



HP DL380z Gen9 Virtual Workstation

User Guide

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Table of contents

1 Abstract	1
2 Component identification	2
Front panel components	2
Front panel LEDs and buttons	3
Power fault LEDs	4
Accessing the optional HP Systems Insight Display	4
Systems Insight Display LEDs	5
Systems Insight Display LED combinations	5
Rear panel components	7
Rear panel LEDs	8
Non-hot-plug PCI riser board slot definitions	9
System board components	10
System maintenance switch	11
NMI functionality	12
DIMM slot locations	12
SAS and SATA device numbers	13
Hot-plug drive LED definitions	13
Hot-plug fans	14
3 Operations	16
Powering up the server	16
Powering down the server	16
Extending the server from the rack	17
Removing the server from the rack	17
Removing the access panel	18
Installing the access panel	18
Accessing the product rear panel	19
Opening the cable management arm	19
Removing the fan cage	20
Removing the hot-plug fan	21
Removing the PCI riser cage	22
Installing the PCI riser cage	23
Securing the full-length expansion board retainer	24
Removing the air baffle	25

4 Setup	26
Optional installation services	26
Optimum environment	27
Space and airflow requirements	27
Temperature requirements	28
Power requirements	28
Electrical grounding requirements	28
Rack warnings	29
Identifying the contents of the server shipping carton	29
Installing hardware options	29
Installing the server into the rack	30
Installing the operating system	31
Powering on and selecting boot options in UEFI Boot Mode	33
Registering the server	33
 5 Hardware options installation	 34
Server QuickSpecs	34
Introduction	34
Processor and fan option	34
Memory options	40
HP SmartMemory	40
Memory subsystem architecture	41
Single-, dual-, and quad-rank DIMMs	41
DIMM identification	42
Memory configurations	42
Advanced ECC memory configuration	43
Online Spare memory configuration	43
General DIMM slot population guidelines	44
Advanced ECC population guidelines	44
Online spare population guidelines	44
Population order	45
Installing a DIMM	45
Hot-plug hard drive options	46
Installing a hot-plug SAS or SATA hard drive	47
Removing a hot-plug SAS or SATA hard drive	48
Universal media bay option	48
Redundant hot-plug power supply option	51
Expansion board options	53
Removing an expansion slot blank	53
Installing an expansion board	55
2-slot PCI riser cage option	56

3-slot PCI riser cage option	58
GPU enablement kit	60
Eight-bay SFF front drive cage option for bay 1	65
Location Discovery Services ear option	70
FlexibleLOM option	74
HP 12G SAS Expander Card	75
HP 12G SAS Expander Card ports	76
HP Flexible Smart Array Controller	80
HP Smart Storage Battery	81
High performance fan option	82
Rear serial port option	84
HP Trusted Platform Module option	85
Installing the Trusted Platform Module board	86
Retaining the recovery key/password	88
Enabling the Trusted Platform Module	88
6 Cabling	89
Eight-bay SFF front drive cage cabling	89
Universal media bay cabling	94
150W PCIe power cable option	96
7 Software and configuration utilities	97
Server mode	97
Product QuickSpecs	97
HP iLO	98
Active Health System	98
HP RESTful API support for HP iLO	99
Integrated Management Log	99
HP Insight Remote Support	100
HP Insight Remote Support central connect	100
HP Insight Online direct connect	100
HP Insight Online	100
Intelligent Provisioning	101
HP Insight Diagnostics	101
HP Insight Diagnostics survey functionality	101
Erase Utility	102
Scripting Toolkit for Windows and Linux	102
HP Service Pack for ProLiant	103
HP Smart Update Manager	103
HP UEFI System Utilities	103
Using HP UEFI System Utilities	103

Flexible boot control	104
Restoring and customizing configuration settings	104
Secure Boot configuration	105
Embedded UEFI shell	105
Embedded UEFI diagnostics	105
HP RESTful API support for UEFI	105
Re-entering the server serial number and product ID	106
Utilities and features	106
HP Smart Storage Administrator	106
ROMPaq utility	106
Automatic Server Recovery	107
USB support	107
External USB functionality	107
Redundant ROM support	107
Safety and security benefits	107
Keeping the system current	108
Drivers	108
Software and firmware	108
Version control	108
HP operating systems and virtualization software support for ProLiant servers	109
HP Technology Service Portfolio	109
Change control and proactive notification	109
8 Troubleshooting	110
Troubleshooting resources	110
9 Battery replacement	111
10 Regulatory information	113
Safety and regulatory compliance	113
Belarus Kazakhstan Russia marking	113
Turkey RoHS material content declaration	114
Ukraine RoHS material content declaration	114
Warranty information	114
11 Electrostatic discharge	115
Preventing electrostatic discharge	115
Grounding methods to prevent electrostatic discharge	115

12 Specifications	116
Environmental specifications	116
Mechanical specifications	116
Power supply specifications	117
HP 800W Flex Slot Platinum Hot-plug Power Supply	117
HP 1400W Flex Slot Platinum Plus Hot-plug Power Supply	118
13 Support and other resources	119
Before you contact HP	119
HP contact information	119
Customer Self Repair	120
14 Acronyms and abbreviations	121
15 Documentation feedback	123
Index	124

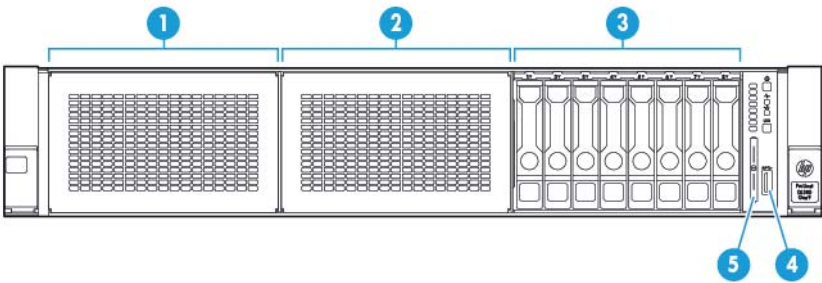
1 Abstract

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

This virtual workstations product is based on an HP ProLiant product, so this documentation contains references to HP ProLiant documentation. The operating systems that this products supports are different from the operating systems that the HP ProLiant products support, however. For information about operating systems that are supported by virtual workstations, go to the Virtual Workstation quick specs on the HP website [DL380z Gen9](#).

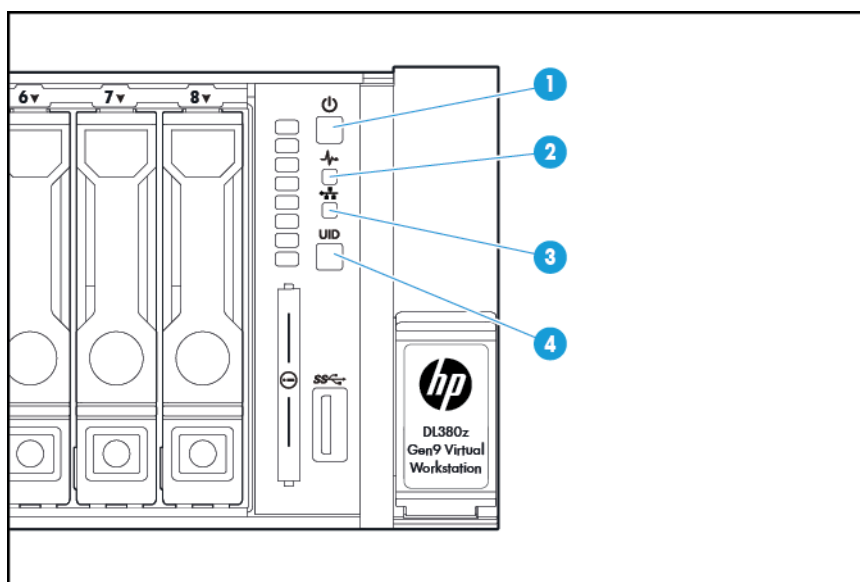
2 Component identification

Front panel components



Item	Description
1	Bay 1 (optional drives or optical drive, video, USB)
2	Bay 2 (optional drives)
3	Fixed drive bays
4	Front USB 3.0 connector
5	Serial label pull tab

Front panel LEDs and buttons



Item	Description	Status
1	Power On/Standby button and system power LED*	<p>Solid green = System on</p> <p>Flashing green (1 Hz/cycle per sec) = Performing power on sequence</p> <p>Solid amber = System in standby</p> <p>Off = No power present**</p>
2	Health LED*	<p>Solid green = Normal</p> <p>Flashing green (1 Hz/cycle per sec) = iLO is rebooting</p> <p>Flashing amber = System degraded</p> <p>Flashing red (1 Hz/cycle per sec) = System critical†</p>
3	NIC status LED*	<p>Solid green = Link to network</p> <p>Flashing green (1 Hz/cycle per sec) = Network active</p> <p>Off = No network activity</p>
4	UID button/LED*	<p>Solid blue = Activated</p> <p>Flashing blue:</p> <ul style="list-style-type: none"> (1 Hz/cycle per sec) = Remote management or firmware upgrade in progress 4 Hz/cycle per sec = iLO manual reboot sequence initiated 8 Hz/cycle per sec = iLO manual reboot sequence in progress <p>Off = Deactivated</p>

*When all four LEDs described in this table flash simultaneously, a power fault has occurred. For more information, see [Power fault LEDs on page 4](#).

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

†If the health LED indicates a degraded or critical state, review the system IML or use iLO to review the system health status.

Power fault LEDs

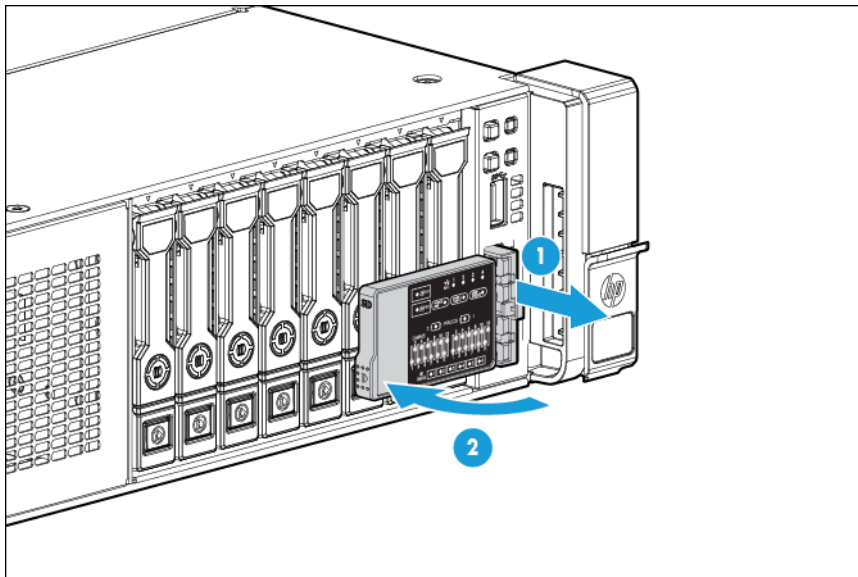
The following table provides a list of power fault LEDs, and the subsystems that are affected. Not all power faults are used by all servers.

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

Accessing the optional HP Systems Insight Display

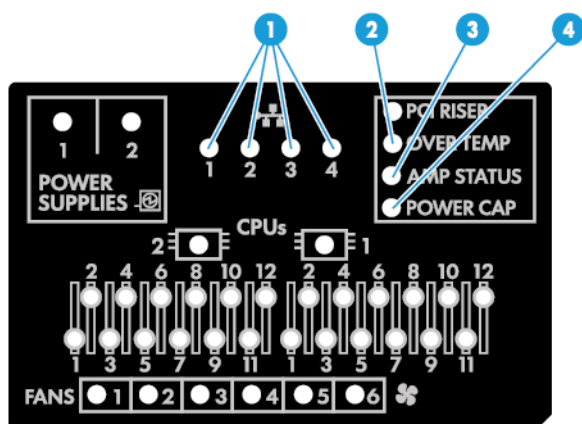
To access a pop-out HP Systems Insight Display on models with this option installed:

1. Press and release the panel.
2. After the display fully ejects, rotate the display to view the LEDs.



Systems Insight Display LEDs

The HP Systems Insight Display LEDs represent the system board layout. The display enables diagnosis with the access panel installed.



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

Systems Insight Display LED combinations

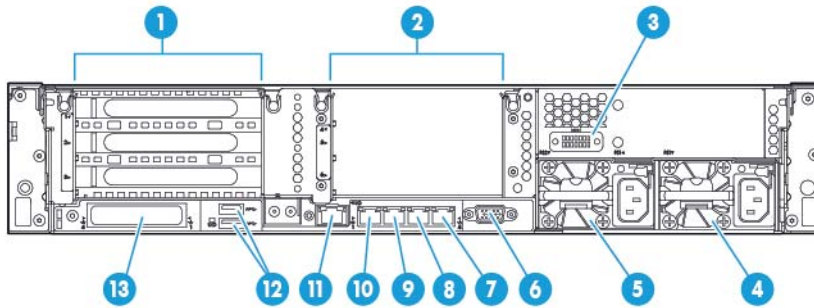
When the health LED on the front panel illuminates either amber or red, the server is experiencing a health event. Combinations of illuminated Systems Insight Display LEDs, the system power LED, and the health LED indicate system status.

Systems Insight Display LED and color	Health LED	System power LED	Status
Processor (amber)	Red	Amber	One or more of the following conditions may exist: <ul style="list-style-type: none"> Processor in socket <i>X</i> has failed. Processor <i>X</i> is not installed in the socket. Processor <i>X</i> is unsupported. ROM detects a failed processor during POST.
Processor (amber)	Amber	Green	Processor in socket <i>X</i> is in a pre-failure condition.
DIMM (amber)	Red	Green	One or more DIMMs have failed.
DIMM (amber)	Amber	Green	DIMM in slot <i>X</i> is in a pre-failure condition.
Over temp (amber)	Amber	Green	The Health Driver has detected a cautionary temperature level.
Over temp (amber)	Red	Amber	The server has detected a hardware critical temperature level.
PCI riser (amber)	Red	Green	The PCI riser cage is not seated properly.
Fan (amber)	Amber	Green	One fan has failed or has been removed.
Fan (amber)	Red	Green	Two or more fans have failed or been removed.
Power supply (amber)	Red	Amber	One or more of the following conditions may exist: <ul style="list-style-type: none"> Only one power supply is installed and that power supply is in standby. Power supply fault System board fault
Power supply (amber)	Amber	Green	One or more of the following conditions may exist: <ul style="list-style-type: none"> Redundant power supply is installed and only one power supply is functional. AC power cord is not plugged into redundant power supply. Redundant power supply fault. Power supply mismatch at POST or power supply mismatch through hot-plug addition.
Power cap (off)	—	Amber	Standby
Power cap (green)	—	Flashing green	Waiting for power
Power cap (green)	—	Green	Power is available.
Power cap (flashing amber)	—	Amber	Power is not available.



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

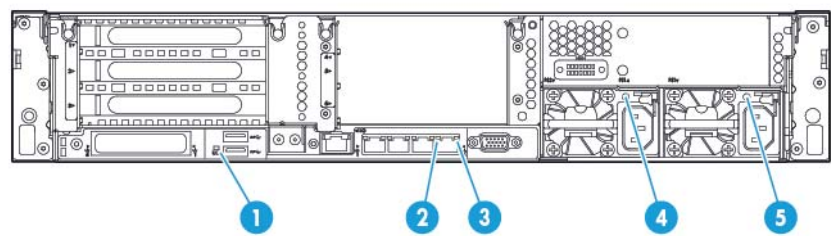
Rear panel components



Item	Description
1	PCIe slots 1–3 (top to bottom)
2	Optional PCIe slots 4–5 (top to bottom)*
3	Optional serial port
4	Power supply 1 (PS1)
5	Power supply 2 (PS2)
6	Video connector
7	1Gb RJ-45 port 4
8	1Gb RJ-45 port 3
9	1Gb RJ-45 port 2
10	1Gb RJ-45 port 1
11	iLO connector
12	USB connectors
13	FlexibleLOM option

*Requires second processor

Rear panel LEDs



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

Non-hot-plug PCI riser board slot definitions

- Primary riser cage connector, connected to processor 1 or the Southbridge

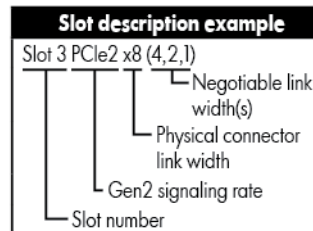
	PCIe 3-slot riser cage*	Optional PCIe 2-slot x 16 riser cage
1 - FL/FH	PCIe3 x16 (8, 4, 2, 1)	—
2 - HL/FH	PCIe3 x16 (8, 4, 2, 1)	PCIe3 x16 (16, 8, 4, 2, 1)
3 - HL/FH	PCIe3 x8 (8, 4, 2, 1)	PCIe3 x8 (8, 4, 2, 1)*

<ul style="list-style-type: none"> Secondary riser cage connector - connected to processor 2 (processor 2 must be installed) 		
	PCIe 3-slot riser cage*	
4 - FL/FH	PCIe3 x16 (16, 8, 4, 2, 1)	
5 - HL/FH	PCIe3 x16 (16, 8, 4, 2, 1)	
6 - HL/FH	PCIe3 x8 (8, 4, 2, 1)	

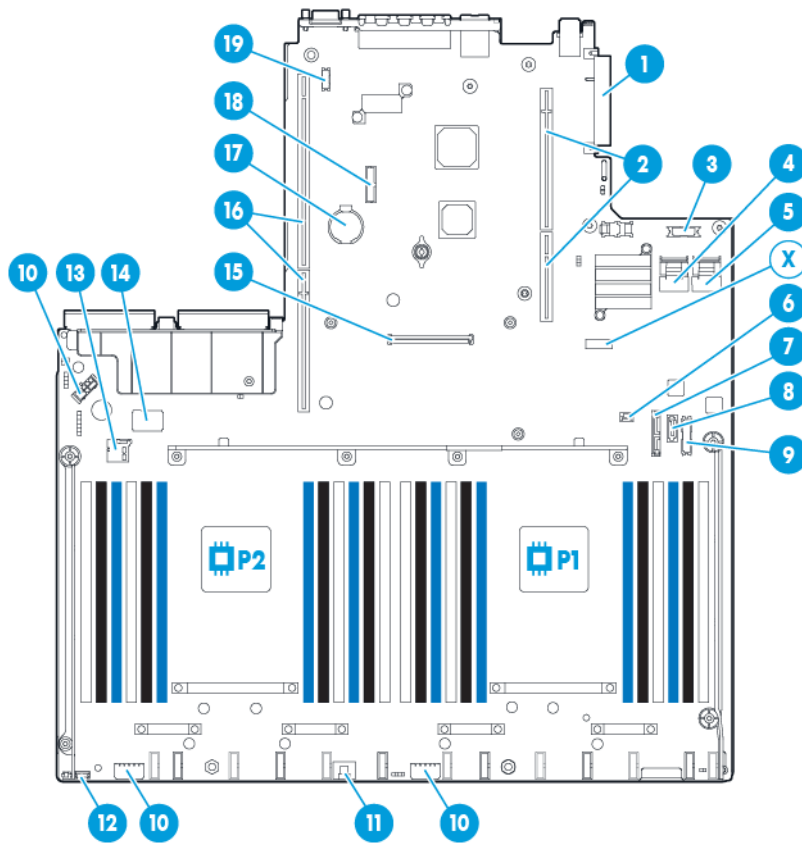
*The server ships with one PCIe3 riser cage installed in the primary riser cage connector.

Notes:

- "Primary" denotes the riser cage is installed in the primary riser connector.
- "Secondary" denotes the riser cage is installed in the secondary riser connector.
- Installing the riser cages listed in the table above in either the primary or secondary riser connectors determines the form factor of the PCI expansion boards supported by those riser cages.
- FL/FH denotes full-length, full-height. HL/FH denotes half-length, full-height.



System board components



Item	Description
1	FlexibleLOM connector
2	Primary (processor 1) PCI riser connector
3	Optical front VGA/USB 2.0 connector
4	x4 SATA port 1
5	x4 SATA port 2
6	Backplane presence detect connector
7	Optical/SATA port 5
8	SATA port 4
9	Front power/USB 3.0 connector
10	Drive backplane power connector
11	HP Smart Storage Battery connector
12	Optional Location Discovery Services connector
13	Micro SD card slot
14	Dual internal USB 3.0 connector
15	Smart Array/HBA connector


Item	Description
16	Secondary processor (processor 2) PCI riser connector
17	System battery
18	TPM connector
19	Optional serial port connector
X	System maintenance switch


System maintenance switch

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

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

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

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

 **IMPORTANT:** Before using the S7 switch to change to Legacy BIOS Boot Mode, be sure the HP Dynamic Smart Array B140i Controller is disabled. Do not use the B140i controller when the server is in Legacy BIOS Boot Mode.

NMI functionality

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

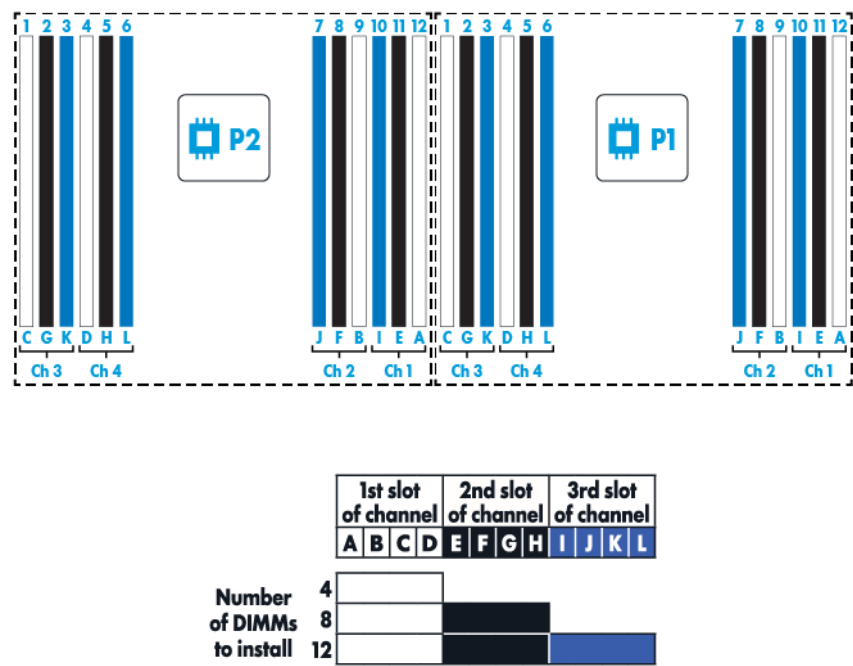
Crash dump log analysis is an essential part of diagnosing reliability problems, such as hangs in operating systems, device drivers, and applications. Many crashes freeze a system, and the only available action for administrators is to cycle the system power. Resetting the system erases any information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

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

For more information, go to the HP website <http://www.hp.com/support/NMI>.

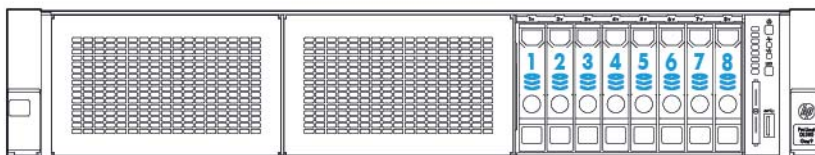
DIMM slot locations

DIMM slots are numbered sequentially (1 through 12) for each processor. The supported AMP modes use the letter assignments for population guidelines.

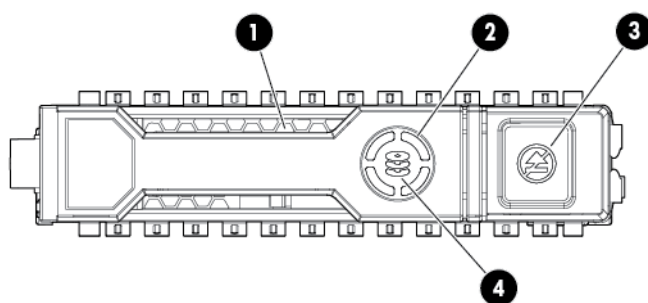


SAS and SATA device numbers

- SFF 8-device bay numbering




Hot-plug drive LED definitions



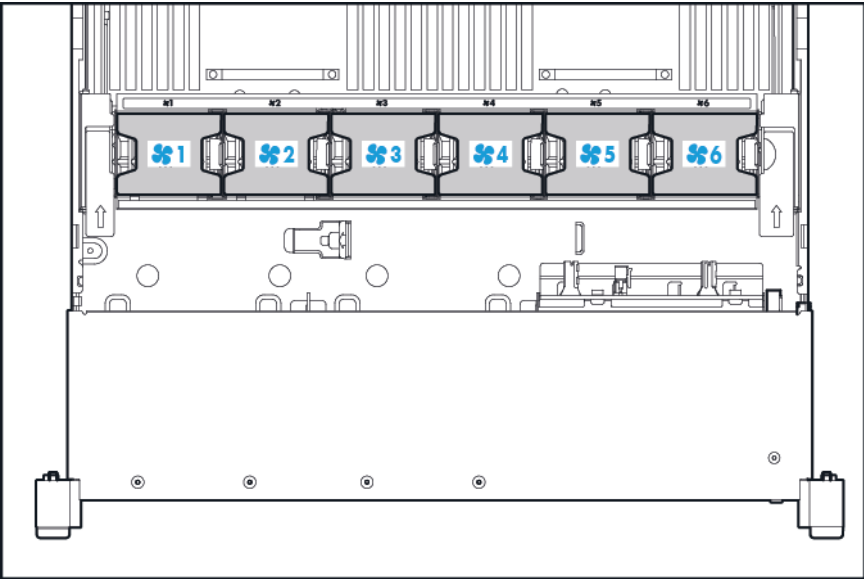
Item	LED	Status	Definition
1	Locate	Solid blue	The drive is being identified by a host application.
		Flashing blue	The drive carrier firmware is being updated or requires an update.
2	Activity ring	Rotating green	Drive activity
		Off	No drive activity
3	Do not remove	Solid white	Do not remove the drive. Removing the drive causes one or more of the logical drives to fail.
		Off	Removing the drive does not cause a logical drive to fail.
4	Drive status	Solid green	The drive is a member of one or more logical drives.
		Flashing green	The drive is rebuilding or performing a RAID migration, strip size migration, capacity expansion, or logical drive extension, or is erasing.
		Flashing amber/green	The drive is a member of one or more logical drives and predicts the drive will fail.
		Flashing amber	The drive is not configured and predicts the drive will fail.
		Solid amber	The drive has failed.
		Off	The drive is not configured by a RAID controller.

Hot-plug fans

-  **CAUTION:** To avoid damage to server components, fan blanks must be installed in fan bays 1 and 2 in a single-processor configuration.
- CAUTION:** To avoid damage to the equipment, do not operate the server for extended periods of time if the server does not have the optimal number of fans installed. Although the server might boot, HP does not recommend operating the server without the required fans installed and operating.

Valid fan configurations are listed in the following table.

Configuration	Fan bay 1	Fan bay 2	Fan bay 3	Fan bay 4	Fan bay 5	Fan bay 6
1 processor	Fan blank	Fan blank	Fan	Fan	Fan	Fan
1 processor, 24 SFF or 12 LFF configuration with high performance fans	Fan	Fan	Fan	Fan	Fan	Fan
2 processors	Fan	Fan	Fan	Fan	Fan	Fan




- For a single-processor configuration, four fans and two blanks are required in specific fan bays for redundancy. A fan failure or missing fan causes a loss of redundancy. A second fan failure or missing fan causes an orderly shutdown of the server.
- Installing more than the required number of fans in a single-processor configuration is not a supported configuration.
- For a dual-processor configuration, six fans are required for redundancy. A fan failure or missing fan causes a loss of redundancy. A second fan failure or missing fan causes an orderly shutdown of the server.
- The high performance fan option might be necessary for the following installations:
- Optional GPU riser installations
 - ASHRAE compliant configurations

For more information, go to the HP website <http://www.hp.com/go/proliant/ASHRAE>.

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

- At POST and in the OS, HP iLO performs an orderly shutdown if a cautionary temperature level is detected. If the server hardware detects a critical temperature level before an orderly shutdown occurs, the server performs an immediate shutdown.
- When the Thermal Shutdown feature is disabled in the BIOS/Platform Configuration (RBSU), HP iLO does not perform an orderly shutdown when a cautionary temperature level is detected. Disabling this feature does not disable the server hardware from performing an immediate shutdown when a critical temperature level is detected.

 **CAUTION:** A thermal event can damage server components when the Thermal Shutdown feature is disabled in the BIOS/Platform Configuration (RBSU).

3 Operations

Powering up the server

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

Powering down the server

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



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

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

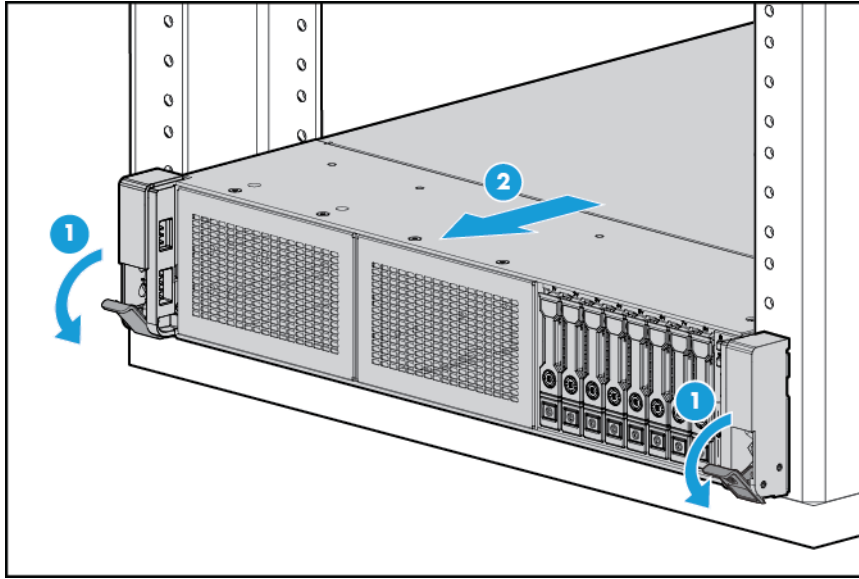
- Press and release the Power On/Standby button.
This method initiates a controlled shutdown of applications and the OS before the server enters standby mode.
- Press and hold the Power On/Standby button for more than 4 seconds to force the server to enter standby mode.
This method forces the server to enter standby mode without properly exiting applications and the OS. If an application stops responding, you can use this method to force a shutdown.
- Use a virtual power button selection through HP iLO.
This method initiates a controlled remote shutdown of applications and the OS before the server enters standby mode.

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

Extending the server from the rack

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

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



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


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


Removing the server from the rack

To remove the server from an HP, Compaq branded, telco, or third-party rack:

1. Power down the server (see [Powering down the server on page 16](#)).
2. Extend the server from the rack (see [Extending the server from the rack on page 17](#)).
3. Disconnect the cabling and remove the server from the rack. For more information, see the documentation that ships with the rack mounting option.
4. Place the server on a sturdy, level surface.

Removing the access panel

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

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

To remove the component:

1. Power down the server (see [Powering down the server on page 16](#)).
2. Extend the server from the rack (see [Extending the server from the rack on page 17](#)).
3. Open or unlock the locking latch, slide the access panel to the rear of the chassis, and remove the access panel.

Installing the access panel

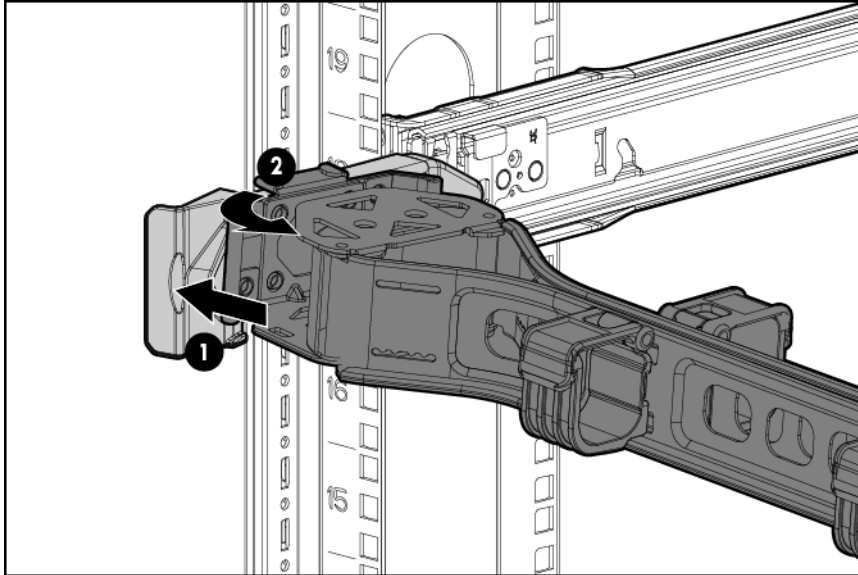
1. Place the access panel on top of the server with the hood latch open. Allow the panel to extend past the rear of the server approximately 1.25 cm (0.5 in).
2. Push down on the hood latch. The access panel slides to a closed position.
3. Tighten the security screw on the hood latch.

Accessing the product rear panel

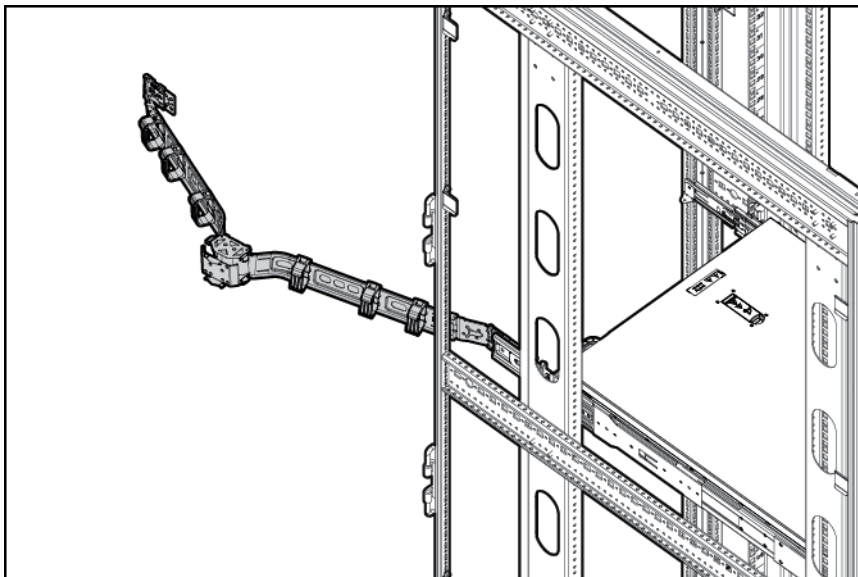
Opening the cable management arm

To access the server rear panel:

1. Release the cable management arm.



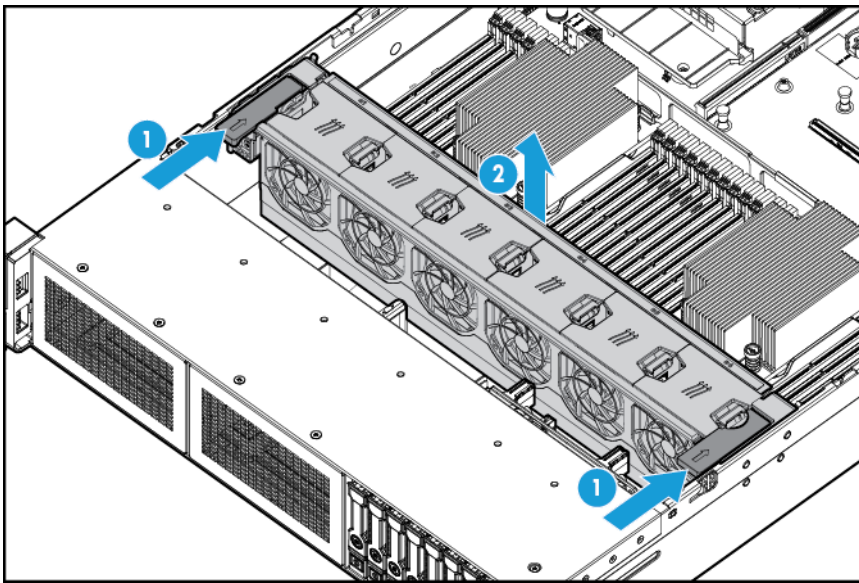
2. Open the cable management arm. Note that the cable management arm can be right-mounted or left-mounted.



Removing the fan cage

To remove the component:

1. Power down the server (see [Powering down the server on page 16](#)).
2. Remove all power:
 - a. Disconnect each power cord from the power source.
 - b. Disconnect each power cord from the server.
3. Extend the server from the rack, (see [Extending the server from the rack on page 17](#)) or remove the server from the rack.
4. Remove the access panel (see [Removing the access panel on page 18](#)).
5. Remove the fan cage.



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

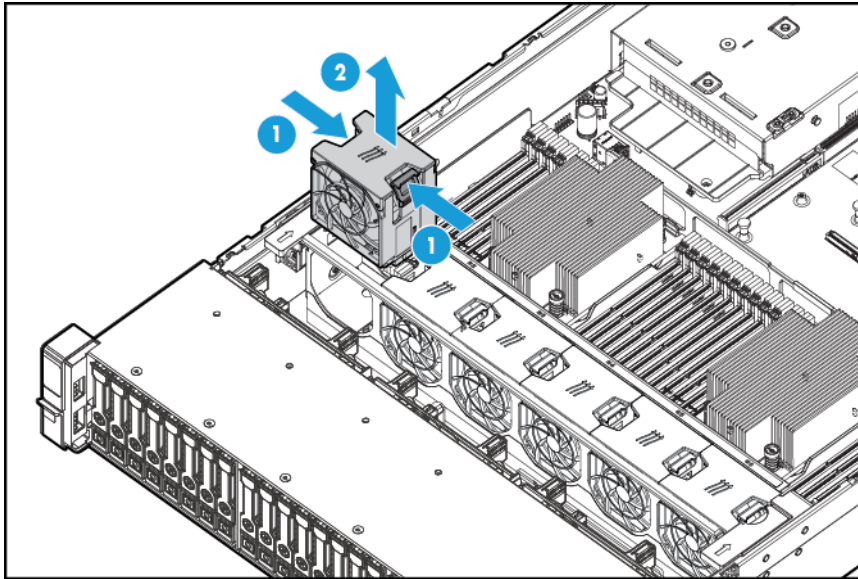
IMPORTANT: For optimum cooling, install fans in all primary fan locations. For more information, refer to the fan locations table, (see [Hot-plug fans on page 14](#)).

To replace the component, reverse the removal procedure.

Removing the hot-plug fan

To remove the component:

1. Power down the server (see [Powering down the server on page 16](#)).
2. Remove all power:
 - a. Disconnect each power cord from the power source.
 - b. Disconnect each power cord from the server.
3. Extend the server from the rack (see [Extending the server from the rack on page 17](#)).
4. Remove the access panel (see [Removing the access panel on page 18](#)).
5. Remove the fan.



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

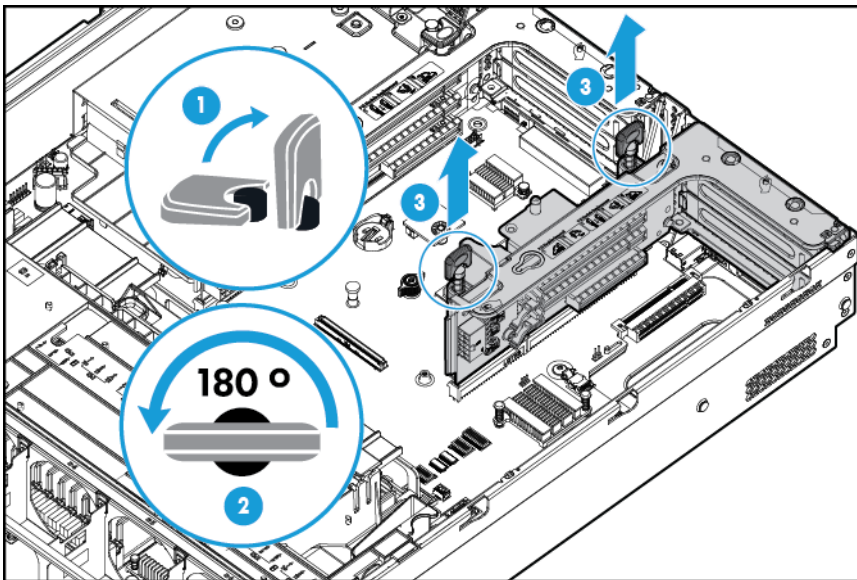
IMPORTANT: For optimum cooling, install fans in all primary fan locations. For more information, refer to the fan locations table ([Hot-plug fans on page 14](#)).

To replace the component, reverse the removal procedure.

Removing the PCI riser cage

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

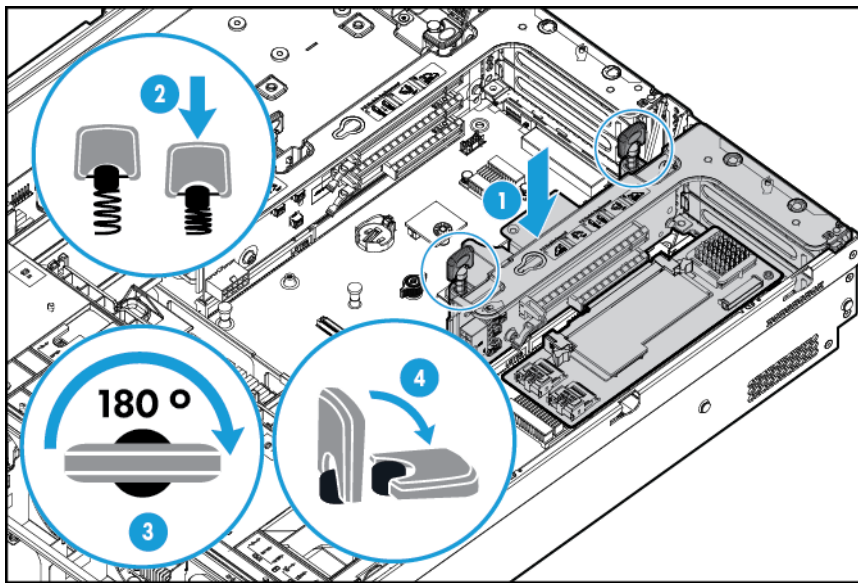
1. Power down the server (see [Powering down the server on page 16](#)).
2. Remove all power:
 - a. Disconnect each power cord from the power source.
 - b. Disconnect each power cord from the server.
3. Do one of the following:
 - Extend the server from the rack (see [Extending the server from the rack on page 17](#)).
 - Remove the server from the rack (see [Removing the server from the rack on page 17](#)).
4. Remove the access panel (see [Removing the access panel on page 18](#)).
5. Remove the PCI riser cage.



Installing the PCI riser cage

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

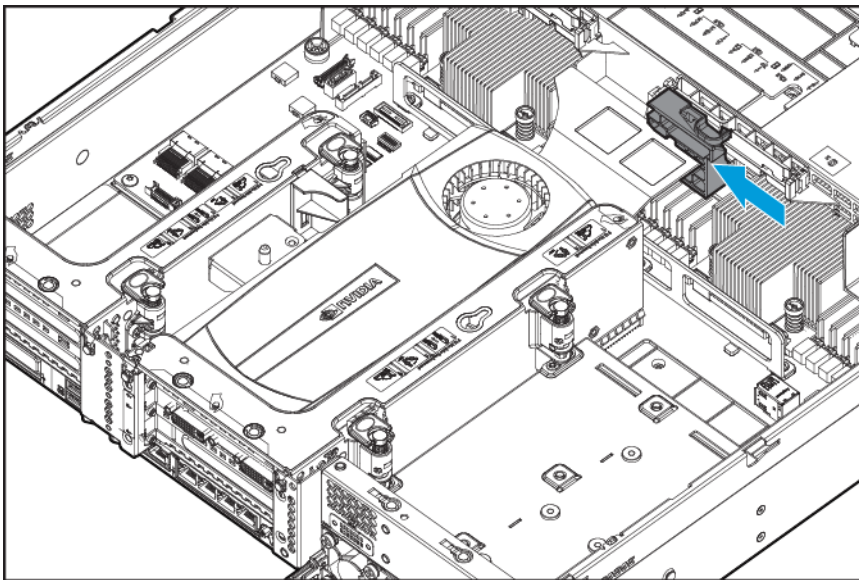
1. Power down the server, (see [Powering down the server on page 16](#)).
2. Remove all power:
 - a. Disconnect each power cord from the power source.
 - b. Disconnect each power cord from the server.
3. Do one of the following:
 - Extend the server from the rack (see [Extending the server from the rack on page 17](#)).
 - Remove the server from the rack (see [Removing the server from the rack on page 17](#)).
4. Remove the access panel (see [Removing the access panel on page 18](#)).
5. Install the PCI riser cage.



6. Install the access panel (see [Installing the access panel on page 18](#)).
7. Install the server into the rack (see [Installing the server into the rack on page 30](#)).
8. Connect each power cord to the server.
9. Connect each power cord to the power source.
10. Power up the server (see [Powering up the server on page 16](#)).

Securing the full-length expansion board retainer

1. Power down the server (see [Powering down the server on page 16](#)).
2. Remove all power:
 - a. Disconnect each power cord from the power source.
 - b. Disconnect each power cord from the server.
3. Extend the server from the rack (see [Extending the server from the rack on page 17](#)).
4. Remove the access panel (see [Removing the access panel on page 18](#)).
5. Install a full-length expansion board (see [Installing an expansion board on page 55](#)).
6. Install the PCI riser cage (see [Installing the PCI riser cage on page 23](#)).
7. Secure the full-length expansion board retainer.



8. Install the access panel (see [Installing the access panel on page 18](#)).
9. Install the server into the rack ([Installing the server into the rack on page 30](#)).
10. Connect each power cord to the server.
11. Connect each power cord to the power source.
12. Power up the server (see [Powering up the server on page 16](#)).

Removing the air baffle

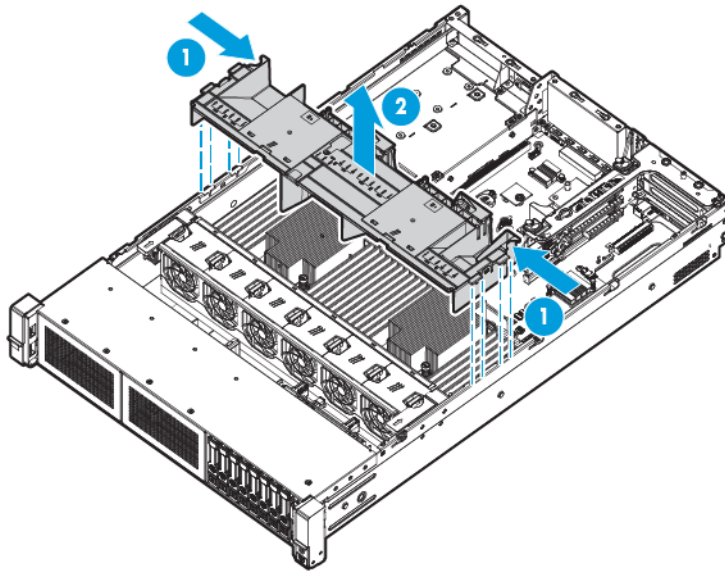
⚠ CAUTION: For proper cooling, do not operate the server without the access panel, baffles, expansion slot covers, or blanks installed. If the server supports hot-plug components, minimize the amount of time the access panel is open.

To remove the component:

1. Power down the server (see [Powering down the server on page 16](#)).
2. Remove all power:
 - a. Disconnect each power cord from the power source.
 - b. Disconnect each power cord from the server.
3. Extend the server from the rack (see [Extending the server from the rack on page 17](#)).
4. Remove the access panel (see [Removing the access panel on page 18](#)).

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

5. Remove the air baffle.



To replace the component, reverse the removal procedure.

4 Setup

Optional installation services

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

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

- Hardware support
 - 6-Hour Call-to-Repair
 - 4-Hour 24x7 Foundation Care
 - 4-Hour Same Business Day
- Software support
 - Bare Metal
 - Windows 7 Professional 64-bit
 - Red Hat Enterprise Linux Workstation 6.x
 - Red Hat Enterprise Linux Workstation 7.0
 - Hypervisor
 - VMWare ESXi 5.5
 - Citrix XenServer 6.5
 - Red Hat KVM
- Integrated hardware and software support
 - Critical Service
 - Proactive 24
 - Support Plus
 - Support Plus 24
- Startup and implementation services for both hardware and software

For more information on HP Care Pack Services, go to the HP website <http://www.hp.com/services/carepack>.

Optimum environment


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

Space and airflow requirements


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

- Leave a minimum clearance of 63.5 cm (25 in) in front of the rack.
- Leave a minimum clearance of 76.2 cm (30 in) behind the rack.
- Leave a minimum clearance of 121.9 cm (48 in) from the back of the rack to the back of another rack or row of racks.


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

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

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


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

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

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

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

- Front and rear doors—If the 42U rack includes closing front and rear doors, you must allow 5,350 sq cm (830 sq in) of holes evenly distributed from top to bottom to permit adequate airflow (equivalent to the required 64 percent open area for ventilation).
- Side—The clearance between the installed rack component and the side panels of the rack must be a minimum of 7 cm (2.75 in).

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

Temperature requirements

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

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

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

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

Power requirements

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

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

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

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


- Balance the server power load between available AC supply branch circuits.
- Do not allow the overall system AC current load to exceed 80% of the branch circuit AC current rating.
- Do not use common power outlet strips for this equipment.
- Provide a separate electrical circuit for the server.

Electrical grounding requirements


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

Because of the high ground-leakage currents associated with multiple servers connected to the same power source, HP recommends the use of a PDU that is either permanently wired to the building's branch circuit or includes a nondetachable cord that is wired to an industrial-style plug. NEMA locking-style plugs or those complying with IEC 60309 are considered suitable for this purpose. Using common power outlet strips for the server is not recommended.

Rack warnings

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

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

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

- At least two people are needed to safely unload the rack from the pallet. An empty 42U rack can weigh as much as 115 kg (253 lb), can stand more than 2.1 m (7 ft) tall, and might become unstable when being moved on its casters.
- Never stand in front of the rack when it is rolling down the ramp from the pallet. Always handle the rack from both sides.

Identifying the contents of the server shipping carton

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

The contents of the server shipping carton include:

- Server
- Power cord
- Hardware documentation, Documentation CD, and software products
- Rack-mounting hardware and documentation

In addition to the supplied items, you might need:

- Operating system or application software
- Hardware options
- Screwdriver

Installing hardware options

Install any hardware options before initializing the server. For options installation information, refer to the option documentation. For server-specific information, refer to [Hardware options installation on page 34](#).

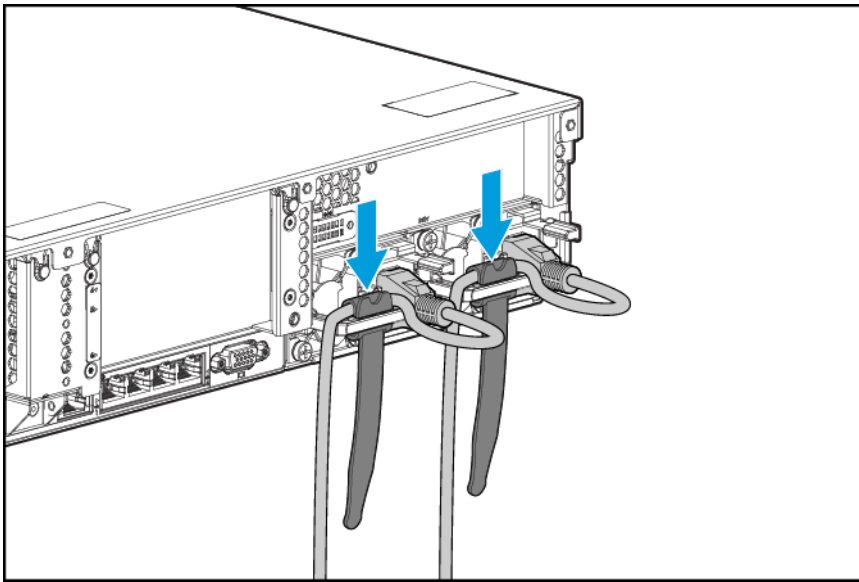
Installing the server into the rack

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


1. Install the server and cable management arm into the rack. For more information, see the installation instructions that ship with the 2U Quick Deploy Rail System.
2. Connect peripheral devices to the server. For information on identifying connectors, see [Rear panel components on page 7](#).

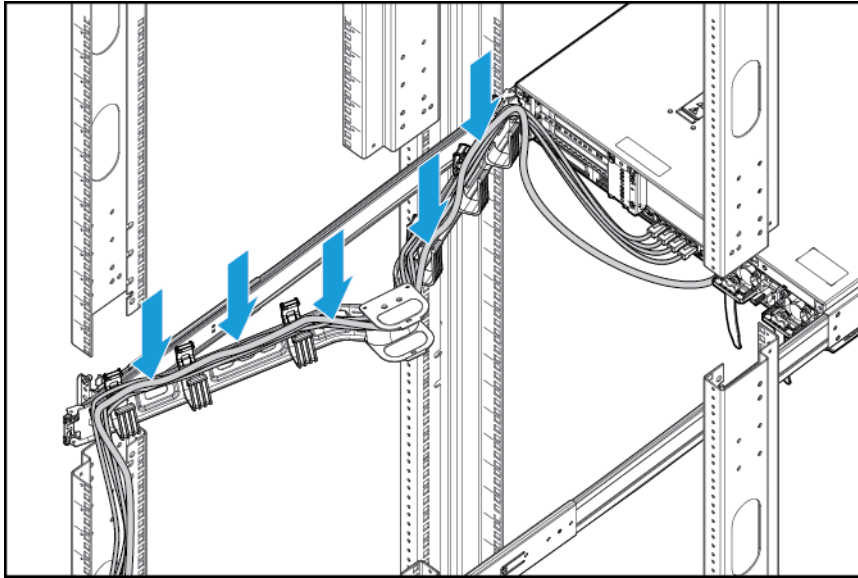
WARNING! To reduce the risk of electric shock, fire, or damage to the equipment, do not plug telephone or telecommunications connectors into RJ-45 connectors.

3. Connect the power cord to the rear of the server.
4. Install the power cord anchors.



5. Secure the cables to the cable management arm.

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



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

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

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

Installing the operating system

This virtual workstation does not ship with provisioning media. Everything needed to manage and install the system software and firmware is preloaded on the server.

To operate properly, the server must have a supported operating system. For the latest information on operating system support, go to the DL380z Gen9 Virtual Workstation QuickSpecs <http://h71069.www7.hp.com/quickspecs/overview.html>.

To install an operating system on the server with Intelligent Provisioning (local or remote), use one of the following methods:

- Intelligent Provisioning—iLO contains Intelligent Provisioning for embedded deployment, updating, and provisioning capabilities. Intelligent Provisioning can configure the server and install an operating system.

To install an operating system on the server with Intelligent Provisioning (local or remote), perform the following steps:

1. Connect the Ethernet cable between the network connector on the server and a network jack.
2. Press the **Power On/Standby** button.
3. During server POST, press the **F10** key.
4. Complete the initial **Preferences and Registration** portion of Intelligent Provisioning.
5. At the **1 Start** screen, click **Configure and Install**.
6. To finish the installation, follow the on-screen prompts. An Internet connection is required to update the firmware and systems software.

For more information about this installation method, go to the HP website <http://www.hp.com/go/ilo>.

- Remote deployment installation—To deploy an operating system remotely, use Insight Control server deployment for an automated solution. For more information about this installation method, go to the HP website <http://www.hp.com/go/ilo>.
- Using the installation media—to install Windows or Linux, use the installation media provided with your product. Use the installation instructions provided on the DVD.

For additional system software and firmware updates, go to the HP website <http://www.hp.com/support/DL380zGen9/download>. Software and firmware must be updated before using the server for the first time, unless any installed software or components require an older version.

Powering on and selecting boot options in UEFI Boot Mode

On servers operating in UEFI Boot Mode, the boot controller and boot order are set automatically.

1. Press the Power On/Standby button.
2. During the initial boot:
 - To modify the server configuration ROM default settings, press **F9** in the HP ProLiant POST screen to enter the UEFI System Utilities screen. By default, RBSU runs in the English language.
 - If you do not need to modify the server configuration and are ready to install the system software, press **F10** to access Intelligent Provisioning.

For more information on automatic configuration, go to the *HP UEFI System Utilities User Guide* on the HP website <http://www.hp.com/go/ProLiantUEFI/docs>.

Registering the server

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



5 Hardware options installation

Server QuickSpecs

For more information about product features, specifications, options, configurations, and compatibility, go to the product QuickSpecs on the HP website <http://www8.hp.com/h20195/v2/GetDocument.aspx?docname=c04484636>.



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 and fan option

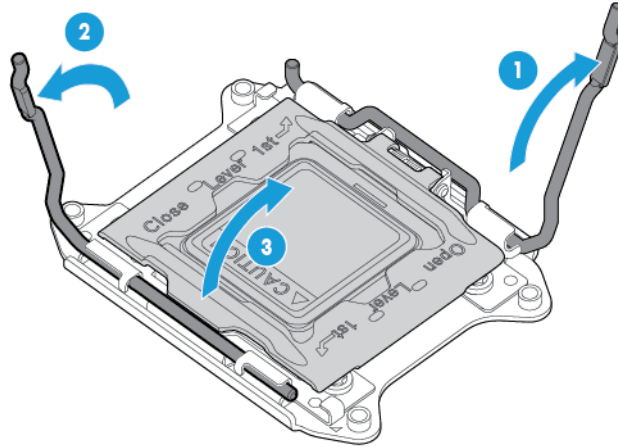
The server supports single-processor and dual-processor operations.

-
-  **CAUTION:** To avoid damage to the processor and system board, only authorized personnel should attempt to replace or install the processor in this server.
- CAUTION:** To prevent possible server malfunction and damage to the equipment, multiprocessor configurations must contain processors with the same part number.
-  **IMPORTANT:** If installing a processor with a faster speed, update the system ROM before installing the processor.
-

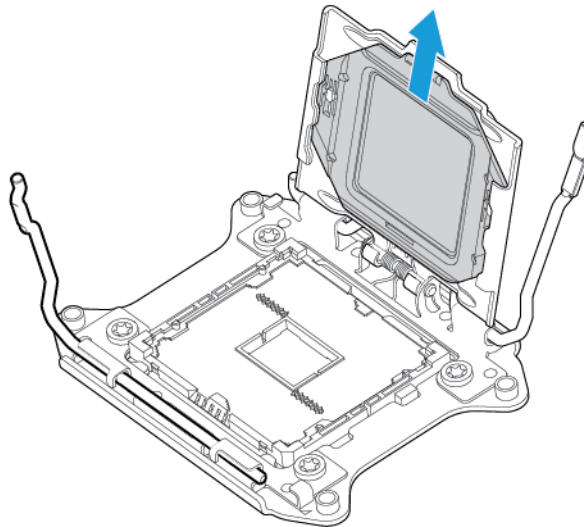
To install a processor:

1. [Powering down the server on page 16](#).
2. Remove all power:
 - a. Disconnect each power cord from the power source.
 - b. Disconnect each power cord from the server.
3. Do one of the following:
 - Extend the server from the rack (see [Extending the server from the rack on page 17](#)).
 - Remove the server from the rack (see [Removing the server from the rack on page 17](#)).
4. Remove the access panel (see [Removing the access panel on page 18](#)).
5. Remove the air baffle (see [Removing the air baffle on page 25](#)).
6. Remove the processor blank.

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

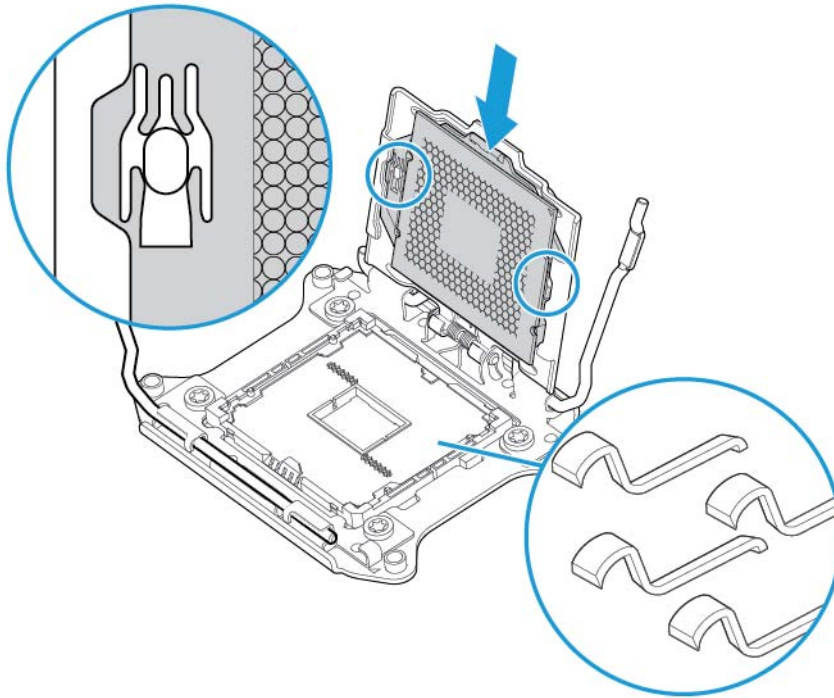


8. Remove the clear processor socket cover. Retain the processor socket cover for future use.



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

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

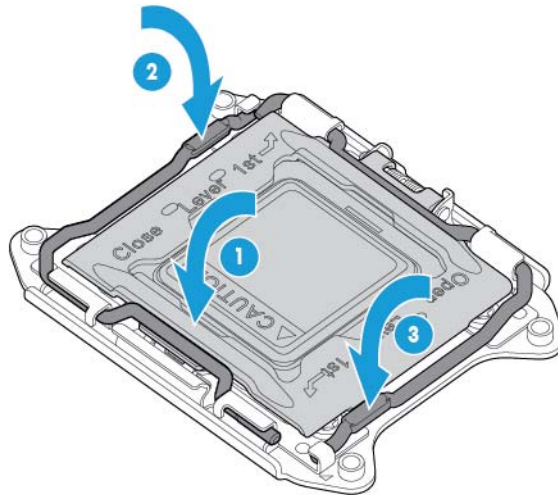


10. Close the processor retaining bracket. When the processor is installed properly inside the processor retaining bracket, the processor retaining bracket clears the flange on the front of the socket.

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

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

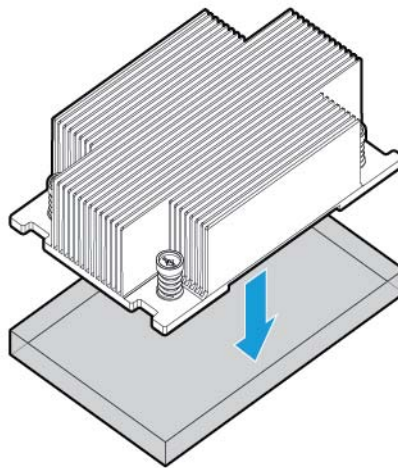
11. Press and hold the processor retaining bracket in place, and then close each processor locking lever. Press only in the area indicated on the processor retaining bracket.



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

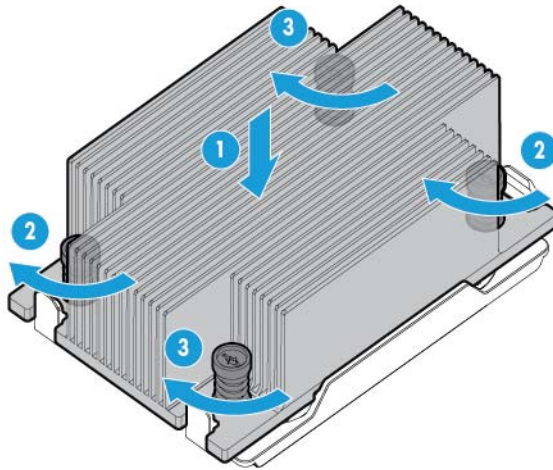
12. Remove the heatsink cover.

CAUTION: After the cover is removed, do not touch the thermal interface media.

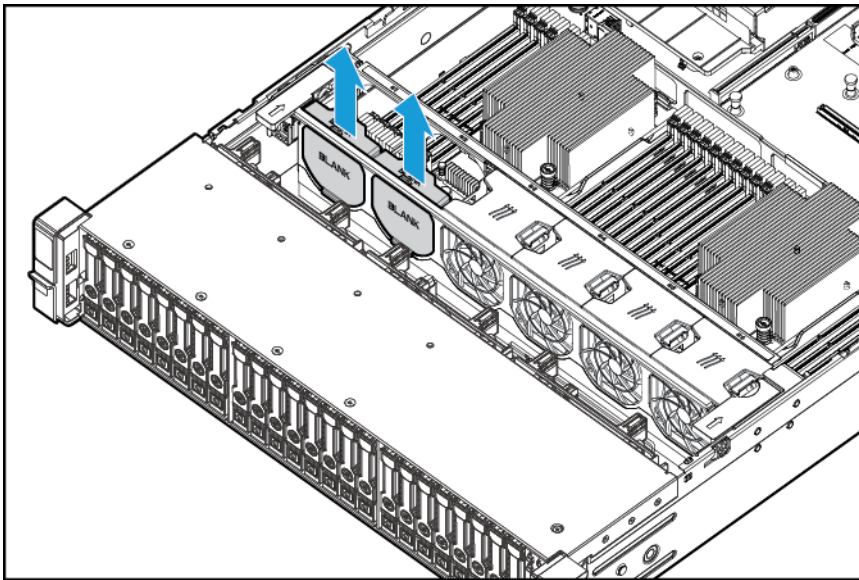


NOTE: Actual heatsink may vary.

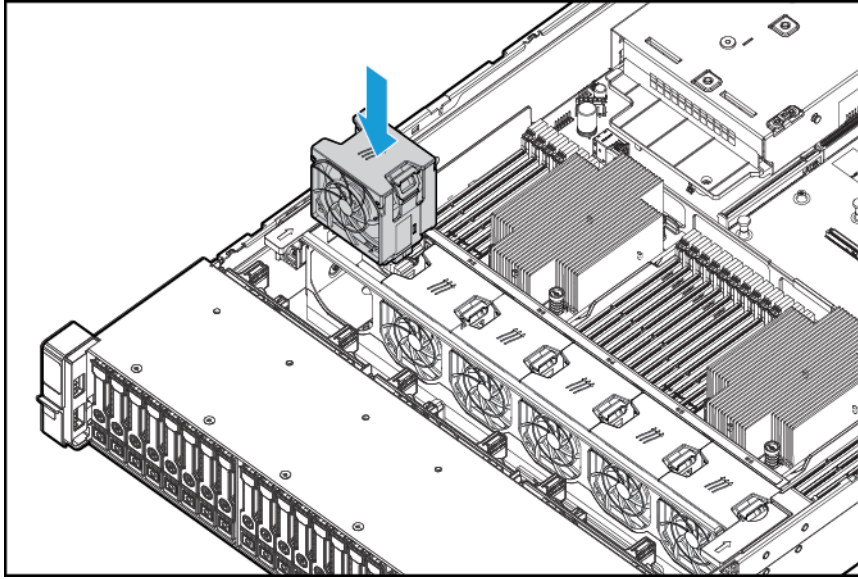
13. Install the heatsink:
 - a. Position the heatsink on the processor backplate.
 - b. Tighten one pair of diagonally opposite screws halfway, and then tighten the other pair of screws.
 - c. Finish the installation by completely tightening the screws in the same sequence.



- 14.** Remove the fan blanks from locations 1 and 2. For fan location and numbering information, see [Hot-plug fans on page 14](#) or the label attached to the chassis next to the fans.



- 15.** Install the fans into locations 1 and 2.



- 16.** Install the air baffle.
- 17.** Install the access panel, see [Installing the access panel on page 18](#).
- 18.** Install the server into the rack.
- 19.** Connect each power cord to the server.
- 20.** Connect each power cord to the power source.
- 21.** Press the Power On/Standby button.
- 22.** The server exits standby mode and applies full power to the system. The system power LED changes from amber to green.

Memory options



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

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

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

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

The server supports the following DIMM speeds:

- Single- and dual-rank PC4-2133 (DDR4-2133) RDIMMs operating at up to 2133 MT/s
- Quad-rank PC4L-2133 (DDR4-2133) LRDIMMs operating at up to 2133 MT/s.

Speed and capacity

DIMM type	DIMM rank	DIMM capacity	Native speed (MT/s)
RDIMM	Single-rank	8 GB	2133
RDIMM	Dual-rank	16 GB	2133
LRDIMM	Quad-rank	32 GB	2133

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

Populated DIMM speed (MT/s)

DIMM type	DIMM rank	1 DIMM per channel	2 DIMMs per channel	3 DIMMs per channel
RDIMM	Single-rank (8 GB)	2133	2133	1600
RDIMM	Dual-rank (16 GB)	2133	2133	1600
LRDIMM	Quad-rank (32 GB)	2133	2133	1600

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

HP SmartMemory

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

Memory subsystem architecture

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

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

For the location of the slot numbers, see [DIMM slot locations on page 12](#).

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

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

Single-, dual-, and quad-rank DIMMs

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

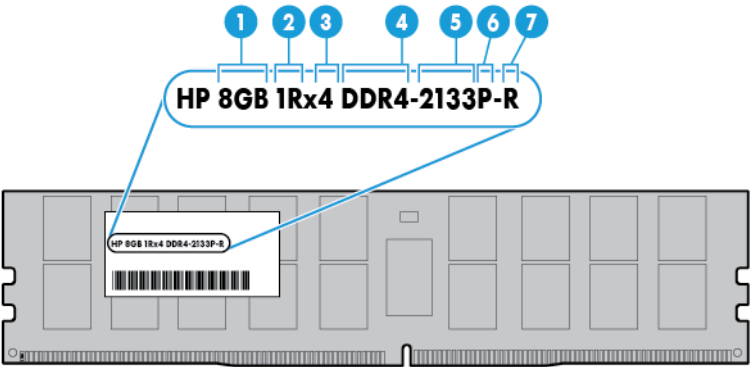
A single-rank DIMM has one set of memory chips that is accessed while writing to or reading from the memory. A dual-rank DIMM is similar to having two single-rank DIMMs on the same module, with only one rank accessible at a time. A quad-rank DIMM is, effectively, two dual-rank DIMMs on the same module.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

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

LRDIMMs are labeled as quad-rank DIMMs. There are four ranks of DRAM on the DIMM, but the LRDIMM buffer creates an abstraction that allows the DIMM to appear as a dual-rank DIMM to the system. The LRDIMM buffer isolates the electrical loading of the DRAM from the system to allow for faster operation. This allows higher memory operating speed compared to quad-rank RDIMMs.

DIMM identification

To determine DIMM characteristics, use the label attached to the DIMM and the following illustration and table.



Item	Description	Definition
1	Capacity	8 GB
		16 GB
		32 GB
2	Rank	1R = Single-rank
		2R = Dual-rank
		4R = Quad-rank
3	Data width	x4 = 4-bit
		x8 = 8-bit
4	Memory generation	DDR4
5	Maximum memory speed	2133 MT/s
6	CAS latency	P = 15
7	DIMM type	R = RDIMM (registered)
		L = LRDIMM (load reduced)

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

Memory configurations

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

- Advanced ECC—provides up to 4-bit error correction and enhanced performance over Lockstep mode. This mode is the default option for this server.
- Online spare memory—provides protection against failing or degraded DIMMs. Certain memory is reserved as spare, and automatic failover to spare memory occurs when the system detects a DIMM

that is degrading. This allows DIMMs that have a higher probability of receiving an uncorrectable memory error (which would result in system downtime) to be removed from operation.

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

Table 5-1 Maximum capacity

DIMM type	DIMM rank	One processor	Two processors
RDIMM	Single-rank (8 GB)	96 GB	192 GB
RDIMM	Dual-rank (16 GB)	192 GB	384 GB
LRDIMM	Quad-rank (32 GB)	384 GB	768 GB

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

Advanced ECC memory configuration

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

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

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

Online Spare memory configuration

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

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

General DIMM slot population guidelines

Observe the following guidelines for all AMP modes:

- Install DIMMs only if the corresponding processor is installed.
- When two processors are installed, balance the DIMMs across the two processors.
- White DIMM slots denote the first slot of a channel (Ch 1-A, Ch 2-B, Ch 3-C, Ch 4-D).
- Do not mix RDIMMs and LRDIMMs.
- When one processor is installed, install DIMMs in sequential alphabetic order: A, B, C, D, E, F, and so forth.
- When two processors are installed, install the DIMMs in sequential alphabetical order balanced between the two processors: P1-A, P2-A, P1-B, P2-B, P1-C, P2-C, and so forth.
- When single-rank, dual-rank, and quad-rank DIMMs are populated for two DIMMs per channel or three DIMMs per channel, always populate the higher number rank DIMM first (starting from the farthest slot). For example, first quad-rank DIMM, then dual-rank DIMM, and then lastly single-rank DIMM.
- DIMMs should be populated starting farthest from the processor on each channel.
- For DIMM spare replacement, install the DIMMs per slot number as instructed by the system software.

For more information about server memory, go to the HP website <http://www.hp.com/go/memory>.

DIMM speeds are supported as indicated in the following table.

Populated slots (per channel)	Rank	Speeds supported (MT/s)
1	Single, dual-, or quad-rank	2133
2	Single- or dual-rank	2133
2	Quad-rank	2133
3	Single-, dual-, or quad-rank	1600

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

Advanced ECC population guidelines

For Advanced ECC mode configurations, observe the following guidelines:

- Observe the general DIMM slot population guidelines (see [General DIMM slot population guidelines on page 44](#)).
- DIMMs may be installed individually.

Online spare population guidelines

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

- Observe the general DIMM slot population guidelines (see [General DIMM slot population guidelines on page 44](#)).
- Each channel must have a valid online spare configuration.

- Each channel can have a different valid online spare configuration.
- Each populated channel must have a spare rank: A single dual-rank DIMM is not a valid configuration.

Population order

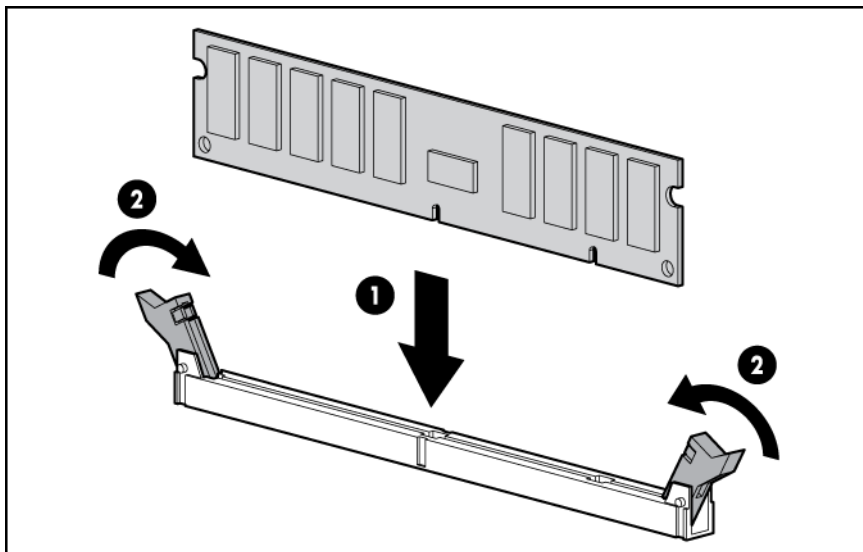
For memory configurations with a single processor or multiple processors, DIMMs must be populated sequentially in alphabetical order (A through L).

After installing the DIMMs, use the BIOS/Platform Configuration (RBSU) in the UEFI System Utilities to configure supported AMP modes.

Installing a DIMM

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

1. Power down the server (see [Powering down the server on page 16](#)).
2. Remove all power:
 - a. Disconnect each power cord from the power source.
 - b. Disconnect each power cord from the server.
3. Do one of the following:
 - a. Extend the server from the rack (see [Extending the server from the rack on page 17](#)).
 - b. Remove the server from the rack (see [Removing the server from the rack on page 17](#)).
4. Remove the access panel (see [Removing the access panel on page 18](#)).
5. Remove the air baffle (see [Removing the air baffle on page 25](#)).
6. Open the DIMM slot latches.
7. Install the DIMM.



8. Install the air baffle.
9. Install the access panel (see [Installing the access panel on page 18](#)).
10. Install the server into the rack (see [Installing the server into the rack on page 30](#)).

11. Connect each power cord to the server.
12. Connect each power cord to the power source.
13. Power up the server (see [Powering up the server on page 16](#)).

Use the BIOS/Platform Configuration (RBSU) in the UEFI System Utilities to configure the memory mode.

For more information about LEDs and troubleshooting failed DIMMs, see [Systems Insight Display LED combinations on page 5](#).

Hot-plug hard drive options

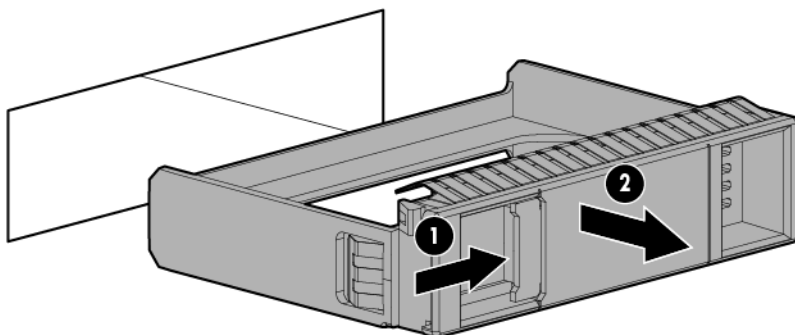
When adding hard drives to the server, observe the following general guidelines:

- The system automatically sets all device numbers.
- If only one drive is used, install it in the bay with the lowest device number.
- Drives should be the same capacity to provide the greatest storage space efficiency when drives are grouped together into the same drive array.

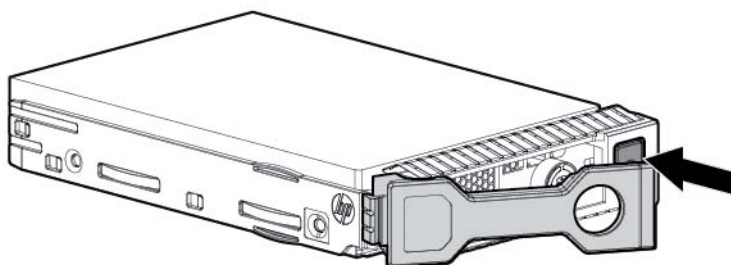
Installing a hot-plug SAS or SATA hard drive

To install the component:

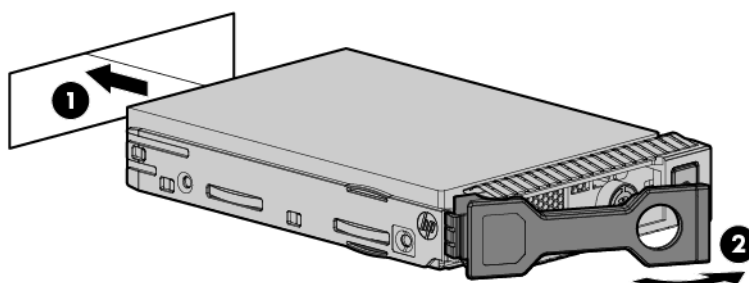
1. Remove the drive blank.



2. Prepare the drive.



3. Install the drive.

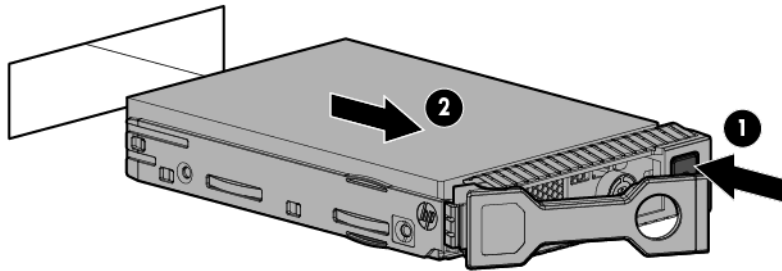


4. Determine the status of the drive from the drive LED definitions (see [Hot-plug drive LED definitions on page 13](#)).

Removing a hot-plug SAS or SATA hard drive

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

1. Determine the status of the drive from the hot-plug SAS drive LED combinations (see [Hot-plug drive LED definitions on page 13](#)).
2. Back up all server data on the drive.
3. Remove the drive.

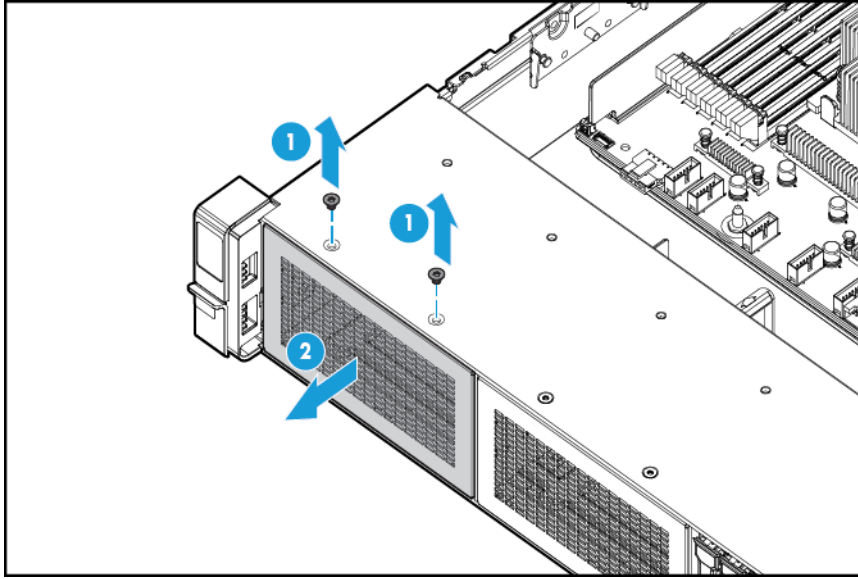


Universal media bay option

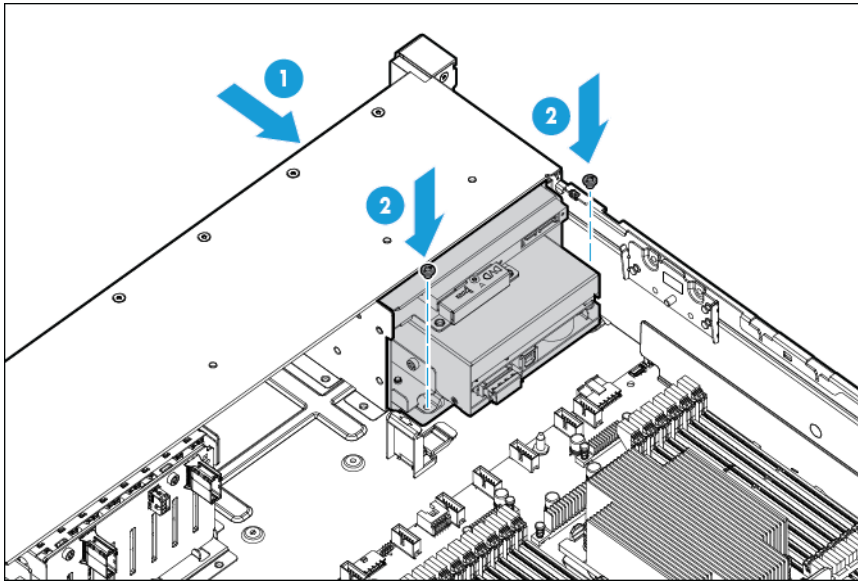
The following procedure provides the steps to install the universal media bay option, route the VGA and USB cables, and install an optional optical disk drive. The universal media bay option also accommodates the two-bay SFF front drive cage option.

1. Power down the server (see [Powering down the server on page 16](#)).
2. Remove all power:
 - a. Disconnect each power cord from the power source.
 - b. Disconnect each power cord from the server.
3. Do one of the following:
 - Extend the server from the rack (see [Extending the server from the rack on page 17](#)).
 - Remove the server from the rack (see [Removing the server from the rack on page 17](#)).
4. Remove the access panel (see [Removing the access panel on page 18](#)).
5. Remove the air baffle (see [Removing the air baffle on page 25](#)).
6. Remove the fan cage (see [Removing the fan cage on page 20](#)).

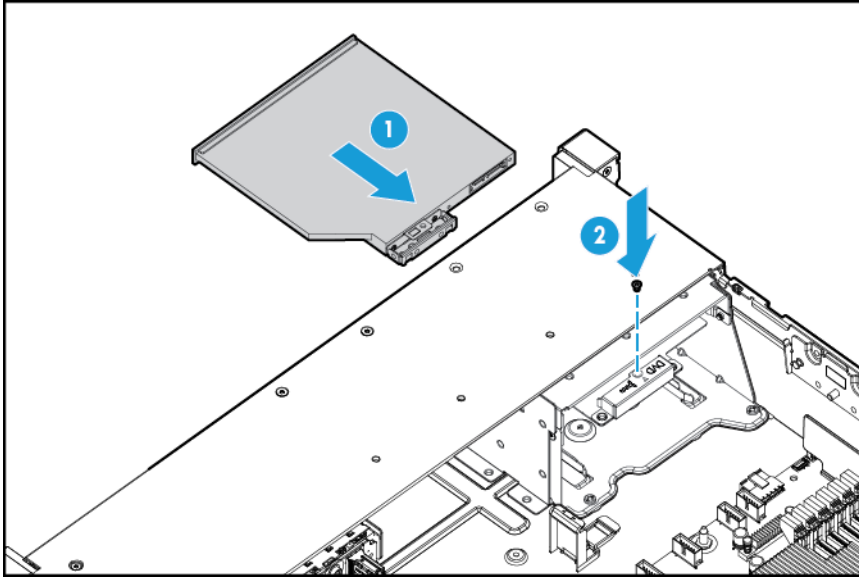
7. Remove the bay blank.



8. Route the USB/VGA cables through the opening, and then install the universal media bay.

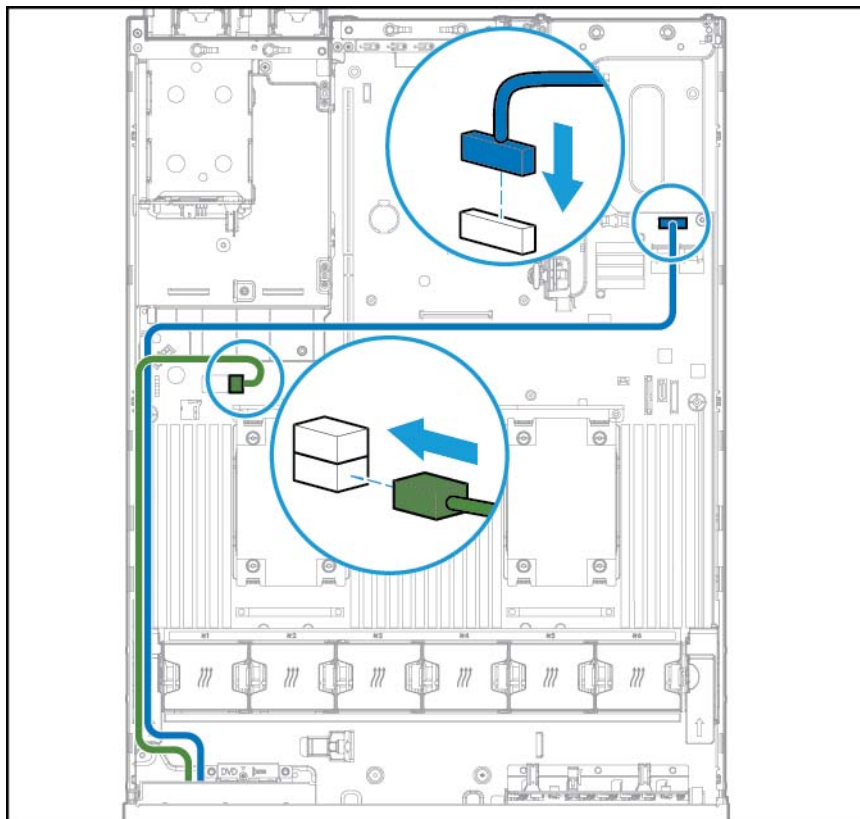


9. Install the optional optical disk drive (optional).

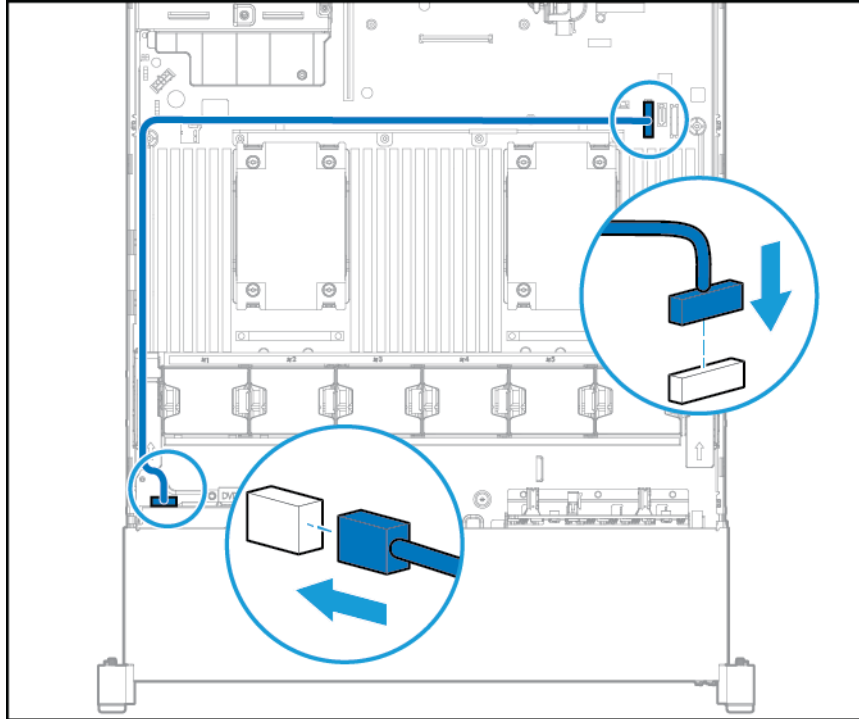


10. Connect the cables:

- a. Connect the VGA cable to the optional VGA connector. Connect the USB cable to the front dual internal USB 3.0 connector.



- b. Connect the SATA optical drive cable to the front optical disk drive connector (optional).



11. Install the fan cage.
12. Install the air baffle.
13. Install the access panel (see [Installing the access panel on page 18](#)).
14. Slide the server into the rack.
15. Connect each power cord to the server.
16. Connect each power cord to the power source.
17. Power up the server (see [Powering up the server on page 16](#)).

Redundant hot-plug power supply option

CAUTION: All power supplies installed in the server must have the same output power capacity. Verify that all power supplies have the same part number and label color. The system becomes unstable and may shut down when it detects mismatched power supplies.

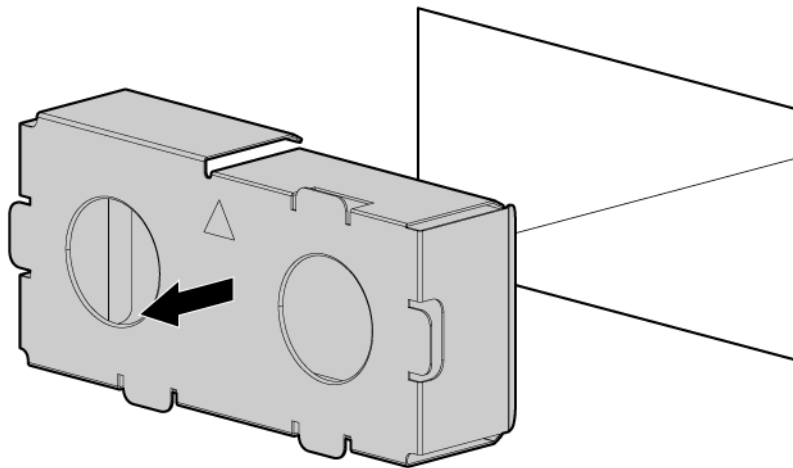
CAUTION: To prevent improper cooling and thermal damage, do not operate the server unless all bays are populated with either a component or a blank.

To install the component:

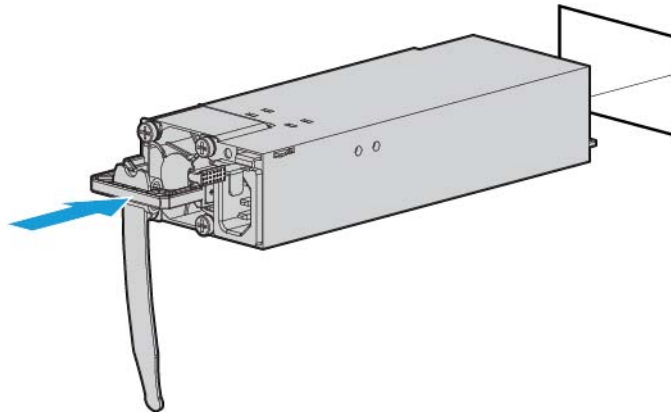
1. Access the product rear panel (see [Accessing the product rear panel on page 19](#)).

2. Remove the blank.

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



3. Insert the power supply into the power supply bay until it clicks into place.



4. Connect the power cord to the power supply.
5. Route the power cord. Use best practices when routing power cords and other cables. A cable management arm is available to help with routing. To obtain a cable management arm, contact an HP authorized reseller.
6. Connect the power cord to the AC power source.
7. Be sure that the power supply LED is green (see [Rear panel LEDs on page 8](#)).

Expansion board options

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

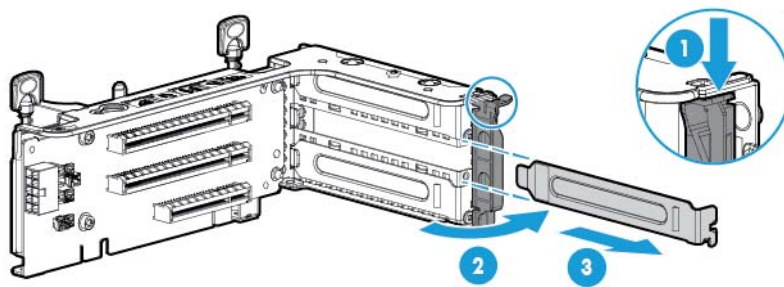
Removing an expansion slot blank

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

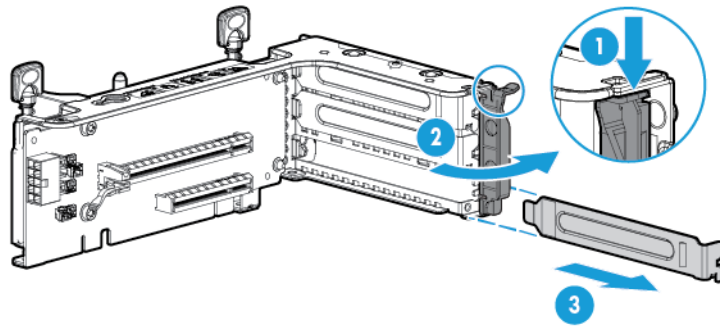
⚠ CAUTION: For proper cooling, do not operate the server without the access panel, baffles, expansion slot covers, or blanks installed. If the server supports hot-plug components, minimize the amount of time the access panel is open.

To remove the component:

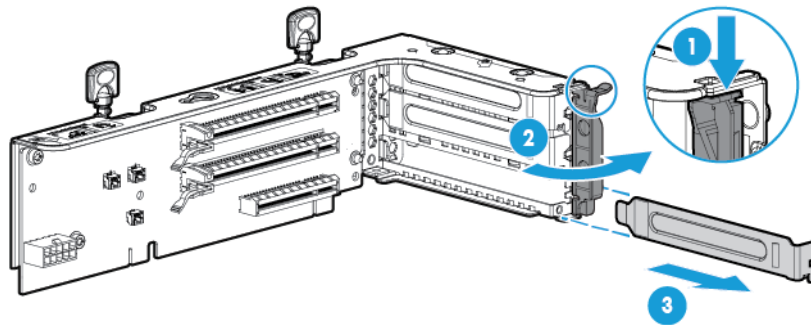
1. Power down the server (see [Powering down the server on page 16](#)).
2. Remove all power:
 - a. Disconnect each power cord from the power source.
 - b. Disconnect each power cord from the server.
3. Do one of the following:
 - a. Extend the server from the rack (see [Extending the server from the rack on page 17](#)).
 - b. [Removing the server from the rack on page 17](#).
4. Remove the access panel (see [Removing the access panel on page 18](#)).
5. Remove the PCI riser cage (see [Removing the PCI riser cage on page 22](#)).
6. Remove the expansion slot blank:
 - Primary PCI riser cage



- Optional primary PCI riser cage



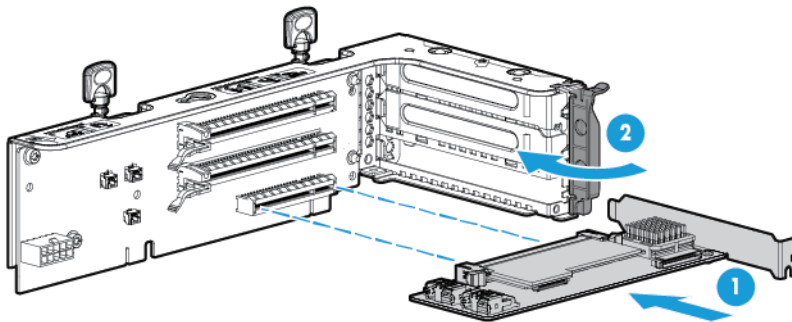
- Secondary PCI riser cage



To replace the component, reverse the removal procedure.

Installing an expansion board

1. Power down the server (see [Powering down the server on page 16](#)).
2. Remove all power:
 - a. Disconnect each power cord from the power source.
 - b. Disconnect each power cord from the server.
3. Do one of the following:
 - Extend the server from the rack (see [Extending the server from the rack on page 17](#)).
 - Remove the server from the rack (see [Removing the server from the rack on page 17](#)).
4. Remove the access panel (see [Removing the access panel on page 18](#)).
5. Remove the PCI riser cage (see [Removing the PCI riser cage on page 22](#)).
6. Remove the expansion slot blank (see [Removing an expansion slot blank on page 53](#)).
7. Install the expansion board.



8. Connect any required internal or external cables to the expansion board. See the documentation that ships with the expansion board.
9. Install the PCI riser cage (see [Installing the PCI riser cage on page 23](#)).
10. Install the access panel (see [Installing the access panel on page 18](#)).
11. Install the server into the rack ([Installing the server into the rack on page 30](#)).
12. Connect each power cord to the server.
13. Connect each power cord to the power source.
14. Power up the server (see [Powering up the server on page 16](#)).

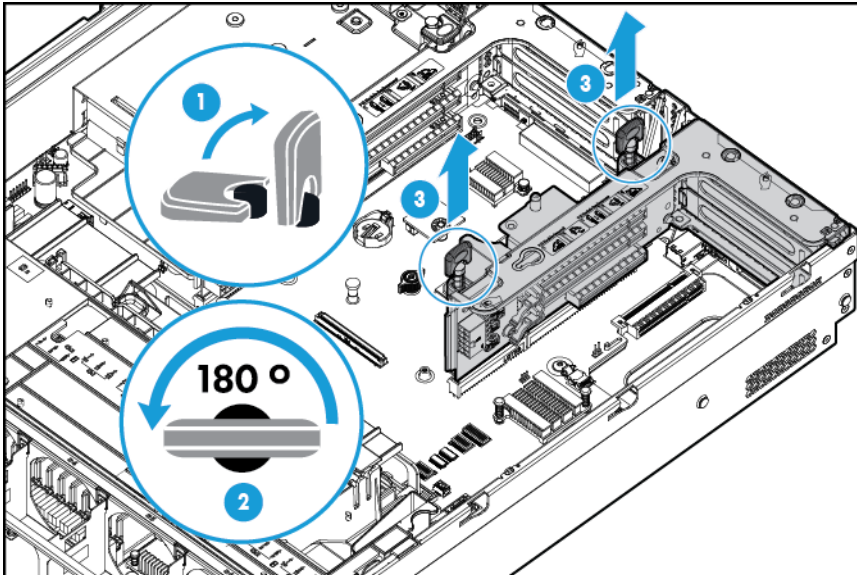
2-slot PCI riser cage option

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

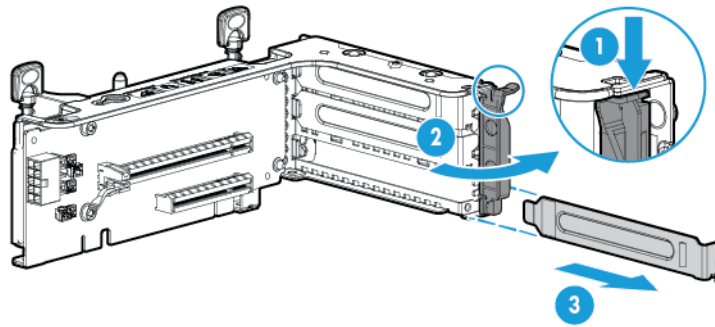
⚠ CAUTION: To prevent improper cooling and thermal damage, do not operate the server unless all PCI slots have either an expansion slot cover or an expansion board installed.

To install the component:

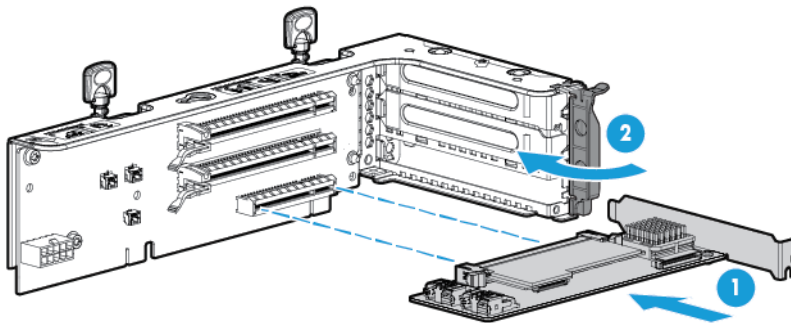
1. Power down the server (see [Powering down the server on page 16](#)).
2. Remove all power:
 - a. Disconnect each power cord from the power source.
 - b. Disconnect each power cord from the server.
3. Do one of the following:
 - Extend the server from the rack (see [Extending the server from the rack on page 17](#)).
 - Remove the server from the rack (see [Removing the server from the rack on page 17](#)).
4. Remove the access panel (see [Removing the access panel on page 18](#)).
5. Remove the standard PCI riser from the primary slot.



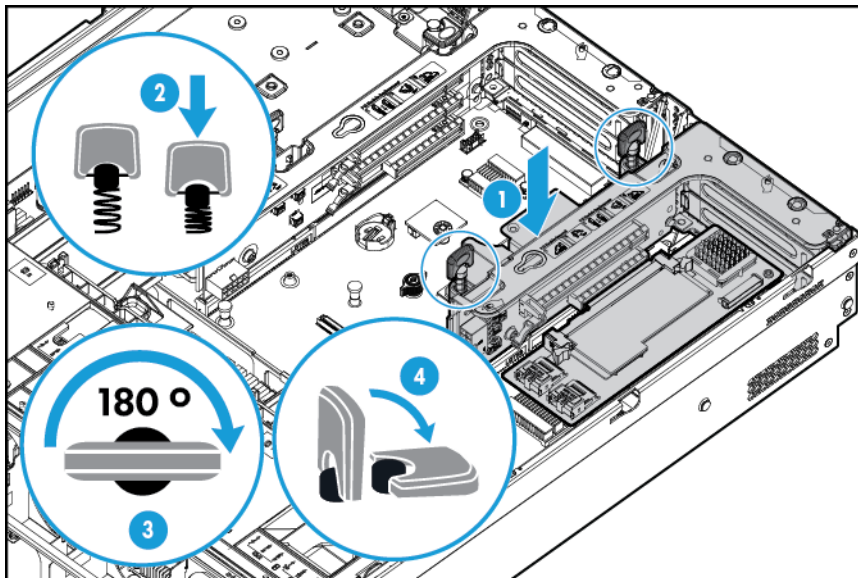
6. Remove the blank from the optional 2-slot PCI riser cage.



7. Install an optional expansion board into the PCI riser cage.



8. Install the optional 2-slot PCI riser cage.



9. Connect any required internal or external cables to the expansion board. See the documentation that ships with the expansion board.
10. Install the access panel (see [Installing the access panel on page 18](#)).
11. Slide the server into the rack.

12. Connect each power cord to the server.
13. Connect each power cord to the power source.
14. Power up the server (see [Powering up the server on page 16](#)).

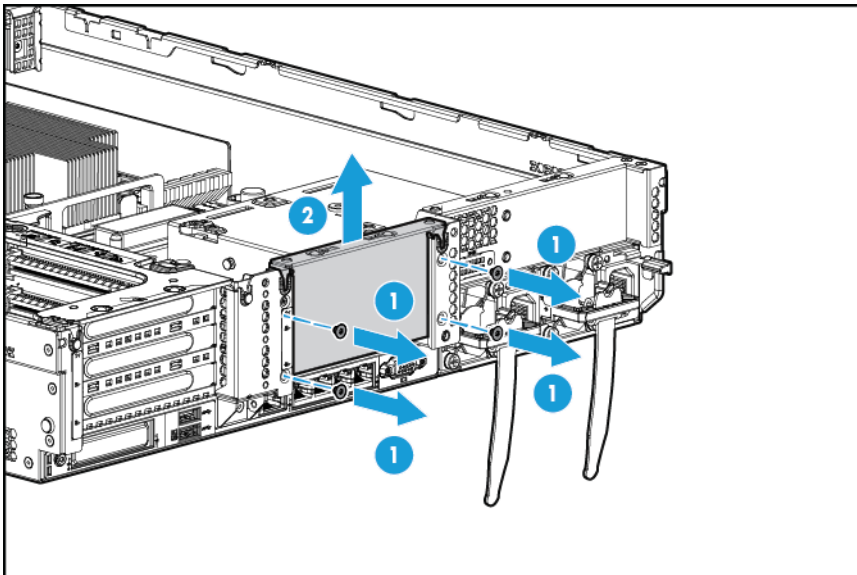
3-slot PCI riser cage option

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

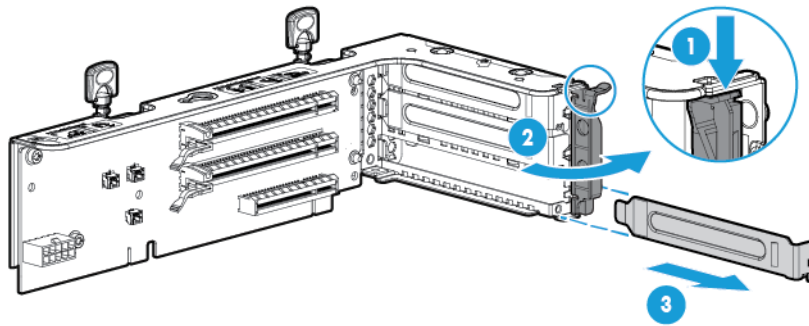
⚠ CAUTION: To prevent improper cooling and thermal damage, do not operate the server unless all PCI slots have either an expansion slot cover or an expansion board installed.

To install the component:

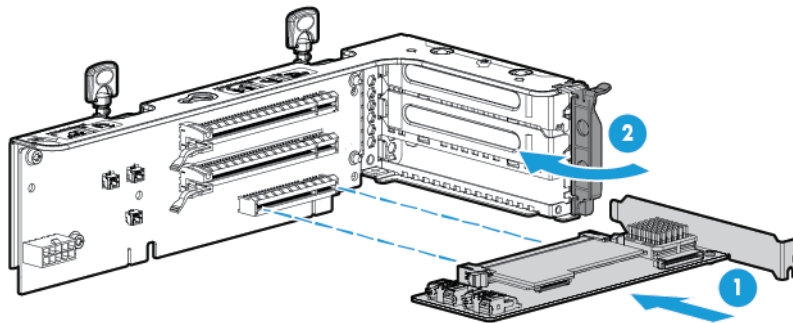
1. Power down the server (see [Powering down the server on page 16](#)).
2. Remove all power:
 - a. Disconnect each power cord from the power source.
 - b. Disconnect each power cord from the server.
3. Do one of the following:
 - Extend the server from the rack (see [Extending the server from the rack on page 17](#)).
 - Remove the server from the rack (see [Removing the server from the rack on page 17](#)).
4. Remove the access panel (see [Removing the access panel on page 18](#)).
5. Remove the secondary PCI riser blank. Some models might require removing only two screws.



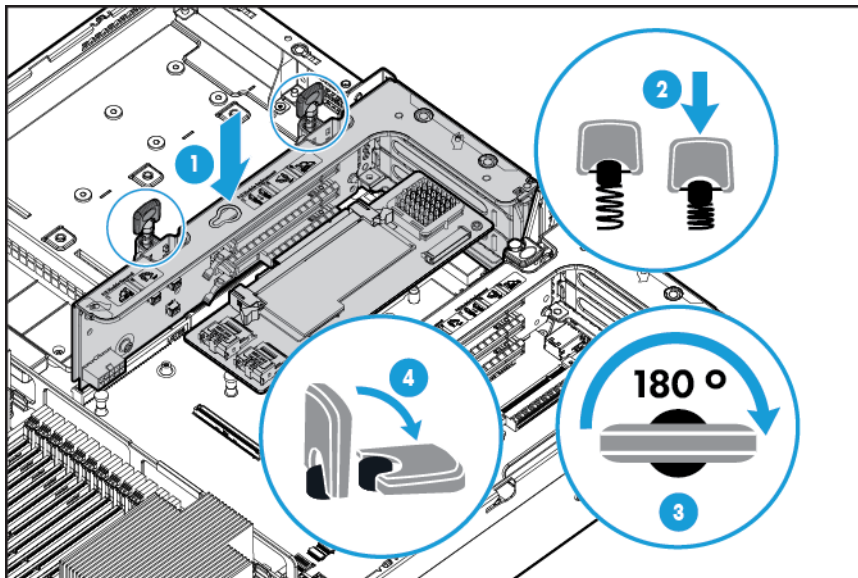
6. Remove the blank from the optional 3-slot PCI riser cage.



7. Install an expansion board into the PCI riser cage.



8. Install the optional 3-slot PCI riser cage.



9. Install the access panel (see [Installing the access panel on page 18](#)).
10. Slide the server into the rack.
11. Connect each power cord to the server.

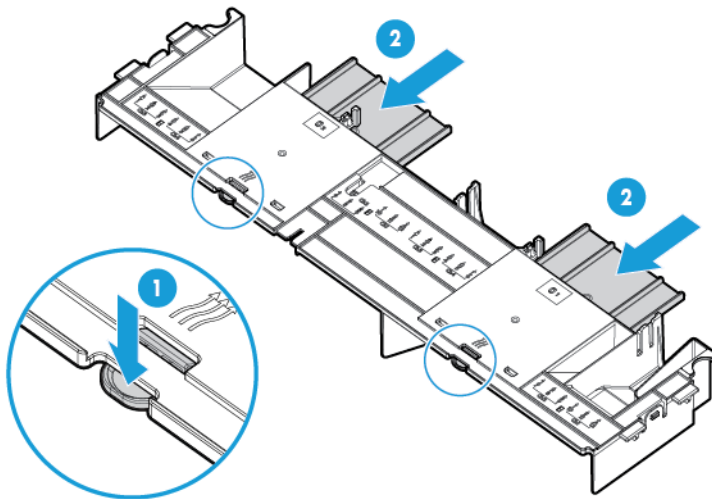
12. Connect each power cord to the power source.
13. Power up the server (see [Powering up the server on page 16](#)).

GPU enablement kit

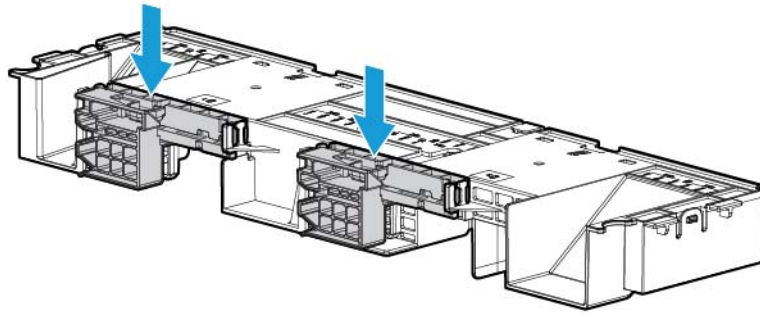
-
- ⚠ WARNING!** To reduce the risk of personal injury, electric shock, or damage to the equipment, remove the power cord to remove power from the server. The front panel Power On/Standby button does not completely shut off system power. Portions of the power supply and some internal circuitry remain active until AC power is removed.
- ⚠ CAUTION:** To prevent improper cooling and thermal damage, do not operate the server unless all PCI slots have either an expansion slot cover or an expansion board installed.
-

To install the component:

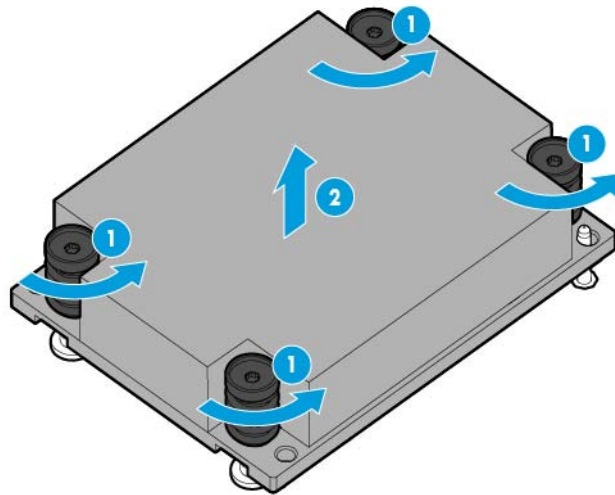
1. Power down the server (see [Powering down the server on page 16](#)).
2. Remove all power:
 - a. Disconnect each power cord from the power source.
 - b. Disconnect each power cord from the server.
3. Do one of the following:
 - Extend the server from the rack (see [Extending the server from the rack on page 17](#)).
 - Remove the server from the rack (see [Removing the server from the rack on page 17](#)).
4. Remove the access panel (see [Removing the access panel on page 18](#)).
5. Remove the air baffle (see [Removing the air baffle on page 25](#)).
6. Remove the standard efficiency air diverters from the air baffle.



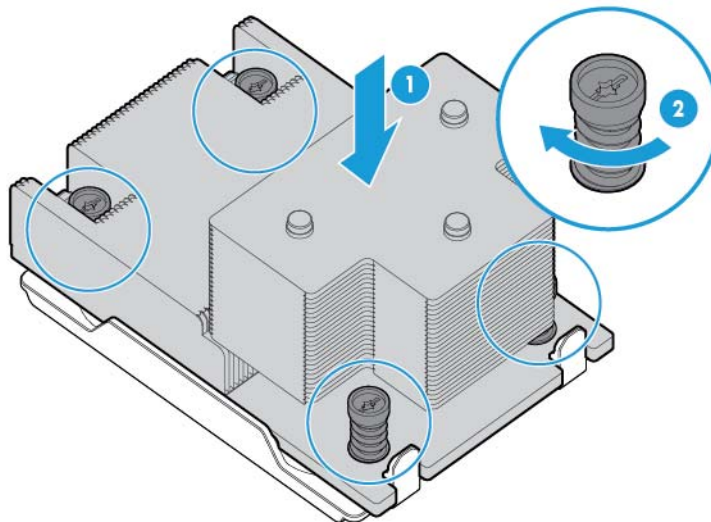
7. Install the GPU retention clips onto the air baffle.



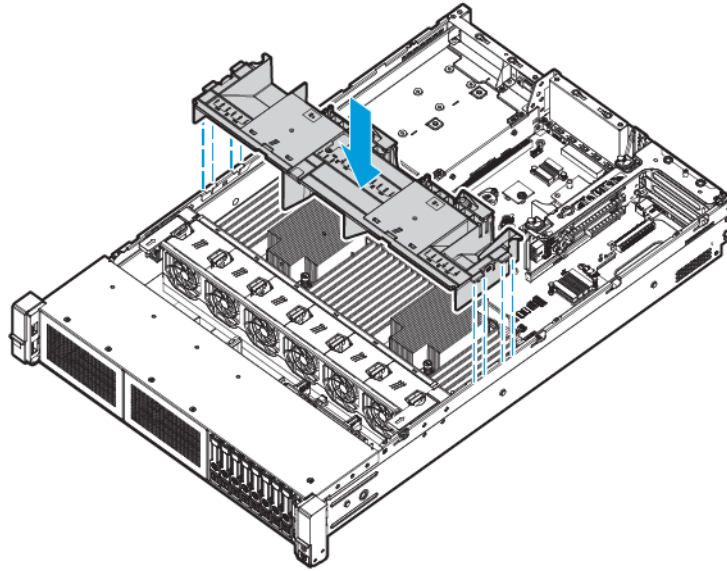
8. Remove the standard heatsinks.




9. Install the high-performance heatsinks.

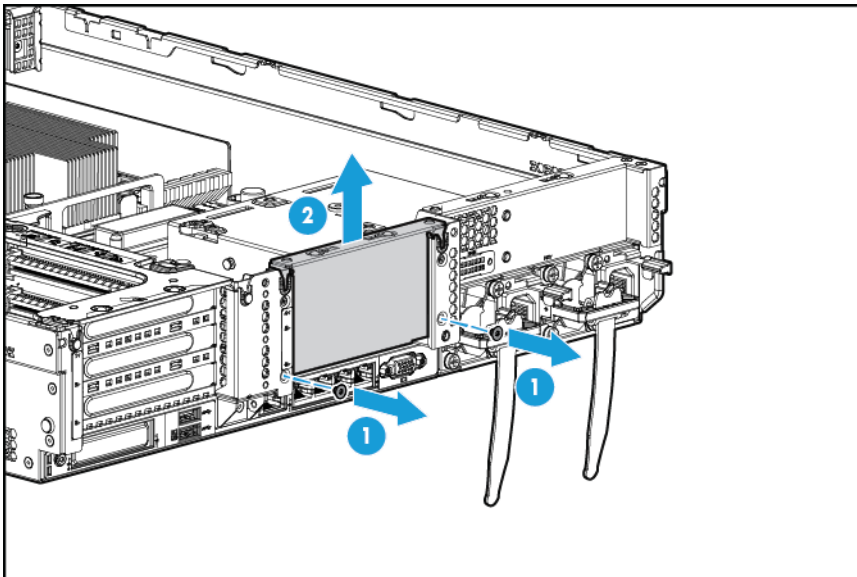


10. Install the air baffle.

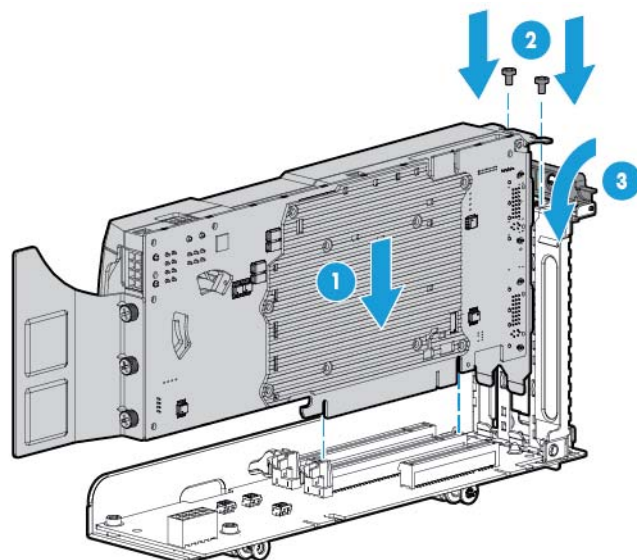


 **IMPORTANT:** This server supports GPU riser cages in both the primary and secondary riser locations. This document shows installation into the secondary riser location.

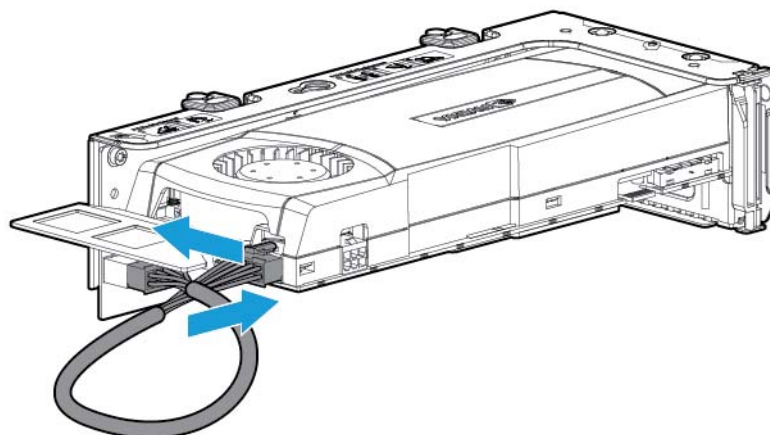
11. Remove the secondary PCI riser blank. Some models might require removing more than two screws.



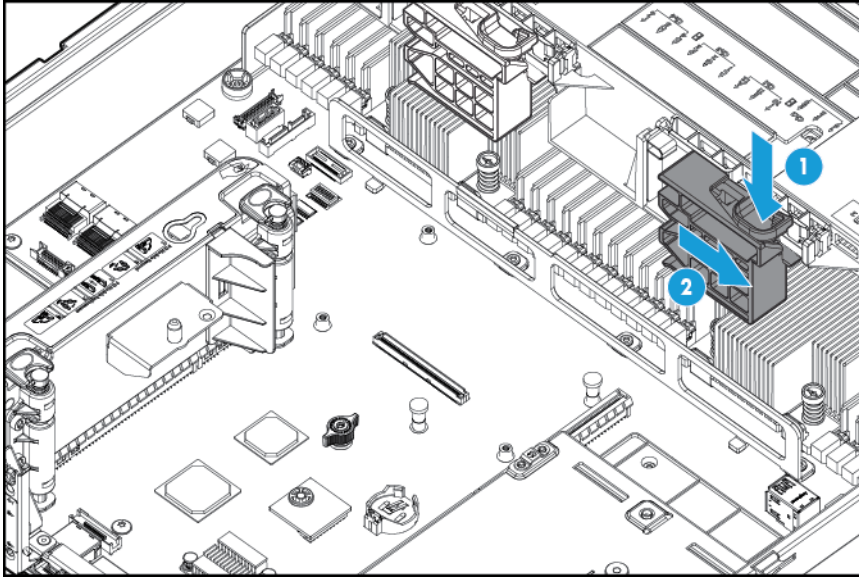
- 12.** Install a GPU into the optional GPU-enabled riser cage.



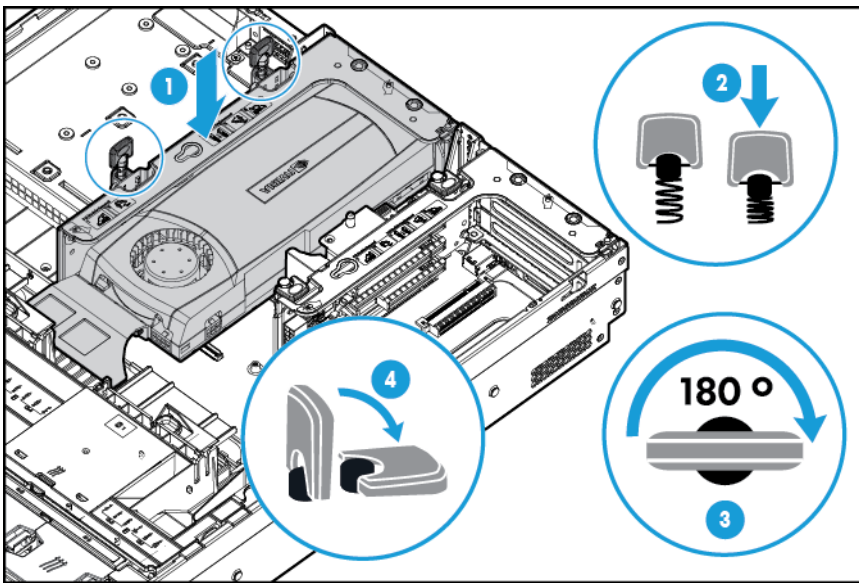
- 13.** Connect the power cable.



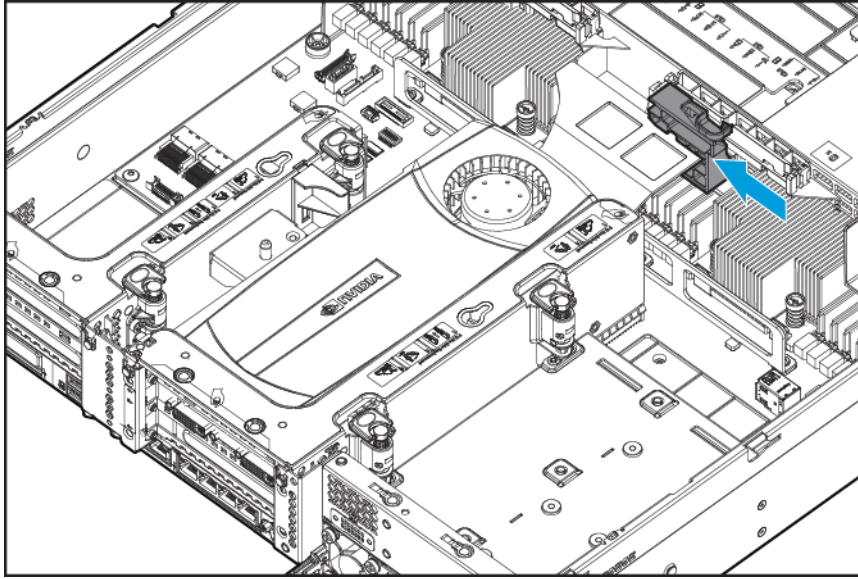
14. Press down on the top of the retention clips and slide them to the unlocked position.



15. Install the GPU-enabled riser cage option.



16. Slide the retention clips to the locked position.



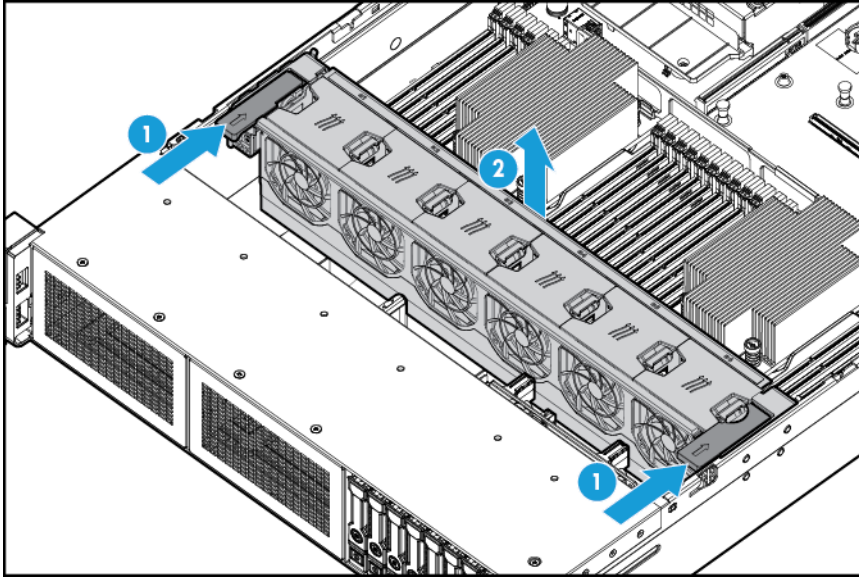
17. Install the access panel (see [Installing the access panel on page 18](#)).
18. Slide the server into the rack.
19. Connect each power cord to the server.
20. Connect each power cord to the power source.
21. Power up the server (see [Powering up the server on page 16](#)).

Eight-bay SFF front drive cage option for bay 1

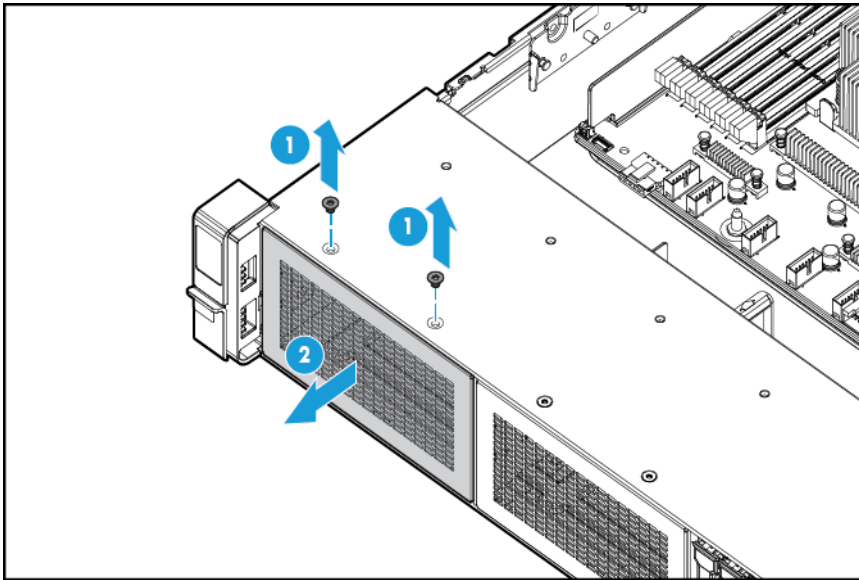
To install the component:

1. Power down the server (see [Powering down the server on page 16](#)).
2. Remove all power:
 - a. Disconnect each power cord from the power source.
 - b. Disconnect each power cord from the server.
3. Do one of the following:
 - a. Extend the server from the rack (see [Extending the server from the rack on page 17](#)).
 - b. Remove the server from the rack (see [Removing the server from the rack on page 17](#)).
4. Remove the access panel (see [Removing the access panel on page 18](#)).

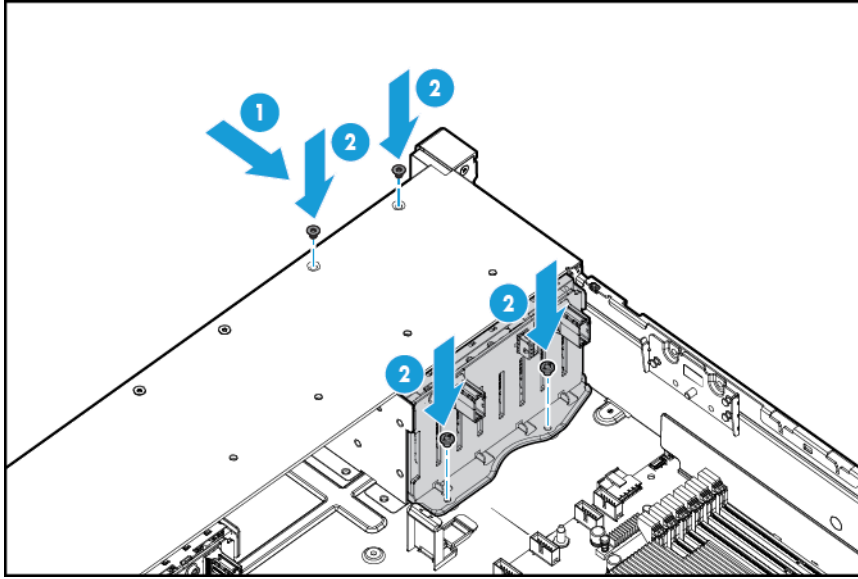
5. Remove the fan cage (see [Removing the fan cage on page 20](#)).



6. Remove the bay blank.

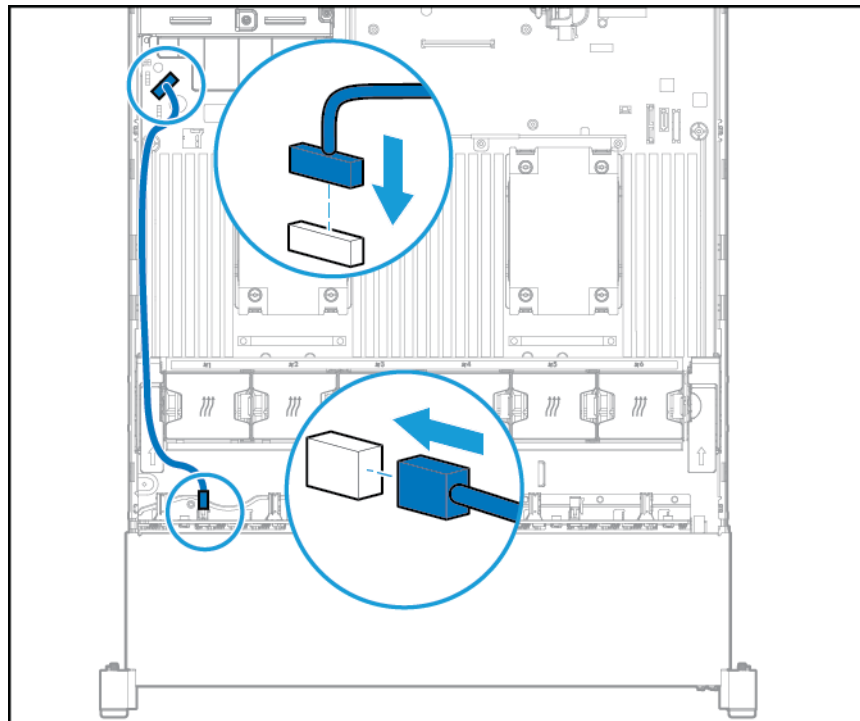


7. Install the eight-bay SFF front drive cage option.

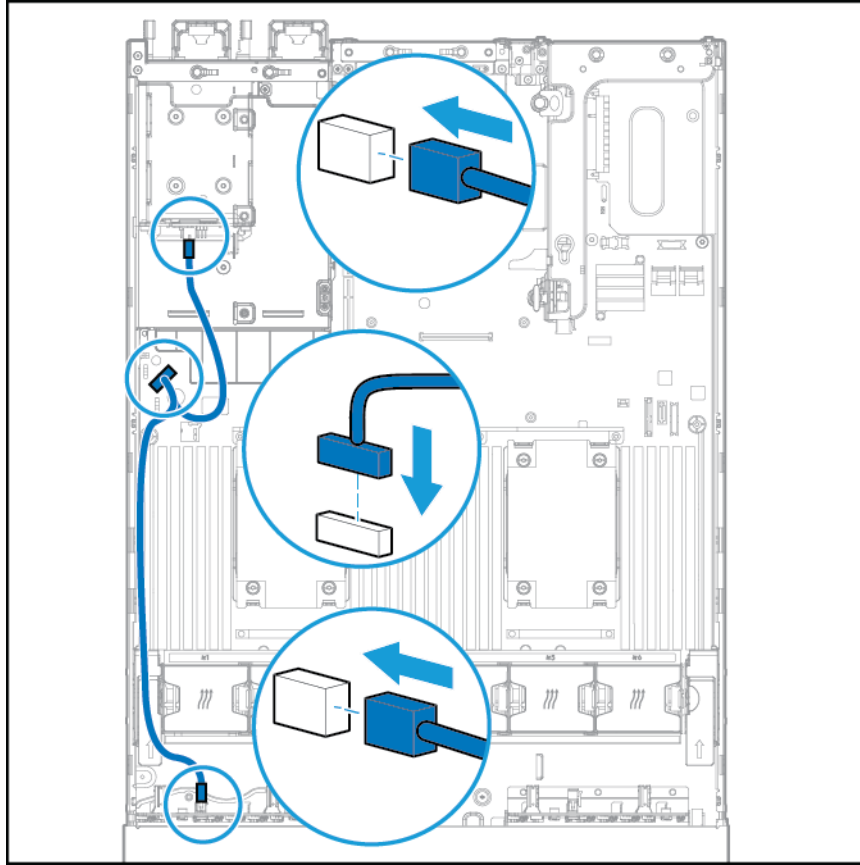


8. If installing drives, connect the power cable:

- Single cable connection

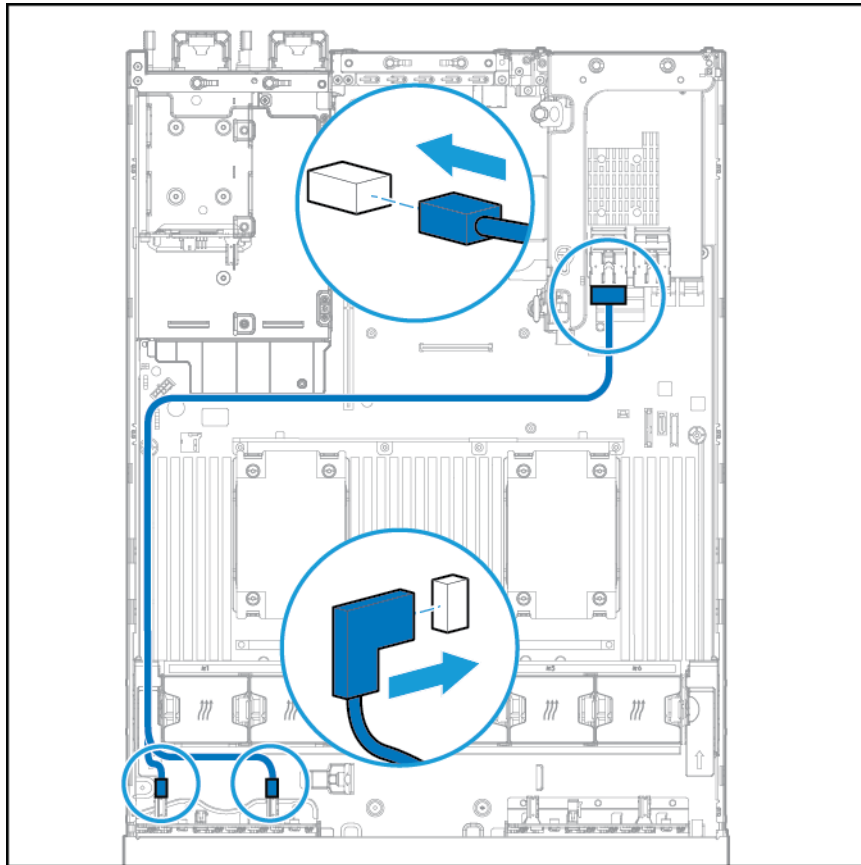


- Y cable connection if the 2 SFF option is installed in the rear bay

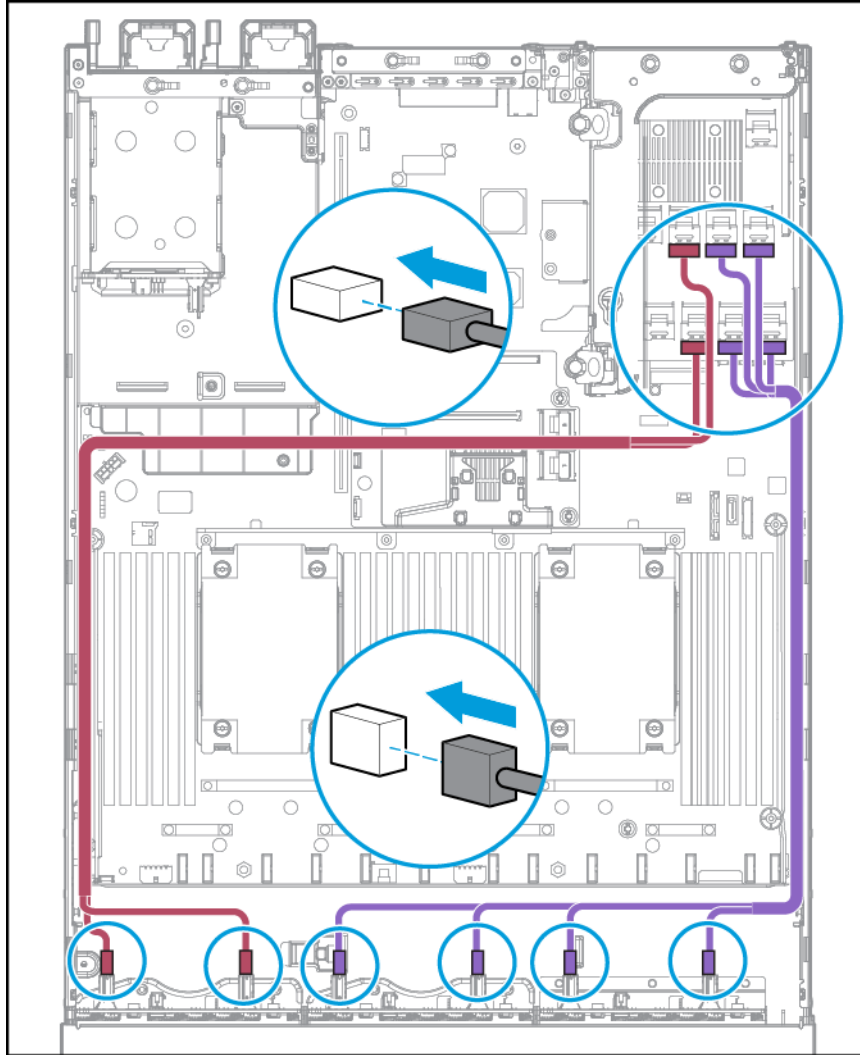


9. Connect the data cable in one of the following configurations:

- Connected to a PCI expansion board



- Connected to an HP 12G SAS Expander Card



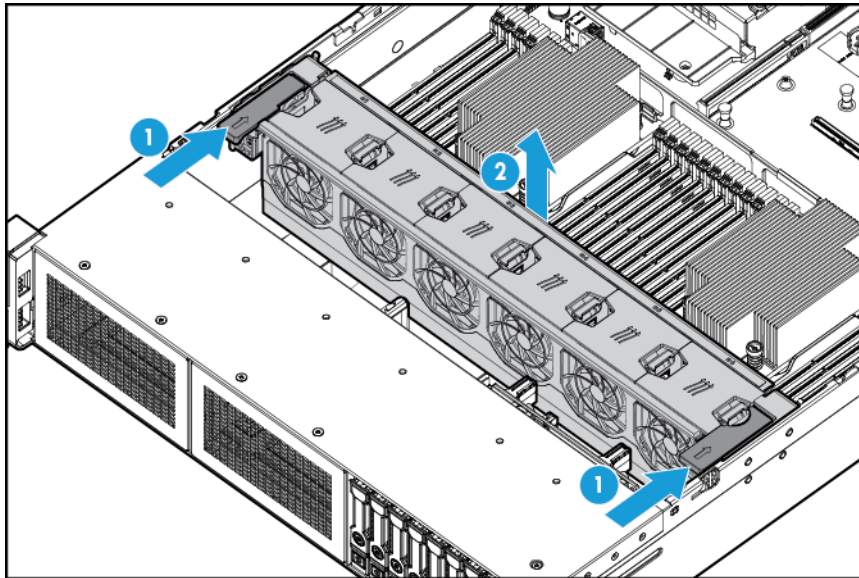
10. Install the fan cage.
11. Install the access panel (see [Installing the access panel on page 18](#)).
12. Slide the server into the rack.
13. Connect each power cord to the server.
14. Connect each power cord to the power source.
15. Power up the server (see [Powering up the server on page 16](#)).

Location Discovery Services ear option

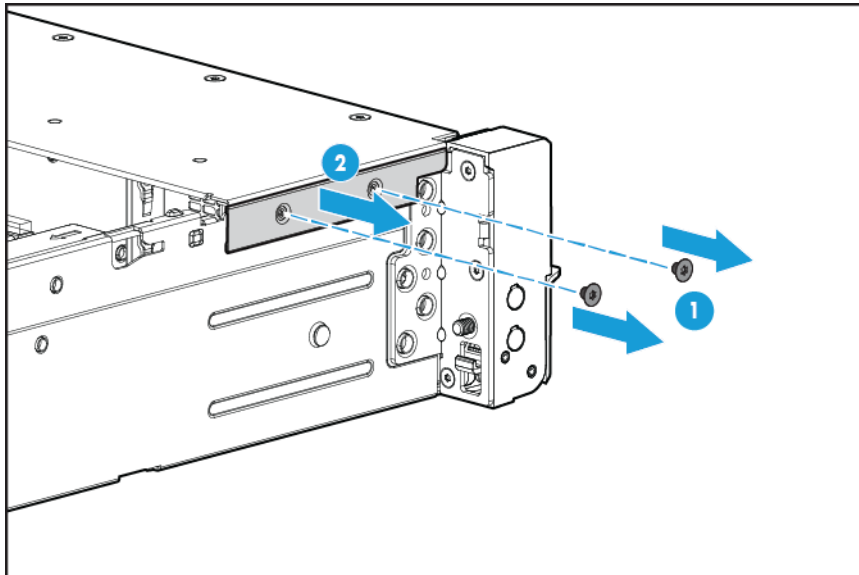
To install the component:

1. Power down the server. See [Powering down the server on page 16](#).
2. Remove all power:

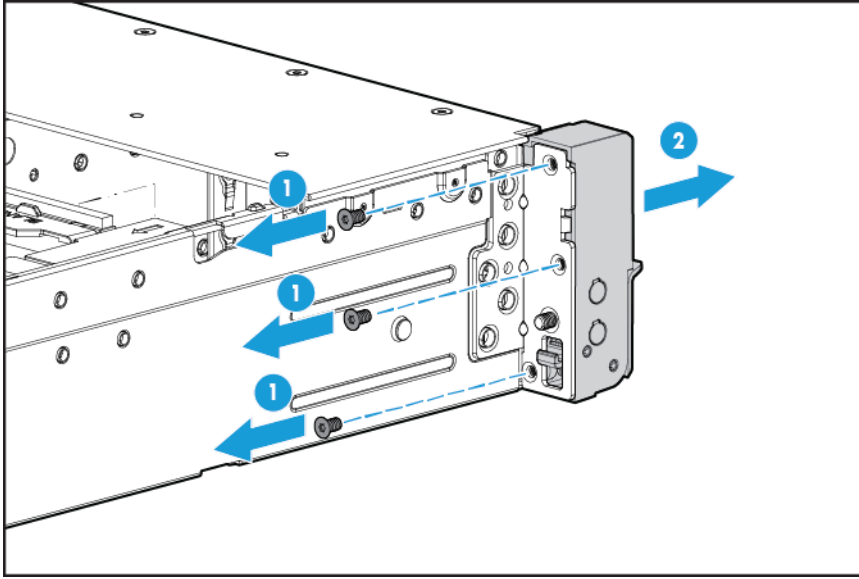
- a. Disconnect each power cord from the power source.
 - b. Disconnect each power cord from the server.
3. Do one of the following:
 - Extend the server from the rack (see [Extending the server from the rack on page 17](#)).
 - Remove the server from the rack (see [Removing the server from the rack on page 17](#)).
4. Remove the access panel (see [Removing the access panel on page 18](#)).
5. Remove the fan cage.



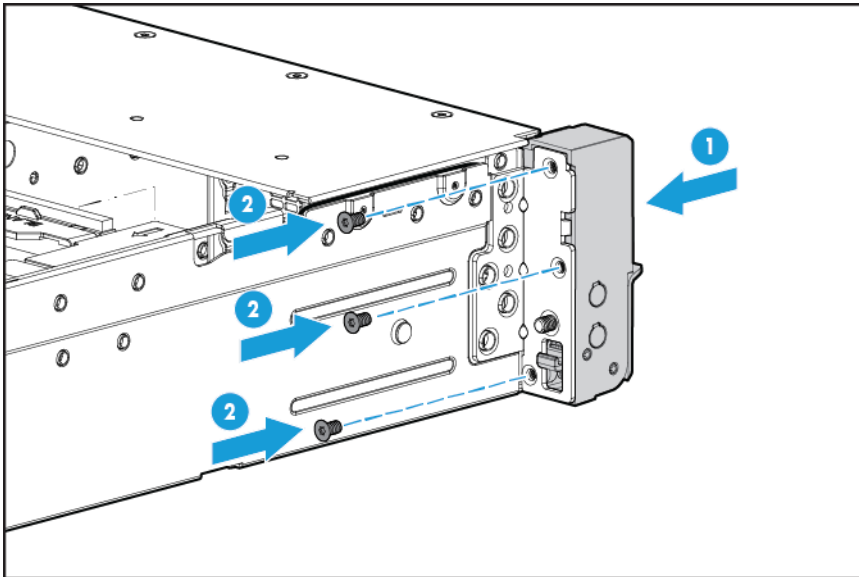
6. Remove the cable protection panel from the left side of the server.



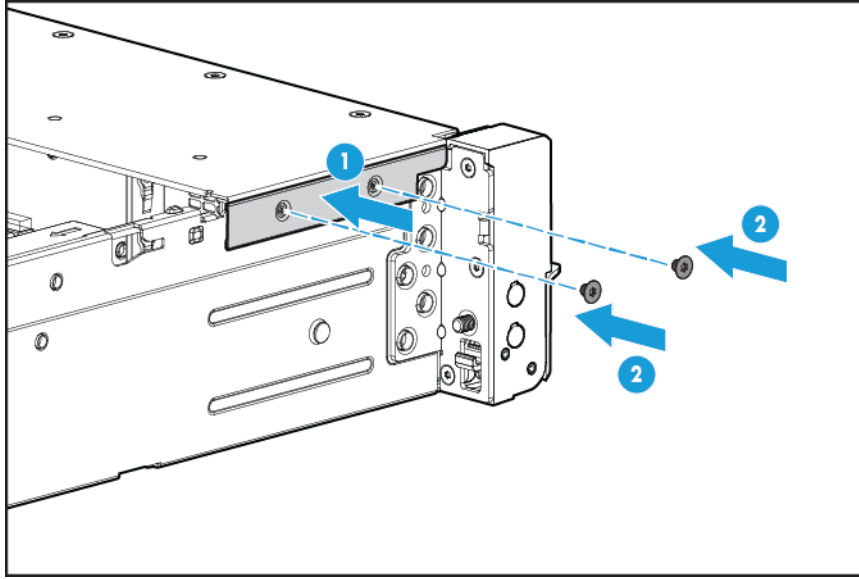
7. Remove the standard ear.



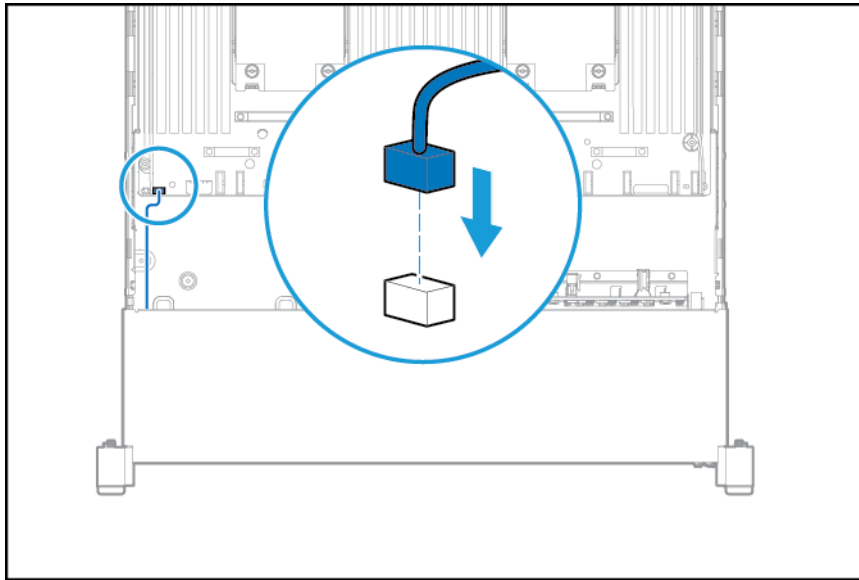
8. Install the Location Discovery Services ear option and route the discovery service cable through side channel.



- 9.** Install the cable protection panel.



- 10.** Connect the discovery service cable.

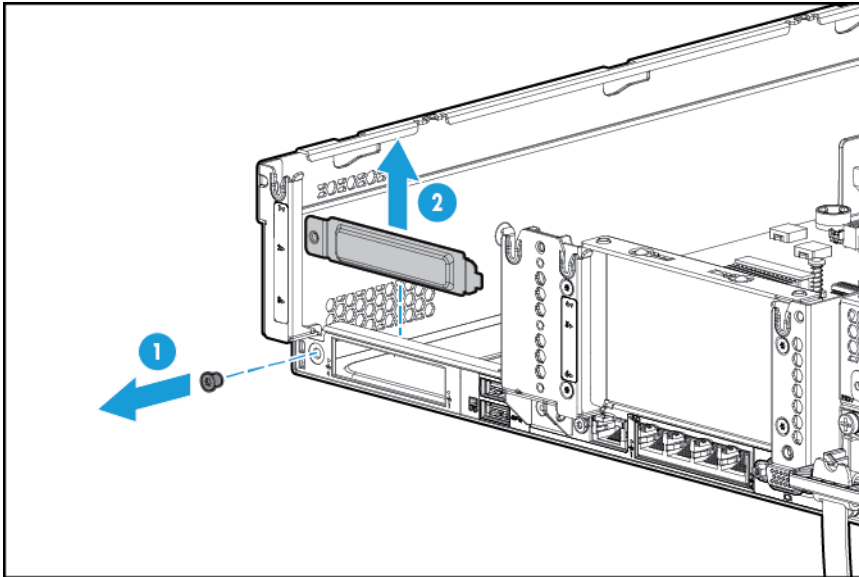


- 11.** Install the fan cage.
- 12.** Install the access panel (see [Installing the access panel on page 18](#)).
- 13.** Slide the server into the rack.
- 14.** Connect each power cord to the server.
- 15.** Connect each power cord to the power source.
- 16.** Power up the server (see [Powering up the server on page 16](#)).

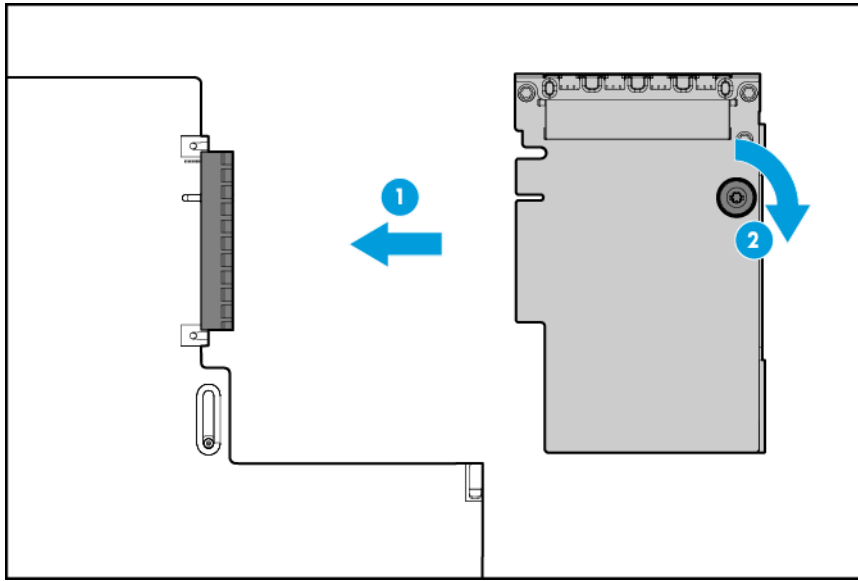
FlexibleLOM option

To install the component:

1. Power down the server. See [Powering down the server on page 16](#).
2. Remove all power:
 - a. Disconnect each power cord from the power source.
 - b. Disconnect each power cord from the server.
3. Do one of the following:
 - Extend the server from the rack (see [Extending the server from the rack on page 17](#)).
 - Remove the server from the rack (see [Removing the server from the rack on page 17](#)).
4. Remove the access panel (see [Removing the access panel on page 18](#)).
5. Remove the FlexibleLOM PCIe blank.



6. Install the component:
 - a. Firmly seat the FlexibleLOM in the slot.
 - b. Tighten the thumbscrew.



7. Install the access panel (see [Installing the access panel on page 18](#)).
8. Slide the server into the rack.
9. Connect the LAN segment cables.
10. Connect each power cord to the server.
11. Connect each power cord to the power source.
12. Power up the server (see [Powering up the server on page 16](#)).

HP 12G SAS Expander Card

Before installing the HP 12G SAS Expander Card, observe the following requirements:

- The following components must be installed:
 - Storage controller
- The SAS expander card is supported only in slot 2 of the primary PCI riser cage. It is not supported in the secondary riser cage.
- To ensure cables are connected correctly, observe the labels on the cable and component connectors.
- Be sure you have the latest firmware for the controllers, HBAs, and the expander card. To download the latest firmware, go to the HP website <http://www.hp.com/go/hpsc>.
- Understand the required cable connections:
 - Group A—Controller to SAS expander card

Cable	Description	Connection to SAS expander	Connection to Controller
776408-001	X4 mini-SAS cable	Port 2	Port 2
776409-001	X4 mini-SAS cable	Port 1	Port 1
781580-001	2 x4 mini-SAS to x-8 mini-SAS Y cable	Ports 1 and 2	Port 1

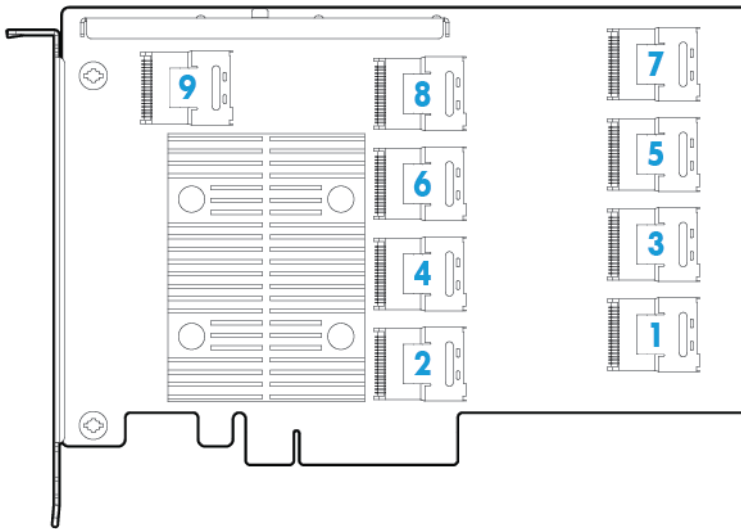
- Group B—SAS expander card to front SFF drive cages

Cable	Description	Connection to SAS expander	Connection to drive bay
776402-001	2 x4 mini-SAS cable	Port 3	8 SFF Bay 1 Port 1
		Port 4	8 SFF Bay 1 Port 2
781579-001	4 x4 mini-SAS cable	Port 5	8 SFF Bay 2 Port 1
		Port 6	8 SFF Bay 2 Port 2
		Port 7	8 SFF Bay 3 Port 1
		Port 8	8 SFF Bay 3 Port 2

- Group C—SAS expander card to rear drive cage

Cable	Description	Connection to SAS expander	Connection to drive bay
776401-001	X4 mini-SAS cable	Port 9	2SFF/3LFF

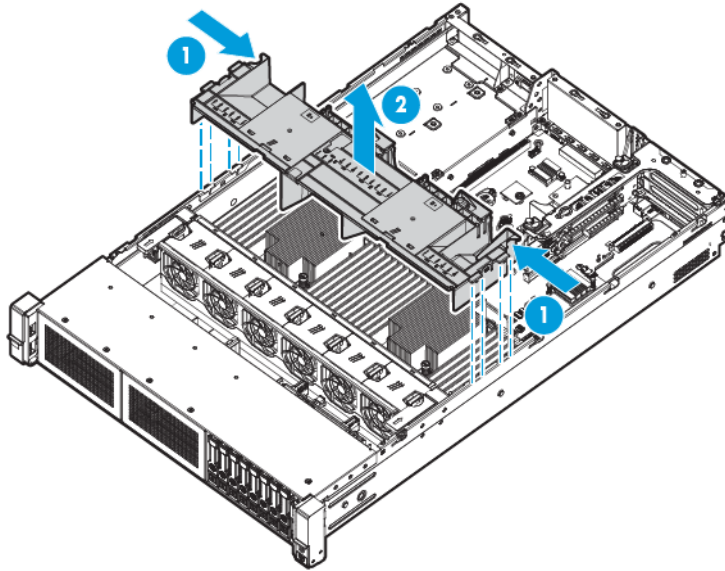
HP 12G SAS Expander Card ports




To install the component:

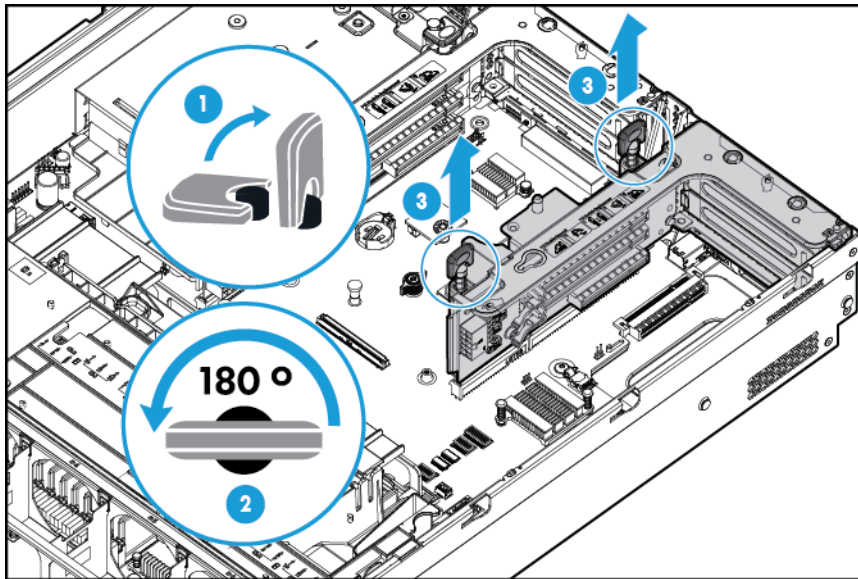
1. Power down the server (see [Powering down the server on page 16](#)).
2. Remove all power:
 - a. Disconnect each power cord from the power source.
 - b. Disconnect each power cord from the server.
3. Do one of the following:
 - Extend the server from the rack (see [Extending the server from the rack on page 17](#)).
 - Remove the server from the rack (see [Removing the server from the rack on page 17](#)).

4. Remove the access panel (see [Removing the access panel on page 18](#)).
5. Remove the air baffle (see [Removing the air baffle on page 25](#)).

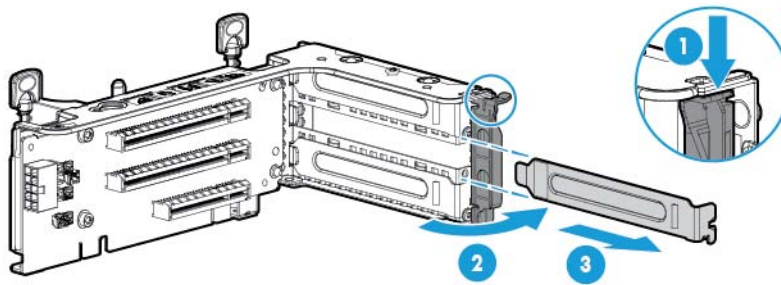


6. Remove the fan cage (see [Removing the fan cage on page 20](#)).
7. Remove the primary PCI riser cage.

 **IMPORTANT:** The HP 12G SAS Expander Card is not supported in the secondary PCI riser cage.



8. Remove the expansion slot blank from slot 2.



9. Using the labels on the cables to determine the correct connections, connect the cables to the SAS expander card:

- a. Depending on the ports on the controller, connect the appropriate controller cables from Group A to the SAS expander card.

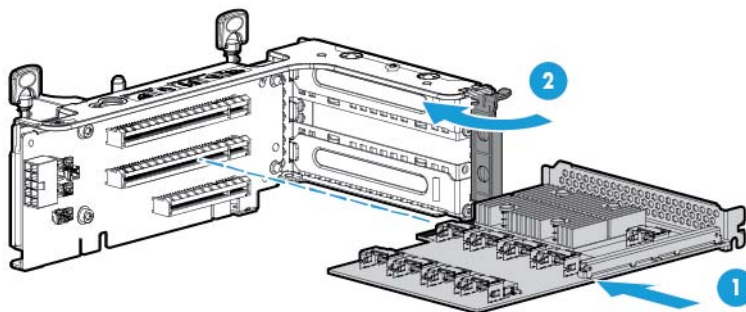
Controller ports	Cable	SAS expander parts
2 x4 connectors	x4 mini-SAS cable	Port 1
	x4 mini-SAS cable	Port 2
1 x8 connector	2 x4 mini-SAS to x8 mini-SAS Y cable	Ports 1 and 2


- b. Depending on the drive configuration, connect the appropriate drive cage cables to the SAS expander card.

Drive configuration	Cable group	Cable	SAS expander ports
2 SFF/3 LFF	D	x4 mini-SAS cable	Port 9

10. Install the SAS expander card. The cables are not shown for clarity.

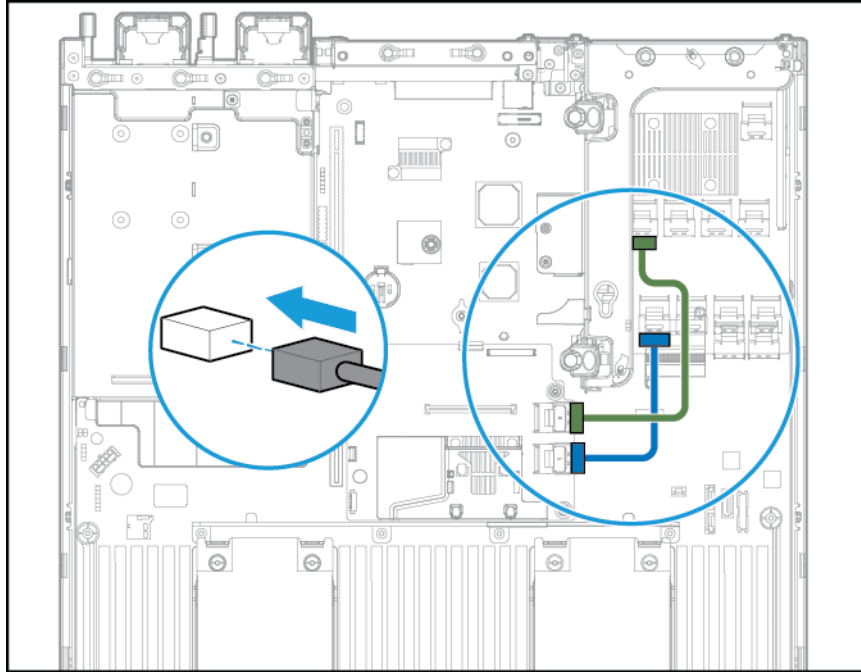
 **IMPORTANT:** The HP 12G SAS Expander Card is only supported in slot 2.



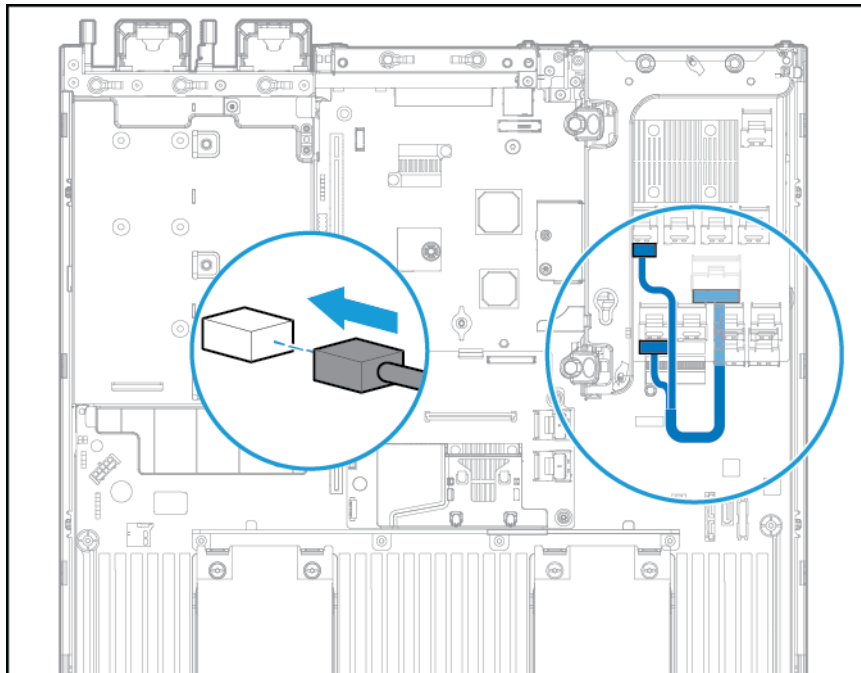
 **IMPORTANT:** If using a PCI slot-based controller, install the controller in slot 1.

11. Install the PCI riser cage (see [Installing the PCI riser cage on page 23](#)).
12. Using the labels on the cables to determine the correct connections, connect the cables from the SAS expander card to the controller:

- HP Flexible Smart Array Controller with 2 x4 connectors (Group A SAS cables)



- PCI slot-based Smart Array controller with x8 connector (Group A SAS cables)



- 13.** Install the air baffle.
- 14.** Install the fan cage.
- 15.** Install the access panel (see [Installing the access panel on page 18](#)).
- 16.** Install the server into the rack (see [Installing the server into the rack on page 30](#)).
- 17.** Connect each power cord to the server.

18. Connect each power cord to the power source.
19. Power up the server (see [Powering up the server on page 16](#)).

HP Flexible Smart Array Controller

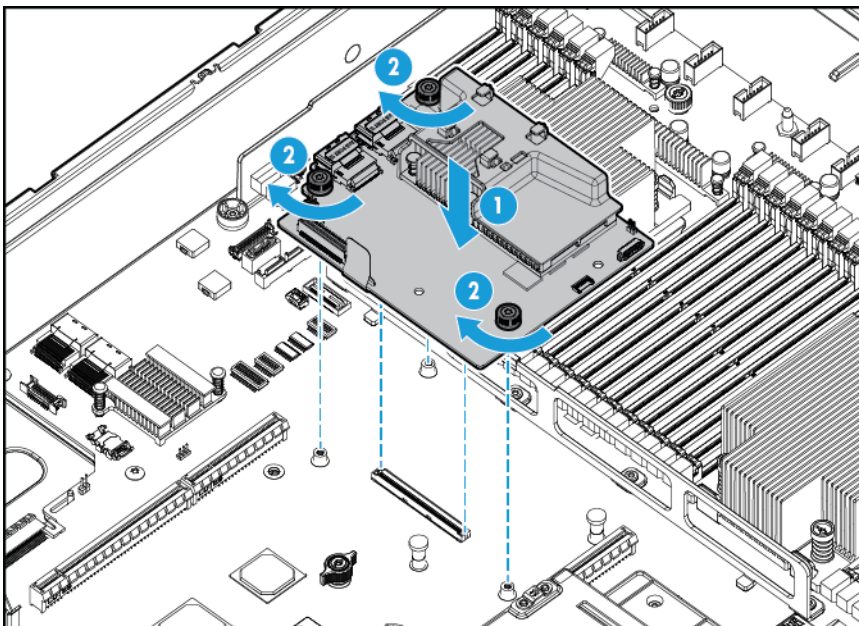
CAUTION: HP recommends performing a complete backup of all server data before performing a controller or adapter installation or removal.

Before installing the controller, observe the following requirements:

- To ensure cables are connected correctly, observe the labels on the cable and component connectors.
- Be sure you have the latest firmware for the controllers, HBAs, and the expander card. To download the latest firmware, go to the HP website <http://www.hp.com/go/hpsc>.

To install the component:

1. Power down the server (see [Powering down the server on page 16](#)).
2. Remove all power:
 - a. Disconnect each power cord from the power source.
 - b. Disconnect each power cord from the server.
3. Do one of the following:
 - Extend the server from the rack (see [Extending the server from the rack on page 17](#)).
 - Remove the server from the rack (see [Removing the server from the rack on page 17](#)).
4. Remove the access panel (see [Removing the access panel on page 18](#)).
5. Remove the air baffle (see [Removing the air baffle on page 25](#)).
6. Install the controller.



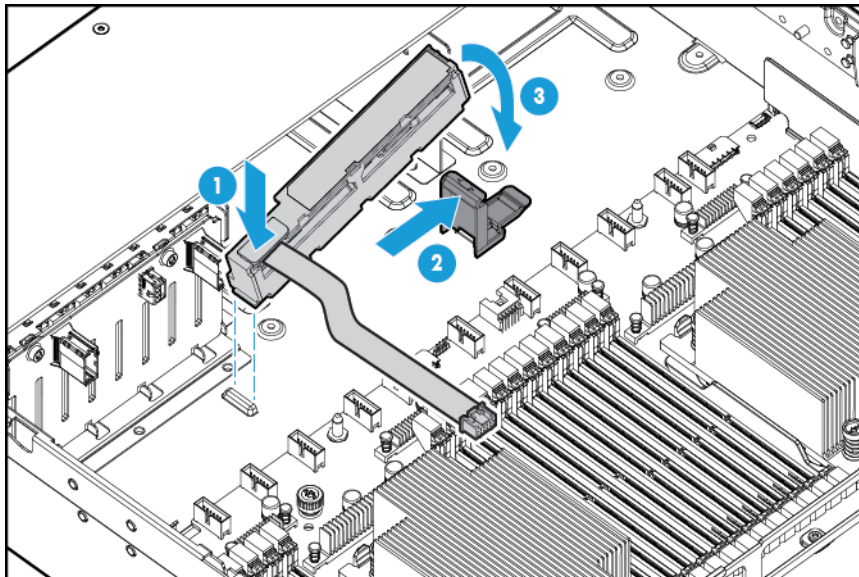
7. Connect the appropriate SAS cables.

8. Install the air baffle.
9. Install the access panel (see [Installing the access panel on page 18](#)).
10. Slide the server into the rack.
11. Connect each power cord to the server.
12. Connect each power cord to the power source.
13. Before powering on the system, be sure the HP Smart Storage Battery is installed (see [HP Smart Storage Battery on page 81](#)).
14. Power up the server (see [Powering up the server on page 16](#)).

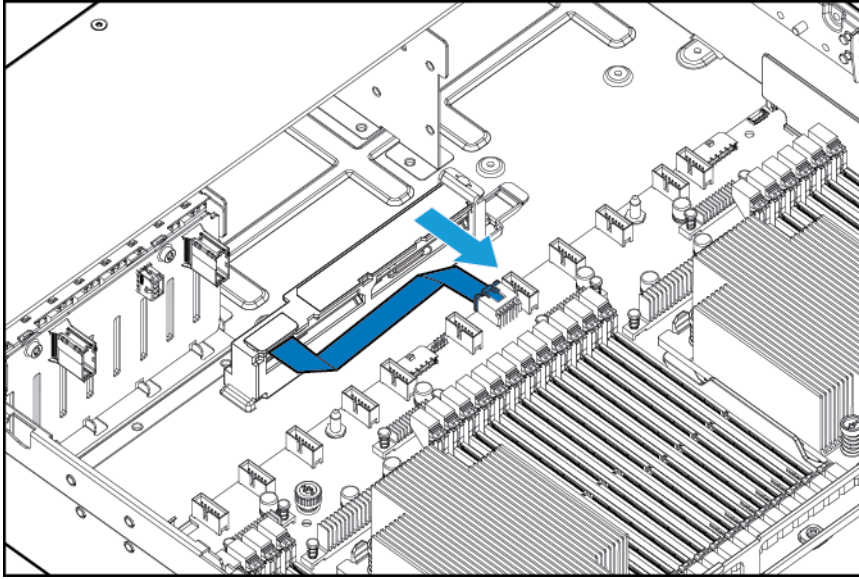
HP Smart Storage Battery

To install the component:

1. Power down the server (see [Powering down the server on page 16](#)).
2. Remove all power:
 - a. Disconnect each power cord from the power source.
 - b. Disconnect each power cord from the server.
3. Do one of the following:
 - Extend the server from the rack (see [Extending the server from the rack on page 17](#)).
 - Remove the server from the rack (see [Removing the server from the rack on page 17](#)).
4. Remove the access panel (see [Removing the access panel on page 18](#)).
5. Remove the air baffle (see [Removing the air baffle on page 25](#)).
6. Remove the fan cage (see [Removing the fan cage on page 20](#)).
7. Install the HP Smart Storage battery.



8. Route the cable.



9. Install the fan cage.
10. Install the air baffle.
11. Install the access panel (see [Installing the access panel on page 18](#)).
12. Slide the server into the rack.
13. Connect each power cord to the server.
14. Connect each power cord to the power source.
15. Power up the server (see [Powering up the server on page 16](#)).

High performance fan option

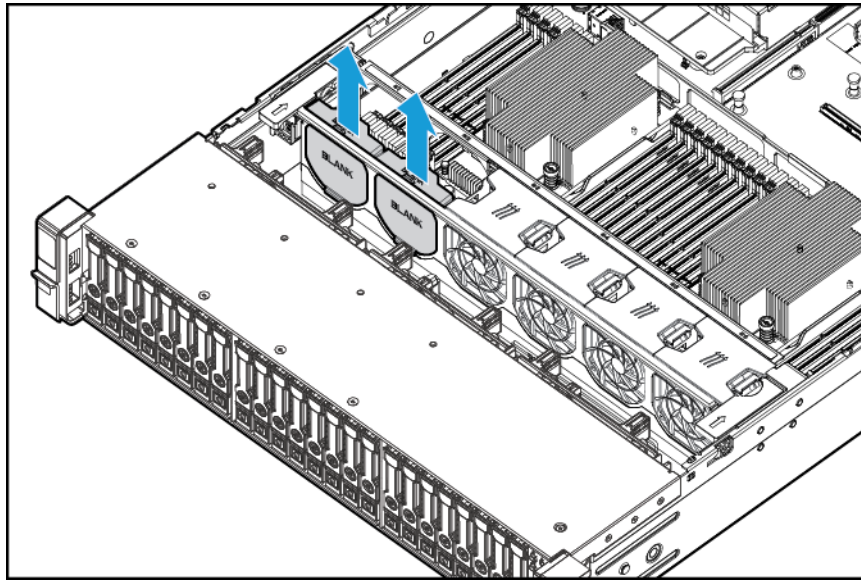
To install the component:

1. Power down the server (see [Powering down the server on page 16](#)).
2. Remove all power:
 - a. Disconnect each power cord from the power source.
 - b. Disconnect each power cord from the server.
3. Do one of the following:
 - Extend the server from the rack (see [Extending the server from the rack on page 17](#)).
 - Remove the server from the rack (see [Removing the server from the rack on page 17](#)).
4. Remove the access panel (see [Removing the access panel on page 18](#)).

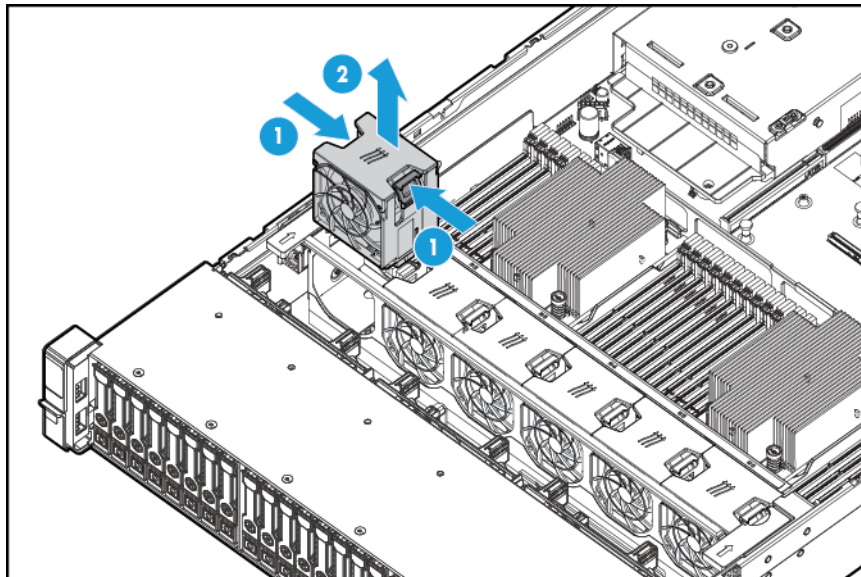


IMPORTANT: Do not mix standard fans and high performance fans in the same server.

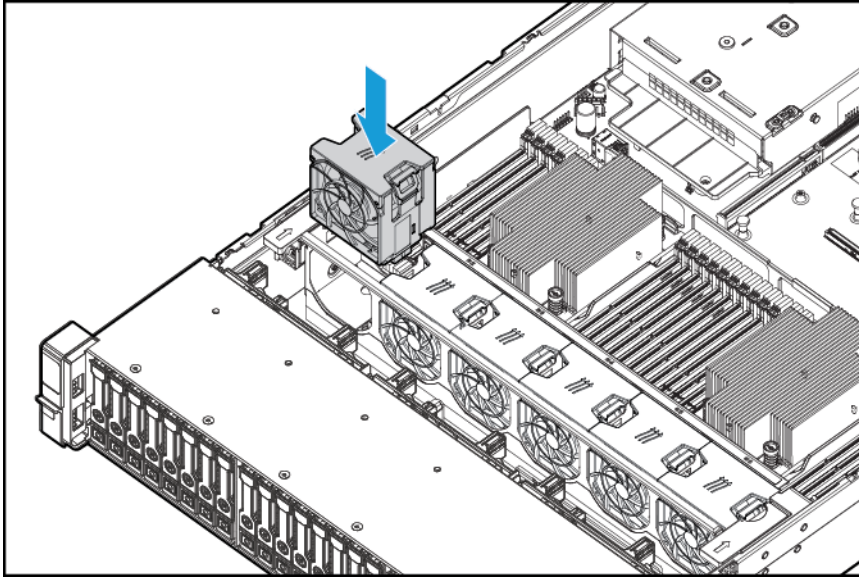
5. Remove fan blanks and standard fans from all locations:
 - Fan blanks



- Standard fans



6. Install high performance fans in all locations.



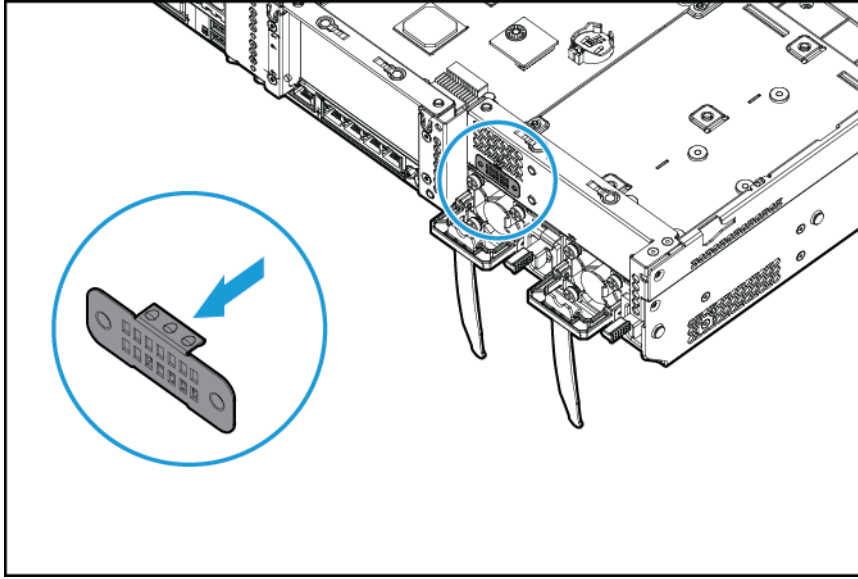
7. Install the access panel (see [Installing the access panel on page 18](#)).
8. Slide the server into the rack.
9. Connect each power cord to the server.
10. Connect each power cord to the power source.
11. Power up the server (see [Powering up the server on page 16](#)).

Rear serial port option

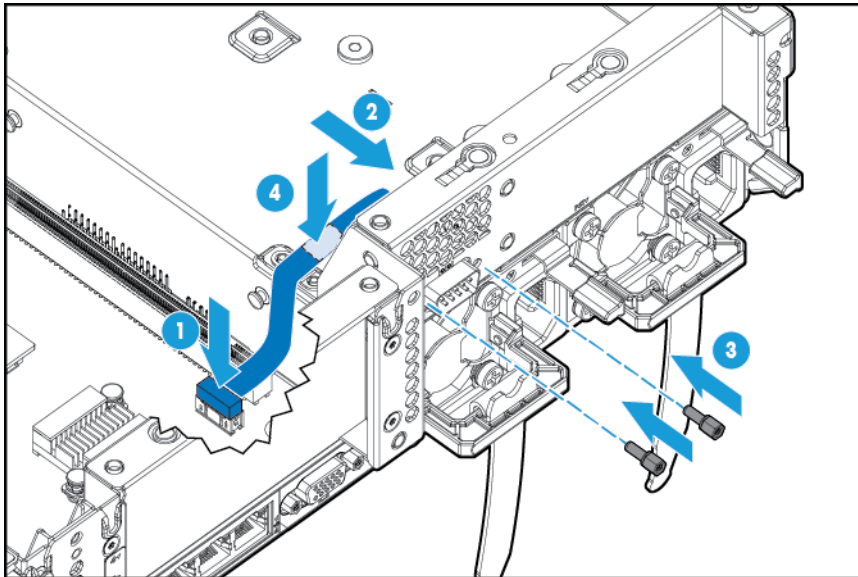
To install the component:

1. Power down the server (see [Powering down the server on page 16](#)).
2. Remove all power:
 - a. Disconnect each power cord from the power source.
 - b. Disconnect each power cord from the server.
3. Do one of the following:
 - Extend the server from the rack (see [Extending the server from the rack on page 17](#)).
 - Remove the server from the rack (see [Removing the server from the rack on page 17](#)).
4. Remove the access panel (see [Removing the access panel on page 18](#)).

5. Remove the serial cable blank.



6. Connect the serial cable option. Then, remove the backing from the double-sided tape and press down where indicated.



7. Install the access panel (see [Installing the access panel on page 18](#)).
8. Slide the server into the rack.
9. Connect each power cord to the server.
10. Connect each power cord to the power source.
11. Power up the server (see [Powering up the server on page 16](#)).

HP Trusted Platform Module option


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

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

1. Installing the Trusted Platform Module board (see [Installing the Trusted Platform Module board on page 86](#)).
2. Retaining the recovery key/password (see [Retaining the recovery key/password on page 88](#)).
3. Enabling the Trusted Platform Module (see [Enabling the Trusted Platform Module on page 88](#)).

Enabling the TPM requires accessing BIOS/Platform Configuration (RBSU) in HP UEFI System Utilities (see [HP UEFI System Utilities on page 103](#)).


TPM installation requires the use of drive encryption technology, such as the Microsoft Windows BitLocker Drive Encryption feature. For more information on BitLocker, go to 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

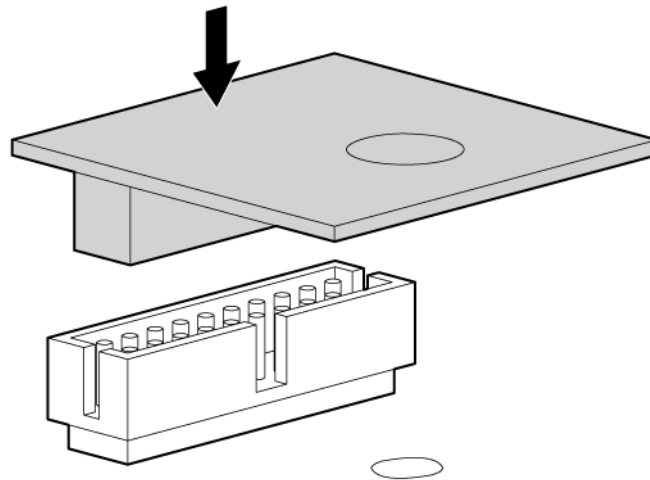
 **WARNING!** To reduce the risk of personal injury from hot surfaces, allow the drives and the internal system components to cool before touching them.

1. Power down the server (see [Powering down the server on page 16](#)).
2. Disconnect all peripheral cables from the server.
3. Remove the server.
4. Place the server on a flat, level work surface.
5. Remove the PCI riser board assembly.
6. Remove the air baffle (see [Removing the air baffle on page 25](#)).

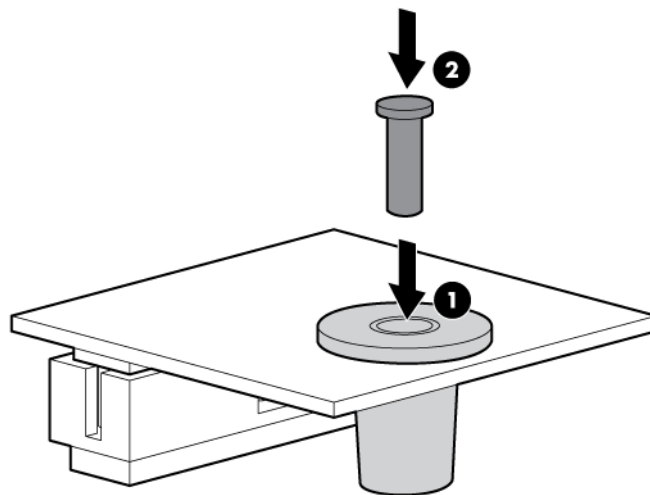
Locate the TPM connector. See [System board components on page 10](#).

⚠ 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.

7. Install the TPM board. Press down on the connector to seat the board. See [System board components on page 10](#).



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



9. Install the PCI riser board assembly.
10. Install the server.
11. Press the Power On/Standby button.

The server exits standby mode and applies full power to the system. The system power LED changes from amber to green.

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

Enabling the Trusted Platform Module

1. During the server start-up sequence, press the **F9** key to access System Utilities.
2. From the System Utilities screen, select **System Configuration > BIOS/Platform Configuration (RBSU) > Server Security**.
3. Select **Trusted Platform Module Options** and press the **Enter** key.
4. Select **Enabled** to enable the TPM and BIOS secure startup. The TPM is fully functional in this mode.
5. Press the **F10** key to save your selection.
6. When prompted to save the change in System Utilities, press the **Y** key.
7. Press the **ESC** key to exit System Utilities. Then, press the **Enter** key when prompted to reboot the server.

The server then reboots a second time without user input. During this reboot, the TPM setting becomes effective.

You can now enable TPM functionality in the OS, such as Microsoft Windows BitLocker or measured boot.

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

For more information on firmware updates and hardware procedures, go to 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, go to the Microsoft website <http://technet.microsoft.com/en-us/library/cc732774.aspx>.

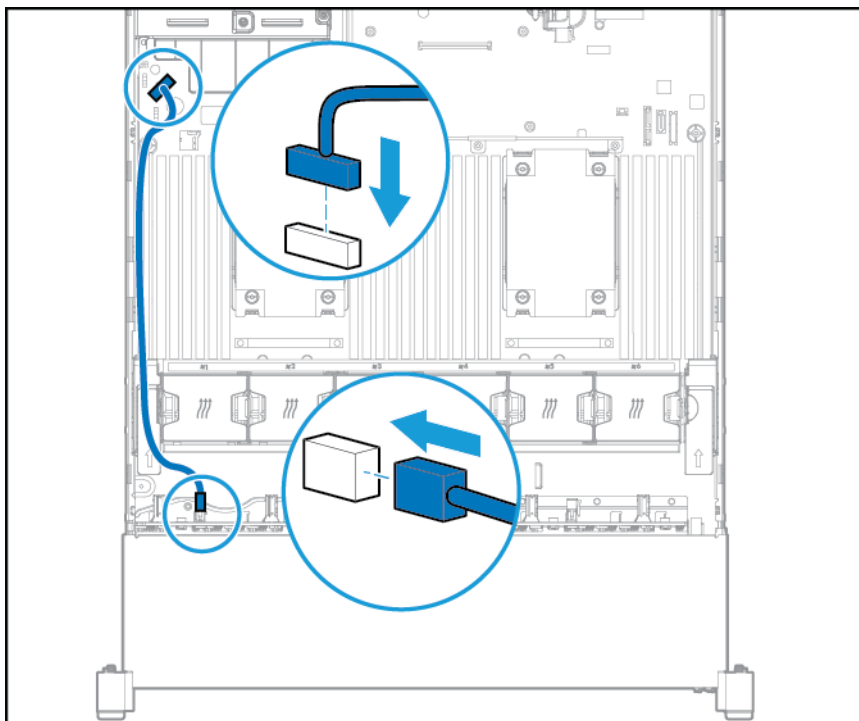
6 Cabling

Eight-bay SFF front drive cage cabling

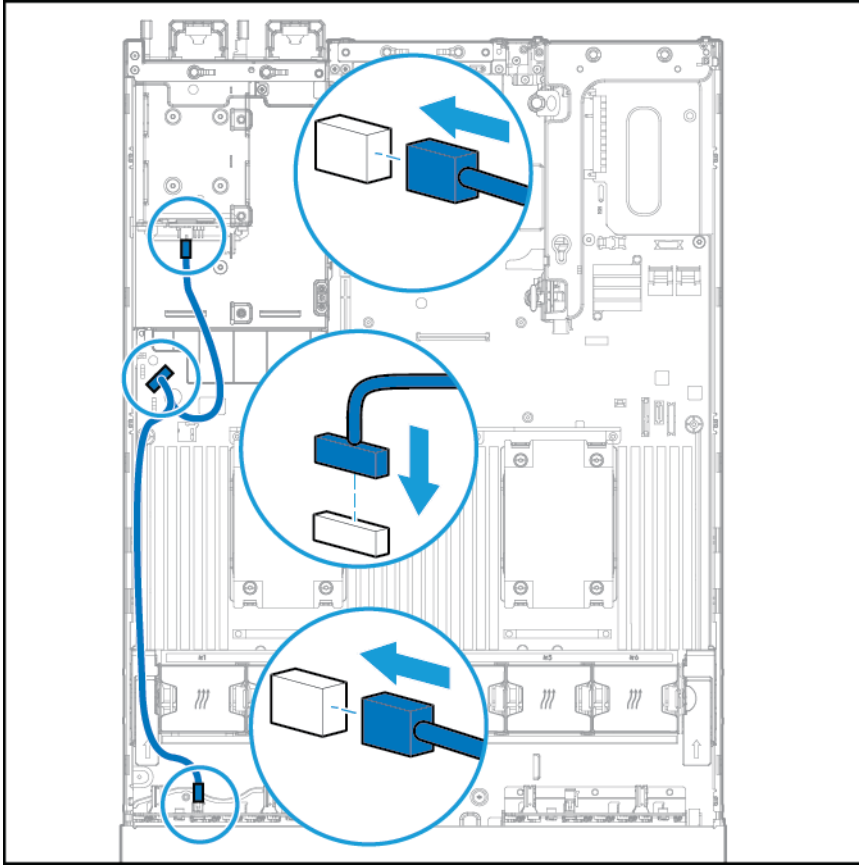
Bay 1 installation

Connect the power cable:

- Single cable connection

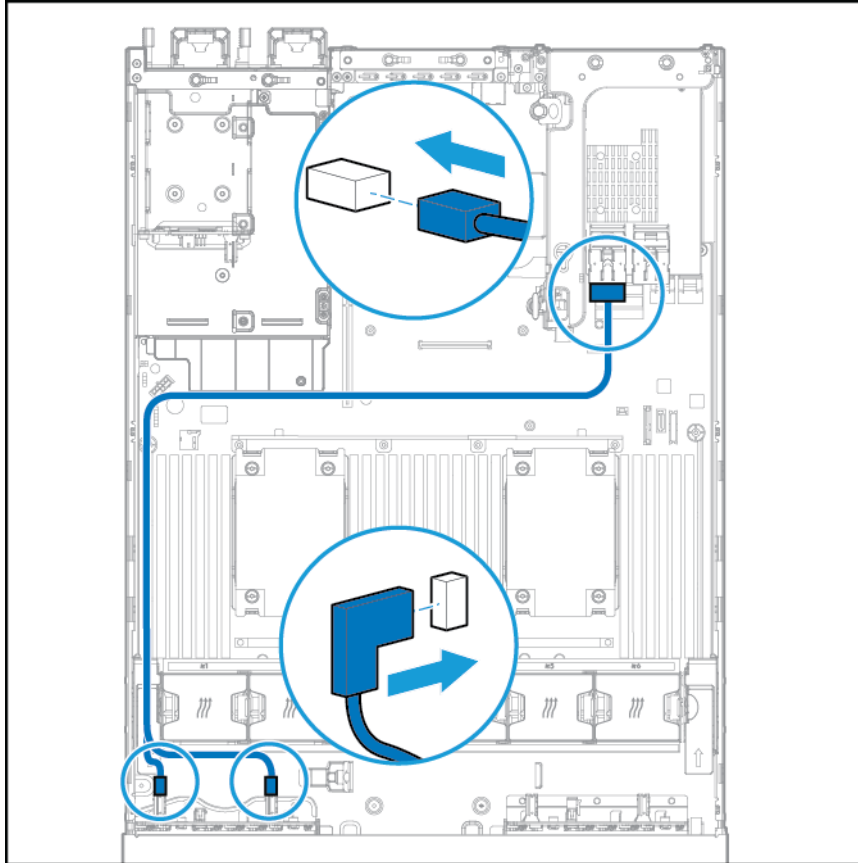


- Y cable connection if the two-bay SFF drive cage option is installed in the rear bay

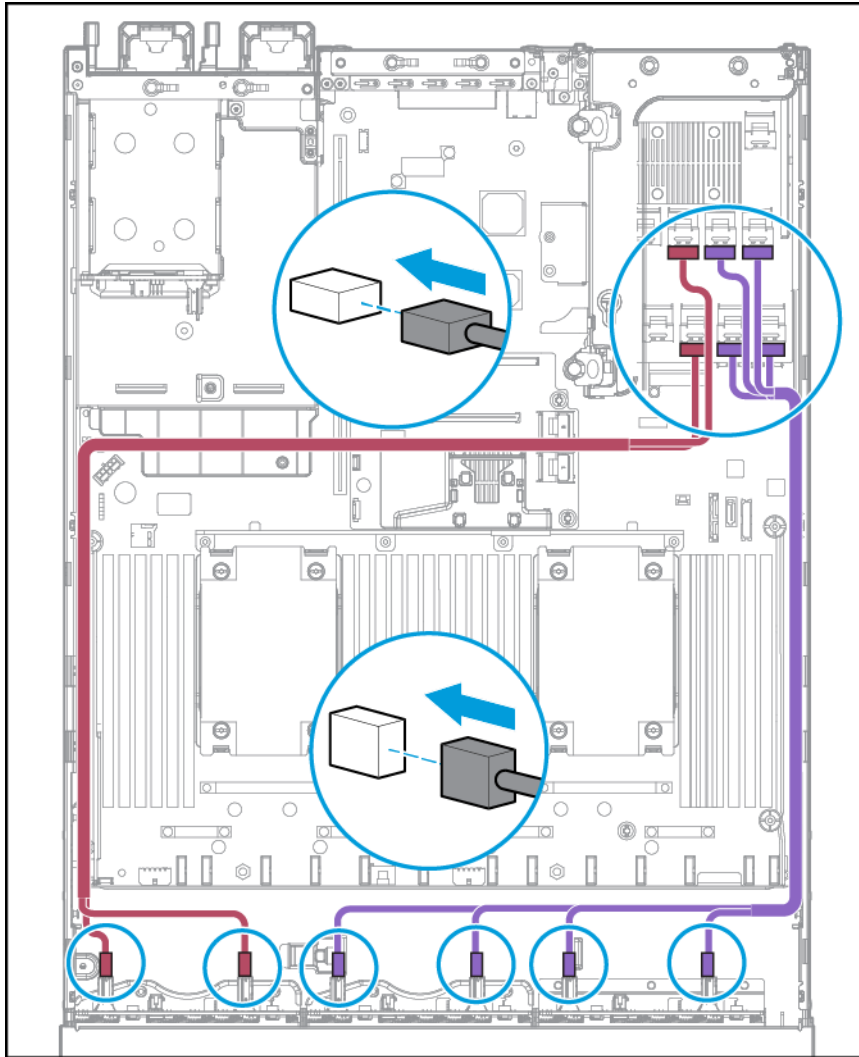


Connect the data cable:

- Connected to a PCI expansion board

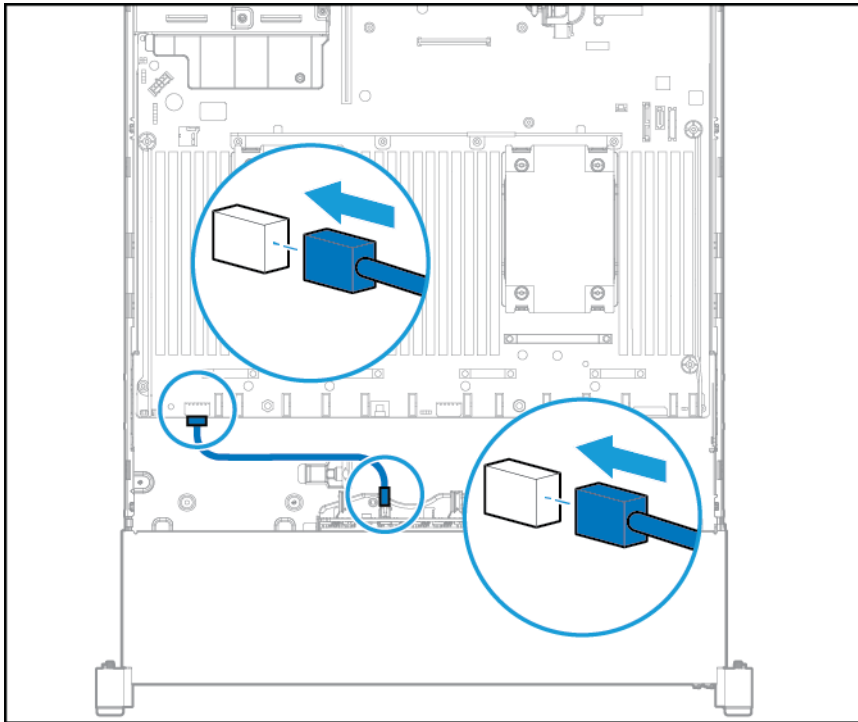


- Connected to an HP 12G SAS Expander Card



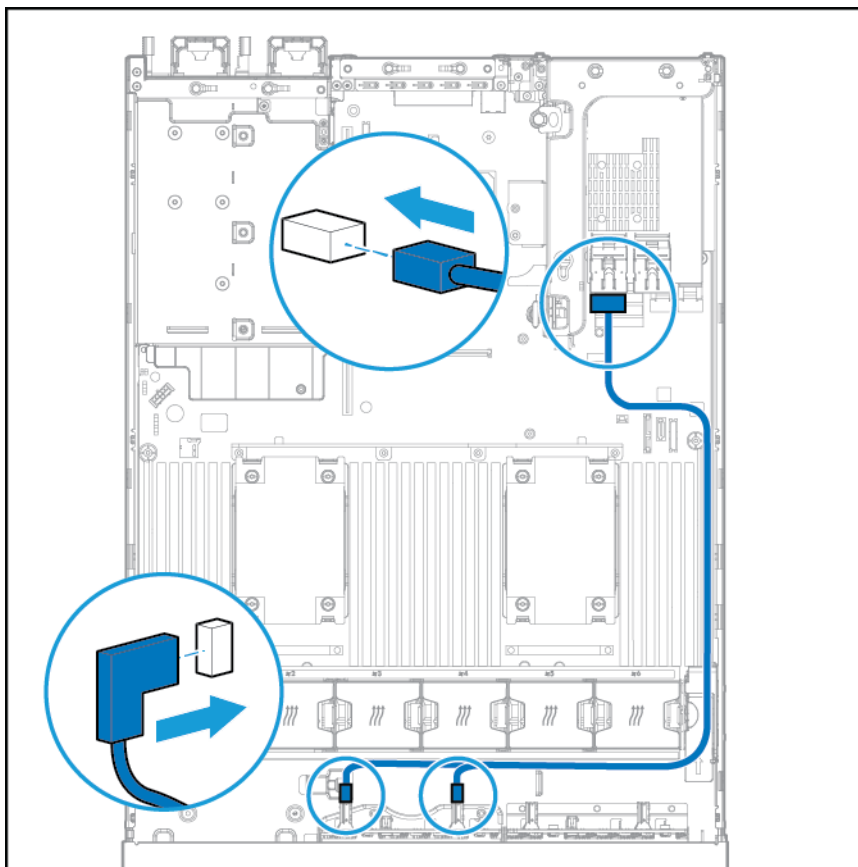
Bay 2 installation

Connect the power cable.

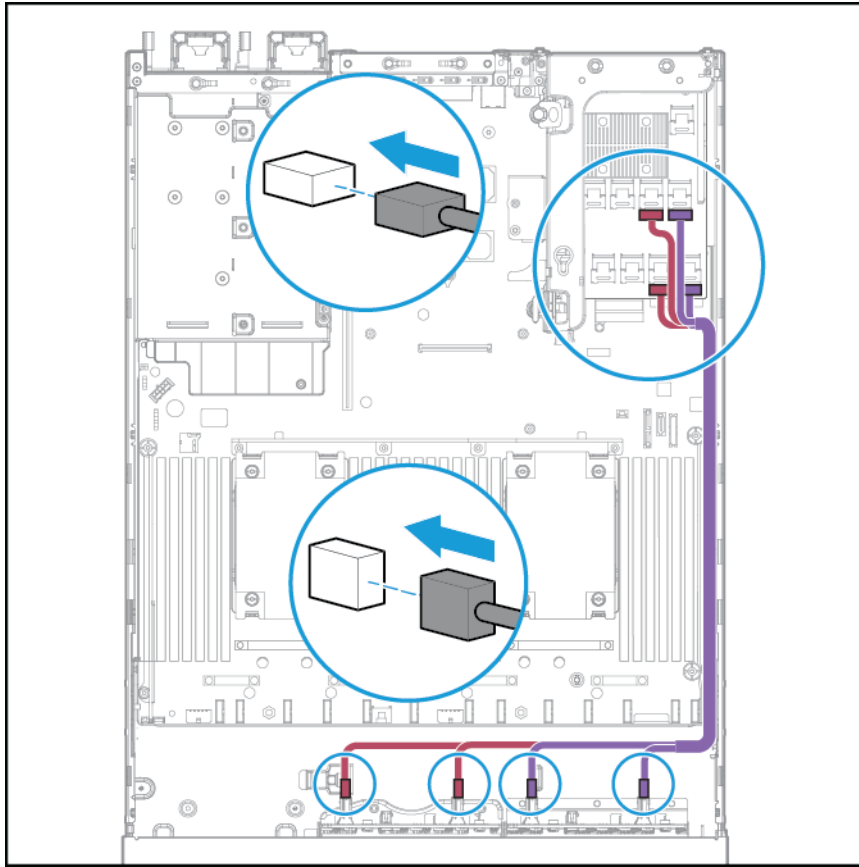


Connect the data cable:

- Connected to a PCI expansion board

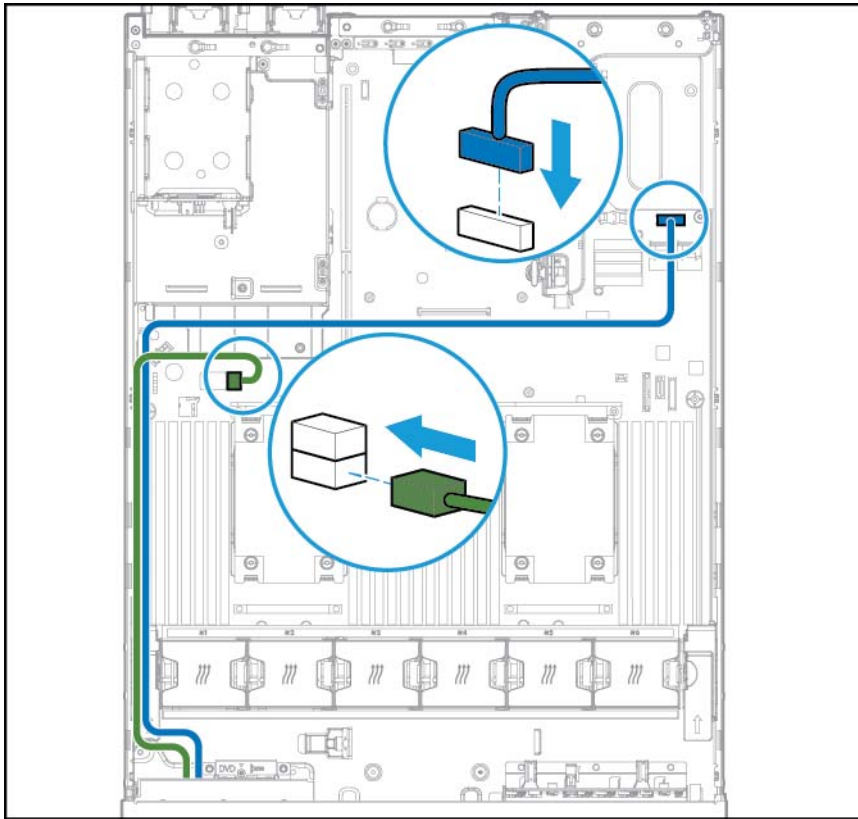


- Connected to an HP 12G SAS Expander Card

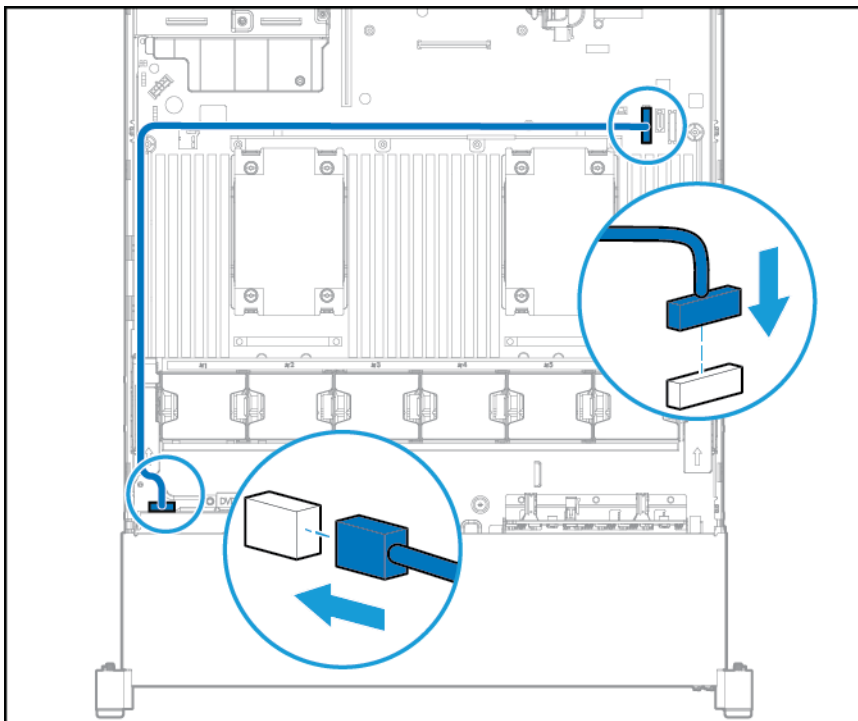


Universal media bay cabling

Connect the VGA cable to the optional VGA connector. Connect the USB cable to the front dual internal USB 3.0 connector.



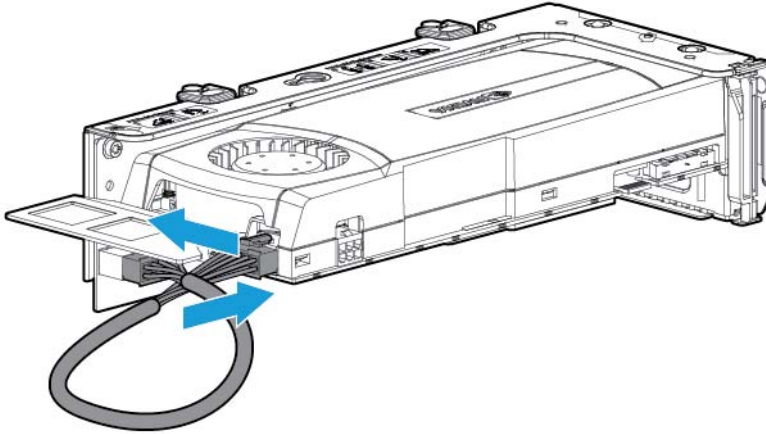
Connect the SATA optical drive cable to the front optical disk drive connector.



150W PCIe power cable option

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

Connect the cable that was provided with the PCIe card.



7 Software and configuration utilities



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

Server mode

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

Software or configuration utility	Server mode
HP iLO See HP iLO on page 98	Online and Offline
Active Health System, see Active Health System on page 98	Online and Offline
HP RESTful API, see HP RESTful API support for HP iLO on page 99	Online and Offline
Integrated Management Log, see Integrated Management Log on page 99	Online and Offline
Intelligent Provisioning, see Intelligent Provisioning on page 101	Offline
HP Insight Diagnostics, see HP Insight Diagnostics on page 101	Online and Offline
HP Insight Remote Support, see HP Insight Remote Support on page 100	Online
HP Insight Online, see HP Insight Online on page 100	Online
Erase Utility, See Erase Utility on page 102	Offline
Scripting Toolkit for Windows and Linux, see Scripting Toolkit for Windows and Linux on page 102	Online
HP Service Pack for ProLiant, see HP Service Pack for ProLiant on page 103	Online and Offline
HP Smart Update Manager, see HP Smart Update Manager on page 103	Online and Offline
HP UEFI System Utilities, see HP UEFI System Utilities on page 103	Offline
HP Smart Storage Administrator, see HP Smart Storage Administrator on page 106	Online and Offline
ROMPaq utility, see ROMPaq utility on page 106	Offline

Product QuickSpecs

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

HP iLO

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

HP iLO enables and manages the Active Health System (see [Active Health System on page 98](#)) and also features Agentless Management. All key internal subsystems are monitored by HP iLO. If enabled, SNMP alerts are sent directly by HP iLO regardless of the host operating system or even if no host operating system is installed.

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

Using HP iLO, you can do the following:

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

For more information about HP iLO features, go to the HP iLO documentation on the HP website <http://www.hp.com/go/ilo/docs>.

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

Active Health System

HP Active Health System provides the following features:

- Combined diagnostics tools/scanners
- Always on, continuous monitoring for increased stability and shorter downtimes
- Rich configuration history
- Health and service alerts
- Easy export and upload to Service and Support

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

The Active Health System collects the following types of data:

- Server model
- Serial number
- Processor number and speed
- Storage capacity and speed
- Memory capacity and speed
- Firmware/BI OS

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

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

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

The Agentless Management Service is available in the SPP, which can be downloaded from the HP website <http://www.hp.com/go/spp/download>. The Active Health System log can be downloaded manually from HP iLO or HP Intelligent Provisioning and sent to HP.

For more information, go to the following documents:

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

HP RESTful API support for HP iLO

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

HP iLO 4 supports the HP RESTful API with HP ProLiant Gen8 and later servers. For more information about the HP RESTful API, go to the HP website <http://www.hp.com/support/restfulinterface/docs>.

Integrated Management Log

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

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

- From within HP SIM
- From within HP UEFI System Utilities, see [HP UEFI System Utilities on page 103](#)
- From within the Embedded UEFI shell, see [Embedded UEFI shell on page 105](#)

- From within operating system-specific IML viewers:
 - For Windows: IML Viewer
 - For Linux: IML Viewer Application
- From within the HP iLO web interface
- From within HP Insight Diagnostics, see [HP Insight Diagnostics on page 101](#)

HP Insight Remote Support

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

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

HP Insight Remote Support central connect

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

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

HP Insight Online direct connect

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

For more information, go to the product documentation on the HP website <http://www.hp.com/go/insightremotesupport/docs>.

HP Insight Online

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

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

Intelligent Provisioning

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

- Intelligent Provisioning assists with the OS installation process by preparing the system for installing "off-the-shelf" and HP branded versions of operating system software and integrating optimized HP ProLiant server support software.
- Intelligent Provisioning provides maintenance-related tasks using the Perform Maintenance window.
- Intelligent Provisioning provides installation help for Microsoft Windows, Red Hat and SUSE Linux, and VMware operating systems. For specific OS support, go to the *HP Intelligent Provisioning Release Notes* on the HP website <http://www.hp.com/go/intelligentprovisioning/docs>.

For more information about Intelligent Provisioning software, go to the HP website <http://www.hp.com/go/intelligentprovisioning>. For Intelligent Provisioning recovery media downloads, go to the **Resources** tab on the HP website <http://www.hp.com/go/ilo>. For consolidated drive and firmware update packages, go to the **HP Smart Update: Server Firmware and Driver Updates** page on the HP website <http://www.hp.com/go/SmartUpdate>.

HP Insight Diagnostics

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

HP Insight Diagnostics Offline Edition performs various in-depth system and component testing while the OS is not running. To run this utility, boot the server using Intelligent Provisioning (see [Intelligent Provisioning on page 101](#)).

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

For more information or to download the utility, go to the HP website <http://www.hp.com/servers/diags>. HP Insight Diagnostics Online Edition is also available in the SPP ([HP Service Pack for ProLiant on page 103](#)).

HP Insight Diagnostics survey functionality


HP Insight Diagnostics provides survey functionality that gathers critical hardware and software information on ProLiant servers.

This functionality supports operating systems that are supported by the server. For operating systems supported by the server, go to the HP website <http://www.hp.com/go/supportos>.

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

Survey functionality is installed with every Intelligent Provisioning-assisted HP Insight Diagnostics installation, or it can be installed through the SPP, see [HP Service Pack for ProLiant on page 103](#).

Erase Utility

 **CAUTION:** Perform a backup before running the Erase Utility. The utility sets the system to its original factory state, deletes the current hardware configuration information, including array setup and disk partitioning, and erases all connected hard drives completely. Before using this utility, see the instructions in the *HP Intelligent Provisioning User Guide*.

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

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

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

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

Scripting Toolkit for Windows and Linux

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

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

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

HP Service Pack for ProLiant

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

SPP can be used in an online mode on a Windows or Linux hosted operating system, or in an offline mode where the server is booted to an operating system included on the ISO file so that the server can be updated automatically with no user interaction or updated in interactive mode.

For more information or to download SPP, see one of the following pages on the HP website:

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

HP Smart Update Manager

HP SUM is a product used to install and update firmware, drivers, and systems software on HP ProLiant servers. HP SUM provides a GUI and a command-line scriptable interface for deployment of systems software for single or one-to-many HP ProLiant servers and network-based targets, such as iLOs, OAs, and VC Ethernet and Fibre Channel modules.

For more information about HP SUM, go to the product page on the HP website <http://www.hp.com/go/hpsum>.

To download HP SUM, go to the HP website <http://www.hp.com/go/hpsum/download>.

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

HP UEFI System Utilities

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

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

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

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

Using HP UEFI System Utilities

To use the System Utilities, use the following keys.

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

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

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

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

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

Flexible boot control

This feature enables you to do the following:

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

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

- Boot to System Utilities

Toward the end of the boot process, the boot options screen appears. This screen is visible for several seconds before the system attempts to boot from a supported boot device. During this time, you can access the System Utilities by pressing the **F9** key.

- Choose between supported modes: Legacy BIOS Boot Mode or UEFI Boot Mode



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

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

Restoring and customizing configuration settings

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

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

Secure Boot configuration

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

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

Once enabled, only firmware components and operating systems with boot loaders that have an appropriate digital signature can execute during the boot process. Only operating systems that support Secure Boot and have an EFI boot loader signed with one of the authorized keys can boot when Secure Boot is enabled. For more information about supported operating systems, go to the *HP UEFI System Utilities and Shell Release Notes* on the HP website <http://www.hp.com/go/ProLiantUEFI/docs>.

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

Embedded UEFI shell

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

For more information, see the following documents:

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

Embedded UEFI diagnostics

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

For more information on the embedded UEFI diagnostics tool, go to the *HP UEFI System Utilities User Guide for HP ProLiant Gen9 Servers* on the HP website <http://www.hp.com/go/ProLiantUEFI/docs>.

HP RESTful API support for UEFI

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

For more information about the HP RESTful API and the HP RESTful Interface Tool, go to the HP website <http://www.hp.com/support/restfulinterface/docs>.

Re-entering the server serial number and product ID

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

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

```
The serial number should only be modified by qualified service
personnel. This value should always match the serial number located on
the chassis.
```

4. Press the **Enter** key to clear the warning.
5. Enter the serial number and press the **Enter** key.
6. Select **Product ID**. The following warning appears:

```
Warning: The Product ID should ONLY be modified by qualified service
personnel. This value should always match the Product ID located on
the chassis.
```

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

Utilities and features

HP Smart Storage Administrator

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

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

Some HP SSA features include the following:

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

For more information about HP SSA, go to the HP website <http://www.hp.com/go/hpssa>.

ROMPaq utility

The ROMPaq utility enables you to upgrade the system firmware (BIOS). To upgrade the firmware, insert a ROMPaq USB Key into an available USB port and boot the system. In addition to ROMPaq, Online Flash Components for Windows and Linux operating systems are available for updating the system firmware.

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

For more information, go to the HP website <http://www.hp.com/go/hpsc>. Enter your product name in the **Enter a product name or number** field and click **Go**.

Automatic Server Recovery

ASR is a feature that causes the system to restart when a catastrophic operating system error occurs, such as a blue screen, ABEND, or panic. A system fail-safe timer, the ASR timer, starts when the System Management driver, also known as the Health Driver, is loaded. When the operating system is functioning properly, the system periodically resets the timer. However, when the operating system fails, the timer expires and restarts the server.

ASR increases server availability by restarting the server within a specified time after a system hang. You can disable ASR from the System Management Homepage or through UEFI System Utilities.

USB support

HP provides standard USB 2.0 support, standard USB 3.0 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 2.0 devices through legacy USB support, which is enabled by default in the system ROM. USB 3.0 ports are not functional before the OS loads. The native OS provides USB 3.0 support through appropriate xHCI drivers.

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 (system boot)
- UEFI System Utilities
- Pre-boot UEFI shell
- DOS
- Operating environments which do not provide native USB support

External USB functionality

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

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

Redundant ROM support

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



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

Safety and security benefits

When you flash the system ROM, ROMPaq writes over the backup ROM and saves the current ROM as a backup, enabling you to switch easily to the alternate ROM version if the new ROM becomes corrupted for any

reason. This feature protects the existing ROM version, even if you experience a power failure while flashing the ROM.

Keeping the system current

Drivers



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

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

If you are installing an Intelligent Provisioning-supported OS, use Intelligent Provisioning (see [Intelligent Provisioning on page 101](#)) and its Configure and Install feature to install the OS and latest supported drivers.

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

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

To locate the drivers for a particular server, go to the HP website <http://www.hp.com/go/hpsc>. Enter your product name in the **Enter a product name or number** field and click **Go**.

Software and firmware

Software and firmware should be updated before using the server for the first time, unless any installed software or components require an older version.

For system software and firmware updates, use one of the following sources:

- Download the SPP ([HP Service Pack for ProLiant on page 103](#)) from the HP Service Pack for ProLiant download page <http://www.hp.com/go/spp>.
- Download individual drivers, firmware, or other systems software components from the server product page in the HP Support Center <http://www.hp.com/go/hpsc>. Enter your product name in the **Enter a product name or number** field and click **Go**.

Version control

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

- VCRM manages the repository for SPP. Administrators can view the SPP contents or configure VCRM to automatically update the repository with internet downloads of the latest software and firmware from HP.
- VCA compares installed software versions on the node with updates available in the VCRM managed repository. Administrators configure VCA to point to a repository managed by VCRM.

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

HP operating systems and virtualization software support for ProLiant servers

For information about specific versions of a supported operating system, go to the HP website and the driver download page <http://www.hp.com/support/DL380zGen9/download>.

HP Technology Service Portfolio

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

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

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

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

Change control and proactive notification

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

For more information, go to the HP website <http://www.hp.com/go/pcn>.

8 Troubleshooting


Troubleshooting resources

The *HP ProLiant Gen9 Troubleshooting Guide, Volume I: Troubleshooting* provides procedures for resolving common problems and comprehensive courses of action for fault isolation and identification, issue resolution, and software maintenance on ProLiant servers and server blades. To view the guide, go to http://www.hp.com/support/Gen9_TSG_en.

The *HP ProLiant Gen9 Troubleshooting Guide, Volume II: Error Messages* provides a list of error messages and information to assist with interpreting and resolving error messages on ProLiant servers and server blades. To view the guide, go to http://www.hp.com/support/Gen9_EMG_en.

9 Battery replacement

If the server no longer automatically displays the correct date and time, you may need to replace the battery that provides power to the real-time clock.

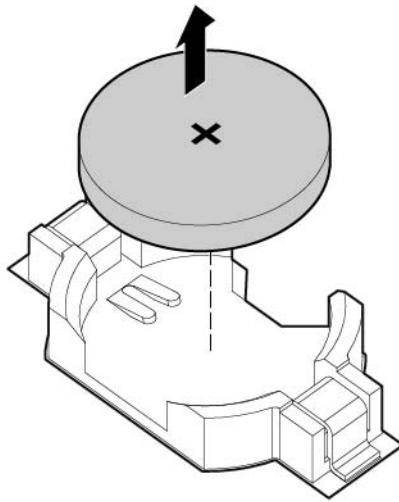
 **WARNING!** The computer contains an internal lithium manganese dioxide, a vanadium pentoxide, or an alkaline battery pack. A risk of fire and burns exists if the battery pack is not properly handled. To reduce the risk of personal injury:

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

To remove the component:

1. Power down the server (see [Powering down the server on page 16](#)).
2. Remove all power.
 - a. Disconnect each power cord from the power source.
 - b. Disconnect each power cord from the server.
3. Do one of the following:
 - Extend the server from the rack (see [Extending the server from the rack on page 17](#)).
 - Remove the server from the rack (see [Removing the server from the rack on page 17](#)).
4. Remove the access panel (see [Removing the access panel on page 18](#)).
5. If installed, remove the secondary PCIe riser cage (see [3-slot PCI riser cage option on page 58](#)).
6. Locate the battery, (see [System board components on page 10](#)).

7. Remove the battery.



To replace the component, reverse the removal procedure.

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

10 Regulatory information

Safety and regulatory compliance

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

Belarus Kazakhstan Russia marking

Manufacturer

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

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Manufacturing date

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

CCSYWWZZZZ

Valid date formats include the following:

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

Turkey RoHS material content declaration

Türkiye Cumhuriyeti: EEE Yönetmeliğine Uygundur

Ukraine RoHS material content declaration

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

Warranty information

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

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

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

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

11 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 \pm 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.

12 Specifications

Environmental specifications

Specification	Value
Temperature range*	—
Operating	10° C to 35° C (50° F to 95° F)
Non-operating	-30° C to 60° C (-22° F to 140° F)
Relative humidity (noncondensing)	—
Operating	Minimum to be the higher (more moisture) of -12°C (10.4°F) dew point or 8% relative humidity Maximum to be 24°C (75.2°F) dew point or 90% relative humidity
Non-operating	5% to 95% 38.7° C (101.7° F), maximum wet bulb temperature

* All temperature ratings shown are for sea level. An altitude derating of 1.0° C per 304.8 m (1.8° F per 1,000 ft) to 3048 m (10,000 ft) is applicable. No direct sunlight allowed. Maximum rate of change is 20°C per hour (36°F per hour). The upper limit and rate of change might be limited by the type and number of options installed.

For certain approved hardware configurations, the supported system inlet temperature range is extended:

- 5°C to 10°C (41°F to 50°F) and 35°C to 40°C (95°F to 104°F) at sea level with an altitude derating of 1.0°C per every 175 m (1.8°F per every 574 ft) above 900 m (2953 ft) to a maximum of 3048 m (10,000 ft).
- 40°C to 45°C (104°F to 113°F) at sea level with an altitude derating of 1.0°C per every 125 m (1.8°F per every 410 ft) above 900 m (2953 ft) to a maximum of 3048 m (10,000 ft).

The approved hardware configurations for this system are listed on the HP website <http://www.hp.com/go/proliant/ASHRAE>.

Mechanical specifications

Specification	Value
Height	8.73 cm (3.44 in)
Depth, SFF	67.94 cm (26.75 in)
Width	44.54 cm (17.54 in)
Weight (maximum—all SFF drives)	14.7 kg (32.6 lb)

*The SFF configuration includes the following components:

- SFF drive (1)
- Drive blanks (7)

- Drive bay blanks for bays 1 and 2 (2)
- Fan assemblies (4)
- Fan blanks (2)
- Standard heatsink (1)
- 1P air baffle (1)
- X8 HP Flexible Smart Array Controller (1)
- Primary riser cage (1)
- Secondary riser cage blank (1)
- Power supply (1)
- Power supply blank (1)
- Cables for the above components

Power supply specifications

Depending on installed options, the server is configured with one of the following power supplies:

- HP 800W Flex Slot Platinum Hot-plug Power Supply, see [HP 800W Flex Slot Platinum Hot-plug Power Supply on page 117](#)
- HP 1400W Flex Slot Platinum Plus Hot-plug Power Supply, see [HP 1400W Flex Slot Platinum Plus Hot-plug Power Supply on page 118](#)

For detailed power supply specifications, go to the HP website <http://www.hp.com/go/proliant/powersupply>.

HP 800W Flex Slot Platinum Hot-plug Power Supply

Specification	Value
Input requirements	
Rated Input voltage	100 to 120 VAC
	200 to 240 VAC
	240 VDC for China only
Rated input frequency	50 Hz to 60 Hz
Rated input current	9.4 A at 100 VAC
	4.5 A at 200 VAC
	3.8 A at 240 VDC
Maximum rated input power	940 W at 100 VAC
	900 W at 200 VAC
BTUs per hour	3207 at 100 VAC
	3071 at 200 VAC
Power supply output	
Rated steady-state power	800 W at 100 VAC to 120 VAC input

Specification	Value
	800 W at 200 VAC to 240 VAC
Maximum peak power	800 W at 100 VAC to 120 VAC input
	800 W at 200 VAC to 240 VAC

HP 1400W Flex Slot Platinum Plus Hot-plug Power Supply

Specification	Value
Input requirement	
Rated input voltage	200 to 240 VAC
Rated input frequency	50 Hz to 60 Hz
Rated input current	8.0 A at 200 VAC
	6.7 A at 240 VAC
Maximum rated input power	1600 W at 200 VAC
	1600 W at 240 VAC
BTUs per hour	5459 at 200 VAC
	5459 at 240 VAC
Power supply output	
Rted steady-state power	1400 W at 200 VAC to 240 VAC input
Maximum peak power	1400 W at 200 VAC to 240 VAC input

13 Support and other resources

Before you contact HP

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

- Active Health System log (HP ProLiant Gen8 or later products)
Download and have available an Active Health System log for 7 days before the failure was detected. For more information, go to the *HP iLO 4 User Guide* or *HP Intelligent Provisioning User Guide* on the HP website <http://www.hp.com/go/ilo/docs>.
- Onboard Administrator SHOW ALL report (for HP BladeSystem products only)
For more information on obtaining the Onboard Administrator SHOW ALL report, go to the HP website <http://www.hp.com/go/OAlog>.
- Technical support registration number (if applicable)
- Product serial number
- Product model name and number
- Product identification number
- Applicable error messages
- Add-on boards or hardware
- Third-party hardware or software
- Operating system type and revision level

HP contact information

For United States and worldwide contact information, go to the Contact HP website <http://www.hp.com/go/assistance>.

In the United States:

- To contact HP by phone, call 1-800-334-5144. For continuous quality improvement, calls may be recorded or monitored.
- If you have purchased a Care Pack (service upgrade), go to the Support & Drivers website <http://www8.hp.com/us/en/support-drivers.html>. If the problem cannot be resolved at the website, call 1-800-633-3600. For more information about Care Packs, go to the HP website <http://pro-aq-sama.houston.hp.com/services/cache/10950-0-0-225-121.html>.

Customer Self Repair

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

- **Mandatory**—Parts for which customer self repair is mandatory. If you request HP to replace these parts, you will be charged for the travel and labor costs of this service.
- **Optional**—Parts for which customer self repair is optional. These parts are also designed for customer self repair. If, however, you require that HP replace them for you, there may or may not be additional charges, depending on the type of warranty service designated for your product.



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

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

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

14 Acronyms and abbreviations

ABEND	abnormal end
ACU	Array Configuration Utility
AMP	Advanced Memory Protection
ASR	Automatic Server Recovery
CSA	Canadian Standards Association
CSR	Customer Self Repair
DDDC	Double Device Data Correction
DDR	double data rate
FBWC	Flash-Backed Write Cache
HDIMM	HyperCloud DIMM
IEC	International Electrotechnical Commission
iLo	Integrated Lights-Out
IML	Integrated Management Log
ISEE	Instant Support Enterprise Edition
LFF	large form factor
NMI	Non-Maskable Interrupt
NVRAM	non-volatile memory
ORCA	Option ROM Configuration for Arrays
PCIe	Peripheral Component Interconnect Express
POST	Power-On Self Test
PSP	HP ProLiant Support Pack
RBSU	ROM-Based Setup Utility
RDIMM	registered dual in-line memory module
RDP	Rapid Deployment Pack
SAS	Serial Attached SCSI
SATA	serial ATA
SDDC	Single Device Data Correction
SELV	separated extra low voltage
SFF	small form factor
SIM	Systems Insight Manager
SSA	HP Systems Insight Manager
TMRA	recommended ambient operating temperature

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

15 Documentation feedback

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

Index

A

abbreviations 121
access panel 18
acronyms 121
Advanced ECC memory 43, 44
air baffle 25
ASR (Automatic Server Recovery) 107
authorized reseller 119
Automatic Server Recovery (ASR) 107

B

battery 111
before you contact HP 119
BIOS upgrade 97, 106
blue screen event 12
boot options 33
buttons 2

C

cable management arm 19, 29
cables 89
cabling 89, 94, 96
Care Pack 26, 100, 109
Change Control 109
components 2
components, identification 2
configuration of system 33, 97
connectors 2
contacting HP 119
crash dump analysis 12
CSR (customer self repair) 120
customer self repair (CSR) 119, 120

D

default settings 43
diagnostic tools 97, 106, 107
DIMM identification 42
DIMM population guidelines 44
DIMM slot locations 12
DIMMs 12, 41
DIMMs, installing 45
DIMMs, single- and dual-rank 41
drive LEDs 13

drivers 108

drives 13

E

electrical grounding requirements 28
electrostatic discharge 115
embedded UEFI diagnostics 105
embedded UEFI shell 105
enabling the Trusted Platform Module 88
environmental requirements 27
environmental specifications 116
Erase Utility 97, 102
error messages 110
expansion board options 53
expansion boards 53
expansion slot blank 53
expansion slots 55
extending server from rack 17

F

fan cage 20
fan option 34
features 2, 106
firmware 108
firmware update 103, 108
firmware, updating 103, 108
flexible boot control 104
FlexibleLOM option 74
front drive cage option 65
front panel buttons 3
front panel components 2
front panel LEDs 3
full-length expansion board 24

G

GPU enablement kit 60
grounding methods 115

H

hard drive bays 2
hard drive LEDs 13
hard drives, determining status of 13

hardware options installation 29, 34
health driver 107
health LEDs 3
help resources 119
high performance fan option 82
hot plug power supply 117, 118
hot plug power supply option 51
hot-plug fans 14, 19, 21
hot-plug SAS hard drive options 46
HP 12G SAS Expander Card 75
ports 76
HP Flexible Smart Array controller 80
HP Insight Diagnostics 101
HP Insight Remote Support software 109
HP RESTful API support 99
HP Service Pack for ProLiant 97, 103
HP Smart Storage Administrator 106
HP Smart storage battery 81
HP Smart Update Manager overview 97, 103
HP SmartMemory 40
HP technical support 109, 119
HP UEFI System Utilities 103

I

ILM (Integrated Management Log) 97
iLO (Integrated Lights-Out) 97, 98, 99
IML (Integrated Management Log) 99
Insight Diagnostics 108
installation services 26
installation, server options 29, 34
installing a hot-plug SAS hard drive 47
installing hardware 34
installing the access panel 18
installing the full-length expansion board retainer 23

- installing the operating system 31
- installing the server into the rack 30
- installing the Trusted Platform Module board 86
- Integrated Lights-Out (iLO) 98, 99
- Integrated Management Log (IML) 99
- Intelligent Provisioning 97, 101

L

- LEDs 5, 13
- LEDs, front panel 13
- LEDs, hard drive 13
- LEDs, SAS hard drive 13
- LEDs, troubleshooting 110
- Location Discovery Services ear option 70

M

- mechanical specifications 116
- memory 40, 41, 42, 43
- memory configurations 42, 43
- memory dump 12
- memory subsystem architecture 41
- memory, configuration requirements 42
- memory, configuring 42, 43
- memory, lockstep 45
- memory, online spare 43

N

- NMI header 12

O

- online spare memory 43, 44
- operating system crash 12, 107
- operating systems 109
- optical drive 2
- optimum environment 27
- Option ROM Configuration for Arrays (ORCA) 97
- options
 - fan 34
 - processor 34
- options installation 29, 34
- ORCA (Option ROM Configuration for Arrays) 97

P

- PCI expansion slots 9

- PCI riser cage 22, 23, 56
- PCI riser cage option, 3-slot 58
- phone numbers 119
- POST error messages 110
- power cabling 96
- power fault LEDs 4
- Power On button 16, 33
- power requirements 28
- power supply 117, 118
- power supply LEDs 8
- power supply specifications 117
- powering down 16
- powering up 16
- preparation procedures 16
- problem diagnosis 110
- processor option 34

Q

- QuickSpecs 97

R

- rack installation 26, 29
- rack mounting hardware 29
- rack warnings 29
- RBSU (ROM-Based Setup Utility) 97
- re-entering server serial number, product ID 106
- rear panel components 7
- rear panel LEDs 8
- rear panel, accessing 19
- rear serial port option 84
- redundant ROM 107
- registering the server 33
- regulatory information 113
- removing a hot-plug SAS hard drive 48
- removing the access panel 18
- RESTful API support for UEFI 105
- restoring and customizing configuration settings 104
- retaining the recovery key/password 88
- ROM redundancy 107
- ROMPaq Utility 97
- ROMPaq utility 106, 107

S

- safety considerations 29, 107
- SAS and SATA device numbers 13
- scripted installation 102
- Secure Boot configuration 105

server

- extending from rack 17
- removing from rack 17
- server features and options 34
- server QuickSpecs 34
- server setup 26, 108
- Service Packs 103
- shipping carton contents 29
- space and airflow requirements 27
- specifications 116, 117, 118
- specifications, environmental 116
- specifications, mechanical 116
- specifications, server 116
- SPP 103
- support 119
- supported operating systems 109
- switches 12
- system battery 111
- system board components 10
- system components 2
- system maintenance switch 11, 12
- system power LED 3
- Systems Insight Display 4, 5
- Systems Insight Display LEDs 5

T

- technical support 109, 119
- telephone numbers 119
- temperature requirements 28
- TPM (Trusted Platform Module) 85, 88
- troubleshooting 110

U

- UID LED 12
- universal media bay options 48
- updating the system ROM 107
- USB connector 2
- USB functionality 107
- USB support 107
- utilities 97, 106
- utilities, deployment 97, 102

V

- ventilation 27
- Version Control 108
- Video connector 2

W

- warnings 29
- website, HP 119