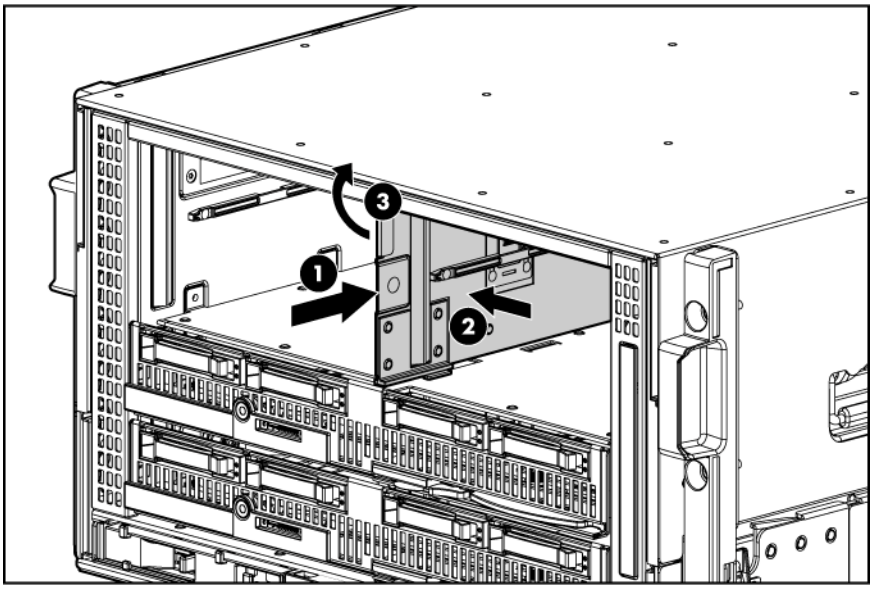


2. Remove the three adjacent device bay blanks.

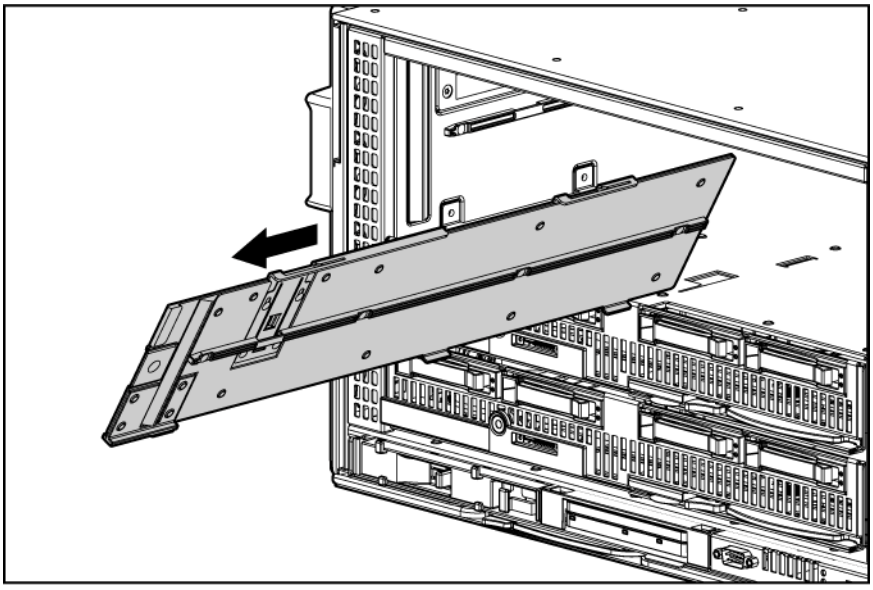
3. Slide the locking tab down.



4. Disengage the divider:
   a. Push the divider toward the back of the enclosure until it stops.
   b. Slide the divider to the left to disengage the tabs from the wall.
   c. Rotate the divider clockwise.



5. Remove the divider from the enclosure.

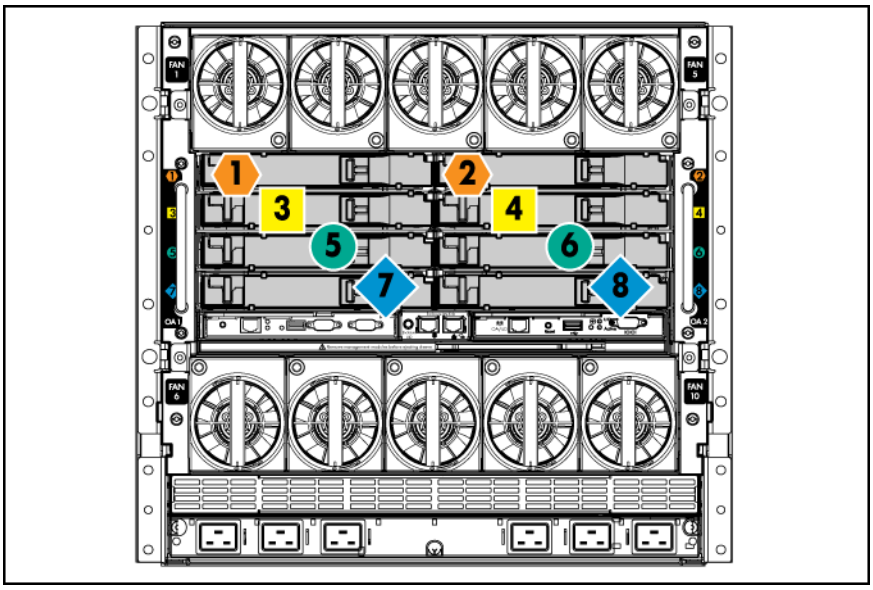


Installing interconnect modules

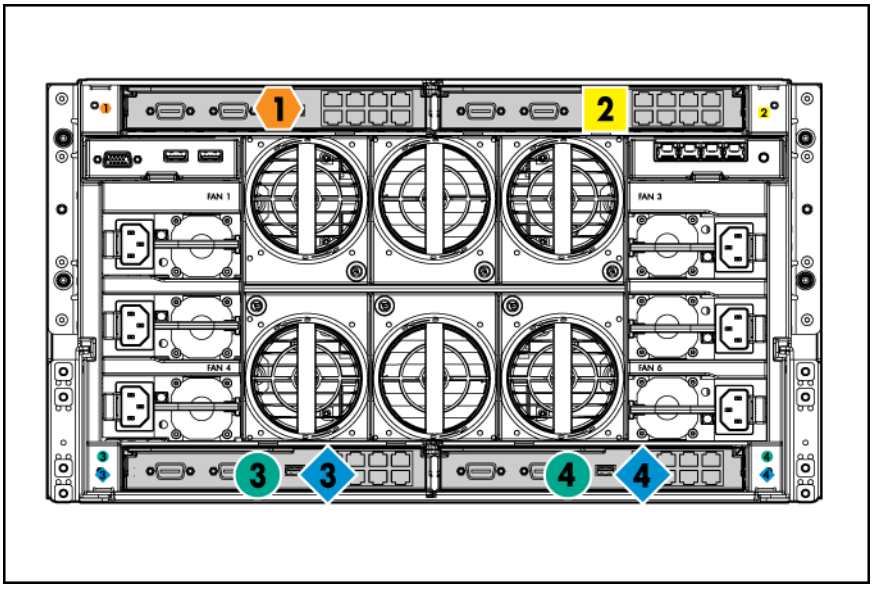
For specific steps to install interconnect modules, see the documentation that ships with the interconnect module.

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 NIC or mezzanine signals.

Server blade signal	c7000 interconnect bay	c3000 interconnect bay	Interconnect bay labels
NIC 1 (Embedded)	1	1	⬢
NIC 2 (Embedded)	2	1	⬢
NIC 3 (Embedded)	1	1	⬢
NIC 4 (Embedded)	2	1	⬢
Mezzanine 1	3 and 4	2	■
Mezzanine 2	5 and 6	3 and 4	●
	7 and 8	3 and 4	◆
Mezzanine 3	5 and 6	3 and 4	●
	7 and 8	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/go/bladesystem/documentation).

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).

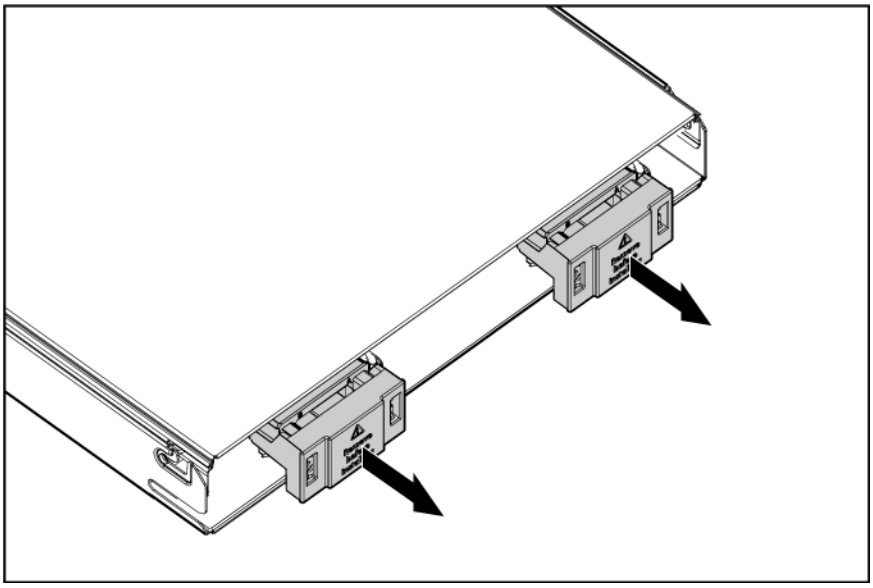
IMPORTANT: To connect to a network with a Pass-Thru module, always connect the Pass-Thru module to a network device that supports Gigabit speed.

Installing server blade options

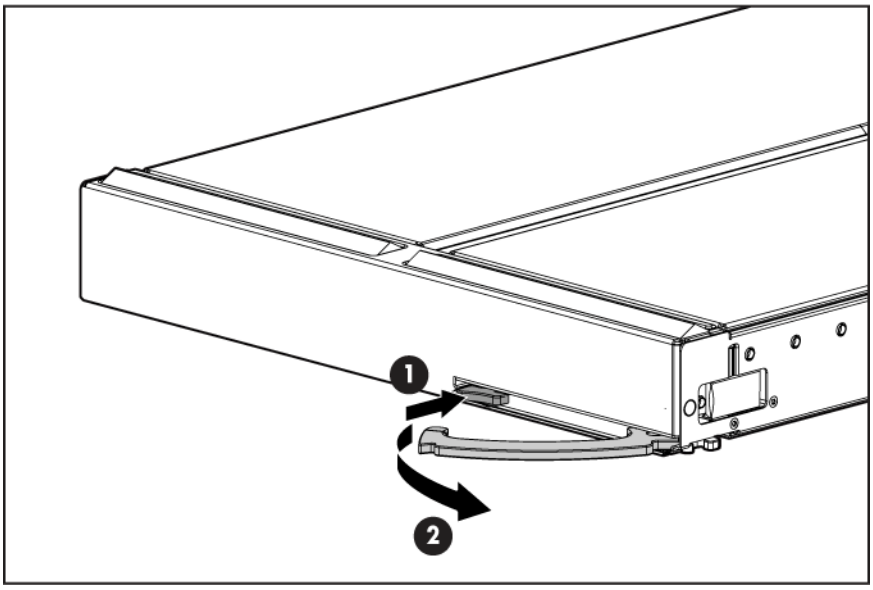
Before installing and initializing the server blade, install any server blade options, such as an additional processor, hard drive, or mezzanine card.

Installing a server blade

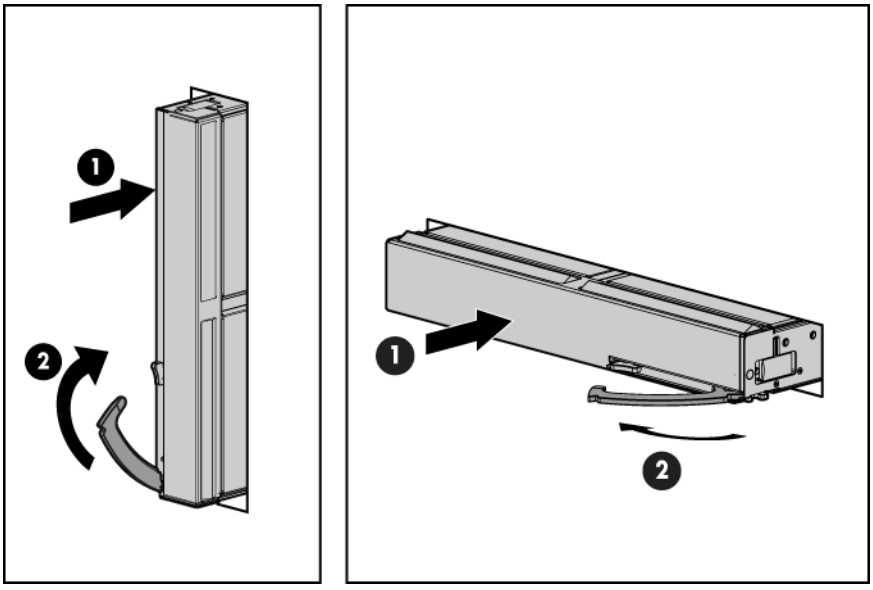
1. Remove the connector covers.



2. Prepare the server blade for installation.



3. Install the server blade.



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.

Processor option

The server supports single- and dual-processor operation. With two processors installed, the server supports boot functions through the processor installed in processor socket 1. However, if processor 1 fails, the system automatically boots from processor 2 and provides a processor failure message.

⚠ **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 avoid damage to the system board:

- Do not touch the processor socket contacts.
- Always install the processor socket cover after removing the processor from the socket.
- Do not tilt or slide the processor when lowering the processor into the socket.

△ **CAUTION:** To avoid damage to the processor:

- Handle the processor only by the edges.
- Do not touch the bottom of the processor, especially the contact area.

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

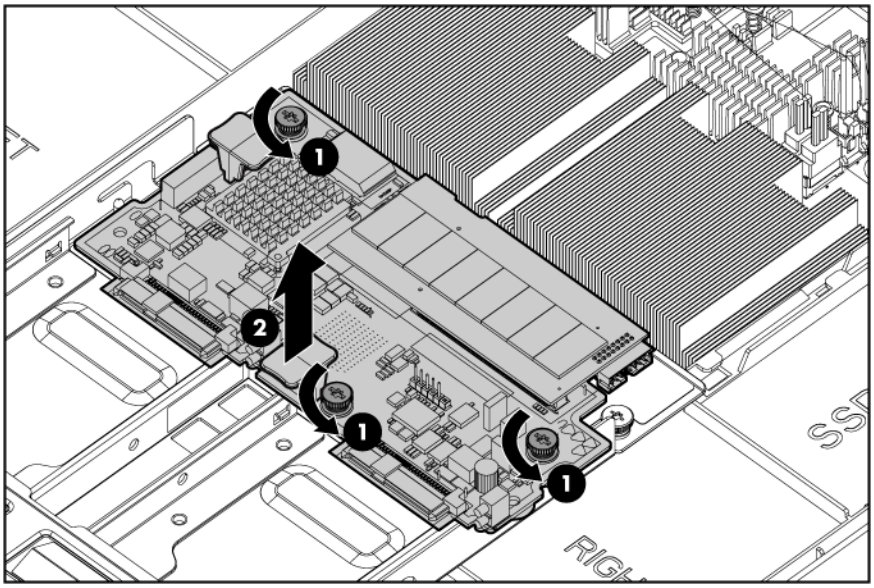
△ **CAUTION:** The server blade supports only two- or four-processor configurations. Always populate processor sockets 1 and 2 with processors and heatsinks. To prevent overheating, always populate processor sockets 3 and 4 with processors and heatsinks or processor socket covers and heatsink blanks.

△ **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.

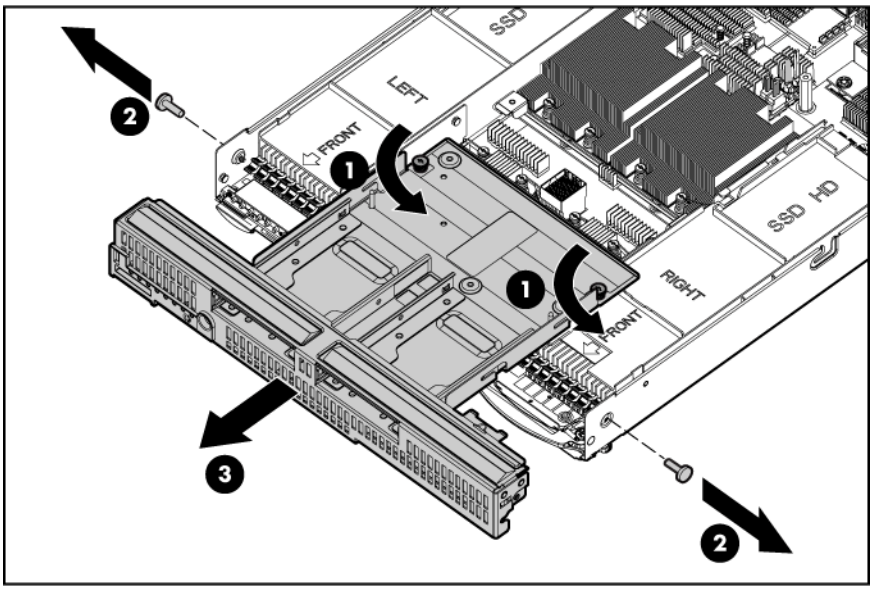
IMPORTANT: Processor sockets 1 and 2 must always be populated. If either processor socket is empty, the server blade does not power up.

To install a processor:

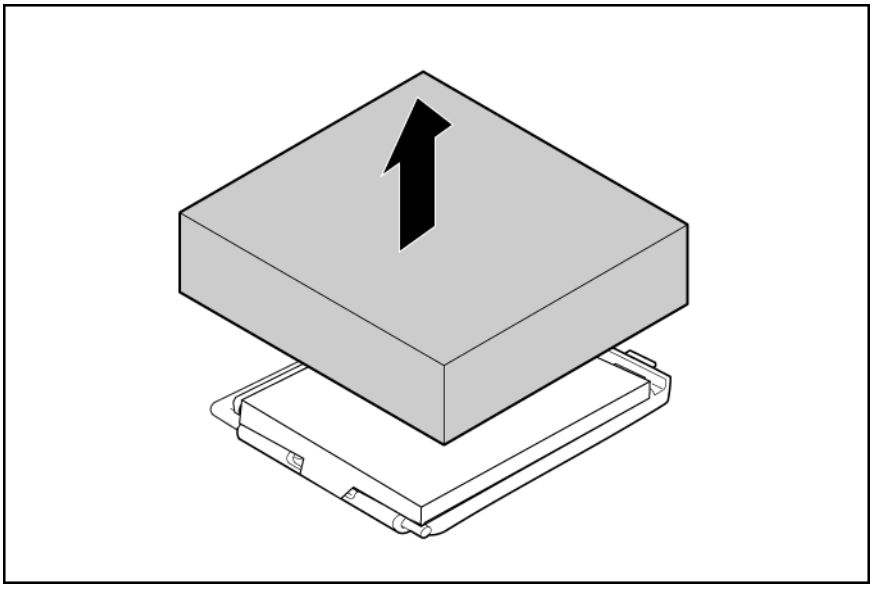
1. Power down the server blade (on page 15).
2. Remove the server blade (on page 16).
3. Remove the access panel (on page 17).
4. Remove the SAS hard drives ("Remove the SAS hard drive" on page 17), if installed.
5. Remove the SAS controller, if installed.



6. Remove the front bezel.

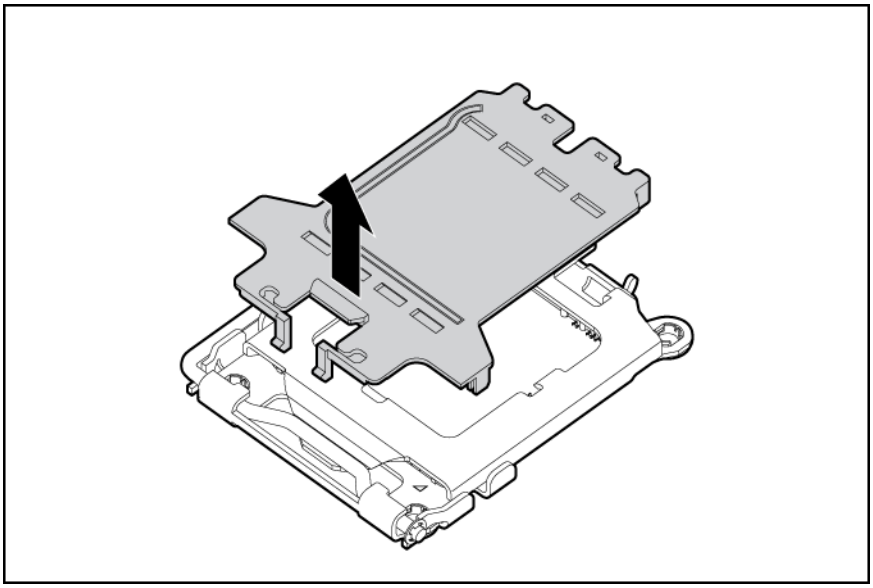


7. Remove the heatsink blank. Retain the heatsink blank for future use.



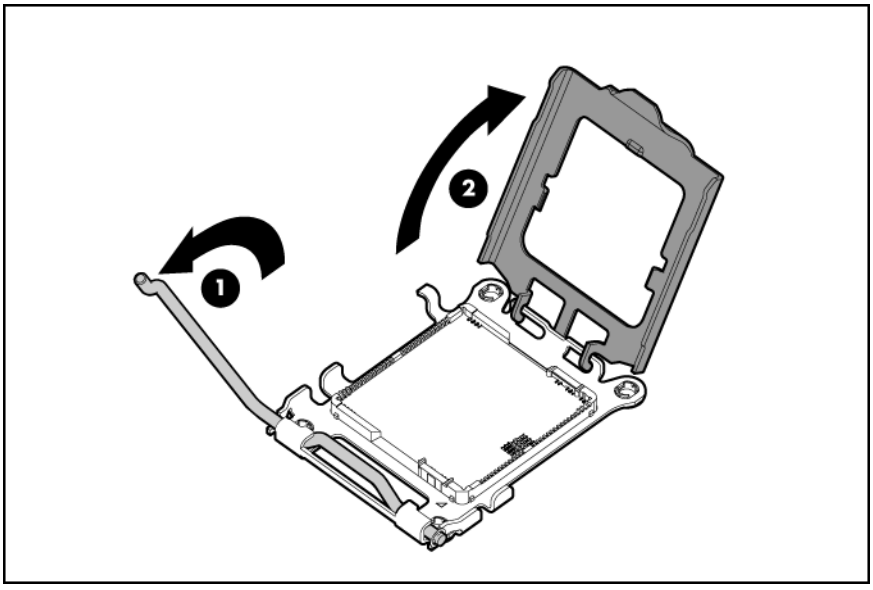
△ **CAUTION:** The pins on the processor socket are very fragile. Any damage to them may require replacing the system board.

8. Remove the processor socket protective cover. Retain the cover for future use.



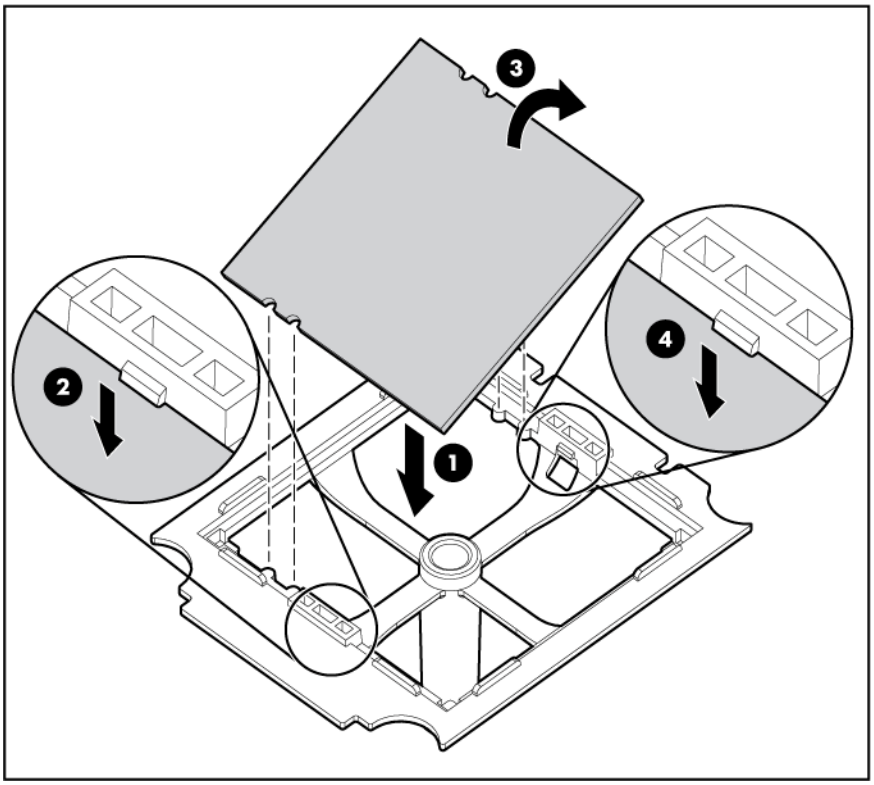
△ **CAUTION:** Failure to completely open the processor retaining latch prevents the processor from seating during installation, leading to hardware damage.

9. Open the processor retaining latch and the processor socket retaining bracket.



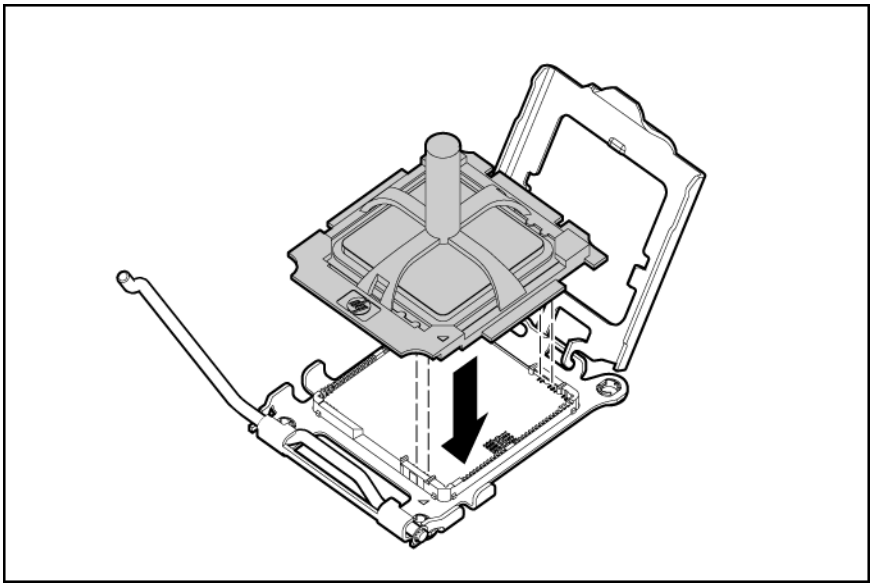
IMPORTANT: Be sure the processor remains inside the processor installation tool.

10. If the processor has separated from the installation tool, carefully re-insert the processor in the tool.

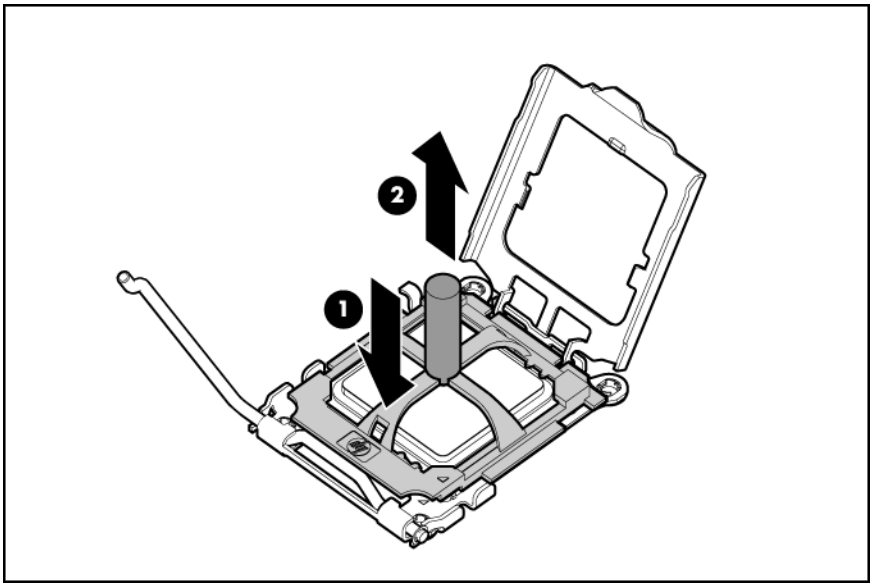


11. Align the processor installation tool with the socket and install the processor.

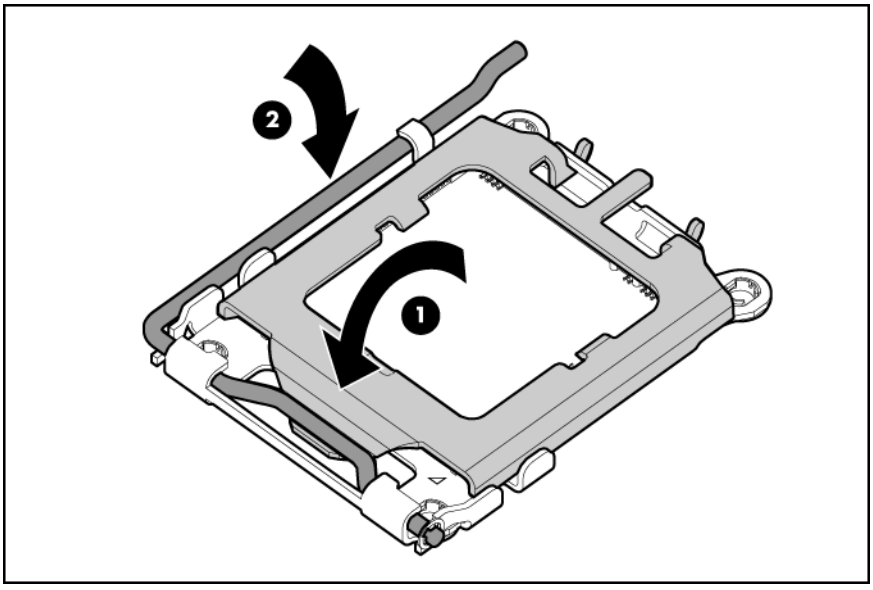
CAUTION: The processor is designed to fit one way into the socket. Use the alignment guides on the processor and socket to properly align the processor with the socket.



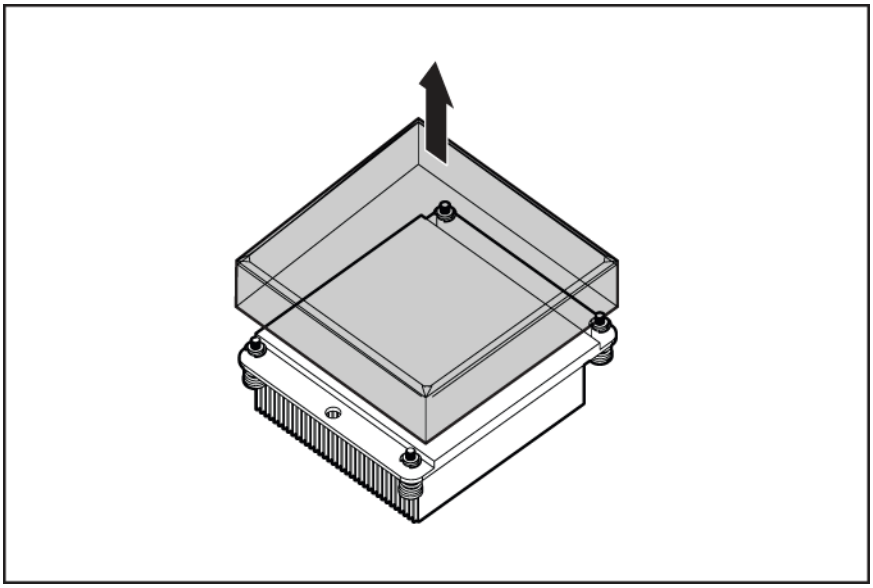
12. Press down firmly until the processor installation tool clicks and separates from the processor, and then remove the processor installation tool.



13. Close the processor retaining bracket and the processor retaining latch.



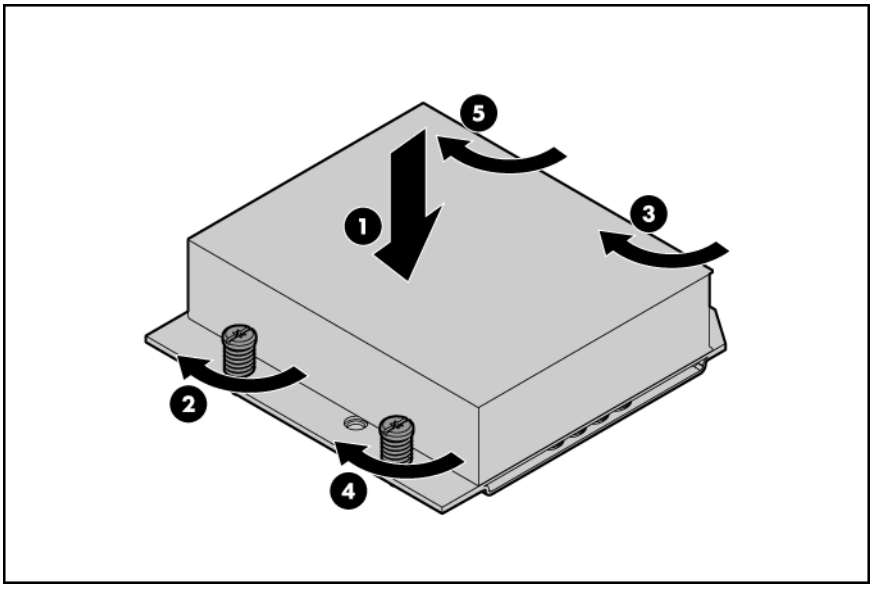
14. Remove the thermal interface protective cover from the heatsink.



CAUTION: Heatsink retaining screws should be tightened in diagonally opposite pairs (in an "X" pattern).

IMPORTANT: When installing the heatsink, align the guide pins on the processor retention bracket with the alignment holes in the heatsink.

15. Install the heatsink.



16. Repeat these steps for the second processor and heatsink.
17. Extend the serial label pull tab.
18. Install the front bezel.
19. Install the SAS controller, if removed.
20. Install the SAS hard drives, if removed.
21. Install the access panel (on page 17).
22. Install the server blade ("Installing a server blade" on page 29, "Remove the server blade" on page 16).

Memory option

You can expand server memory by installing PC2-6400 Registered DDR2 SDRAM DIMMs or 8-GB PC2-5300 SDRAM DIMMs. The server supports up to 256 GB of memory using 32 8-GB DIMMs (eight DIMMs per processor).

> **NOTE:** The Advanced Memory Protection option in RBSU provides additional memory protection beyond Advanced ECC. By default, the server is set to **Advanced ECC Support**. For more information, refer to "HP ROM-Based Setup Utility (on page 63)."

For DIMM slot locations and bank assignments, see "DIMM slots (on page 11)."

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. The server blade provides notification that correctable error events have exceeded a pre-defined threshold rate.

DIMM installation guidelines

Observe the following guidelines when installing additional memory:

- Install only the following memory types:
  - ECC PC2-6400 Registered DDR2 SDRAM DIMMs
  - ECC PC2-5300 Registered DDR2 8-GB SDRAM DIMMs
- Install DIMMs in pairs (banks) beginning with banks farthest from each populated processor.
- Install DIMMs with the greatest capacity in the banks farthest from the processor.
- Install identical DIMMs with the same part number in a bank.
- DIMMs must be installed for processor 1.
- DIMMs installed in different banks can be of different sizes.
- For best performance, populate one bank of memory for each installed processor before populating more than one bank for a specific processor.
- DIMMs installed in banks for processor 3 and 4 can be used only if processor 3 and 4 are installed.
- Processors 3 and 4 can be installed without memory.

△ **CAUTION:** Always wear an antistatic wrist strap when working inside the server.

DIMM population order

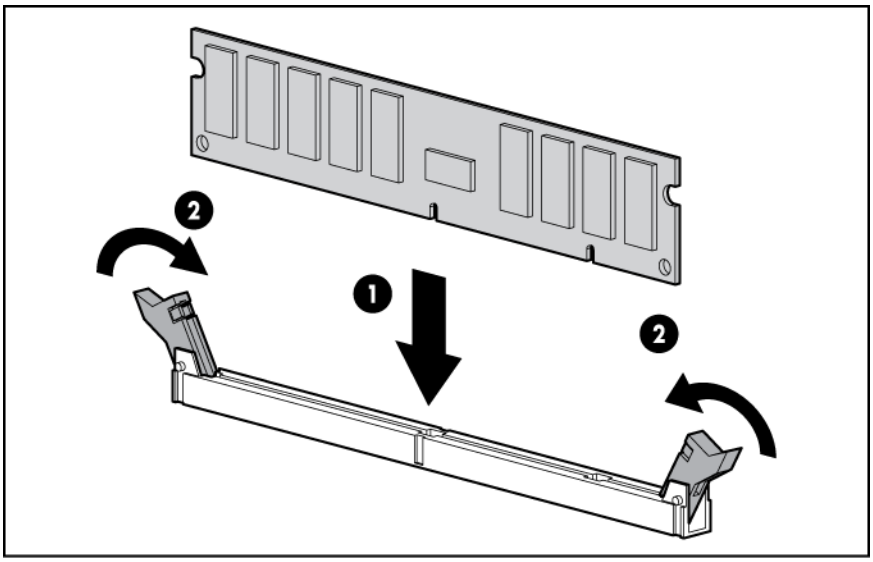
Banks	Dual processor	Quad processor
1A, 2A and 9E, 10E	1st	1st
3B, 4B and 11F, 12F	2nd	3rd
5C, 6C and 13G, 14G	3rd	5th
7D, 8D and 15H, 16H	4th	7th
17I, 18I and 25M, 26M	—	2nd
19J, 20J and 27N, 28N	—	4th
21K, 22K and 29O, 30O	—	6th
23L, 24L and 31P, 32P	—	8th

Installing DIMMs

To install the component:

1. Power down the server blade (on page 15).
2. Remove the server blade (on page 16).
3. Remove the access panel (on page 17).

4. Remove the DIMM baffle (on page 18).
5. Open the DIMM slot latches.
6. Install the DIMM.



7. Install the DIMM baffle (on page 19).
8. Install the access panel (on page 17).
9. Install the server blade ("Installing a server blade" on page 29, "Remove the server blade" on page 16).

Solid state drive option

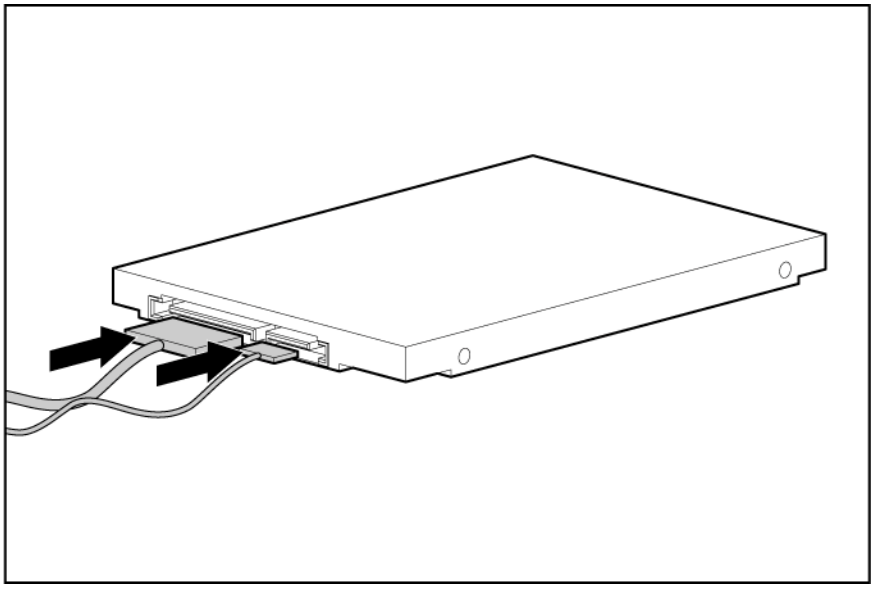
WARNING: To reduce the risk of personal injury from hot surfaces, allow the drives and the internal system components to cool before touching them.

IMPORTANT: Installation of SATA SSD drives and hot-plug SAS drives at the same time is not a supported configuration in this server blade.

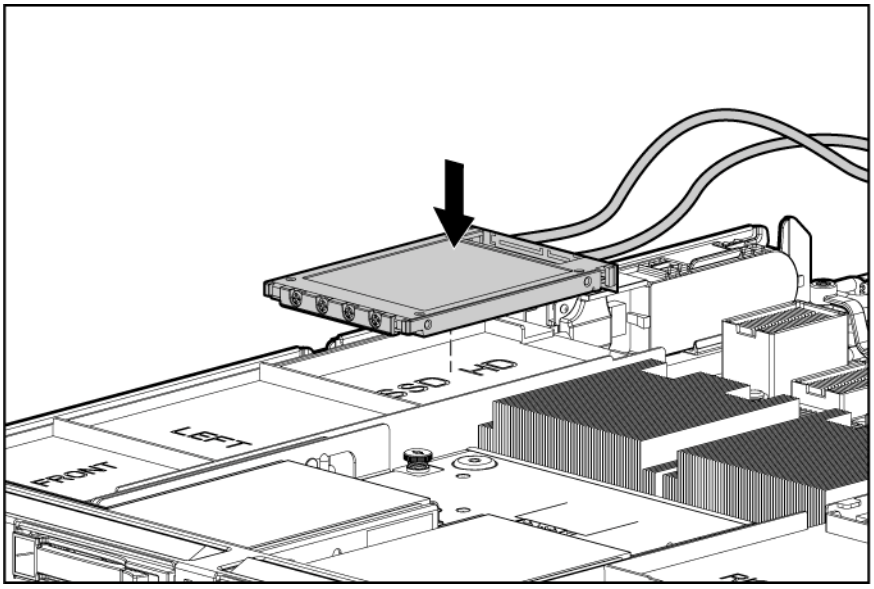
To install the component:

1. Power down the server blade (on page 15).
2. Remove the server blade (on page 16).
3. Remove the access panel (on page 17).

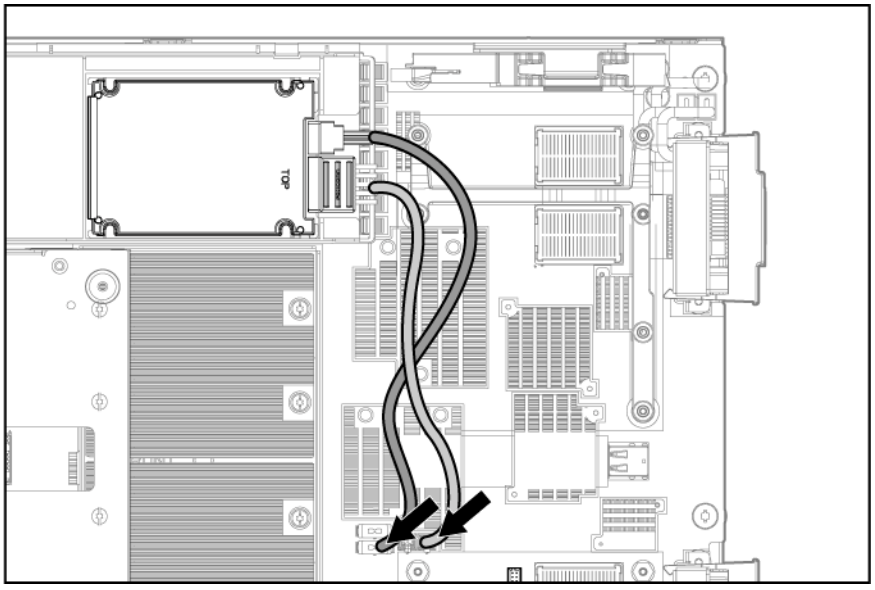
4. Connect the cables to the SSD.



5. Install the SSD.



6. Connect and route the cables.



7. Install the access panel (on page 17).
8. Install the server blade ("Installing a server blade" on page 29, "Remove the server blade" on page 16).

Mezzanine card option

Optional mezzanine cards enable network connectivity and provide Fibre Channel support. For mezzanine card locations, see "System board components (on page 10)."

For mezzanine card signal mapping, see the *HP ProLiant BL685c G6 Server Blade Installation Instructions* that ship with the server blade.

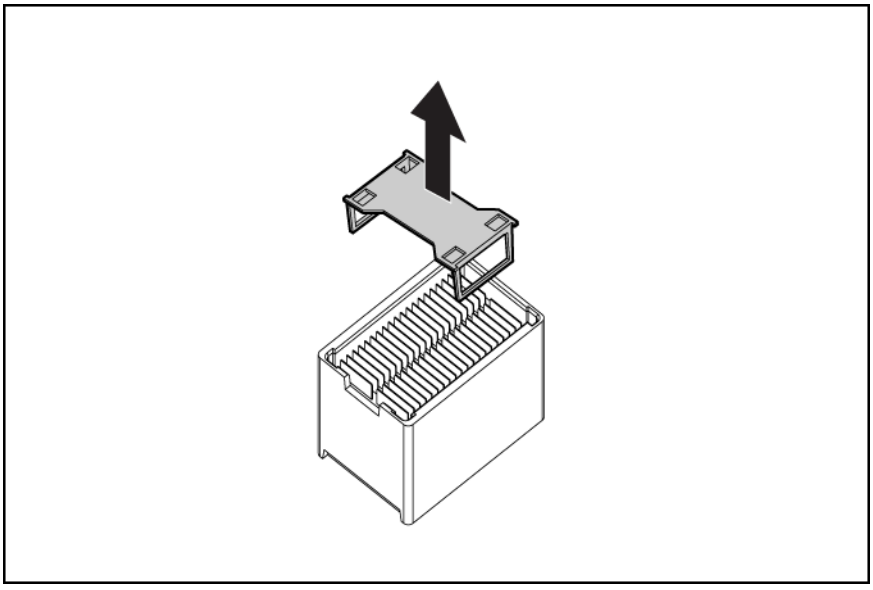
Optional mezzanine cards are classified as Type I mezzanine cards and Type II mezzanine cards. The card type determines where it can be installed in the server blade:

- Install Type I mezzanine cards on any mezzanine connector.
- Install Type II mezzanine cards only on Mezzanine 2 connector or Mezzanine 3 connector.

To install the component:

1. Power down the server blade (on page 15).
2. Remove the server blade (on page 16).
3. Remove the access panel (on page 17).

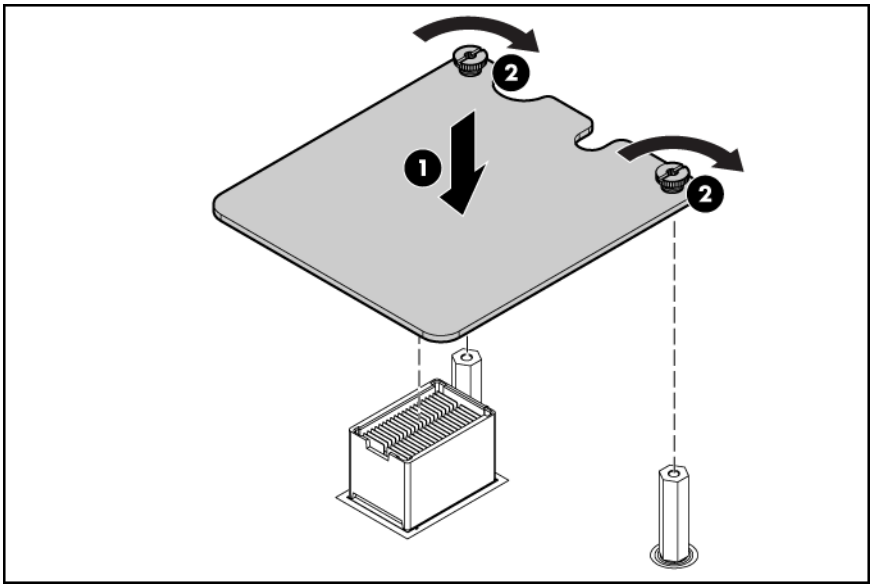
4. Remove the mezzanine connector cover.



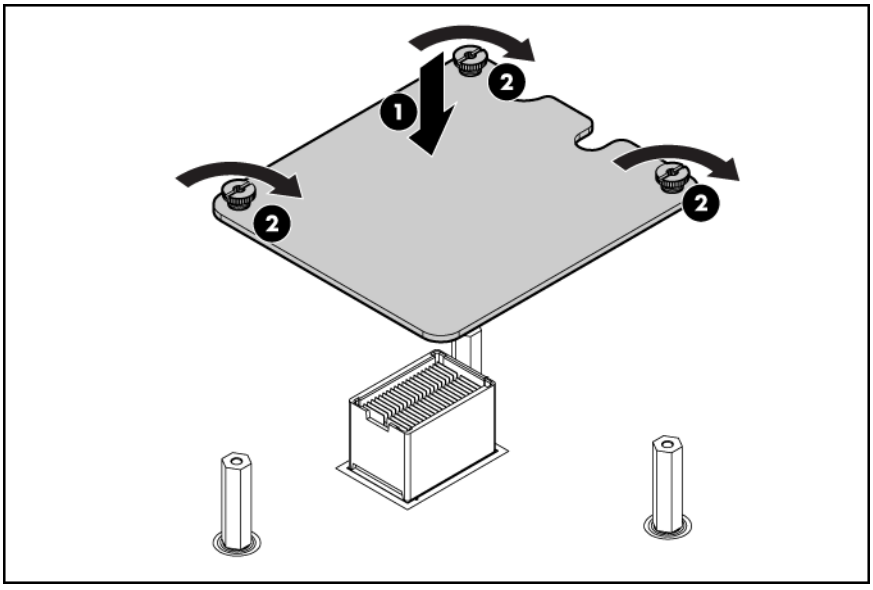
5. Align the mezzanine connector on the option card with the mezzanine connector on the system board.

> **CAUTION:** To prevent damage to the server blade, apply pressure over the mezzanine connector when installing the mezzanine card. Do not apply pressure to the edges of the card.

6. Install the mezzanine card. Press down on the connector to seat the card:
   - Mezzanine 1 and 2



- Mezzanine 3



7. Install the access panel (on page 17).
8. Install the server blade ("Installing a server blade" on page 29, "Remove the server blade" on page 16).
9. Power up the server blade (on page 15).

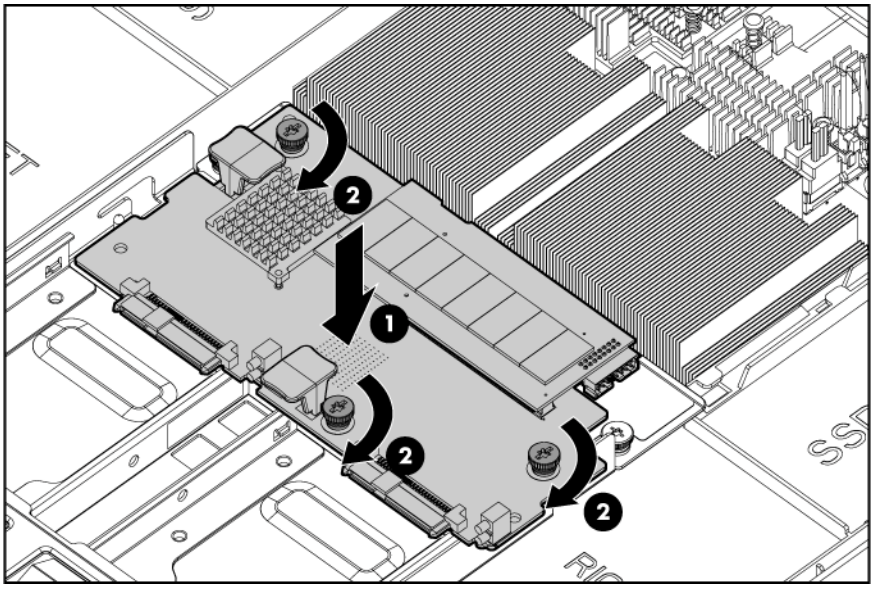
SAS controller option

IMPORTANT: Installation of SATA SSD drives and hot-plug SAS drives at the same time is not a supported configuration in this server blade.

To install the controller:

1. Power down the server blade (on page 15).
2. Remove the server blade (on page 16).
3. Remove the access panel (on page 17).

4. Install the SAS controller.



5. Install the access panel (on page 17).
6. Remove hard drive blanks, as needed.
7. Install the hot-plug SAS hard drives ("Hot-plug SAS or SATA hard drive option" on page 44).
8. Install the server blade ("Installing a server blade" on page 29, "Remove the server blade" on page 16).
9. Power up the server blade (on page 15).

Hot-plug SAS or SATA hard drive option

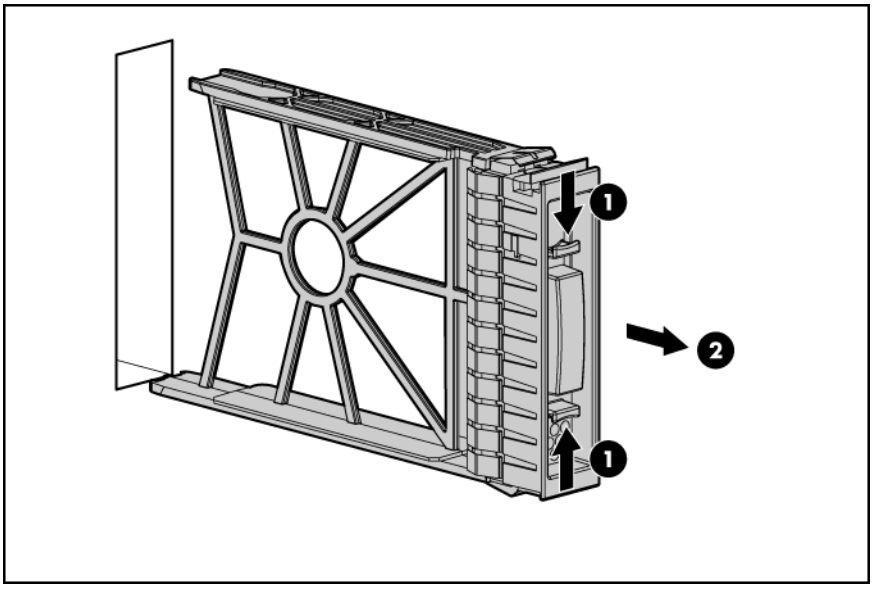
The server blade supports up to two hot-plug SAS or SATA drives. Installation of the SAS controller option is also required.

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

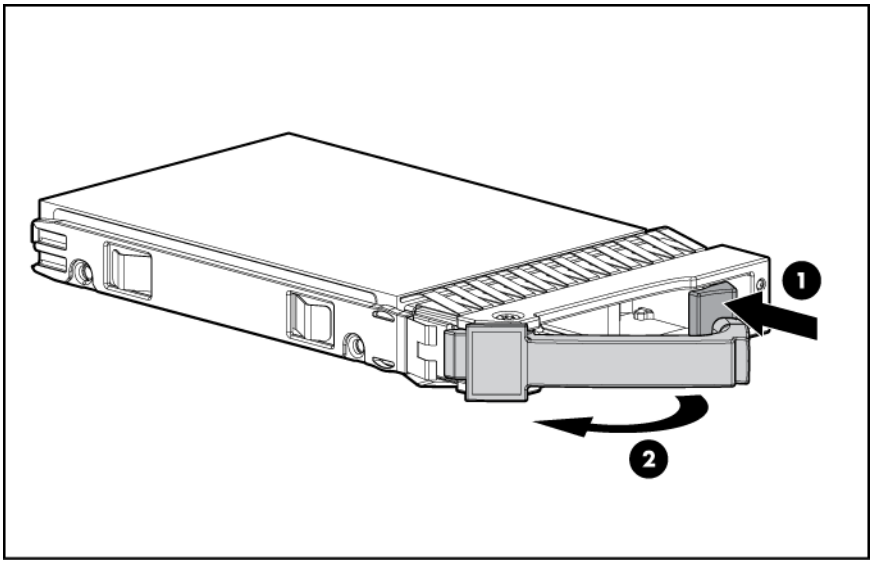
IMPORTANT: Installation of SATA SSD drives and hot-plug SAS drives at the same time is not a supported configuration in this server blade.

To install the component:

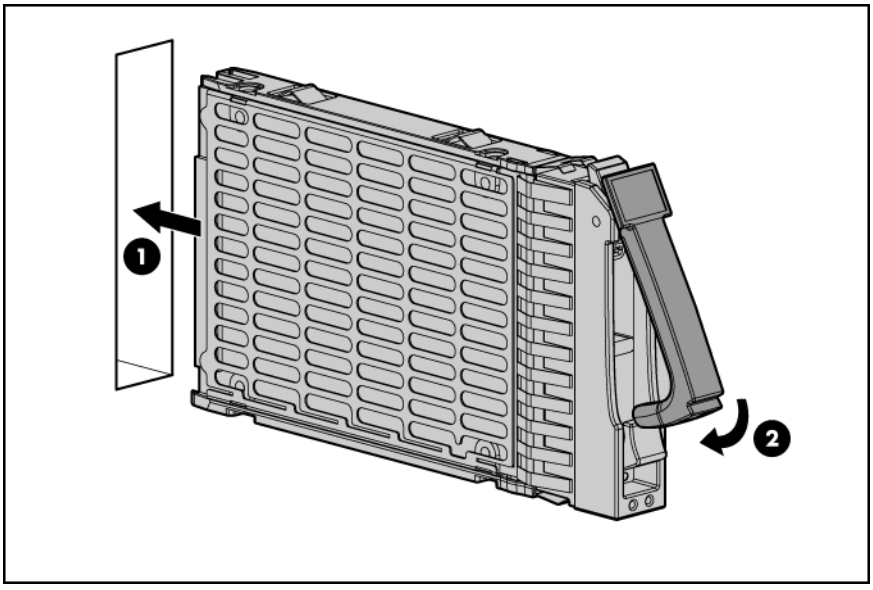
1. Remove the hard drive blank.



2. Prepare the hard drive.



3. Install the hard drive.



4. Determine the status of the hard drive from the hot-plug hard drive LEDs ("SAS and SATA hard drive LEDs" on page 8).
5. Resume normal server blade operations.

BBWC battery option

The battery pack option can be installed for a cache module located on the optional SAS controller module or for a cache module installed on an optional mezzanine card controller.

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

CAUTION: After the server blade is powered down, wait 15 seconds and then check the amber LED before removing the battery from the cache module. If the amber LED flashes after 15 seconds, do not remove the battery from the cache module. The cache module is backing up data, and data is lost if the battery is detached before the LED is extinguished.

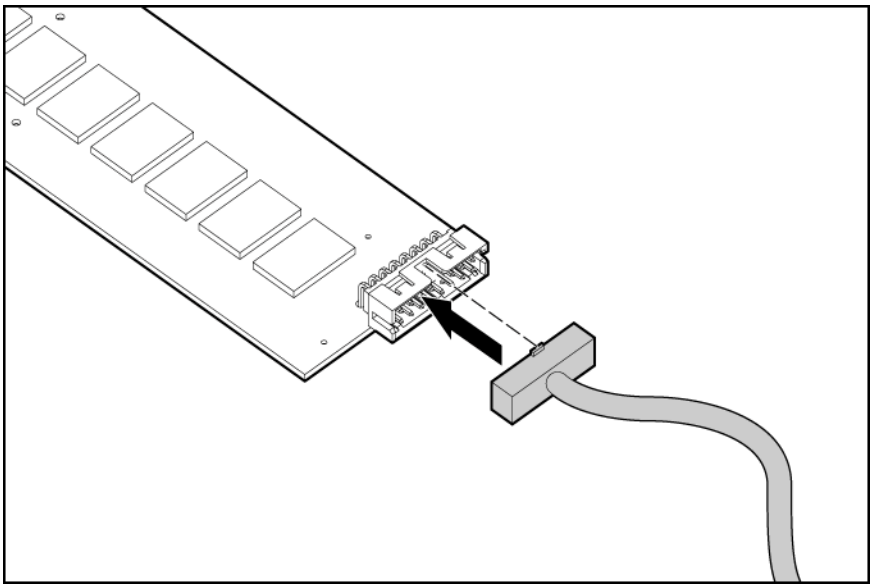
IMPORTANT: The battery pack might have a low charge when installed. In this case, a POST error message is displayed when the server blade is powered up, indicating that the battery pack is temporarily disabled. No action is necessary on your part. The internal circuitry automatically recharges the batteries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

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

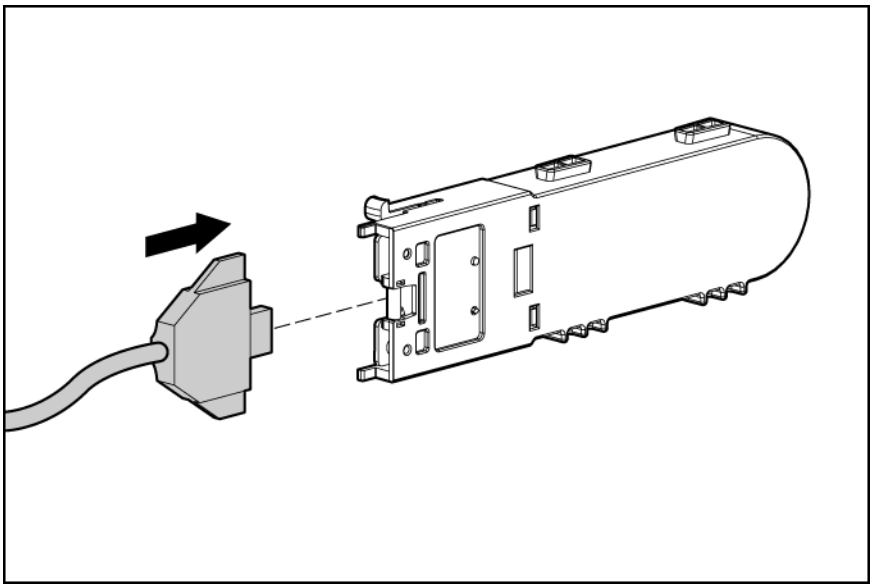
To install the battery pack:

1. Power down the server blade (on page 15).

2. Remove the server blade (on page 16).
3. Remove the access panel (on page 17).
4. Connect the battery cable to the cache module.

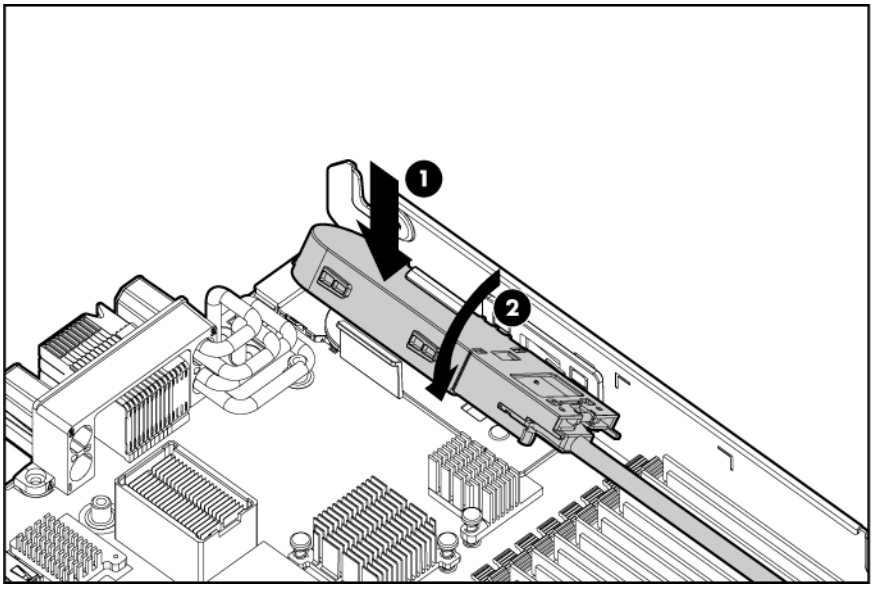


5. Connect the battery cable to the battery pack.

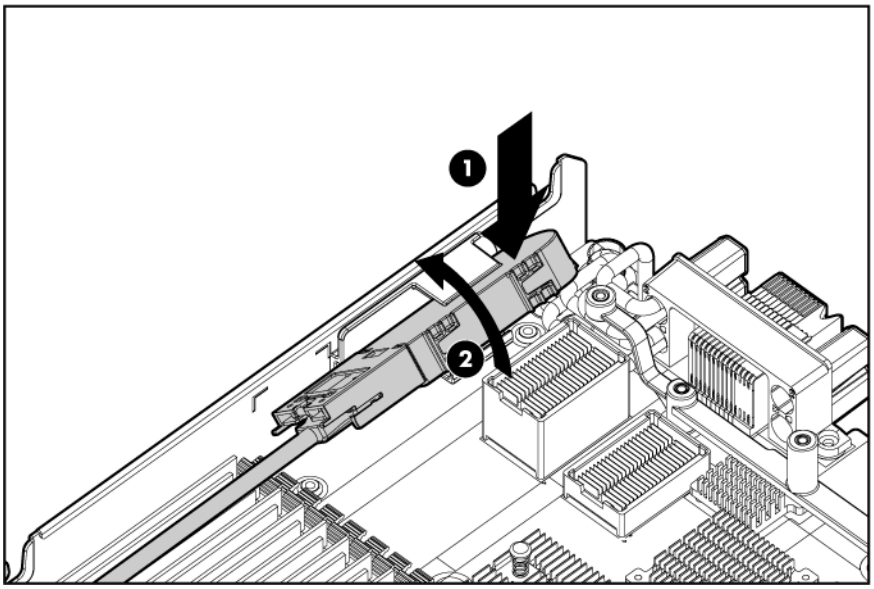


6. Install the battery pack in the battery holder:

- Hot-plug SAS controller option



- Mezzanine card controller option



7. Install the access panel (on page 17).
8. Install the server blade ("Installing a server blade" on page 29, "Remove the server blade" on page 16).
9. Power up the server blade (on page 15).

HP Trusted Platform Module option

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 (on page 49).
2. Retaining the recovery key/password (on page 50).
3. Enabling the Trusted Platform Module (on page 51).

Enabling the TPM requires accessing the ROM-Based Setup Utility (RBSU) ("HP ROM-Based Setup Utility" on page 63). For more information about RBSU, see the HP website (http://www.hp.com/support/smartstart/documentation).

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.

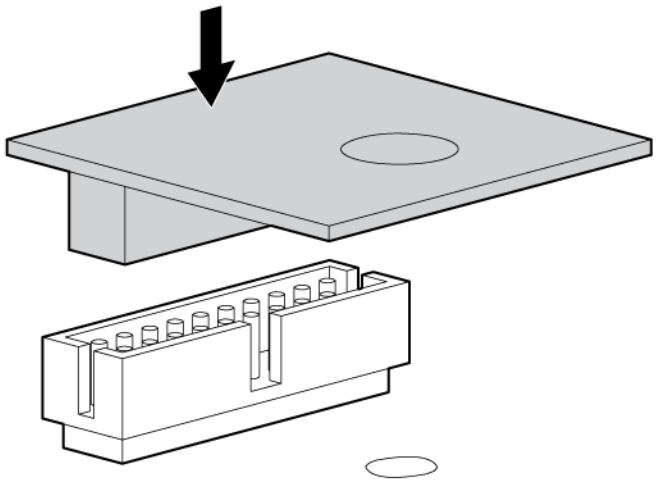
Installing the Trusted Platform Module board

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

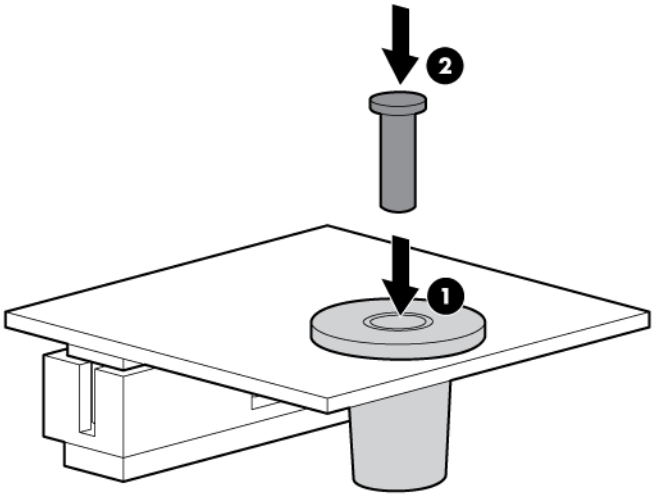
1. Power down the server blade (on page 15).
2. Remove the server blade (on page 16).
3. Place the server blade on a flat, level work surface.
4. Remove the access panel (on page 17).

> **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.

5. Install the TPM board. Press down on the connector to seat the board ("System board components" on page 10).



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



7. Install the access panel (on page 17).
8. Install the server blade ("Installing a server blade" on page 29, "Remove the server blade" on page 16).
9. Power up the server blade (on page 15).

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.

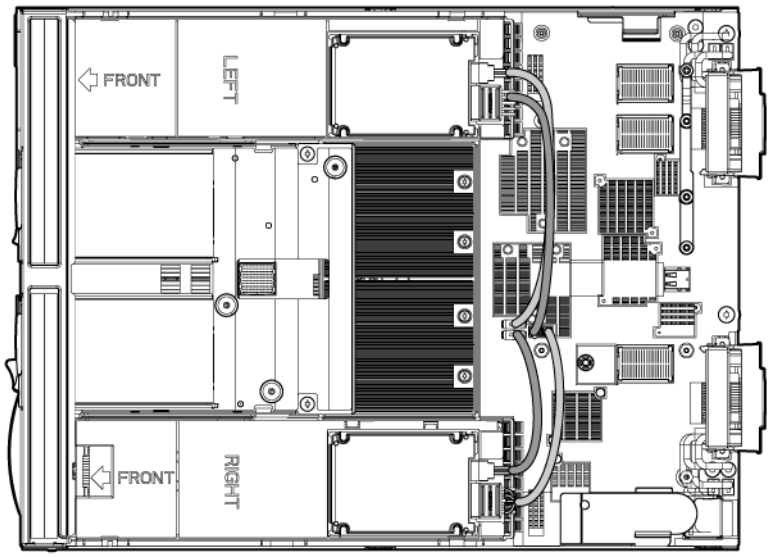
> △ **CAUTION:** When a TPM is installed and enabled on the server blade, data access is locked if you fail to follow the proper procedures for updating the system or option firmware, replacing the system board, replacing a hard drive, or modifying OS application TPM settings.

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).

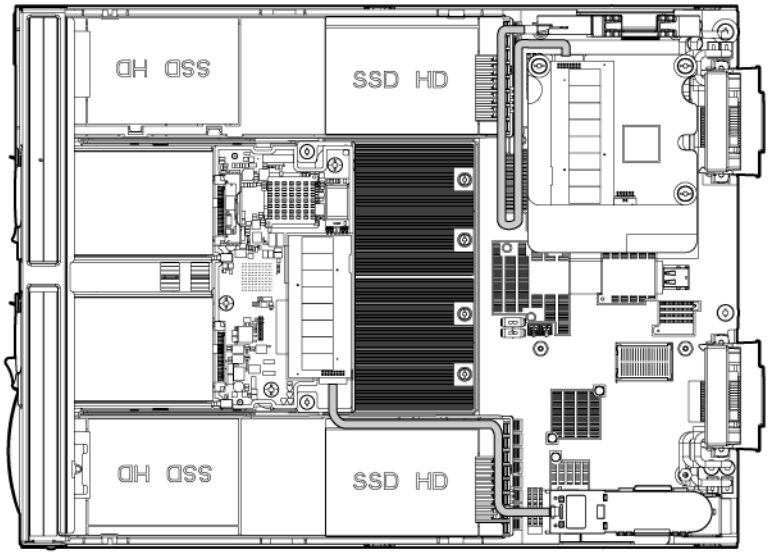
For more information on adjusting TPM usage in BitLocker™, see the Microsoft website (http://technet.microsoft.com/en-us/windowsvista/aa905065.aspx).

Cabling

SSD cable routing



Cache module battery 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 14)."

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
- USB diskette drive

Numerous configurations are possible. This section offers two possible configurations. For more information, see "USB support and functionality (on page 70)."

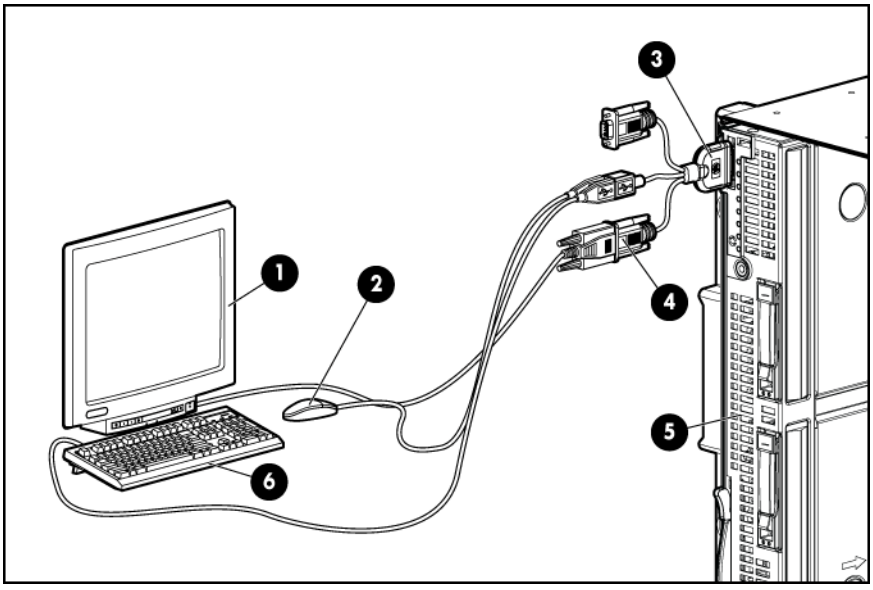
Accessing a server blade with local KVM

△ **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.

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

1. Connect the 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.



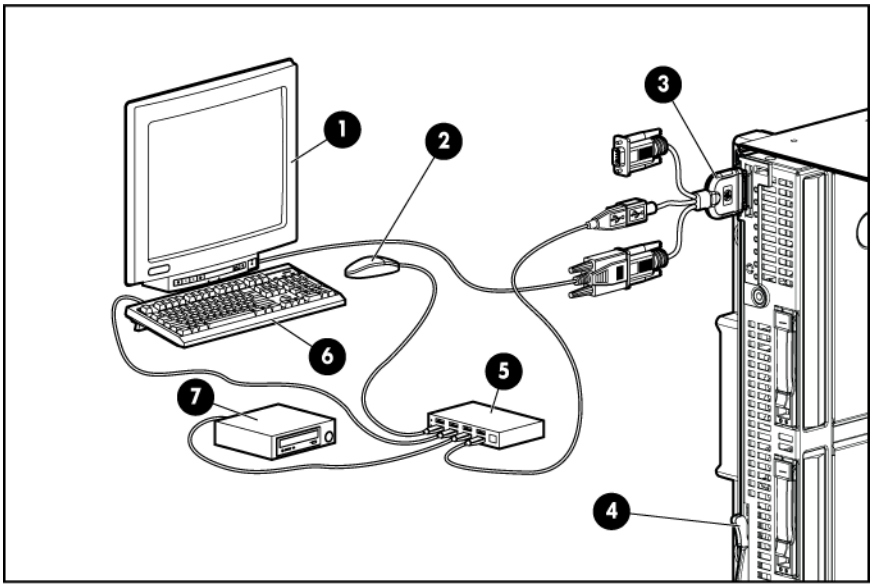
Item	Description
1	Monitor
2	USB mouse
3	HP c-Class Blade SUV Cable
4	Video connector
5	Server blade
6	USB keyboard

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 or a USB diskette.

1. Connect the 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
   - USB diskette drive

NOTE: Use a USB hub when connecting a USB diskette drive and/or USB CD-ROM drive to the server blade. The USB hub provides additional connections.



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

Software and configuration utilities

Server blade deployment tools

RBSU requirement for Linux deployment

To properly install some versions of the Linux x64 operating system, the Linux x64 HPET Workaround selection in RBSU must be enabled. If this step is not performed, a kernel panic can occur during boot. The following operating systems are affected:

- Red Hat Enterprise Linux 4 Update 3 x86_64
- Red Hat Enterprise Linux 4 Update 4 x86_64
- SUSE SLES9 SP3 x86_64

To avoid the kernel panic issue with these operating systems, perform the following steps:

1. Access RBSU ("Using RBSU" on page 63).
2. Select the Advanced Options menu.
3. Set the Linux x64 HPET Workaround selection to Enabled.
4. Save the changes and exit the utility.

HP is working with Linux providers to address this problem in future revisions of these operating systems. This option may not be required with newer revisions of Red Hat Enterprise Linux or SUSE Linux Enterprise Server.

Software drivers and additional components

HP offers the following additional software components for server blades:

- Health and Wellness driver and IML viewer
- iLO 2 Management interface driver
- Rack infrastructure interface service

For Microsoft® Windows® OS users, these items are included in the HP ProLiant iLO 2 Standard Blade Edition, available from the HP website (http://www.hp.com/servers/lights-out).

Linux OS users can download these components from the HP website (http://www.hp.com/products/servers/linux).

For information on how to use these components with a Linux OS, see the HP website (http://h18000.www1.hp.com/products/servers/linux/documentation.html).

HP BladeSystem c-Class Advanced management

iLO 2 is a standard component of ProLiant c-Class server blades that provides server health and remote server blade manageability. Its features are accessed from a network client device using a supported web browser. In addition to other features, iLO 2 provides keyboard, mouse, and video (text and graphics) capability for a server blade, regardless of the state of the host OS or host server blade.

iLO 2 includes an intelligent microprocessor, secure memory, and a dedicated network interface. This design makes iLO 2 independent of the host server blade and its OS. iLO 2 provides remote access to any authorized network client, sends alerts, and provides other server blade management functions.

Using a supported web browser, you can:

- Remotely access the console of the host server blade, including all text mode and graphics mode screens with full keyboard and mouse controls.
- Remotely power up, power down, or reboot the host server blade.
- Remotely boot a host server blade to a virtual media image to perform a ROM upgrade or install an OS.
- Send alerts from iLO 2 regardless of the state of the host server blade.
- Access advanced troubleshooting features provided by iLO 2.
- Launch a web browser, use SNMP alerting, and diagnose the server blade with HP SIM.
- Configure static IP bay settings for the dedicated iLO 2 management NICs on each server blade in an enclosure for faster deployment.

To connect to the server blade using iLO 2, install the server blade in an enclosure. Onboard Administrator assigns an IP address to enable iLO 2 connectivity to the server blade.

The c-Class tab enables you to control specific settings for the HP BladeSystem. iLO 2 also provides web-based status for the HP BladeSystem configuration.

For detailed information about iLO 2, refer to the *HP Integrated Lights-Out User Guide* on the HP website (http://www.hp.com/servers/lights-out).

Network-based PXE deployment

PXE is a component of the Intel® WfM specification. The PXE model enables server blades to load and execute an NBP from a PXE server and to execute a pre-configured image. The image can be an OS image created by software utilities or a boot diskette image. This feature enables a user to configure a server blade and install an OS over a network.

Deployment overview

When a PXE-enabled target server blade boots, it obtains an IP address from a DHCP server. The target server blade obtains the name of the NBP from the appropriate boot server. Then, the target server blade uses TFTP to download the NBP from the boot server and executes the image.

IMPORTANT: To connect to a network with a Pass-Thru module, always connect the Pass-Thru module to a network device that supports Gigabit speed.

For each server blade being deployed, the PXE server must be connected to the NIC designated for PXE. The server blade defaults PXE functions to NIC 1, but any of the NC series NICs in the server blade can

be designated for PXE in RBSU. For NIC connector locations, refer to the documentation included with the server blade.

NOTE: Actual NIC numeration depends on several factors, including the OS installed on the server blade.

To deploy an OS to multiple server blades, install a PXE deployment server on a network.

Deployment infrastructure

IMPORTANT: To connect to a network with a Pass-Thru module, always connect the Pass-Thru module to a network device that supports Gigabit speed.

To establish a network-based PXE deployment infrastructure, provide the following software and minimum hardware:

- Client PC (administrative workstation)
  - AMD Athlon™ XP processor (700 MHz or greater recommended), AMD Athlon™ 64 processor, or Intel® Pentium® III or higher processor (700 MHz or greater recommended)
  - 128 MB of RAM
  - Microsoft® Windows® 2000 Professional or Microsoft® Windows® XP OS
  - Microsoft® Internet Explorer 5.5 or above with 128-bit encryption
  - Ethernet NIC with 10/100 RJ-45 connector
  - TCP/IP networking and an IP address compatible with one of the following: the iLO 2 Diagnostic Port IP address or an assigned DHCP or static IP address
  - CD-ROM drive, CD/DVD-ROM drive, and/or diskette drive
  - Any of the following Java™ Runtime Environment versions:

    1.3.1_02

    1.3.1_07

    1.3.1_08

    1.4.1 for Windows® users only

    1.4.2 for Linux users only

    Access the Java™ Runtime Environment versions at the HP website (http://java.sun.com/products/archive/index.html).
- DHCP server (IP address assignment)
  - AMD Athlon™ XP processor (700 MHz or greater recommended), AMD Athlon™ 64 processor, or Intel® Pentium® or Pentium® II 200-MHz or faster processor
  - 64 MB of RAM
  - 64 MB of free hard drive space
  - 10-Mb/s network adapter
- PXE deployment server (storing boot images)
  - AMD Athlon™ XP processor (700 MHz or greater recommended), AMD Athlon™ 64 processor, or Intel® Pentium® III or higher processor (500 MHz recommended)
  - 256 MB of RAM

- 10-Mb/s network adapter
- CD-ROM drive

- Windows® repository server (Windows® or Linux deployment)
  - Windows® 2000 or Windows Server® 2003 OS installed
  - Network connection
  - CD-ROM drive
  - 1.5 GB of available disk space
  - TCP/IP networking and an IP address compatible with one of the following: the iLO 2 Diagnostic Port IP address or an assigned DHCP or static IP address
  - CD-ROM drive and/or diskette drive
  - Any of the following Java™ Runtime Environment versions:

    1.3.1_02

    1.3.1_07

    1.3.1_08

    1.4.1 for Windows® users only

    1.4.2 for Linux users only

    Access the Java™ Runtime Environment versions at the HP website (http://java.sun.com/products/archive/index.html).
- Network server with an OS installed

Deployment methods

Three primary deployment methods are supported:

IMPORTANT: To deploy a server blade without the RDP, create a bootable diskette or image of a bootable diskette.

- PXE deployment (on page 59)
- CD-ROM deployment (on page 60)
- Diskette image deployment (on page 61)

PXE deployment

PXE enables server blades to load an image over the network from a PXE server, and then execute it in memory. The first NIC on the server blade is the default PXE boot NIC, but any of the other NC series NICs can be configured to boot PXE. For more information, refer to "Network-based PXE deployment (on page 57)."

NOTE: Actual NIC numeration depends on several factors, including the OS installed on the server blade.

HP recommends using one of the following methods for PXE deployment:

- HP ProLiant Essentials RDP ("HP ProLiant Essentials Rapid Deployment Pack" on page 60)
- SmartStart Scripting Toolkit (on page 60)

A number of third-party PXE deployment tools are available for Windows® and Linux. For additional information, refer to the HP website (ftp://ftp.compaq.com/pub/products/servers/management/pxe_wp.pdf).

HP ProLiant Essentials Rapid Deployment Pack

NOTE: To deploy server blades in an existing server blade enclosure, always use the most recent version of RDP available at the HP website (http://www.hp.com/servers/rdp).

The RDP software is the preferred method for rapid, high-volume server deployments. The RDP software integrates two powerful products: Altiris Deployment Solution and the HP ProLiant Integration Module.

The intuitive graphical user interface of the Altiris Deployment Solution console provides simplified point-and-click and drag-and-drop operations that enable you to deploy target servers, including server blades, remotely. It enables you to perform imaging or scripting functions and maintain software images.

For more information about the RDP, refer to the HP ProLiant Essentials Rapid Deployment Pack CD or refer to the HP website (http://www.hp.com/servers/rdp).

SmartStart Scripting Toolkit

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

Using SmartStart technology, 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 server deployed, making it possible to scale server deployments to high volumes in a rapid manner.

For more information, and to download the SmartStart Scripting Toolkit, refer to the HP website (http://www.hp.com/servers/sstoolkit).

CD-ROM deployment

CD-ROM deployment involves using a bootable CD that executes scripts to configure the hardware and install the OS. After the OS is configured, the server blade can access the network to locate the scripts and files necessary for deployment. Before beginning the deployment process, connect the server blade to the network.

NOTE: For more information about hardware and cabling configurations, see the documents that ship with the enclosure.

Two methods are available for CD-ROM deployment:

- iLO virtual CD-ROM (on page 60)
- USB CD-ROM (on page 61)

iLO virtual CD-ROM

To deploy with a boot CD:

1. Do one of the following:
   - Insert the boot CD into the client PC that is using the iLO 2 Remote Console.

- Use iLO 2 to create an image file of the boot CD.
- Copy the image of the boot CD to a location on the network or the client PC hard drive.

2. Remotely access the server blade through iLO 2. Refer to "HP BladeSystem c-Class advanced management (on page 57)."
3. Click the **Virtual Devices** tab.
4. Select **Virtual Media**.
5. Use the Virtual Media applet to select the local CD or image file and connect the Virtual CD to the server blade.
6. Use the iLO 2 Virtual Power Button feature to reboot the server blade.
7. After the server blade boots, follow the normal network installation procedure for the OS.

USB CD-ROM

This method uses SmartStart to facilitate loading the OS. However, SmartStart also allows for manual loading of the OS and drivers.

To deploy with a boot CD:

1. Use the local I/O cable to connect a USB CD-ROM drive to the server blade. Refer to "Connecting locally to a server blade with video and USB devices (on page 53)."
2. Insert the boot CD into the USB CD-ROM drive.
3. Reboot the server blade.
4. After the server blade boots, follow the normal installation procedure for an OS.

Windows Server® 2003 cannot be installed from a USB CD-ROM on the I/O cable if the hard drive is completely blank (no partitions defined). To install Windows Server® 2003, use one of the following methods:

- Make a partition on the hard drive that Windows Server® 2003 will be loaded on.
- Use the SmartStart CD 7.60 or later.
- Use the Rapid Deployment Pack. For instructions, see the HP website (http://h18013.www1.hp.com/products/servers/management/rdp.html?jumpid=reg_R1002_USEN).

Diskette image deployment

To deploy with a diskette image, the user creates a DOS-based network-enabled boot diskette that executes a script that configures the hardware and installs the OS. The diskette enables the server blade to access the required deployment scripts and files on the network.

This method implies a deployment infrastructure that may include an administrator workstation, PXE server, Microsoft® Windows® file share, or a Linux file share. For more information, refer to "Deployment infrastructure (on page 58)."

Before beginning the deployment process, connect the server blade to the network.

NOTE: For more information about hardware and cabling configurations, see the documents that ship with the enclosure.

Two methods are available for diskette image deployment:

- iLO virtual floppy (on page 62)
- PXE ("PXE deployment" on page 59)

iLO virtual floppy

To deploy with a boot diskette:

1. Do one of the following:
   - Insert the boot diskette into the client PC that is using the iLO 2 Remote Console.
   - Use iLO 2 to create an image file of the boot diskette.
   - Copy the image of the boot diskette to a location on the network or the client PC hard drive.
2. Remotely access the server blade through iLO 2. Refer to "HP BladeSystem c-Class advanced management (on page 57)."
3. Click the **Virtual Devices** tab.
4. Select **Virtual Media**.
5. Use the Virtual Media applet to select the local diskette or image file and connect the Virtual CD to the server blade.
6. Use the iLO 2 Virtual Power Button feature to reboot the server blade.
7. After the server blade boots, follow the normal network installation procedure for the OS.

Creating a boot diskette

The SmartStart Scripting Toolkit provides the tools and information for creating a boot diskette. For details, refer to the *SmartStart Scripting Toolkit User Guide* and download the latest version of the software from the HP website (http://www.hp.com/servers/sstoolkit).

As an alternative method, configure the hardware manually with RBSU and the iLO 2 remote console. With this method, the disk is more generic and integrates with an existing network OS installation process. For more information, refer to "HP BladeSystem c-Class advanced management (on page 57)."

To operate properly, the server blade must have a supported OS. For the latest information on a supported OS, refer to the HP website (http://www.hp.com/go/supportos).

Configuration tools

SmartStart software

SmartStart is a collection of software that optimizes single-server setup, providing a simple and consistent way to deploy server configuration. SmartStart has been tested on many ProLiant server products, resulting in proven, reliable configurations.

SmartStart assists the deployment process by performing a wide range of configuration activities, including:

- Configuring hardware using embedded configuration utilities, such as RBSU and ORCA
- Preparing the system for installing "off-the-shelf" versions of leading operating system software
- Installing optimized server drivers, management agents, and utilities automatically with every assisted installation

- Testing server hardware using the Insight Diagnostics Utility ("HP Insight Diagnostics" on page 71)
- Installing software drivers directly from the CD. With systems that have internet connection, the SmartStart Autorun Menu provides access to a complete list of ProLiant system software.
- Enabling access to the Array Configuration Utility (on page 64), Array Diagnostic Utility (on page 72), and Erase Utility (on page 66)

SmartStart is included in the HP ProLiant Essentials Foundation Pack. For more information about SmartStart software, refer to the HP ProLiant Essentials Foundation Pack or the HP website (http://h18013.www1.hp.com/products/servers/management/smartstart/index.html).

HP ROM-Based Setup Utility

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

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

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

Using RBSU

To use RBSU, use the following keys:

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

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

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

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

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

Auto-configuration process

The auto-configuration process automatically runs when you boot the server for the first time. During the power-up sequence, the system ROM automatically configures the entire system without needing any

intervention. During this process, the ORCA utility, in most cases, automatically configures the array to a default setting based on the number of drives connected to the server.

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

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

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

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

By default, the auto-configuration process configures the system for the English language. To change any default settings in the auto-configuration process (such as the settings for language, operating system, and primary boot controller), execute RBSU by pressing the **F9** key when prompted. After the settings are selected, exit RBSU and allow the server to reboot automatically.

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

Boot options

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

- Access RBSU by pressing the **F9** key.
- Access the System Maintenance Menu (which enables you to launch ROM-based Diagnostics or Inspect) by pressing the **F10** key.
- Force a PXE Network boot by pressing the **F12** key.

BIOS Serial Console

BIOS Serial Console allows you to configure the serial port to view POST error messages and run RBSU remotely through a serial connection to the server COM port. The server that you are remotely configuring does not require a keyboard and mouse.

For more information about BIOS Serial Console, see the *BIOS Serial Console User Guide* on the Documentation CD or the HP website (http://www.hp.com/support/smartstart/documentation).

Array Configuration Utility

ACU is a browser-based utility with the following features:

- Runs as a local application or remote service

- Supports online array capacity expansion, logical drive extension, assignment of online spares, and RAID or stripe size migration
- Suggests the optimum configuration for an unconfigured system
- Provides different operating modes, enabling faster configuration or greater control over the configuration options
- Remains available any time that the server is on
- Displays on-screen tips for individual steps of a configuration procedure

For optimum performance, the minimum display settings are 800 × 600 resolution and 256 colors. Servers running Microsoft® operating systems require Internet Explorer 5.5 (with Service Pack 1) or later. For Linux servers, refer to the README.TXT file for additional browser and support information.

For more information, refer to the *Configuring Arrays on HP Smart Array Controllers Reference Guide* on the Documentation CD or the HP website (http://www.hp.com).

Option ROM Configuration for Arrays

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

The utility also provides support for the following functions:

- Reconfiguring one or more logical drives
- Viewing the current logical drive configuration
- Deleting a logical drive configuration
- Setting the controller to be the boot controller

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

For more information regarding array controller configuration, refer to the controller user guide.

For more information regarding the default configurations that ORCA uses, refer to the *HP ROM-Based Setup Utility User Guide* on the Documentation CD.

Re-entering the server serial number and product ID

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

1. During the server startup sequence, press the **F9** key to access RBSU.
2. Select the **System Options** menu.
3. Select **Serial Number**. The following warning is displayed:

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

4. Press the **Enter** key to clear the warning.
5. Enter the serial number and press the **Enter** key.
6. Select **Product ID**.
7. Enter the product ID and press the **Enter** key.
8. Press the **Esc** key to close the menu.

9. Press the **Esc** key to exit RBSU.
10. Press the **F10** key to confirm exiting RBSU. The server will automatically reboot.

Management tools

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 or shutdown. At the same time, the HP SIM console notifies you by sending a message to a designated pager number that ASR has restarted the system. You can disable ASR from the HP SIM console or through RBSU.

ROMPaq utility

The ROMPaq utility enables you to upgrade the system firmware (BIOS) or Lights-Out 100 firmware. To upgrade the firmware, insert a ROMPaq diskette into the diskette drive or ROMPaq USB Key into an available USB port and boot the system.

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

For more information about the ROMPaq utility, see the HP website (http://www.hp.com/go/support).

iLO 2 Standard Blade Edition technology

The iLO 2 subsystem is a standard component of selected ProLiant servers that provides server health and remote server manageability. The iLO 2 subsystem includes an intelligent microprocessor, secure memory, and a dedicated network interface. This design makes iLO 2 independent of the host server and its operating system. The iLO 2 subsystem provides remote access to any authorized network client, sends alerts, and provides other server management functions.

Using iLO 2, you can:

- Remotely power up, power down, or reboot the host server.
- Send alerts from iLO 2 regardless of the state of the host server.
- Access advanced troubleshooting features through the iLO 2 interface.
- Diagnose iLO 2 using HP SIM through a web browser and SNMP alerting.

For more information about iLO 2 features, refer to the iLO 2 documentation on the Documentation CD or on the HP website (http://www.hp.com/servers/lights-out).

Erase Utility

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

Run the Erase Utility if you must erase the system for the following reasons:

- You want to install a new operating system on a server with an existing operating system.
- You encounter an error when completing the steps of a factory-installed operating system installation.

The Erase Utility can be accessed from the **Maintenance Utilities** menu of the SmartStart CD ("SmartStart software" on page 62).

StorageWorks library and tape tools

HP StorageWorks L&TT provides functionality for firmware downloads, verification of device operation, maintenance procedures, failure analysis, corrective service actions, and some utility functions. It also provides seamless integration with HP hardware support by generating and emailing support tickets that deliver a snapshot of the storage system.

For more information, and to download the utility, refer to the StorageWorks L&TT website (http://h18006.www1.hp.com/products/storageworks/ltt).

HP Systems Insight Manager

HP SIM is a web-based application that allows system administrators to accomplish normal administrative tasks from any remote location, using a web browser. HP SIM provides device management capabilities that consolidate and integrate management data from HP and third-party devices.

IMPORTANT: You must install and use HP SIM to benefit from the Pre-Failure Warranty for processors, SAS and SATA hard drives, and memory modules.

For additional information, refer to the Management CD in the HP ProLiant Essentials Foundation Pack or the HP SIM website (http://www.hp.com/go/hpsim).

Management Agents

Management Agents provide the information to enable fault, performance, and configuration management. The agents allow easy manageability of the server through HP SIM software, and third-party SNMP management platforms. Management Agents are installed with every SmartStart assisted installation or can be installed through the HP PSP. The Systems Management homepage provides status and direct access to in-depth subsystem information by accessing data reported through the Management Agents. For additional information, refer to the Management CD in the HP ProLiant Essentials Foundation Pack or the HP website (http://www.hp.com/servers/manage).

HP ProLiant Essentials Virtualization Management Software

The ProLiant Essentials Virtual Machine Management Pack and ProLiant Essentials Server Migration Pack plug-ins extend HP Systems Insight Manager capabilities to manage virtual machines.

The Virtual Machine Management Pack provides the following functionality:

- Central management and control of VMware® and Microsoft® virtual machines with physical host to virtual machine association
- Easy identification of VMs or host servers reaching high CPU, memory, or disk utilization levels
- Highly flexible move capabilities that enable live moves and moves to dissimilar host resources
- Back up, template, and alternate host capabilities that enable restoration of VMs on any available host

The Server Migration Pack automates the manual processes required for migrating servers between physical or virtual platforms (P2V, V2P, and V2V), enabling easy migration to appropriate physical or virtual platforms that meet performance and capacity requirements.

For more information about virtualization management software, see the HP website (http://www.hp.com/go/vmmanage).

HP ProLiant Essentials Vulnerability and Patch Management Pack

The HP ProLiant Essentials Vulnerability and Patch Management Pack software extends the functionality of HP Systems Insight Manager (HP SIM) to provide vulnerability and patch management for target systems.

The Vulnerability and Patch Management Pack is an all-in-one vulnerability assessment and patch management tool. It enables you to gain the upper hand in the war against hackers, worms, and Trojan software that exploit software security vulnerabilities by:

- Enhancing system lifecycle management by incorporating vulnerability assessment and patching as integral parts of the system management process.
- Accelerating resolution of vulnerabilities by reducing the research time to understand the criticality of the vulnerability and the expected behavior for patches and fixes.
- Reducing the risk of security threats by automating the acquisition, scheduling the deployment, and ensuring that the patches remain in place continuously enforcing the persistence (desired state) of patches.

The Vulnerability and Patch Management Pack and HP SIM can be installed on a single server (referred to as a shared configuration) or on a separate server (referred to as a distributed configuration).

The Vulnerability and Patch Management Pack is included on the *Insight Control Data Center Edition* DVD. For more information, see the *HP ProLiant Essentials Vulnerability and Patch Management Pack User Guide*, or the HP website (http://www.hp.com).

HP Insight Server Migration software for ProLiant

The HP Insight Server Migration software for ProLiant (SMP) enables administrators to upgrade or replace an existing server blade through server migration. SMP provides an automated, accurate, and affordable method of migrating existing server blades and their content to the latest server technologies.

SMP automates the migration of the operating system, applications, and data from one server blade to another without errors, eliminating the need for manual redeployment of these elements on the new server blade. During the migration process, the software automatically loads new drivers, required for boot, on the destination server blade. The wizard-based user interface simplifies the migration process and requires little experience or training.

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

HP ProLiant Essentials Performance Management Pack

HP ProLiant Essentials Performance Management Pack (PMP) is an integrated performance management solution that detects and analyzes hardware bottlenecks on HP ProLiant servers, select HP Integrity servers and MSA500/MSA1000/MSA1500 shared storage devices.

PMP provides the tools you need to receive proactive notification of building bottlenecks, and debug existing performance issues. PMP is automatically installed with HP Systems Insight Manager (HP SIM) and is integrated with HP SIM. No software installation on the monitored servers is required, other than the Insight Management Agents. PMP analyzes performance information to determine if there is a building or existing restriction. You can display this information interactively, log the information to a database for later analysis or reporting, and set up proactive notification using the HP Systems Insight Manager notification mechanism.

For more information on HP ProLiant Essentials Performance Management Pack, see the documentation available on the HP website (http://www.hp.com/products/pmp).

HP Insight Control Environment Suites

HP Insight Control Environment and Insight Control Environment for BladeSystem are integrated suites of software that simplify the management of HP infrastructures.

The HP Insight Control Environment suites are licensing options for HP infrastructure management software delivered on the Insight Control Management DVD. HP Insight Control Environment provides comprehensive management for ProLiant ML/DL customers, while HP Insight Control Environment for BladeSystem provides additional functionality for HP BladeSystem environments.

Using an integrated, wizard-based installer, Insight Control Environment suites install and configure HP Systems Insight Manager (HP SIM) and HP ProLiant Essentials management software rapidly and consistently. Once installed, Insight Control Environment suites deliver enhanced infrastructure stability by improving control over IT assets, increasing responsiveness to business needs through flexible deployment and optimization of compute resources, and providing tangible savings through improved IT staff efficiency.

The software installed by Insight Control Environment suites delivers core management functionality for HP ProLiant server and HP BladeSystem lifecycles, including:

- Rapid server deployment
- Health and performance monitoring
- Comprehensive remote control
- Vulnerability scanning and patch management
- Power and thermal measurement, reporting, capping, and regulation
- Integrated management of virtual and physical infrastructure
- Third-party device management

For more information about Insight Control Environment suites, see the HP website (http://www.hp.com/go/ice).

HP Insight Control Linux Edition

HP Insight Control Linux Edition is an all-in-one software package that provides Linux-based management and deployment capabilities for the HP BladeSystem and its c-Class and p-Class ProLiant server blades.

Built on Linux, the software includes an easy-to-use interface customized for blades and optimized for Linux users. HP Insight Control Linux Edition enables operating system deployment with both standard installation and image-based technologies.

For more information about HP Insight Control Linux Edition, see the HP website (http://www.hp.com/go/icle).

Redundant ROM support

The server enables you to upgrade or configure the ROM safely with redundant ROM support. The server has a 4-MB ROM that acts as two, separate 2-MB ROMs. In the standard implementation, one side of the ROM contains the current ROM program version, while the other side of the ROM contains a backup version.

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

Safety and security benefits

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

USB support and functionality

USB support

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

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

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

For more information on ProLiant USB support, see the HP website (http://h18004.www1.hp.com/products/servers/platforms/usb-support.html).

Internal USB functionality

An internal USB connector is available for use with security key devices and USB drive keys. This solution provides for use of a permanent USB key installed in the internal connector, avoiding issues of clearance on the front of the rack and physical access to secure data.

External USB functionality

HP provides external USB support to enable local connection of USB devices for server blade administration, configuration, and diagnostic procedures. For more information, see "Using the HP c-Class Blade SUV Cable (on page 53)."

For additional security, external USB functionality can be disabled through RBSU. Disabling external USB support in RBSU disables the USB connectors on the HP c-Class Blade SUV Cable.

Internal SD support

An internal SD connector is available for use with embedded Hypervisors. This solution provides for use of a permanently installed SD card in the internal connector, decreasing the possibility of tampering or loss.

Diagnostic tools

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, launch the SmartStart CD.

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, refer to the HP website (http://www.hp.com/servers/diags).

HP Insight Diagnostics survey functionality

HP Insight Diagnostics (on page 71) provides survey functionality that gathers critical hardware and software information on ProLiant server blades.

This functionality supports operating systems that may not be 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 SmartStart-assisted HP Insight Diagnostics installation, or it can be installed through the HP PSP ("ProLiant Support Packs" on page 73).

NOTE: The current version of SmartStart provides the memory spare part numbers for the server blade. To download the latest version, see the HP website (http://www.hp.com/support).

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 ("HP Systems Insight Manager" on page 67)
- From within operating system-specific IML viewers:
  - For NetWare: IML Viewer
  - For Windows®: IML Viewer
  - For Linux: IML Viewer Application
- From within the iLO 2 user interface
- From within HP Insight Diagnostics (on page 71)
- From within the Onboard Administrator GUI

  For more information, see the *HP BladeSystem Onboard Administrator User Guide* on the HP website (http://www.hp.com/go/bladesystem/documentation).
- From the Onboard Administrator CLI

  See the *HP BladeSystem Onboard Administrator Command Line Interface User Guide* for information on accessing the CLI.

For more information, see the Management CD in the HP ProLiant Essentials Foundation Pack.

Array Diagnostic Utility

The HP Array Diagnostics Utility is a web-based application that creates a report of all HP storage controllers and disk drives. This report provides vital information to assist in identifying faults or conditions that may require attention. ADU can be accessed from the SmartStart CD ("SmartStart software" on page 62) or downloaded from the HP website (http://www.hp.com).

Remote support and analysis tools

HP Insight Remote Support software

HP Insight Remote Support software delivers secure remote support for your HP Servers and Storage, 24 X 7, so you can spend less time solving problems and more time focused on your business. You can have your systems remotely monitored for hardware failure using secure technology that has been proven at thousands of companies around the world. In many cases, you can avoid problems before they occur. There are two HP Insight Remote Support solutions:

- For small and midsize environments: HP Insight Remote Support Standard provides basic remote monitoring, notification/advisories and service dispatch. It is optimized for environments with 1 to

50 servers and can be installed on a shared HP ProLiant Windows application server. The software supports HP EVA storage devices, HP ProLiant, BladeSystems, HP Integrity and HP 9000 servers running Microsoft Windows, Red Hat Enterprise Linux, Novell SUSE and Novell Netware. Download from the HP website (http://h20392.www2.hp.com/portal/swdepot/displayProductInfo.do?productNumber=RSSWMBASE).

- For midsize and large environments: HP Insight Remote Support Pack (formerly Service Essentials Remote Support Pack) is targeted for larger environments and is integrated with HP Systems Insight Manager (SIM). It provides comprehensive remote monitoring, notification/advisories, dispatch and proactive service support for nearly all HP servers, storage, network and SAN environments, plus selected Dell and IBM Windows servers that have a support obligation with HP. It also enables HP to deliver higher levels of proactive support in line with HP Mission Critical Services support agreements. Download from the HP website (http://h20392.www2.hp.com/portal/swdepot/displayProductInfo.do?productNumber=ISDVD).

Both HP Insight Remote Support solutions are available at no additional cost to customers with a valid warranty on HP technology, an HP Care Pack Service or HP contractual support agreement.

For more information, visit the HP website (http://www.hp.com/go/insightremotesupport)

Keeping the system current

Drivers



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

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

If you are installing a SmartStart-supported OS, use the SmartStart software (on page 62) and its Assisted Path feature to install the OS and latest driver support.

If you are installing drivers from the SmartStart CD, be sure that you are using the latest SmartStart version that your server blade supports. To verify that your server blade is using the latest supported version, see the HP website (http://www.hp.com/support). For more information, see the documentation provided with the SmartStart CD.

If you do not use the SmartStart CD 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 from the HP website (http://www.hp.com/support).

ProLiant Support Packs

PSPs represent operating system-specific bundles of ProLiant optimized drivers, utilities, and management agents. Refer to the PSP website (http://h18000.www1.hp.com/products/servers/management/psp.html).

Operating system version support

Refer to the operating system support matrix (http://www.hp.com/go/supportos).

System Online ROM flash component utility

The Online ROM Flash Component Utility enables system administrators to efficiently upgrade system or controller ROM images across a wide range of servers and array controllers. This tool has the following features:

- Works offline and online
- Supports Microsoft® Windows Server™ 2003 and Linux operating systems

IMPORTANT: This utility supports operating systems that may not be supported by the server. For operating systems supported by the server, see the HP website (http://www.hp.com/support).

- Integrates with other software maintenance, deployment, and operating system tools
- Automatically checks for hardware, firmware, and operating system dependencies, and installs only the correct ROM upgrades required by each target server

To download the tool and for more information, see the HP website (http://h18000.www1.hp.com/support/files/index.html).

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).

Care Pack

HP Care Pack Services offer upgraded service levels to extend and expand standard product warranty with easy-to-buy, easy-to-use support packages that help you make the most of your server investments. Refer to the Care Pack website (http://www.hp.com/hps/carepack/servers/cp_proliant.html).

Troubleshooting

Troubleshooting resources

The *HP ProLiant Servers Troubleshooting Guide* provides procedures for resolving common problems and comprehensive courses of action for fault isolation and identification, error message interpretation, issue resolution, and software maintenance on ProLiant servers and server blades. This guide includes problem-specific flowcharts to help you navigate complex troubleshooting processes. To view the guide, select a language:

- English (http://www.hp.com/support/ProLiant_TSG_en)
- French (http://www.hp.com/support/ProLiant_TSG_fr)
- Italian (http://www.hp.com/support/ProLiant_TSG_it)
- Spanish (http://www.hp.com/support/ProLiant_TSG_sp)
- German (http://www.hp.com/support/ProLiant_TSG_gr)
- Dutch (http://www.hp.com/support/ProLiant_TSG_nl)
- Japanese (http://www.hp.com/support/ProLiant_TSG_jp)

The *HP BladeSystem c-Class Enclosure Troubleshooting Guide* provides procedures and solutions for troubleshooting HP BladeSystem c-Class enclosures. This guide explains how to use the Insight Display to troubleshoot enclosures, and it includes a flowchart to help you navigate the troubleshooting process. To view the guide, see the HP website (http://www.hp.com/support/BladeSystem_Enclosure_TSG_en).

Pre-diagnostic steps

WARNING: To avoid potential problems, ALWAYS read the warnings and cautionary information in the server documentation before removing, replacing, reseating, or modifying system components.

IMPORTANT: This guide provides information for multiple servers. Some information may not apply to the server you are troubleshooting. Refer to the server documentation for information on procedures, hardware options, software tools, and operating systems supported by the server.

1. Review the important safety information (on page 76).
2. Gather symptom information (on page 77).
3. Prepare the server for diagnosis (on page 77).
4. Use the Start diagnosis flowchart (on page 79) to begin the diagnostic process.

Important safety information

Familiarize yourself with the safety information in the following sections before troubleshooting the server.

Important safety information

Before servicing this product, read the *Important Safety Information* document provided with the server.

Symbols on equipment

The following symbols may be placed on equipment to indicate the presence of potentially hazardous conditions.



This symbol indicates the presence of hazardous energy circuits or electric shock hazards. Refer all servicing to qualified personnel.

WARNING: To reduce the risk of injury from electric shock hazards, do not open this enclosure. Refer all maintenance, upgrades, and servicing to qualified personnel.



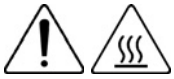
This symbol indicates the presence of electric shock hazards. The area contains no user or field serviceable parts. Do not open for any reason.

WARNING: To reduce the risk of injury from electric shock hazards, do not open this enclosure.



This symbol on an RJ-45 receptacle indicates a network interface connection.

WARNING: To reduce the risk of electric shock, fire, or damage to the equipment, do not plug telephone or telecommunications connectors into this receptacle.



This symbol indicates the presence of a hot surface or hot component. If this surface is contacted, the potential for injury exists.

WARNING: To reduce the risk of injury from a hot component, allow the surface to cool before touching.



11.8 kg

26.1 lb

This symbol indicates that the component exceeds the recommended weight for one individual to handle safely.

WARNING: To reduce the risk of personal injury or damage to the equipment, observe local occupational health and safety requirements and guidelines for manual material handling.



These symbols, on power supplies or systems, indicate that the equipment is supplied by multiple sources of power.

WARNING: To reduce the risk of injury from electric shock, remove all power cords to completely disconnect power from the system.

Warnings

⚠ **WARNING:** Only authorized technicians trained by HP should attempt to repair this equipment. All troubleshooting and repair procedures are detailed to allow only subassembly/module-level repair. Because of the complexity of the individual boards and subassemblies, no one should attempt to make repairs at the component level or to make modifications to any printed wiring board. Improper repairs can create a safety hazard.

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

- The leveling feet are extended to the floor.
- The full weight of the rack rests on the leveling feet.
- The stabilizing feet are attached to the rack if it is a single-rack installation.
- The racks are coupled together in multiple-rack installations.
- Only one component is extended at a time. A rack may become unstable if more than one component is extended for any reason.

Symptom information

Before troubleshooting a server problem, collect the following information:

- What events preceded the failure? After which steps does the problem occur?
- What has been changed since the time the server was working?
- Did you recently add or remove hardware or software? If so, did you remember to change the appropriate settings in the server setup utility, if necessary?
- How long has the server exhibited problem symptoms?
- If the problem occurs randomly, what is the duration or frequency?

To answer these questions, the following information may be useful:

- Run HP Insight Diagnostics (on page 71) and use the survey page to view the current configuration or to compare it to previous configurations.
- Refer to your hardware and software records for information.
- Refer to server LEDs and their statuses.

Prepare the server for diagnosis

1. Be sure the server is in the proper operating environment with adequate power, air conditioning, and humidity control. For required environmental conditions, see the server documentation.
2. Record any error messages displayed by the system.
3. Remove all diskettes, CD-ROMs, DVD-ROMs, and USB drive keys.
4. Power down the server and peripheral devices if you will be diagnosing the server offline. If possible, always perform an orderly shutdown:
   a. Exit any applications.
   b. Exit the operating system.
   c. Power down the server ("Power down the server blade" on page 15).
5. Disconnect any peripheral devices not required for testing (any devices not necessary to power up the server). Do not disconnect the printer if you want to use it to print error messages.

6. Collect all tools and utilities, such as a Torx screwdriver, loopback adapters, ESD wrist strap, and software utilities, necessary to troubleshoot the problem.
   - You must have the appropriate Health Drivers and Management Agents installed on the server.

     To verify the server configuration, connect to the System Management homepage and select **Version Control Agent**. The VCA gives you a list of names and versions of all installed HP drivers, Management Agents, and utilities, and whether they are up-to-date.
   - HP recommends you have access to the server documentation for server-specific information.
   - HP recommends you have access to the SmartStart CD for value-added software and drivers required during the troubleshooting process. Download the current version of SmartStart from the HP website (http://www.hp.com/servers/smartstart).

Service notifications

To view the latest service notifications, refer to the HP website (http://www.hp.com/go/bizsupport). Select the appropriate server model, and then click the **Troubleshoot a Problem** link on the product page.

Loose connections

Action:

- Be sure all power cords are securely connected.
- Be sure all cables are properly aligned and securely connected for all external and internal components.
- Remove and check all data and power cables for damage. Be sure no cables have bent pins or damaged connectors.
- If a fixed cable tray is available for the server, be sure the cords and cables connected to the server are routed correctly through the tray.
- Be sure each device is properly seated. Avoid bending or flexing circuit boards when reseating components.
- If a device has latches, be sure they are completely closed and locked.
- Check any interlock or interconnect LEDs that may indicate a component is not connected properly.
- If problems continue to occur, remove and reinstall each device, checking the connectors and sockets for bent pins or other damage.

Troubleshooting flowcharts

To effectively troubleshoot a problem, HP recommends that you start with the first flowchart in this section, "Start diagnosis flowchart (on page 79)," and follow the appropriate diagnostic path. If the other flowcharts do not provide a troubleshooting solution, follow the diagnostic steps in "General diagnosis flowchart (on page 80)." The General diagnosis flowchart is a generic troubleshooting process to be used when the problem is not server-specific or is not easily categorized into the other flowcharts.

The available flowcharts include:

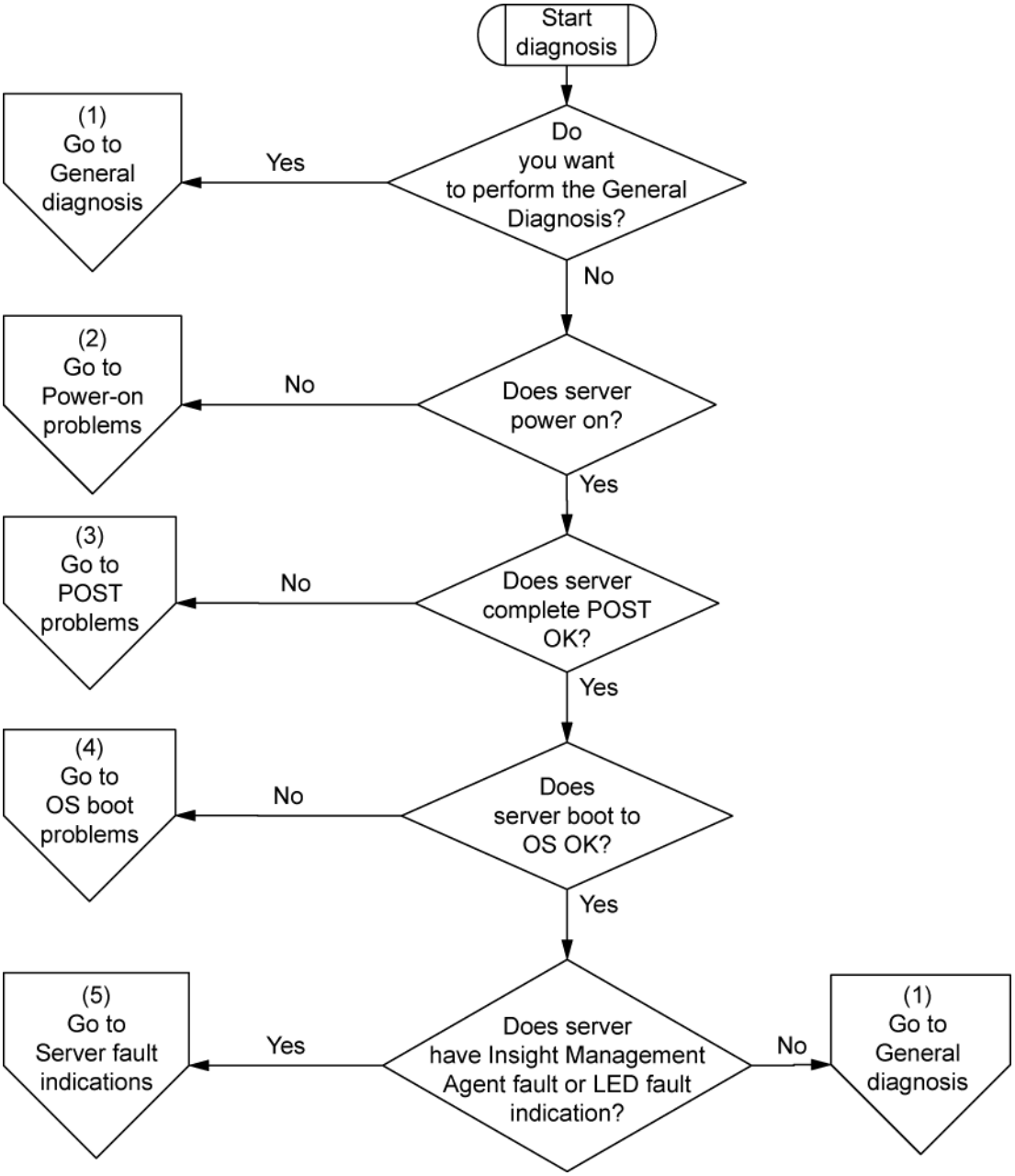
- Start diagnosis flowchart (on page 79)
- General diagnosis flowchart (on page 80)

- Server blade power-on problems flowchart (on page 82)
- POST problems flowchart (on page 84)
- OS boot problems flowchart (on page 86)
- Server fault indications flowchart (on page 88)

Start diagnosis flowchart

Use the following flowchart to start the diagnostic process.

Item	Refer to
1	"General diagnosis flowchart (on page 80)"
2	"Power-on problems flowchart ("Server blade power-on problems flowchart" on page 82)"
3	"POST problems flowchart (on page 84)"
4	"OS boot problems flowchart (on page 86)"
5	"Server fault indications flowchart (on page 88)"

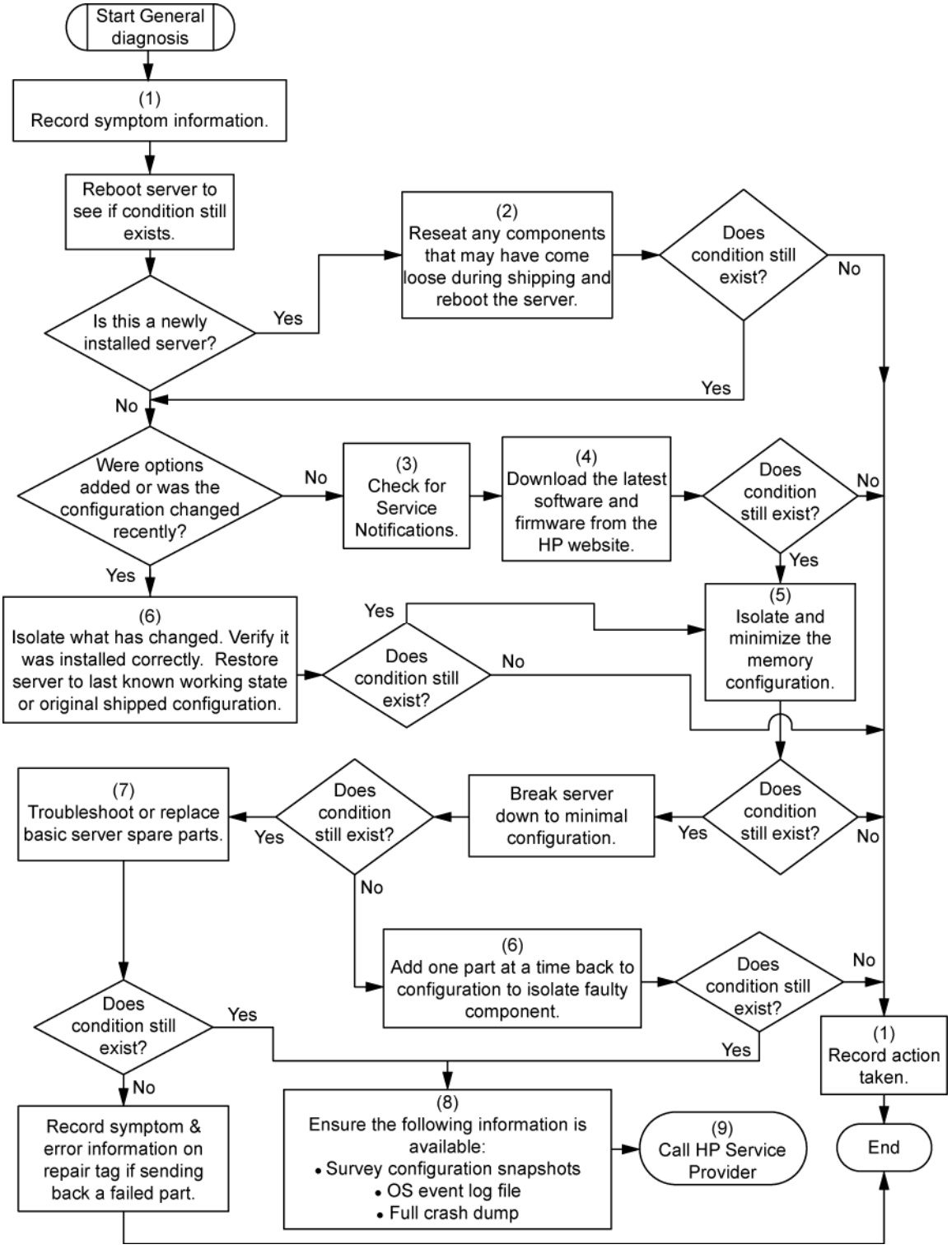


General diagnosis flowchart

The General diagnosis flowchart provides a generic approach to troubleshooting. If you are unsure of the problem, or if the other flowcharts do not fix the problem, use the following flowchart.

Item	See
1	"Symptom information (on page 77)"
2	"Loose connections (on page 78)"
3	"Service notifications (on page 78)"
4	The most recent version of a particular server blade or option firmware is available on the HP Support website (http://www.hp.com/support).

Item	See
5	"General memory problems are occurring" in the *HP ProLiant Servers Troubleshooting Guide* located on the Documentation CD or on the HP website (http://www.hp.com/support)
6	• Maintenance and service guides for p-Class server blades, located on the Documentation CD or the HP website (http://www.hp.com/products/servers/proliant-bl/p-class/info) • Maintenance and service guides for c-Class server blades, located on the Documentation CD or the HP website (http://www.hp.com/go/bladesystem/documentation)
7	• Maintenance and service guides for p-Class server blades, located on the Documentation CD or the HP website (http://www.hp.com/products/servers/proliant-bl/p-class/info) • Maintenance and service guides for c-Class server blades, located on the Documentation CD or the HP website (http://www.hp.com/go/bladesystem/documentation) • "Hardware problems" in the *HP ProLiant Servers Troubleshooting Guide* located on the Documentation CD or on the HP website (http://www.hp.com/support)
8	• "Server information you need" in the *HP ProLiant Servers Troubleshooting Guide* located on the Documentation CD or on the HP website (http://www.hp.com/support) • "Operating system information you need" in the *HP ProLiant Servers Troubleshooting Guide* located on the Documentation CD or on the HP website (http://www.hp.com/support)
9	"HP contact information (on page 100)"



Server blade power-on problems flowchart

Symptoms:

- The server does not power on.
- The system power LED is off or amber.

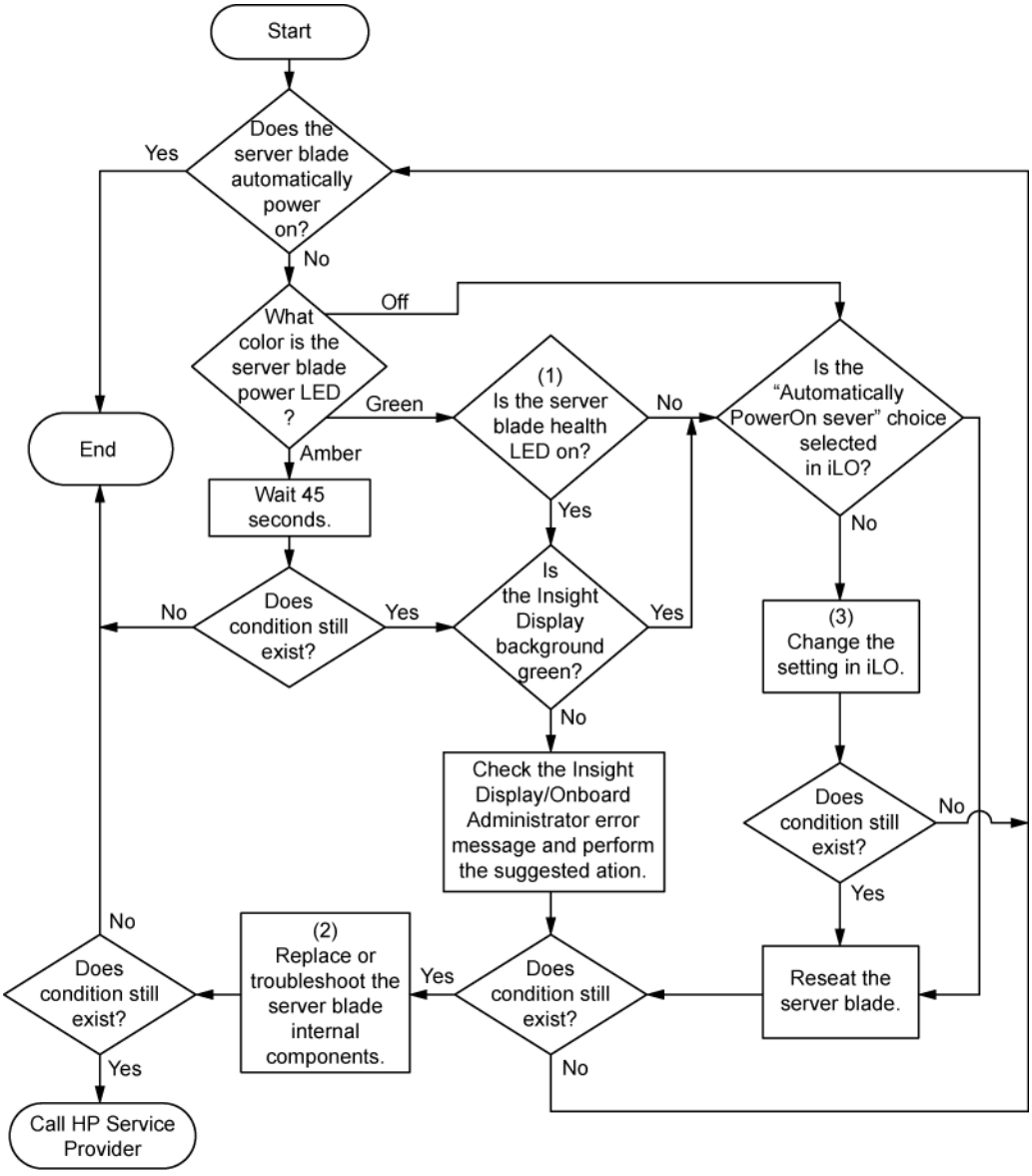
- The health LED is red or amber.

  NOTE: For the location of server LEDs and information on their statuses, refer to the server documentation.

Possible causes:

- Improperly seated or faulty power supply
- Loose or faulty power cord
- Power source problem
- Power on circuit problem
- Improperly seated component or interlock problem
- Faulty internal component

Item	See
1	"Component identification (on page 7)"
2	Maintenance and service guides for c-Class server blades, located on the HP website (http://www.hp.com/go/bladesystem/documentation)
3	*Integrated Lights-Out User Guide* located on the HP website (http://www.hp.com/servers/lights-out)



POST problems flowchart

Symptoms:

- Server does not complete POST

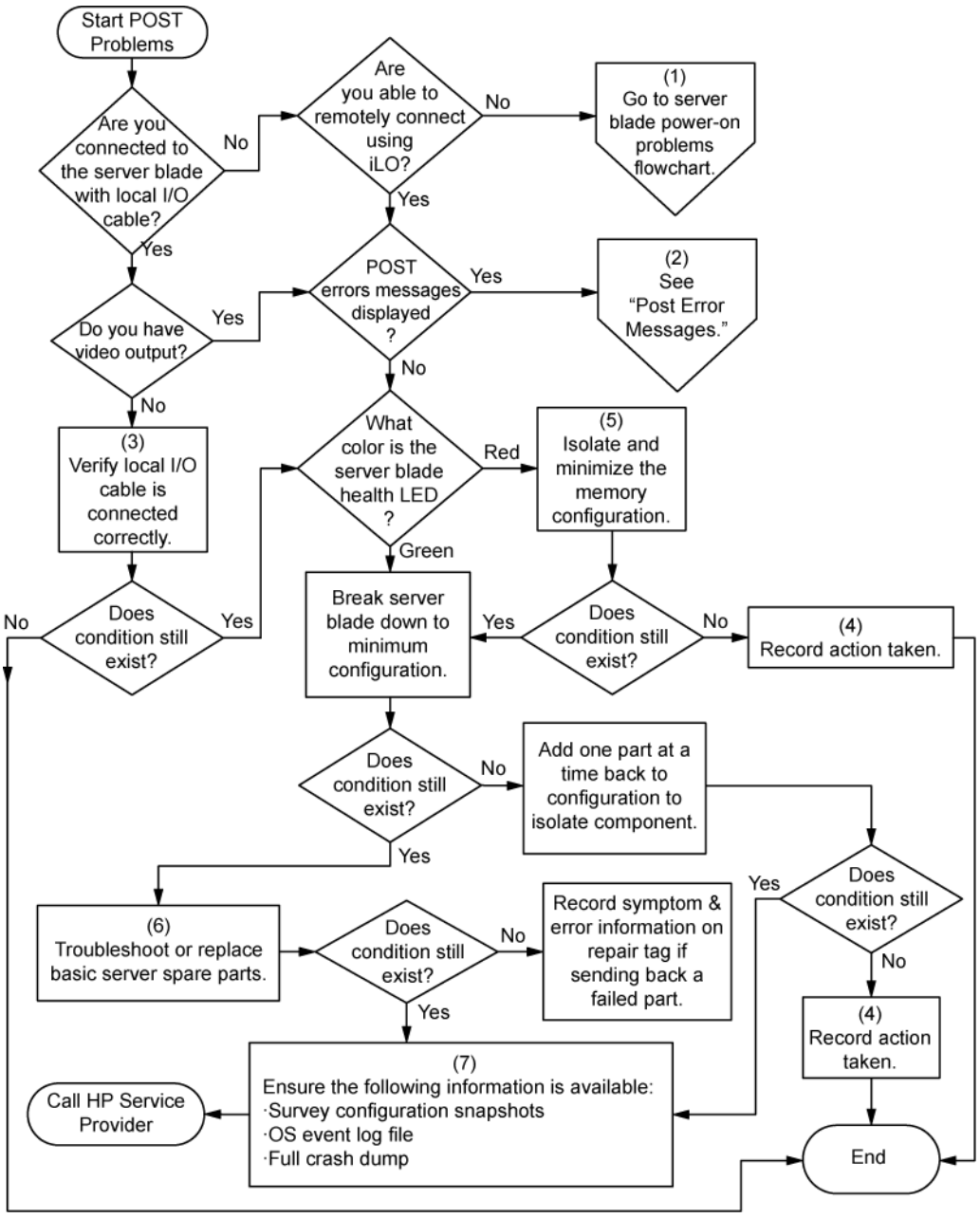
  NOTE: The server has completed POST when the system attempts to access the boot device.

- Server completes POST with errors

Possible problems:

- Improperly seated or faulty internal component
- Faulty KVM device
- Faulty video device

Item	Refer to
1	Server blade power-on problems flowchart (on page 82)
2	"POST error messages and beep codes (on page 90)"
3	"Video problems" in the *HP ProLiant Servers Troubleshooting Guide* located on the Documentation CD or on the HP website (http://www.hp.com/support)
4	"Symptom information (on page 77)"
5	"General memory problems are occurring" in the *HP ProLiant Servers Troubleshooting Guide* located on the Documentation CD or on the HP website (http://www.hp.com/support)
6	• "Hardware problems" in the *HP ProLiant Servers Troubleshooting Guide* located on the Documentation CD or on the HP website (http://www.hp.com/support) • Maintenance and service guides for c-Class server blades, located on the Documentation CD or the HP website (http://www.hp.com/go/bladesystem/documentation)
7	• "Server information you need" in the *HP ProLiant Servers Troubleshooting Guide* located on the Documentation CD or on the HP website (http://www.hp.com/support) • "Operating system information you need" in the *HP ProLiant Servers Troubleshooting Guide* located on the Documentation CD or on the HP website (http://www.hp.com/support)



OS boot problems flowchart

There are two ways to use SmartStart when diagnosing OS boot problems on a server blade:

- Use iLO to remotely attach virtual devices to mount the SmartStart CD onto the server blade.
- Use a local I/O cable and drive to connect to the server blade, and then restart the server blade.

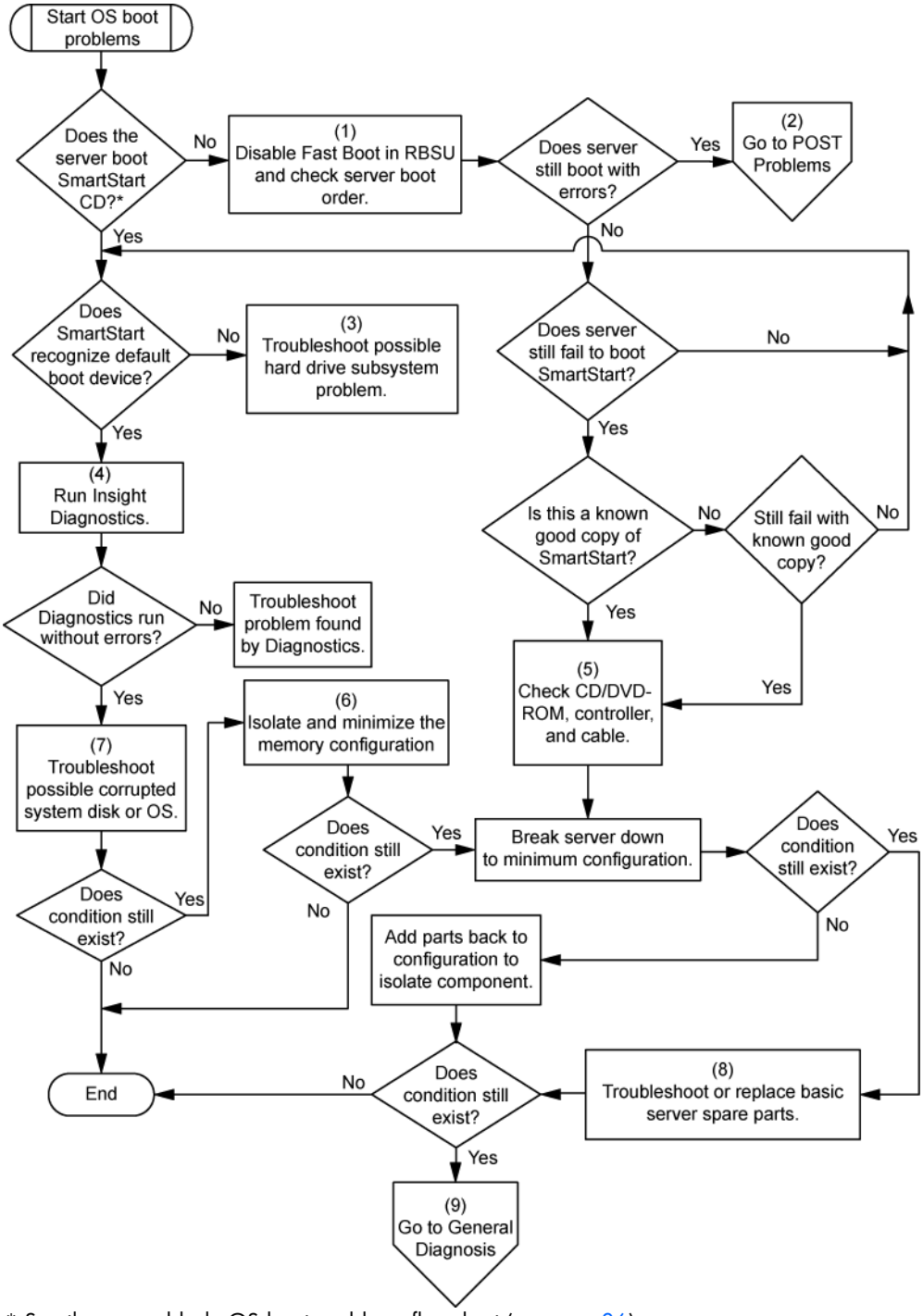
Symptoms:

- Server does not boot a previously installed OS
- Server does not boot SmartStart

Possible causes:

- Corrupted OS
- Hard drive subsystem problem
- Incorrect boot order setting in RBSU

Item	See
1	*HP ROM-Based Setup Utility User Guide* (http://www.hp.com/servers/smartstart)
2	"POST problems flowchart (on page 84)"
3	• "Hard drive problems" in the *HP ProLiant Servers Troubleshooting Guide* located on the Documentation CD or on the HP website (http://www.hp.com/support) • Controller documentation
4	"HP Insight Diagnostics (on page 71)" or in the *HP ProLiant Servers Troubleshooting Guide* located on the Documentation CD or on the HP website (http://www.hp.com/support)
5	• "Loose connections (on page 78)" • "CD-ROM and DVD drive problems" in the *HP ProLiant Servers Troubleshooting Guide* located on the Documentation CD or on the HP website (http://www.hp.com/support) • Controller documentation
6	"General memory problems are occurring" in the *HP ProLiant Servers Troubleshooting Guide* located on the Documentation CD or on the HP website (http://www.hp.com/support)
7	• "Operating system problems" in the *HP ProLiant Servers Troubleshooting Guide* located on the Documentation CD or on the HP website (http://www.hp.com/support) • "HP contact information (on page 100)"
8	• "Hardware problems" in the *HP ProLiant Servers Troubleshooting Guide* located on the Documentation CD or on the HP website (http://www.hp.com/support) • Maintenance and service guides for p-Class server blades, located on the Documentation CD or the HP website (http://www.hp.com/products/servers/proliant-bl/p-class/info) • Maintenance and service guides for c-Class server blades, located on the Documentation CD or the HP website (http://www.hp.com/go/bladesystem/documentation)
9	"General diagnosis flowchart (on page 80)"



* See the server blade OS boot problems flowchart (on page 86)

Server fault indications flowchart

Symptoms:

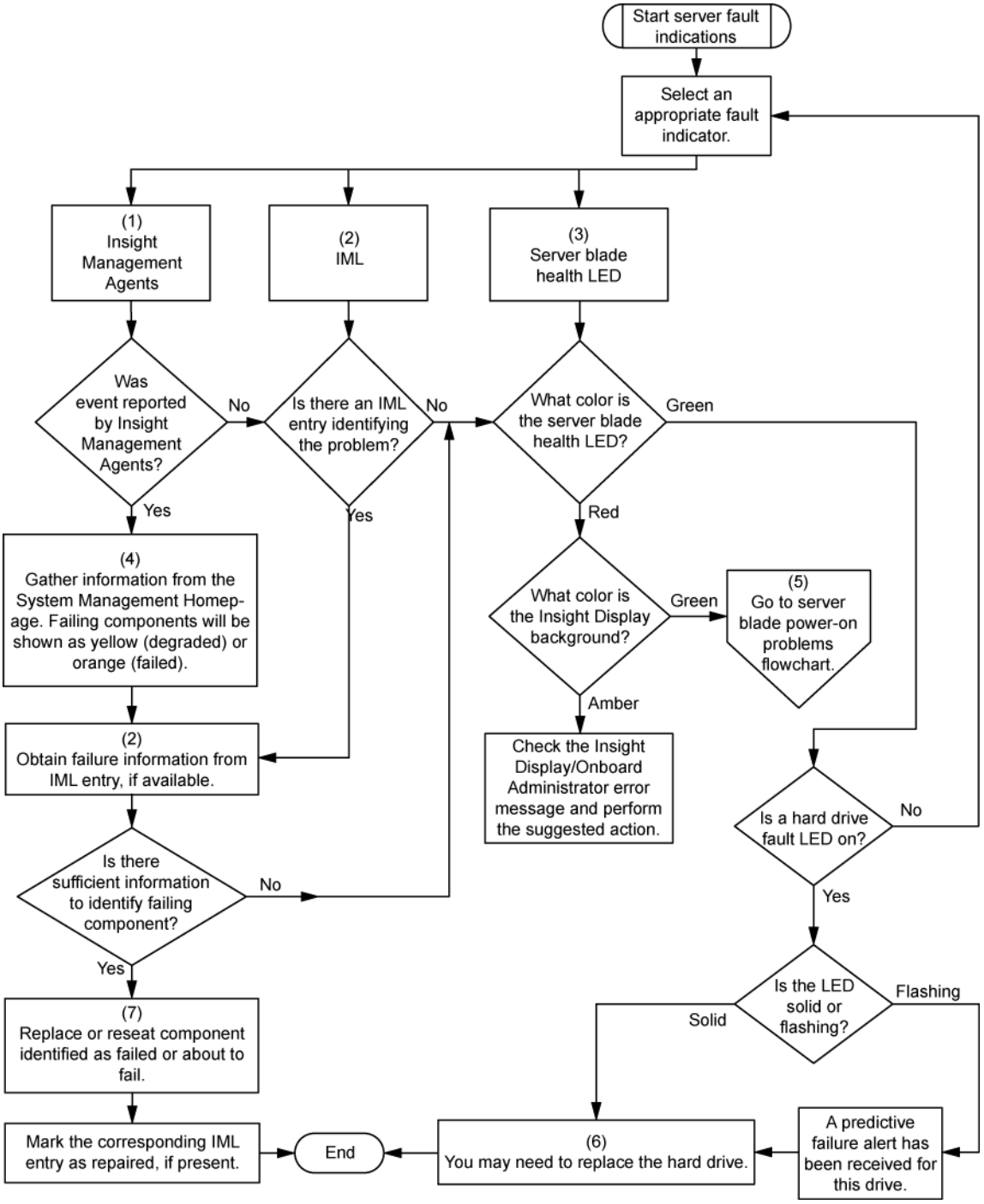
- Server boots, but a fault event is reported by Insight Management Agents (on page 67)
- Server boots, but the internal health LED, external health LED, or component health LED is red or amber

NOTE: For the location of server LEDs and information on their statuses, refer to the server documentation.

Possible causes:

- Improperly seated or faulty internal or external component
- Unsupported component installed
- Redundancy failure
- System overtemperature condition

Item	See
1	"Management agents (on page 67)" or in the *HP ProLiant Servers Troubleshooting Guide* located on the Documentation CD or on the HP website (http://www.hp.com/support)
2	• "Integrated Management Log (on page 72)" or in the *HP ProLiant Servers Troubleshooting Guide* located on the Documentation CD or on the HP website (http://www.hp.com/support) • "Event list error messages" in the *HP ProLiant Servers Troubleshooting Guide* located on the Documentation CD or on the HP website (http://www.hp.com/support)
3	"Component identification (on page 7)"
4	System Management Homepage (https://localhost:2381)
5	"Power-on problems flowchart ("Server blade power-on problems flowchart" on page 82)"
6	• "Hardware problems" in the *HP ProLiant Servers Troubleshooting Guide* located on the Documentation CD or on the HP website (http://www.hp.com/support) • Maintenance and service guides for c-Class server blades, located on the Documentation CD or the HP website (http://www.hp.com/go/bladesystem/documentation) • "HP contact information (on page 100)"
7	• "Hardware problems" in the *HP ProLiant Servers Troubleshooting Guide* located on the Documentation CD or on the HP website (http://www.hp.com/support) • Maintenance and service guides for c-Class server blades, located on the Documentation CD or the HP website (http://www.hp.com/go/bladesystem/documentation)



POST error messages and beep codes

For a complete listing of error messages, refer to the "POST error messages" in the *HP ProLiant Servers Troubleshooting Guide* located on the Documentation CD or on the HP website (http://www.hp.com/support).

⚠ **WARNING:** To avoid potential problems, ALWAYS read the warnings and cautionary information in the server documentation before removing, replacing, reseating, or modifying system components.

Battery replacement

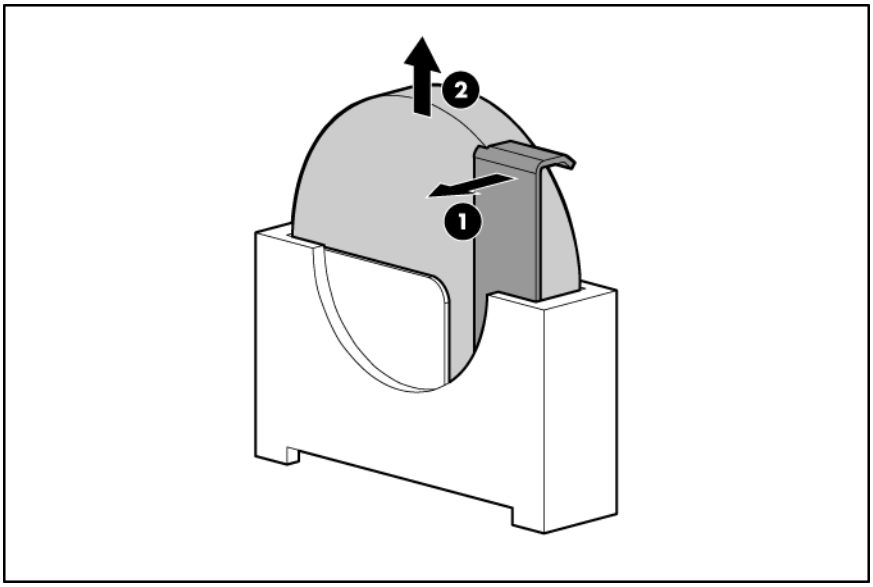
If the server blade no longer automatically displays the correct date and time, you may need to replace the battery that provides power to the real-time clock. Under normal use, battery life is 5 to 10 years.

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

To remove the component:

1. Power down the server blade (on page 15).
2. Remove the server blade (on page 16).
3. Remove the access panel (on page 17).
4. Identify the battery location ("System board components" on page 10).
5. Remove the battery.



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

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 compliance notices

Regulatory compliance identification numbers

For the purpose of regulatory compliance certifications and identification, this product has been assigned a unique regulatory model number. The regulatory model number can be found on the product nameplate label, along with all required approval markings and information. When requesting compliance information for this product, always refer to this regulatory model number. The regulatory model number is not the marketing name or model number of the product.

Federal Communications Commission notice

Part 15 of the Federal Communications Commission (FCC) Rules and Regulations has established Radio Frequency (RF) emission limits to provide an interference-free radio frequency spectrum. Many electronic devices, including computers, generate RF energy incidental to their intended function and are, therefore, covered by these rules. These rules place computers and related peripheral devices into two classes, A and B, depending upon their intended installation. Class A devices are those that may reasonably be expected to be installed in a business or commercial environment. Class B devices are those that may reasonably be expected to be installed in a residential environment (for example, personal computers). The FCC requires devices in both classes to bear a label indicating the interference potential of the device as well as additional operating instructions for the user.

FCC rating label

The FCC rating label on the device shows the classification (A or B) of the equipment. Class B devices have an FCC logo or ID on the label. Class A devices do not have an FCC logo or ID on the label. After you determine the class of the device, refer to the corresponding statement.

Class A equipment

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference, in which case the user will be required to correct the interference at personal expense.

Class B equipment

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses, and can radiate radio frequency

energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit that is different from that to which the receiver is connected.
- Consult the dealer or an experienced radio or television technician for help.

Declaration of conformity for products marked with the FCC logo, United States only

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) this device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

For questions regarding this product, contact us by mail or telephone:

- Hewlett-Packard Company
  P. O. Box 692000, Mail Stop 530113
  Houston, Texas 77269-2000
- 1-800-HP-INVENT (1-800-474-6836). (For continuous quality improvement, calls may be recorded or monitored.)

For questions regarding this FCC declaration, contact us by mail or telephone:

- Hewlett-Packard Company
  P. O. Box 692000, Mail Stop 510101
  Houston, Texas 77269-2000
- 1-281-514-3333

To identify this product, refer to the part, series, or model number found on the product.

Modifications

The FCC requires the user to be notified that any changes or modifications made to this device that are not expressly approved by Hewlett-Packard Company may void the user's authority to operate the equipment.

Cables

Connections to this device must be made with shielded cables with metallic RFI/EMI connector hoods in order to maintain compliance with FCC Rules and Regulations.

Canadian notice (Avis Canadien)

Class A equipment

This Class A digital apparatus meets all requirements of the Canadian Interference-Causing Equipment Regulations.

Cet appareil numérique de la classe A respecte toutes les exigences du Règlement sur le matériel brouilleur du Canada.

Class B equipment

This Class B digital apparatus meets all requirements of the Canadian Interference-Causing Equipment Regulations.

Cet appareil numérique de la classe B respecte toutes les exigences du Règlement sur le matériel brouilleur du Canada.

European Union regulatory notice

This product complies with the following EU Directives:

- Low Voltage Directive 2006/95/EC
- EMC Directive 2004/108/EC

Compliance with these directives implies conformity to applicable harmonized European standards (European Norms) which are listed on the EU Declaration of Conformity issued by Hewlett-Packard for this product or product family.

This compliance is indicated by the following conformity marking placed on the product:



This marking is valid for non-Telecom products and EU harmonized Telecom products (e.g. Bluetooth).



This marking is valid for EU non-harmonized Telecom products.

*Notified body number (used only if applicable—refer to the product label)

Hewlett-Packard GmbH, HQ-TRE, Herrenberger Strasse 140, 71034 Boeblingen, Germany

Disposal of waste equipment by users in private households in the European Union



This symbol on the product or on its packaging indicates that this product must not be disposed of with your other household waste. Instead, it is your responsibility to dispose of your waste equipment by handing it over to a designated collection point for the recycling of waste electrical and electronic equipment. The separate collection and recycling of your waste equipment at the time of disposal will help to conserve natural resources and ensure that it is recycled in a manner that protects human health and the environment. For more information about where you can drop off your waste equipment for recycling, please contact your local city office, your household waste disposal service or the shop where you purchased the product.

Japanese notice

ご使用になっている装置にVCCIマークが付いていましたら、次の説明文をお読み下さい。

この装置は、情報処理装置等電波障害自主規制協議会（VCCI）の基準に基づくクラスB情報技術装置です。この装置は、家庭環境で使用することを目的としていますが、この装置がラジオやテレビジョン受信機に近接して使用されると、受信障害を引き起こすことがあります。
取扱説明書に従って正しい取り扱いをして下さい。

VCCIマークが付いていない場合には、次の点にご注意下さい。

この装置は、情報処理装置等電波障害自主規制協議会（VCCI）の基準に基づくクラスA情報技術装置です　この装置を家庭環境で使用すると電波妨害を引き起こすことがあります。この場合には使用者が適切な対策を講ずるよう要求されることがあります。

BSMI notice

警告使用者:

這是甲類的資訊產品，在居住的環境中使用時，可能會造成射頻干擾，在這種情況下，使用者會被要求採取某些適當的對策。

Korean notice

Class A equipment

A급 기기 (업무용 방송통신기기)	이 기기는 업무용(A급)으로 전자파적합등록을 한 기기이오니 판매자 또는 사용자는 이 점을 주의하시기 바라며, 가정 외의 지역에서 사용하는 것을 목적으로 합니다.

Class B equipment

B급 기기 (가정용 방송통신기기)	이 기기는 가정용(B급)으로 전자파적합등록을 한 기기로서 주로 가정에서 사용하는 것을 목적으로 하며, 모든 지역에서 사용할 수 있습니다.

Chinese notice

Class A equipment

声明
此为 A 级产品，在生活环境中，该产品可能会造成无线电干扰。在这种情况下，可能需要用户对其干扰采取可行的措施。

Laser compliance

This product may be provided with an optical storage device (that is, CD or DVD drive) and/or fiber optic transceiver. Each of these devices contains a laser that is classified as a Class 1 Laser Product in accordance with US FDA regulations and the IEC 60825-1. The product does not emit hazardous laser radiation.

Each laser product complies with 21 CFR 1040.10 and 1040.11 except for deviations pursuant to Laser Notice No. 50, dated May 27, 2001; and with IEC 60825-1:1993/A2:2001.

⚠ **WARNING:** Use of controls or adjustments or performance of procedures other than those specified herein or in the laser product's installation guide may result in hazardous radiation exposure. To reduce the risk of exposure to hazardous radiation:

- Do not try to open the module enclosure. There are no user-serviceable components inside.
- Do not operate controls, make adjustments, or perform procedures to the laser device other than those specified herein.
- Allow only HP Authorized Service technicians to repair the unit.

The Center for Devices and Radiological Health (CDRH) of the U.S. Food and Drug Administration implemented regulations for laser products on August 2, 1976. These regulations apply to laser products manufactured from August 1, 1976. Compliance is mandatory for products marketed in the United States.

Battery replacement notice

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

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



Batteries, battery packs, and accumulators should not be disposed of together with the general household waste. To forward them to recycling or proper disposal, use the public collection system or return them to HP, an authorized HP Partner, or their agents.

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

Taiwan battery recycling notice

The Taiwan EPA requires dry battery manufacturing or importing firms in accordance with Article 15 of the Waste Disposal Act to indicate the recovery marks on the batteries used in sales, giveaway or promotion. Contact a qualified Taiwanese recycler for proper battery disposal.



Acoustics statement for Germany (Geräuschemission)

Schalldruckpegel L_{pA} < 70 dB(A)

Zuschauerpositionen (bystander positions), Normaler Betrieb (normal operation)

Nach ISO 7779:1999 (Typprüfung)

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)
Shipping	-40°C to 60°C (-40°F to 140°F)
Storage	-20°C to 60°C (-4°F to 140°F)
Maximum wet bulb temperature	30°C (86°F)
Relative humidity (noncondensing)**	
Operating	10% to 90%
Shipping	10% to 90%
Storage	10% to 95%

* All temperature ratings shown are for sea level. An altitude derating of 1°C per 304.8 m (1.8°F per 1,000 ft) to 3048 m (10,000 ft) is applicable. No direct sunlight allowed. Upper operating limit is 3,048m (10,000 ft) or 70 kPa (10.1 psia). Upper non-operating limit is 9,144 m (30,000 ft) or 30.3 kPa (4.4 psia).
** Storage maximum humidity of 95% is based on a maximum temperature of 45°C (113°F). Altitude maximum for storage corresponds to a pressure minimum of 70 kPa.

Server blade specifications

Specification	Value
Height	36.60 cm (14.42 in)
Depth	50.90 cm (20.06 in)
Width	5.14 cm (2.03 in)
Weight (maximum)	11.8 kg (26.1 lb)

Technical support

Before you contact HP

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

- 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 the name of the nearest HP authorized reseller:

- See the Contact HP worldwide (in English) webpage (http://welcome.hp.com/country/us/en/wwcontact.html).

For HP technical support:

- In the United States, for contact options see the Contact HP United States webpage (http://welcome.hp.com/country/us/en/contact_us.html). To contact HP by phone:
  - Call 1-800-HP-INVENT (1-800-474-6836). This service is available 24 hours a day, 7 days a week. For continuous quality improvement, calls may be recorded or monitored.
  - If you have purchased a Care Pack (service upgrade), call 1-800-633-3600. For more information about Care Packs, refer to the HP website (http://www.hp.com/hps).
- In other locations, see the Contact HP worldwide (in English) webpage (http://welcome.hp.com/country/us/en/wwcontact.html).

Acronyms and abbreviations

ABEND

abnormal end

ACU

Array Configuration Utility

ASR

Automatic Server Recovery

BBWC

battery-backed write cache

CSR

Customer Self Repair

DDR2

double data rate-2

DHCP

Dynamic Host Configuration Protocol

ESD

electrostatic discharge

IEC

International Electrotechnical Commission

iLO 2

Integrated Lights-Out 2

IML

Integrated Management Log

IP

Internet Protocol

KVM

keyboard, video, and mouse

NBP

Network Bootstrap Program

NIC

network interface controller

ORCA

Option ROM Configuration for Arrays

POST

Power-On Self Test

PSP

ProLiant Support Pack

PXE

Preboot Execution Environment

RAID

redundant array of inexpensive (or independent) disks

RBSU

ROM-Based Setup Utility

RDP

Rapid Deployment Pack

SAS

serial attached SCSI

SATA

serial ATA

SCSI

small computer system interface

SFP

small form-factor pluggable

SIM

Systems Insight Manager

SMP

Server Migration Pack

SNMP

Simple Network Management Protocol

SSD

solid-state drive

TCP/IP

Transmission Control Protocol/Internet Protocol

TFTP

Trivial File Transfer Protocol

TPM

trusted platform module

UID

unit identification

USB

universal serial bus

VCA

Version Control Agent

WfM

Wired for Management

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