



ThinkSystem SR665 Setup Guide



Machine Types: 7D2V and 7D2W

Note

Before using this information and the product it supports, be sure to read and understand the safety information and the safety instructions, which are available at:

http://thinksystem.lenovofiles.com/help/topic/safety_documentation/pdf_files.html

In addition, be sure that you are familiar with the terms and conditions of the Lenovo warranty for your server, which can be found at:

<http://datacentersupport.lenovo.com/warrantylookup>

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Chapter 1. Introduction

The ThinkSystem™ SR665 server is a 2-socket 2U server that features the new AMD® EPYC™ family of processors. The server offers a broad selection of drive and slot configurations and offers high performance and expansion for various IT workloads. Combining performance and flexibility, the server is a great choice for enterprises of all sizes.

Performance, ease of use, reliability, and expansion capabilities were key considerations in the design of the server. These design features make it possible for you to customize the system hardware to meet your needs today and provide flexible expansion capabilities for the future.

The server comes with a limited warranty. For details about the warranty, see:

<https://support.lenovo.com/us/en/solutions/ht503310>

For details about your specific warranty, see:

<http://datacentersupport.lenovo.com/warrantylookup>

Identifying your server

When you contact Lenovo for help, the machine type and serial number information helps support technicians to identify your server and provide faster service.

The machine type and serial number are on the ID label on the right rack latch in the front of the server.

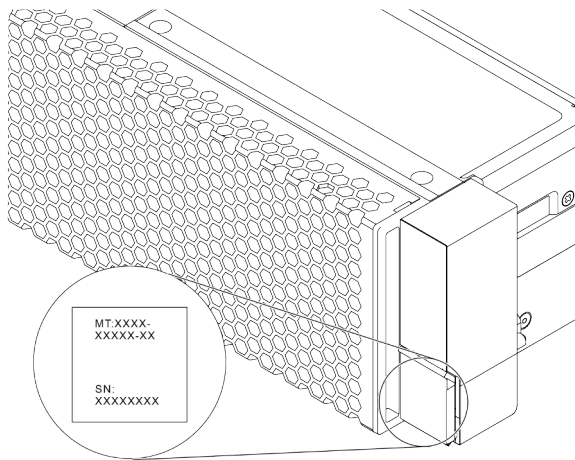


Figure 1. Location of the ID label

XCC network access label

The network access label for the XClarity Controller (XCC) is attached on the top side of the pull-out information tab as shown. After you get the server, peel the network access label away and store it in a safe place.

Note: The pull-out information tab is located on the right bottom of the front side of your server. For detailed information, see [“Front view” on page 33](#)

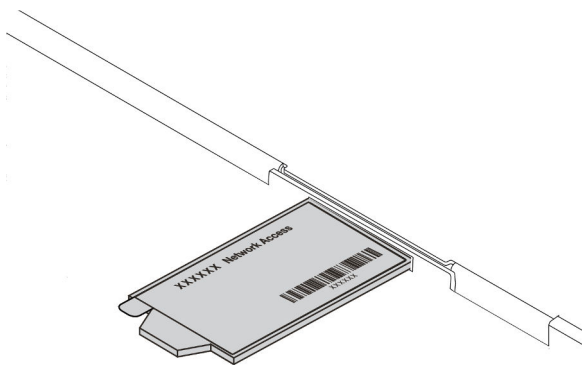


Figure 2. Location of the XCC network access label

Quick response code

The system service label, which is on the top cover, provides a quick response (QR) code for mobile access to service information. Scan the QR code with a mobile device and a QR code reader application to get quick access to the Lenovo Service Web site for this server. The Lenovo Service Information Web site provides additional information for parts installation and replacement videos, and error codes for server support.

The following illustrates the QR code: <https://datacentersupport.lenovo.com/products/servers/thinksystem/sr665/7d2w>

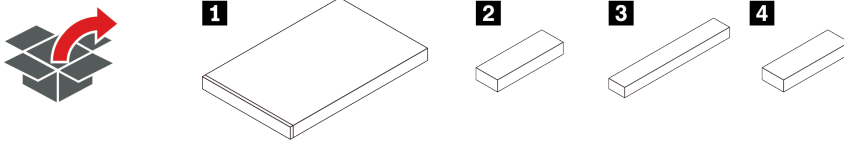


Figure 3. QR code

Package contents

This section provides server package contents list.

The server package includes the following items:



Note: Items marked with asterisk (*) are available on some models.

- ❶ Server
- ❷ Material box, including items such as accessory kit, power cords*, and documentation.
- ❸ Rail kit box*, including the rail kit and documentation.
- ❹ CMA box*, including the cable management arm.

Features

Performance, ease of use, reliability, and expansion capabilities were key considerations in the design of your server. These design features make it possible for you to customize the system hardware to meet your needs today and provide flexible expansion capabilities for the future.

Your server implements the following features and technologies:

- **Features on Demand**

If a Features on Demand feature is integrated in the server or in an optional device that is installed in the server, you can purchase an activation key to activate the feature. For information about Features on Demand, see:

<https://fod.lenovo.com/lkms>

- **Flexible network support**

The server has an Open Compute Project (OCP) 3.0 slot for an OCP 3.0 Ethernet adapter, which provides two or four network connectors for network support.

- **Integrated Trusted Platform Module (TPM)**

This integrated security chip performs cryptographic functions and stores private and public secure keys. It provides the hardware support for the Trusted Computing Group (TCG) specification. You can download the software to support the TCG specification. For more information on TPM configurations, see “Configure security settings” in *Maintenance Manual*.

Note: TPM 1.2 is supported on server models with 7002 series processors and UEFI firmware before version 2.02 at the same time.

TPM version	Type	Outside Chinese Mainland		Chinese Mainland	
		7002 CPU	7003 CPU	7002 CPU	7003 CPU
TPM 1.2	Onboard chip	√			
TPM 2.0	Onboard chip	√	√		
NationZ TPM 2.0	Daughter card			√	√

- **Large system-memory capacity**

The server supports up to 32 TruDDR4 registered DIMMs (RDIMMs) or three-dimensional stacking registered DIMMs (3DS RDIMMs). For more about the specific types and maximum amount of memory, see “[Technical specifications](#)” on page 7.

- **Large data-storage capacity and hot-swap capability**

The hot-swap server models support a maximum of fourteen 3.5-inch hot-swap Serial Attached SCSI (SAS) hard disk drives or hot-swap Serial ATA (SATA) hard disk drives. The simple-swap server models support a maximum of eight 3.5-inch simple-swap SATA hard disk drives.

With the hot-swap feature, you can add, remove, or replace hard disk drives without turning off the server.

- **System management tools**

The server supports the following tools to enable easier and more efficient server management process.

- Lenovo XClarity Controller

Important: Lenovo XClarity Controller (XCC) supported version varies by product. All versions of Lenovo XClarity Controller are referred to as Lenovo XClarity Controller and XCC in this document,

unless specified otherwise. To see the XCC version supported by your server, go to https://sysmgt.lenovofiles.com/help/topic/lxcc_frontend/lxcc_overview.html.

- Lenovo XClarity Administrator
- Lenovo XClarity Essentials toolset
- Lenovo XClarity Provisioning Manager

Important: Lenovo XClarity Provisioning Manager (LXPM) supported version varies by product. All versions of Lenovo XClarity Provisioning Manager are referred to as Lenovo XClarity Provisioning Manager and LXPM in this document, unless specified otherwise. To see the LXPM version supported by your server, go to https://sysmgt.lenovofiles.com/help/topic/lxpm_frontend/lxpm_product_page.html.

- Lenovo XClarity Integrator
- Lenovo XClarity Energy Manager
- Lenovo Capacity Planner

For details, see “[Management options](#)” on page 15.

- **Light path diagnostics**

Light path diagnostics provides LEDs to help you diagnose problems and an integrated LCD diagnostics panel or external diagnostics handset can provide additional diagnostic information. For more information about the light path diagnostics, see the following:

- “[Drive LEDs](#)” on page 43
- “[Rear view LEDs](#)” on page 61
- “[Diagnostics panel](#)” on page 45
- “[LCD diagnostics panel/handset](#)” on page 48

- **Mobile access to Lenovo Service Information website**

The server provides a QR code on the system service label, which is on the cover of the server, that you can scan using a QR code reader and scanner with a mobile device to get quick access to the Lenovo Service Information website. The Lenovo Service Information website provides additional information for parts installation, replacement videos, and error codes for server support.

- **Redundant networking connection**

The Lenovo XClarity Controller provides failover capability to a redundant Ethernet connection with the applicable application installed. If a problem occurs with the primary Ethernet connection, all Ethernet traffic that is associated with the primary connection is automatically switched to the optional redundant Ethernet connection. If the applicable device drivers are installed, this switching occurs without data loss and without user intervention.

- **Redundant cooling and optional power capabilities**

The server supports a maximum of two hot-swap power supplies and six hot-swap fans, which provide redundancy for a typical configuration. The redundant cooling by the fans in the server enables continued operation if one of the fans fails.

- **ThinkSystem RAID support**

The ThinkSystem RAID adapter provides hardware redundant array of independent disks (RAID) support to create configurations. The standard RAID adapter provides RAID levels 0 and 1. An optional RAID adapter is available for purchase.

- **UEFI-compliant server firmware**

Lenovo ThinkSystem firmware is Unified Extensible Firmware Interface (UEFI) compliant. UEFI replaces BIOS and defines a standard interface between the operating system, platform firmware, and external devices.

Lenovo ThinkSystem servers are capable of booting UEFI-compliant operating systems, BIOS-based operating systems, and BIOS-based adapters as well as UEFI-compliant adapters.

Note: The server does not support Disk Operating System (DOS).

Specifications

This section provides technical and environment specifications of the server.

- [“Technical specifications” on page 7](#)
- [“Environment specifications” on page 18](#)

Technical specifications

The section provides technical specifications of the server. Depending on the model, some features might not be available, or some specifications might not apply.

Note: For technical rules of each component, see [“Technical rules” on page 22](#).

- [“Dimensions” on page 7](#)
- [“CPU” on page 7](#)
- [“Memory” on page 9](#)
- [“Fan” on page 10](#)
- [“Operating systems” on page 10](#)
- [“Input/Output \(I/O\)” on page 10](#)
- [“Internal drives” on page 10](#)
- [“Expansion slots” on page 11](#)
- [“Storage controller” on page 11](#)
- [“Network” on page 13](#)
- [“GPU” on page 13](#)
- [“Power supplies” on page 14](#)
- [“Management options” on page 15](#)

Dimensions

Form factor	Height	Depth	Width	Package weight
2U	86.5 mm (3.4 inches)	763.7 mm (30.1 inches)	<ul style="list-style-type: none">• With rack latches: 482.1 mm (19.0 inches)• Without rack latches: 445.0 mm (17.5 inches)	Up to 38.8 kg (85.5 lb)

Note: The depth is measured with rack latches installed, but without security bezel installed.

CPU

- Up to two AMD® EPYC™ 7002 or 7003 series CPUs
- Scalable up to 64 cores per socket, 128 cores in total
- 7nm process technologies
- Designed for Land Grid Array (LGA) 4094 (SP3) socket
- Supports 3200 MHz DDR4 frequency
- TDP ratings up to 280 watts

Notes:

- For the system to support 7203, 7203P, 7303, 7303P, 7643P, and 7663P processors, the minimum UEFI version is d8e132g-3.10, and the minimum XCC version is d8bt54m-5.00.

- 7002 series CPU and 7003 series CPU cannot be mixed within a server.
- CPUs with a P suffix (for example 7232P) are single-socket capable only.
- Check “[CPU, heat sink, and fan combinations](#)” on [page 22](#) for selecting the correct heat sinks and fans under different CPU and hardware configurations.
- For a list of supported processors, see <https://serverproven.lenovo.com/>.

7002 series CPUs

Model	Core/threads	Base Freq.	Default TDP	Group
7232P	8/16	3.1 GHz	120 W	C
7252	8/16	3.1 GHz	120 W	
7272	12/24	2.9 GHz	120 W	
7282	16/32	2.8 GHz	120 W	
7262	8/16	3.2 GHz	155 W	B
7302	16/32	3.0 GHz	155 W	
7302P	16/32	3.0 GHz	155 W	
7352	24/48	2.3 GHz	155 W	
7452	32/64	2.35 GHz	155 W	
7F32	8/16	3.7 GHz	180 W	A
7402	24/48	2.8 GHz	180 W	
7402P	24/48	2.8 GHz	180 W	
7502	32/64	2.5 GHz	180 W	
7502P	32/64	2.5 GHz	180 W	
7532	32/64	2.4 GHz	200 W	
7552	48/96	2.2 GHz	200 W	
7702	64/128	2.0 GHz	200 W	
7702P	64/128	2.0 GHz	200 W	
7542	32/64	2.9 GHz	225 W	D
7642	48/96	2.3 GHz	225 W	
7662	64/128	2.0 GHz	225 W	
7742	64/128	2.25 GHz	225 W	
7F72	24/48	3.2 GHz	240 W	
7F52	16/32	3.5GHz	240 W	
7H12	64/128	2.6 GHz	280 W	Z

7003 series CPUs

Model	Core/threads	Base Freq.	Default TDP	Group
7203	8/16	2.8 GHz	120 W	C
7203P	8/16	2.8 GHz	120 W	
7303	16/32	2.4 GHz	130 W	
7303P	16/32	2.4 GHz	130 W	

7313	16/32	3.0 GHz	155 W	B
7313P	16/32	3.0 GHz	155 W	
72F3	8/16	3.7 GHz	180 W	D
7413	24/48	2.65 GHz	180 W	
7343	16/32	3.2 GHz	190 W	
7443	24/48	2.85 GHz	200 W	
7443P	24/48	2.85 GHz	200 W	
7513	32/64	2.6 GHz	200 W	
7643P	48/96	2.3 GHz	225 W	
7663P	56/112	2.0 GHz	240 W	
7453	28/56	2.8 GHz	225 W	
7543	32/64	2.8 GHz	225 W	
7543P	32/64	2.8 GHz	225 W	A
7643	48/96	2.3 GHz	225 W	
7663	56/112	2.3 GHz	225 W	
7713	64/128	2.0 GHz	225 W	
7713P	64/128	2.0 GHz	225 W	
73F3	16/32	3.5 GHz	240 W	
74F3	24/48	3.2 GHz	240 W	
75F3	32/64	2.95 GHz	280 W	
7763	64/128	2.45 GHz	280 W	Z
7373X	16/32	3.05 GHz	240 W	
7473X	24/48	2.8 GHz	240 W	
7573X	32/64	2.8 GHz	280 W	
7773X	64/128	2.2 GHz	280 W	X

Memory

- 16 independent channels with interleaved feature
- 8 channels per CPU, 2 DIMM per channel(DPC)
 - Slot 1–16: CPU 1
 - Slot 17–32: CPU 2

Notes:

- The operating speed and total memory capacity depend on the processor model and UEFI settings.
- 256 GB 3DS RDIMMs are only available on 8 x 2.5" models, 16 x 2.5" models, and 8 x 3.5" models.
- Check “[DIMM population rules](#)” on page 24 for detailed DIMM mixing and population rules.
- For a list of supported DIMMs, see <https://serverproven.lenovo.com/>.

Parameter	RDIMM	Performance+ RDIMM	3DS RDIMM
Generation	TruDDR4	TruDDR4	TruDDR4
Rank	2R	2R	2S2R/2S4R
Speed	3200 MHz	3200 MHz	3200 MHz/2933 MHz

Voltage	1.2 V	1.2 V	1.2 V
DRAM data width	x4/x8	x4/x8	x4
DRAM density	8 Gbit/16 Gbit	16 Gbit	16 Gbit
DIMM capacity	16 GB/32 GB/64 GB	32 GB/64 GB	128 GB/256 GB
Maximum memory	<ul style="list-style-type: none"> 1 CPU: 1 TB 2 CPUs: 2 TB 	<ul style="list-style-type: none"> 1 CPU: 512 GB 2 CPUs: 2 TB 	<ul style="list-style-type: none"> 1 CPU: 4 TB 2 CPUs: 8 TB
Minimum memory	<ul style="list-style-type: none"> 1 CPU: 16 GB 2 CPUs: 32 GB 	<ul style="list-style-type: none"> 1 CPU: 32 GB 2 CPUs: 64 GB 	<ul style="list-style-type: none"> 1 CPU: 128 GB 2 CPUs: 256 GB

Fan

Up to 6 hot-swap fans (including 1 redundant fans)

Note: Check “[CPU, heat sink, and fan combinations](#)” on page 22 for selecting the correct heat sinks and fans under different CPU and hardware configurations.

Form factor	Rotor	Type	Speed
6038	single	Standard	17K RPM
6056	dual	Performance	24K RPM

Note: If there is an OCP module installed, when the system is powered off but still plugged in to AC power, fans 1 and 2 may continue to spin at a much lower speed. This is the system design to provide proper cooling for the OCP module.

Operating systems

Supported and certified operating systems:

- Microsoft Windows Server
- VMware ESXi
- Red Hat Enterprise Linux
- SUSE Linux Enterprise Server

References:

- Complete list of available operating systems: <https://lenovopress.com/osig>.
- OS deployment instructions: “[Deploy the operating system](#)” on page 247.

Input/Output (I/O)

Front:

- One VGA (optional)
- One USB 3.2 Gen 1 (5 Gbps) connector and one USB 2.0 (BMC management)
- One external diagnostics connector
- One diagnostics panel or LCD diagnostics panel (optional)

Rear:

- One VGA connector
- Three USB 3.2 Gen 1 (5 Gbps) connectors
- One XClarity Controller network connector
- Two or four Ethernet connectors on the OCP 3.0 Ethernet adapter (optional)

For detailed information about each component, see “[Front view](#)” on page 33 and “[Rear view](#)” on page 54.

Internal drives

Front drive bays (all hot-swap):

- Up to twenty-four 2.5-inch SAS/SATA/U.2 NVMe/U.3 NVMe drives
- Up to twelve 3.5-inch SAS/SATA/U.2 NVMe drives

Middle drive bays (all hot-swap):

- Up to eight 2.5-inch SAS/SATA/U.2 NVMe drives
- Up to four 3.5-inch SAS/SATA drives

Rear drive bays (all hot-swap):

- Up to eight 2.5-inch hot-swap SAS/SATA drives
- Up to four 3.5-inch hot-swap SAS/SATA drives
- Up to two 7mm hot-swap SATA/NVMe drives

Standard air baffle, GPU air baffle, or middle drive cage:

- Up to two internal SATA/NVMe M.2 drives

Notes:

- For supported internal storage systems, See <https://lenovopress.com/lp1269-thinksystem-sr665-server#internal-drive-options>.
- For supported external storage systems, see <https://lenovopress.com/lp1269-thinksystem-sr665-server#external-storage-systems>
- For backplane-less models, field upgrades to other models are available. For details, see <https://lenovopress.com/lp1269-thinksystem-sr665-server#field-upgrades>.

Expansion slots

PCIe slots 1-8:

- PCIe x16/x8/x8, full-height
- PCIe x16/x16/E*, full-height
- PCIe E*/x16/x16, full-height
- PCIe x16, full-height
- PCIe x16, full-height
- PCIe x16/x16, full-height
- PCIe x8/x8, full-height

Network slot:

- OCP 3.0 Ethernet adapter (2-port or 4-port)

Note: “E” is short for “empty”. It means the slot in the three-slot riser card is unavailable.

Storage controller

Notes:

- **SFF:** Standard Form Factor. This type of RAID/HBA adapter is installed in the PCIe expansion slots.
- **CFF:** Custom Form Factor. This type of RAID/HBA adapter is installed between fans and front backplanes.
- **Tri-Mode:** This type of controllers are hardware RAID designed with Tri-Mode SerDes technology. Once the Tri-Mode setting is enabled, the controllers support any combinations of NVMe, SAS, and SATA devices.

Support for JBOD mode and RAID level 0, 1, 10:

- 530-16i PCIe 12Gb Internal SFF RAID adapter (Gen 3)
- 540-8i PCIe 12Gb Internal SFF RAID adapter (Gen 4)
- 540-16i PCIe 12Gb SFF RAID adapter (Gen4)

Support for JBOD mode and RAID level 0, 1, 5, 10:

- 5350-8i PCIe 12Gb Internal SFF RAID adapter (Gen3)

Support for JBOD mode and RAID level 0, 1, 5, 10, 50:

- 530-8i PCIe 12Gb Internal SFF RAID adapter (Gen 3)

Support for JBOD mode and RAID level 0, 1, 5, 6, 10, 50, 60:

- 5350-8i PCIe 12Gb Internal CFF RAID adapter (Gen 3)
- 930-8i 2GB Flash 12Gb Internal SFF RAID adapter (Gen 3)
- 930-16i 4GB Flash 12Gb Internal SFF RAID adapter (Gen 3)
- 930-16i 8GB Flash 12Gb Internal SFF RAID adapter (Gen 3)
- 9350-8i 2GB Flash 12Gb Internal SFF RAID adapter (Gen 3)
- 9350-8i 2GB Flash 12Gb Internal CFF RAID adapter (Gen 3)
- 9350-16i 4GB Flash 12Gb Internal SFF RAID adapter (Gen 3)
- 9350-16i 4GB Flash 12Gb Internal CFF RAID adapter (Gen 3)
- 940-8i 4GB Flash 12Gb Internal SFF RAID adapter (Gen 4, support Tri-Mode)
- 940-8i 8GB Flash 12Gb Internal SFF RAID adapter (Gen 4, support Tri-Mode)
- 940-16i 4GB Flash 12Gb Internal SFF RAID adapter (Gen 4, support Tri-Mode)
- 940-16i 8GB Flash 12Gb Internal SFF RAID adapter (Gen 4, support Tri-Mode)
- 940-16i 8GB Flash 12Gb Internal CFF RAID adapter (Gen 4, support Tri-Mode)
- 940-32i 8GB Flash 12Gb Internal SFF RAID adapter (Gen 4)
- 930-8e 4GB Flash 12Gb External SFF RAID adapter (Gen 3)
- 940-8e 4GB Flash 12Gb External SFF RAID adapter (Gen 4)

Support the following HBA:

- 430-8i SAS/SATA 12Gb Internal SFF HBA adapter (Gen 3)
- 430-16i SAS/SATA 12Gb Internal SFF HBA adapter (Gen 3)
- 4350-8i SAS/SATA 12Gb Internal SFF HBA adapter (Gen3)
- 4350-16i SAS/SATA 12Gb Internal SFF HBA adapter (Gen3)
- 440-8i SAS/SATA 12Gb Internal SFF HBA adapter (Gen 4)
- 440-16i SAS/SATA 12Gb Internal SFF HBA adapter (Gen 4)
- 440-16i SAS/SATA 12Gb Internal CFF HBA adapter (Gen 4)
- 430-8e SAS/SATA 12Gb External SFF HBA adapter (Gen 3)
- 430-16e SAS/SATA 12Gb External SFF HBA adapter (Gen 3)
- 440-8e SAS/SATA 12Gb External SFF HBA adapter (Gen4)
- 440-16e SAS/SATA 12Gb External SFF HBA adapter (Gen 4)

Support the following RAID expander:

- 48P 12Gb Internal CFF RAID Expander

Support the following Fibre Channel HBA:

- Emulex 16Gb Gen6 1-port Fibre Channel Adapter(Gen 3)
- Emulex 16Gb Gen6 2-port Fibre Channel Adapter (Gen 3)
- Emulex LPe35000 32Gb 1-port Fibre Channel Adapter (Gen 4)
- Emulex LPe35002 32Gb 2-port Fibre Channel Adapter (Gen 4)
- Emulex LPe36002 64Gb 2-port PCIe Fibre Channel Adapter (Gen 4)
- QLogic 16Gb Enhanced Gen5 1-port Fibre Channel Adapter(Gen 3)
- QLogic 16Gb Enhanced Gen5 2-port Fibre Channel Adapter(Gen 3)
- QLogic QLE2772 32Gb 2-Port Fibre Channel Adapter(Gen 4)
- QLogic QLE2770 32Gb 1-Port Fibre Channel Adapter(Gen 4)

Support the following controllers for rich NVMe configurations:

- 1610-8P NVMe switch adapter (Gen 3)
- 1611-8P NVMe switch adapter (Gen 4)
- NVMe Retimer card (Gen 4)

Notes:

- CM6-V, CM6-R and CM5-V NVMe drives are not supported when a system is configured with NVMe Retimer cards.
- The following adapters are only supported on server models with 7003 series processors:

- 5350-8i, 9350-8i, and 9350-16i RAID adapters
- 4350-8i and 4350-16i HBA adapters
- 1611-8P NVMe switch adapter

Network

The server supports Ethernet adapters installed in a dedicated OCP 3.0 slot and the regular PCIe slots. For a list of supported OCP and PCIe Ethernet adapters, see <https://serverproven.lenovo.com/>.

Note: For detailed specifications of each Ethernet adapters, see <https://lenovopress.com/servers/options/ethernet>.

GPU

The following configuration requirements must be met when installing GPUs:

- All GPUs installed must be identical.
- Flash storage adapters are not supported.
- Middle drive bays and rear drive bays are not supported.
- Below GPU adapters are only supported on 8 x 2.5" models, 16 x 2.5" models, and 8 x 3.5" models.
 - Tesla T4
 - NVIDIA A2
 - NVIDIA A10
 - NVIDIA A30
 - NVIDIA A40
 - NVIDIA A100
 - NVIDIA A800
 - NVIDIA H100
 - NVIDIA L4
 - NVIDIA L40
 - NVIDIA Tesla V100
 - NVIDIA Tesla V100S
 - AMD Instinct MI210
- NVIDIA A100/L40 and AMD Instinct MI210 are only supported on server models with 7003 series processors.

Your server supports the following GPU adapters:

SW: single-wide, DW: double-wide, HL: half-length, LP: low profile

Manufacturer	Name	Form factor	Power	Max Qty.	PCIe Lane	Slot supported
NVIDIA	Tesla T4	SW, HL, LP	75 W	8	x16	<ul style="list-style-type: none"> • 1 CPU: 1, 2, 3, 7 • 2 CPU: 1, 4, 5, 6, 7, 8, 2, 3
	Quadro P620	SW, HL, LP	40 W	8	x16	
	A2	SW, HL, LP	60 W	8	x8	
	L4 24GB	SW, HL, LP	72 W	8	x16	
	A10	SW, FL, FH	150 W	3	x16	<ul style="list-style-type: none"> • 1 CPU: 1 • 2 CPU: 1, 4, 7
	A16	DW, FL, FH	250 W	3	x16	<ul style="list-style-type: none"> • 1 CPU: 2, 7 • 2 CPU: 2, 5, 7
	A30	DW, FL, FH	165 W	3	x16	
	A40	DW, FL, FH	300 W	3	x16	

Manufacturer	Name	Form factor	Power	Max Qty.	PCIe Lane	Slot supported
	A100 32GB	DW, FL, FH	250 W	3	x16	
	A100 80GB	DW, FL, FH	300 W	3	x16	
	A800 80GB	DW, FL, FH	300 W	3	x16	
	H100 80GB	DW, FL, FH	350 W	3	x16	
	L40 48GB	DW, FL, FH	300 W	3	x16	
	Tesla V100	DW, FL, FH	250 W	3	x16	
	Tesla V100S	DW, FL, FH	250 W	3	x16	
AMD	Instinct MI210	DW, FL, FH	300 W	3	x16	

Notes: When a double-wide GPU is installed in slot 2, 5 or 7, the adjacent slot 1, 4 and 8 respectively is not available. The riser cards listed in the following table are used with double-wide GPUs.

- Riser 1/2: ThinkSystem SR650 V2/SR665 E/x16/x16 PCIe G4 Riser 1/2 Option Kit v2
- Riser 3: ThinkSystem SR665 x16/x16 PCIe G4 Riser3 Option Kit v2

Power supplies

The server supports up to two power supplies for redundancy.

The server does not support setting the redundancy mode manually. The BMC of the server can automatically set it based on the installed power supply unit quantity.

- When only 1 power supply unit is installed, the power policy is set to “Non-redundant mode”.
- When 2 power supply units are installed, the redundancy mode is set to “Redundant N+N”. If one of the power supply units fails or has been removed, the BMC will report an event and set the redundancy mode to “Non-redundant mode” automatically.

Table 1. Electrical input for power supplies

Power supply	100–127 V ac	200–240 V ac	240 V dc	-48 V dc
500-watt 80 PLUS Platinum	√	√	√	
750-watt 80 PLUS Platinum	√	√	√	
750-watt 80 PLUS Titanium		√	√	
1100-watt 80 PLUS Platinum	√	√	√	
1100-watt 80 PLUS Platinum				√
1100-watt 80 PLUS Titanium		√	√	
1800-watt 80 PLUS Platinum		√	√	
2600-watt 80 PLUS Titanium		√	√	

CAUTION:

- Use **Lenovo Capacity Planner** to calculate the required power capacity for what is configured for your server. More information about **Lenovo Capacity Planner** is available at: [Lenovo Capacity Planner website](#).
- Ensure that the power supply units that you are installing are supported. For a list of supported power supply units for the server, go to: <https://serverproven.lenovo.com/>.
- 240 V dc input (input range: 180-300 V dc) is supported in Chinese Mainland ONLY.

Minimum configuration for debugging

- One processor
- One DIMM in slot 14
- One power supply
- One heatsink
- One HDD/SSD drive, one M.2 drive, or one 7mm drive (if OS is needed for debugging)
- Five system fans

Management options

Overview

The XClarity portfolio and other system management offerings described in this section are available to help you manage the servers more conveniently and efficiently.

Options	Description
Lenovo XClarity Controller	<p>Baseboard management controller (BMC)</p> <p>Consolidates the service processor functionality, Super I/O, video controller, and remote presence capabilities into a single chip on the server system board.</p> <p>Interface</p> <ul style="list-style-type: none">• CLI application• Mobile application• Web GUI interface• REST API <p>Usage and downloads</p> <p>https://sysmgt.lenovofiles.com/help/topic/lxcc_frontend/lxcc_overview.html</p>
Lenovo XClarity Administrator	<p>Centralized GUI tool for multi-server management.</p> <p>Interface</p> <ul style="list-style-type: none">• Web GUI interface• Mobile application• REST API <p>Usage and downloads</p> <p>http://sysmgt.lenovofiles.com/help/topic/com.lenovo.lxca.doc/aug_product_page.html</p>
Lenovo XClarity Essentials toolset	<p>Portable and light toolset for server configuration, data collection, and firmware updates. Suitable both for single-server or multi-server management contexts.</p> <p>Interface</p> <ul style="list-style-type: none">• OneCLI: CLI application• Bootable Media Creator: CLI application, GUI application• UpdateXpress: GUI application <p>Usage and downloads</p> <p>http://sysmgt.lenovofiles.com/help/topic/xclarity_essentials/overview.html</p>

Lenovo XClarity Provisioning Manager	<p>UEFI-based GUI tool on a single server that can simplify management tasks.</p> <p>Interface</p> <ul style="list-style-type: none"> • Web GUI interface (BMC remote access) <p>Usage and downloads</p> <p>https://sysmgt.lenovofiles.com/help/topic/lxpm_frontend/lxpm_product_page.html</p>
Lenovo XClarity Integrator	<p>Series of applications that can integrate management features of Lenovo XClarity Administrator and your server with software used in a certain deployment infrastructure, such as VMware vCenter, Microsoft Admin Center, or Microsoft System Center.</p> <p>Interface</p> <p>GUI application</p> <p>Usage and downloads</p> <p>https://sysmgt.lenovofiles.com/help/topic/lxci/lxci_product_page.html</p>
Lenovo XClarity Energy Manager	<p>Application that can manage and monitor server power and temperature.</p> <p>Interface</p> <ul style="list-style-type: none"> • Web GUI Interface <p>Usage and downloads</p> <p>https://datacentersupport.lenovo.com/solutions/Invo-lxem</p>
Lenovo Capacity Planner	<p>Application that supports power consumption planning for a server or rack.</p> <p>Interface</p> <ul style="list-style-type: none"> • Web GUI Interface <p>Usage and downloads</p> <p>https://datacentersupport.lenovo.com/solutions/Invo-lcp</p>

Functions

Options		Functions							
		Multi-system mgmt	OS deployment	System configuration	Firmware updates ¹	Events/alert monitoring	Inventory/logs	Power mgmt	Power planning
Lenovo XClarity Controller				√	√ ²	√	√ ⁴		
Lenovo XClarity Administrator		√	√	√	√ ²	√	√ ⁴		
Lenovo XClarity Essentials toolset	OneCLI	√		√	√ ²	√	√ ⁴		
	Bootable Media Creator			√	√ ²		√ ⁴		
	UpdateXpress			√	√ ²				
Lenovo XClarity Provisioning Manager			√	√	√ ³		√ ⁵		
Lenovo XClarity Integrator		√	√ ⁶	√	√	√	√	√ ⁷	
Lenovo XClarity Energy Manager		√				√		√	
Lenovo Capacity Planner									√ ⁸

Notes:

1. Most options can be updated through the Lenovo tools. Some options, such as GPU firmware or Omni-Path firmware, require the use of supplier tools.
2. The server UEFI settings for option ROM must be set to **Auto** or **UEFI** to update firmware using Lenovo XClarity Administrator, Lenovo XClarity Essentials, or Lenovo XClarity Controller.
3. Firmware updates are limited to Lenovo XClarity Provisioning Manager, Lenovo XClarity Controller, and UEFI updates only. Firmware updates for optional devices, such as adapters, are not supported.
4. The server UEFI settings for option ROM must be set to **Auto** or **UEFI** for detailed adapter card information, such as model name and firmware levels, to be displayed in Lenovo XClarity Administrator, Lenovo XClarity Controller, or Lenovo XClarity Essentials.
5. Limited inventory.
6. The Lenovo XClarity Integrator deployment check for System Center Configuration Manager (SCCM) supports Windows operating system deployment.
7. Power management function is supported by Lenovo XClarity Integrator for VMware vCenter.
8. It is highly recommended that you check the power summary data for your server using Lenovo Capacity Planner before purchasing any new parts.

Environment specifications

The section provides environmental specifications of the server.

- [“Ambient temperature/Humidity/Altitude” on page 18](#)
- [“Vibration” on page 19](#)
- [“Shock” on page 19](#)
- [“Heat output” on page 19](#)
- [“Acoustical noise emissions” on page 19](#)
- [“Particulate contamination” on page 20](#)

Ambient temperature/Humidity/Altitude

Server is operating:

Specification	Description
Ambient temperature	<p>The temperature range is measured at sea level altitude.</p> <ul style="list-style-type: none">• ASHRAE class A2: 10°C to 35°C (50°F to 95°F) <p>The maximum ambient temperature decreases by 1°C for every 300 m (984 ft) increase in altitude above 900 m (2,953 ft)</p> <ul style="list-style-type: none">• ASHRAE class A3: 5°C to 40°C (41°F to 104°F) <p>The maximum ambient temperature decreases by 1°C for every 175 m (574 ft) increase in altitude above 900 m (2,953 ft)</p> <ul style="list-style-type: none">• ASHRAE class A4: 5°C to 45°C (41°F to 113°F) <p>The maximum ambient temperature decreases by 1°C for every 125 m (410 ft) increase in altitude above 900 m (2,953 ft)</p>
Relative humidity (non-condensing)	<ul style="list-style-type: none">• ASHRAE class A2: 20%–80%; maximum dew point: 21°C (70°F)• ASHRAE class A3: 8%–85%; maximum dew point: 24°C (75°F)• ASHRAE class A4: 8%–90%; maximum dew point: 24°C (75°F)
Maximum altitude	3050 m (10 000 ft)

Note: The ambient temperature requirement for the server varies by the hardware configuration. For more information, see [“Thermal rules” on page 32](#).

Server is not operating:

Specification	Description
Ambient temperature	<ul style="list-style-type: none">• Server off: -10°C – 60°C (14°F – 140°F)• Shipment/storage: -40°C – 70°C (-40°F – 158°F)
Relative humidity (non-condensing)	8%–90%
Maximum altitude	3050 m (10 000 ft)

ASHRAE class A3/A4 requirement

To ensure that the server can operate normally under ASHRAE class A3/A4 environment, the server must NOT be configured with below components:

- CPU (TDP ≥ 170W)
- 3DS RDIMMs
- GPUs

- Mellanox ConnectX-6 100 GbE/200GbE with AOC
- Xilinx Alveo U25 FPGA
- Xilinx Alveo U50 FPGA
- Broadcom 57454 OCP 3.0
- NVMe AIC switches
- Middle/rear 2.5"/3.5" drives

Vibration

- Server is operating:
0.21 G rms at 5 Hz to 500 Hz for 15 minutes across 3 axes
- Server is not operating:
1.04 G rms at 2 Hz to 200 Hz for 15 minutes across 6 surfaces

Shock

- Server is operating:
15 G for 3 milliseconds in each direction (positive and negative X, Y, and Z axes)
- Server is not operating:
 - 23 kg - 31 kg: 35 G for 152 in./sec velocity change across 6 surfaces (3 x GPU config, 2.5" config)
 - 32 kg - 68 kg: 35 G for 136 in./sec velocity change across 6 surfaces (20 x 3.5" HDD config)

Heat output

- Minimum configuration: 900 BTU/hr, 264 W
- Maximum configuration: 2924 BTU/hr, 857 W

Acoustical noise emissions

These sound levels were measured in controlled acoustical environments according to procedures specified by ISO7779 and are reported in accordance with ISO 9296.

	Typical	Storage rich	GPU rich
Sound power levels ($L_{WA,m}$)			
Idling	6.1 Bel	7.4 Bel	6.7 Bel
Operating	6.3 Bel	7.4 Bel	8.0 Bel
Sound pressure level ($L_{pA,m}$)			
Idling	43 dBA	56 dBA	51 dBA
Operating	46 dBA	56 dBA	68 dBA

The declared acoustic noise levels are based on below configurations, which may change depending on configurations and conditions:

Config.	Typical	Storage rich	GPU rich
CPU	2 x 155 W	1 x 155 W	1 x 155 W
DIMM	32 RDIMM	32 RDIMM	32 RDIMM
Ethernet	1 x SFP28 2-port OCP	1 x SFP28 2-port OCP	1 x SFP28 2-port OCP
PSU	2 x 750 W	2 x 1100 W	2 x 1800 W

RAID	930-8i RAID	930-16i RAID	930-8i RAID
Drive	8 x 2.5" HDD	20 x 3.5" HDD	8 x 2.5" HDD
GPU	NA	NA	3 x V100 GPU

Note: Government regulations (such as those prescribed by OSHA or European Community Directives) may govern noise level exposure in the workplace and may apply to you and your server installation. The actual sound pressure levels in your installation depend upon a variety of factors, including the number of racks in the installation; the size, materials, and configuration of the room; the noise levels from other equipment; the room ambient temperature, and employee's location in relation to the equipment. Further, compliance with such government regulations depends on a variety of additional factors, including the duration of employees' exposure and whether employees wear hearing protection. Lenovo recommends that you consult with qualified experts in this field to determine whether you are in compliance with the applicable regulations.

Particulate contamination

Attention: Airborne particulates (including metal flakes or particles) and reactive gases acting alone or in combination with other environmental factors such as humidity or temperature might pose a risk to the device that is described in this document.

Risks that are posed by the presence of excessive particulate levels or concentrations of harmful gases include damage that might cause the device to malfunction or cease functioning altogether. This specification sets forth limits for particulates and gases that are intended to avoid such damage. The limits must not be viewed or used as definitive limits, because numerous other factors, such as temperature or moisture content of the air, can influence the impact of particulates or environmental corrosives and gaseous contaminant transfer. In the absence of specific limits that are set forth in this document, you must implement practices that maintain particulate and gas levels that are consistent with the protection of human health and safety. If Lenovo determines that the levels of particulates or gases in your environment have caused damage to the device, Lenovo may condition provision of repair or replacement of devices or parts on implementation of appropriate remedial measures to mitigate such environmental contamination. Implementation of such remedial measures is a customer responsibility.

Table 2. Limits for particulates and gases

Contaminant	Limits
Reactive gases	<p>Severity level G1 as per ANSI/ISA 71.04-1985¹:</p> <ul style="list-style-type: none"> • The copper reactivity level shall be less than 200 Angstroms per month ($\text{\AA}/\text{month} \approx 0.0035 \mu\text{g}/\text{cm}^2\text{-hour weight gain}$).² • The silver reactivity level shall be less than 200 Angstroms per month ($\text{\AA}/\text{month} \approx 0.0035 \mu\text{g}/\text{cm}^2\text{-hour weight gain}$).³ • The reactive monitoring of gaseous corrosivity must be conducted approximately 5 cm (2 in.) in front of the rack on the air inlet side at one-quarter and three-quarter frame height off the floor or where the air velocity is much higher.
Airborne particulates	<p>Data centers must meet the cleanliness level of ISO 14644-1 class 8.</p> <p>For data centers without airside economizer, the ISO 14644-1 class 8 cleanliness might be met by choosing one of the following filtration methods:</p> <ul style="list-style-type: none"> • The room air might be continuously filtered with MERV 8 filters. • Air entering a data center might be filtered with MERV 11 or preferably MERV 13 filters. <p>For data centers with airside economizers, the choice of filters to achieve ISO class 8 cleanliness depends on the specific conditions present at that data center.</p> <ul style="list-style-type: none"> • The deliquescent relative humidity of the particulate contamination should be more than 60% RH.⁴ • Data centers must be free of zinc whiskers.⁵
<p>¹ ANSI/ISA-71.04-1985. <i>Environmental conditions for process measurement and control systems: Airborne contaminants</i>. Instrument Society of America, Research Triangle Park, North Carolina, U.S.A.</p> <p>² The derivation of the equivalence between the rate of copper corrosion growth in the thickness of the corrosion product in $\text{\AA}/\text{month}$ and the rate of weight gain assumes that Cu_2S and Cu_2O grow in equal proportions.</p> <p>³ The derivation of the equivalence between the rate of silver corrosion growth in the thickness of the corrosion product in $\text{\AA}/\text{month}$ and the rate of weight gain assumes that Ag_2S is the only corrosion product.</p> <p>⁴ The deliquescent relative humidity of particulate contamination is the relative humidity at which the dust absorbs enough water to become wet and promote ionic conduction.</p> <p>⁵ Surface debris is randomly collected from 10 areas of the data center on a 1.5 cm diameter disk of sticky electrically conductive tape on a metal stub. If examination of the sticky tape in a scanning electron microscope reveals no zinc whiskers, the data center is considered free of zinc whiskers.</p>	

Technical rules

This section provides technical rules for the server.

- [“PCIe slots and configurations” on page 29](#)
- [“Thermal rules” on page 32](#)
- [“CPU, heat sink, and fan combinations” on page 22](#)
- [“DIMM population rules” on page 24](#)

CPU, heat sink, and fan combinations

8 x 3.5"/ 8 x 2.5"/16 x 2.5" models

CPU group	Config.	Heat sink	Fan
C/B	<ul style="list-style-type: none">• GPUs• Mellanox ConnectX-6 100 GbE/200 GbE AOC• Xilinx Alveo U25 FPGA• Xilinx Alveo U50 FPGA• 256 GB 3DS RDIMMs	1U Aluminium	Performance
	All other configurations	1U Aluminium	Standard
A	Double-wide GPUs	1U Aluminium	Performance
	<ul style="list-style-type: none">• Single-wide GPUs• Mellanox ConnectX-6 100 GbE/200 GbE AOC• Xilinx Alveo U25 FPGA• Xilinx Alveo U50 FPGA• 256 GB 3DS RDIMMs	2U Standard	Performance
	All other configurations	2U Standard	Standard
D/Z/X	<ul style="list-style-type: none">• GPUs• Mellanox ConnectX-6 100 GbE/200 GbE AOC• Xilinx Alveo U25 FPGA• Xilinx Alveo U50 FPGA• 256 GB 3DS RDIMMs	2U Performance	Performance
	All other configurations	2U Performance	Standard

24 x 2.5"/12 x 3.5" models

CPU group	Config.	Heat sink	Fan
C/B/A	<ul style="list-style-type: none"> P620 GPU Mellanox ConnectX-6 100 GbE/200 GbE AOC Xilinx Alveo U25 FPGA Xilinx Alveo U50 FPGA Broadcom 57454 10GBASE-T 4-port OCP 	2U Standard	Performance
	Mid bays	1U Aluminium	Performance
	All other configurations	2U Standard	Standard
D/Z/X	<ul style="list-style-type: none"> P620 GPU Mellanox ConnectX-6 100 GbE/200 GbE AOC Xilinx Alveo U25 FPGA Xilinx Alveo U50 FPGA Broadcom 57454 10GBASE-T 4-port OCP 	2U Performance	Performance
	All other configurations	2U Performance	Standard

Notes:

- Under all of the following conditions, standard fans can be used. Otherwise, performance fans are required.
 - No GPUs
 - No Mellanox ConnectX-6 100 GbE/200 GbE with AOC
 - No Xilinx Alveo U25 FPGA
 - No Xilinx Alveo U50 FPGA
 - No Broadcom 57454 10GBASE-T 4-port OCP
 - No 256 GB 3DS RDIMMs
 - No middle drive bays or rear drive bays
- The following configurations require six fans:
 - two-processor configurations
 - one-processor configurations with middle drives, rear drives, or riser 3
- If there is an OCP 3.0 Ethernet adapter installed, when the system is powered off but still plugged in to AC power, fans 5 and fan 6 will continue to spin at a much lower speed. This is the system design to provide proper cooling for the OCP 3.0 Ethernet adapter.

DIMM population rules

General mixing rules:

DIMMs	Coexist in a channel	Coexist in a system
RDIMMs and Performance+ RDIMMs		
3DS RDIMMs and other DIMM types		
128 GB 3DS RDIMMs and 256 GB 3DS RDIMMs		
DIMMs of different DRAM density (8Gbit and 16 Gbit)	√ ¹	√ ¹
DIMMs of different DRAM data width (x4 and x8)		√
DIMMs of different rank	√ ²	√ ²
DIMMs manufactured by different vendors	√	√
DIMMs of different voltage ³		
ECC and Non-ECC DIMMs ⁴		
1. Install the one with the higher density first. 2. Install the one with the higher rank first. 3. Only support 1.2 V. 4. Only support ECC DIMMs.		

DIMM compatibility (based on general mixing rules)

Type	Option	Capacity	DRAM data width	DRAM density
RDIMM	1	16 GB	x8	8 Gbit
	2	32 GB	x4	8 Gbit
	3	32 GB	x8	16 Gbit
	4	64 GB	x4	16 Gbit
Performance+ RDIMM	5	32 GB	x8	16 Gbit
	6	64 GB	x4	16 Gbit
3DS RDIMM	7	128 GB	x4	16 Gbit
	8	256 GB	x4	16 Gbit
Support mixing within a channel: <ul style="list-style-type: none"> Options 1 and 3 Options 2 and 4 Support mixing within a system: <ul style="list-style-type: none"> Options 1 to 4 (Install the one with higher DRAM density first.) Options 5 and 6 (Install the one with higher capacity first.) 				

Alternatively, for balancing memory and for better performance, consider below rules:

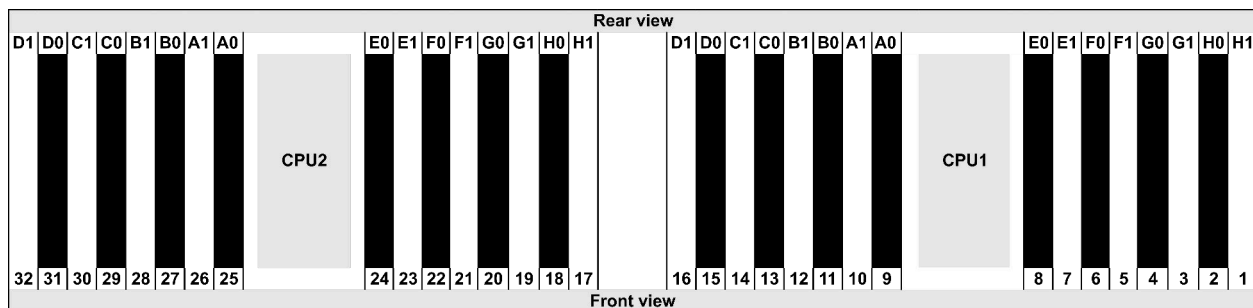
- Balance memory capacity per channel pair on a given CPU.
- Balance memory capacity per CPU socket when 2 CPUs are installed.
- In cases of using Performance+ RDIMMs to maximize memory operating speed, ensure that Performance+ RDIMMs with the same capacity are populated on 2DPC. Otherwise, there will be no performance gain.
- When only one DIMM is to be populated in a given channel, it must be populated in DIMM slot 1 (physically farthest away from the CPU).
- The server supports single DIMM as a minimum configuration, however, full memory bandwidth requires one DIMM per channel (A–H) be populated. For best performance, populate all 8 channels per socket, with every channel having the same capacity.

Note: Detailed instructions for balancing memory configurations for your server can be found at:

[Balanced Memory Configurations with Second-or-Third-Generation AMD EPYC Processors](#)

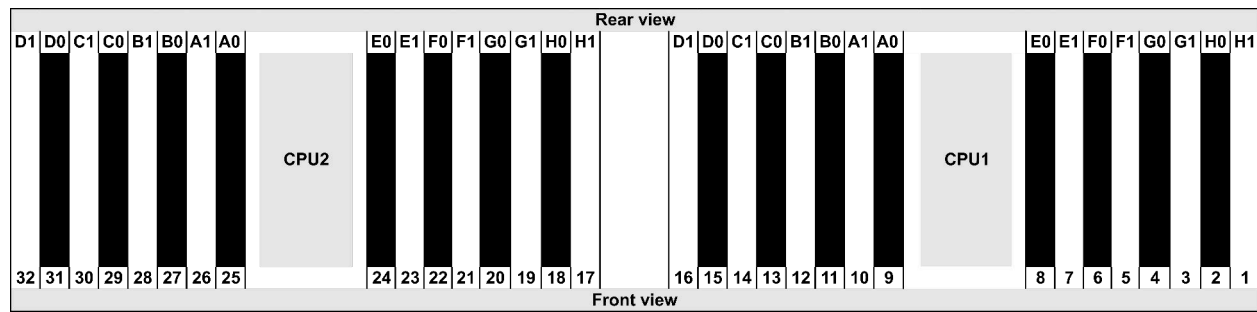
Recommended population order (based on general rules)

1 CPU installed:



Qty.	DIMM population order															
1 DIMM	14															
2 DIMMs	14	16														
3 DIMMs	14	16	3													
4 DIMMs	14	16	3	1												
5 DIMMs	14	16	3	1	10											
6 DIMMs	14	16	3	1	10	12										
7 DIMMs	14	16	3	1	10	12	7									
8 DIMMs	14	16	3	1	10	12	7	5								
9 DIMMs	14	16	3	1	10	12	7	5	13							
10 DIMMs	14	16	3	1	10	12	7	5	13	15						
11 DIMMs	14	16	3	1	10	12	7	5	13	15	4					
12 DIMMs	14	16	3	1	10	12	7	5	13	15	4	2				
13 DIMMs	14	16	3	1	10	12	7	5	13	15	4	2	9			
14 DIMMs	14	16	3	1	10	12	7	5	13	15	4	2	9	11		
15 DIMMs	14	16	3	1	10	12	7	5	13	15	4	2	9	11	8	
16 DIMMs	14	16	3	1	10	12	7	5	13	15	4	2	9	11	8	6

2 CPUs installed:



Qty.	DIMM population order																																					
1 DIMM	14																																					
2 DIMMs	14	30																																				
3 DIMMs	14	30	16																																			
4 DIMMs	14	30	16	32																																		
5 DIMMs	14	30	16	32	3																																	
6 DIMMs	14	30	16	32	3	19																																
7 DIMMs	14	30	16	32	3	19	1																															
8 DIMMs	14	30	16	32	3	19	1	17																														
9 DIMMs	14	30	16	32	3	19	1	17	10																													
10 DIMMs	14	30	16	32	3	19	1	17	10	26																												
11 DIMMs	14	30	16	32	3	19	1	17	10	26	12																											
12 DIMMs	14	30	16	32	3	19	1	17	10	26	12	28																										
13 DIMMs	14	30	16	32	3	19	1	17	10	26	12	28	7																									
14 DIMMs	14	30	16	32	3	19	1	17	10	26	12	28	7	23																								
15 DIMMs	14	30	16	32	3	19	1	17	10	26	12	28	7	23	5																							
16 DIMMs	14	30	16	32	3	19	1	17	10	26	12	28	7	23	5	21																						
17 DIMMs	14	30	16	32	3	19	1	17	10	26	12	28	7	23	5	21	13																					
18 DIMMs	14	30	16	32	3	19	1	17	10	26	12	28	7	23	5	21	13	29																				
19 DIMMs	14	30	16	32	3	19	1	17	10	26	12	28	7	23	5	21	13	29	15																			
20 DIMMs	14	30	16	32	3	19	1	17	10	26	12	28	7	23	5	21	13	29	15	31																		
21 DIMMs	14	30	16	32	3	19	1	17	10	26	12	28	7	23	5	21	13	29	15	31	4																	
22 DIMMs	14	30	16	32	3	19	1	17	10	26	12	28	7	23	5	21	13	29	15	31	4	20																
23 DIMMs	14	30	16	32	3	19	1	17	10	26	12	28	7	23	5	21	13	29	15	31	4	20	2															
24 DIMMs	14	30	16	32	3	19	1	17	10	26	12	28	7	23	5	21	13	29	15	31	4	20	2	18														
25 DIMMs	14	30	16	32	3	19	1	17	10	26	12	28	7	23	5	21	13	29	15	31	4	20	2	18	9													
26 DIMMs	14	30	16	32	3	19	1	17	10	26	12	28	7	23	5	21	13	29	15	31	4	20	2	18	9	25												
27 DIMMs	14	30	16	32	3	19	1	17	10	26	12	28	7	23	5	21	13	29	15	31	4	20	2	18	9	25	11											
28 DIMMs	14	30	16	32	3	19	1	17	10	26	12	28	7	23	5	21	13	29	15	31	4	20	2	18	9	25	11	27										
29 DIMMs	14	30	16	32	3	19	1	17	10	26	12	28	7	23	5	21	13	29	15	31	4	20	2	18	9	25	11	27	8									
30 DIMMs	14	30	16	32	3	19	1	17	10	26	12	28	7	23	5	21	13	29	15	31	4	20	2	18	9	25	11	27	8	24								
31 DIMMs	14	30	16	32	3	19	1	17	10	26	12	28	7	23	5	21	13	29	15	31	4	20	2	18	9	25	11	27	8	24	6							
32 DIMMs	14	30	16	32	3	19	1	17	10	26	12	28	7	23	5	21	13	29	15	31	4	20	2	18	9	25	11	27	8	24	6	22						

Note: There are performance-optimized 6-DIMM and 12-DIMM configurations for server models with one 7003 series CPU and 12-DIMM and 24-DIMM configurations for server models with two 7003 series CPUs. For details, see the table below.

CPU Qty.	DIMM Qty.	Performance-optimized DIMM population order
1	6	1, 3, 7, 10, 14, 16
	12	1, 2, 3, 4, 7, 8, 9, 10, 13, 14, 15, 16
2	12	1, 3, 7, 10, 14, 16, 17, 19, 23, 26, 30, 32
	24	1, 2, 3, 4, 7, 8, 9, 10, 13, 14, 15, 16, 17, 18, 19, 20, 23, 24, 25, 26, 29, 30, 31, 32

PCIe slots and configurations

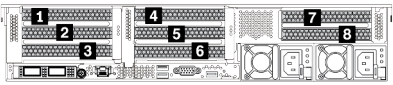
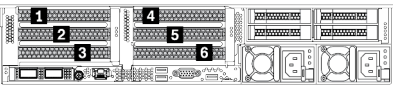
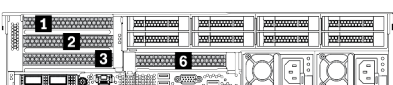
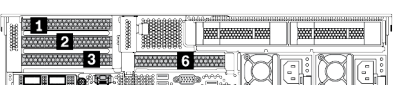
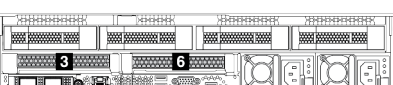
- “Slot configurations” on page 29
- “PCIe adapter and slot priority” on page 29
- “RAID rules” on page 31

Slot configurations

The server supports up to 8 PCIe slots on the rear. The PCIe slot configurations vary by server model.

Notes: The slots defined in the UEFI setting are slightly different from the physical slots. For information about slots defined in the UEFI setting, refer to:

- For AMD EPYC 7002 series processors: https://thinksystem.lenovofiles.com/help/topic/uefi_amd_2p/onboard_device.html
- For AMD EPYC 7003 series processors: https://thinksystem.lenovofiles.com/help/topic/uefi_amd_2p_milan/onboard_device.html

Server rear view	PCIe slots		
	Slots 1–3 on riser 1: <ul style="list-style-type: none"> • Type 1: x16/x8/x8 • Type 2: x16/x16/E • Type 3: E/x16/x16 	Slots 4–6 on riser 2: <ul style="list-style-type: none"> • Type 1: x16/x8/x8 • Type 2: x16/x16/E • Type 3: E/x16/x16 	Slots 7–8 on riser 3: <ul style="list-style-type: none"> • Type 1: x16/x16 • Type 2: x8/x8
	Slots 1–3 on riser 1: <ul style="list-style-type: none"> • Type 1: x16/x8/x8 • Type 2: x16/x16/E • Type 3: E/x16/x16 	Slots 4–6 on riser 2: <ul style="list-style-type: none"> • Type 1: x16/x8/x8 • Type 2: x16/x16/E • Type 3: E/x16/x16 	NA
	Slots 1–3 on riser 1: <ul style="list-style-type: none"> • Type 1: x16/x8/x8 • Type 2: x16/x16/E • Type 3: E/x16/x16 	Slot 6 on riser 2: x16	NA
	Slots 1–3 on riser 1: <ul style="list-style-type: none"> • Type 1: x16/x8/x8 • Type 2: x16/x16/E • Type 3: E/x16/x16 	Slot 6 on riser 2: x16	NA
	Slot 3 on riser 1: x16	Slot 6 on riser 2: x16	NA

PCIe adapter and slot priority

The following table lists the recommended physical slot sequence for common PCIe adapters.

PCIe adapters		Max. qty.	Slot priority
GPU	Single-wide LPHL (40W/75W)	8	<ul style="list-style-type: none"> • 1 CPU: 1, 2, 3, 7 • 2 CPU: 1, 4, 5, 6, 7, 8, 2, 3
	Single-wide FHFL (150W)	3	<ul style="list-style-type: none"> • 1 CPU: 1, 7 • 2 CPU: 1, 4, 7
	Double-wide FHFL (250W/300W)	3	<ul style="list-style-type: none"> • 1 CPU: 2, 7 • 2 CPU: 2, 5, 7 <p>Notes: To install a double-wide GPU, one of the riser cages is required:</p> <ul style="list-style-type: none"> • E/x16/x16 Riser 1/2 cage • x16/x16 Riser 3 cage

PCIe adapters		Max. qty.	Slot priority
NIC	Xilinx Alveo U25 FPGA	2	<ul style="list-style-type: none"> 1 CPU: 1 2 CPU: 1, 4 2 CPU + 1 A100 GPU: 3, 4
	Xilinx Alveo U50 FPGA	6	<ul style="list-style-type: none"> 1 CPU: 1 2 CPU: 1, 4, 2, 5, 7, 8
	Broadcom 57508 100GbE 2-port	6	<ul style="list-style-type: none"> 1 CPU: 1, 2, 3, 7 2 CPU: 1, 4, 2, 5, 3, 6, 7, 8 Note: The Broadcom 57454 10/25GbE SFP28 4-port PCIe Ethernet Adapter_Refresh (V2) requires a full-height bracket and must be installed in a full-height slot.
	Broadcom 57454 10/25GbE SFP28 4-port PCIe Ethernet Adapter_Refresh (V2)		
	Mellanox ConnectX-6 HDR100 IB/100GbE VPI 1-port		
	Mellanox ConnectX-6 HDR100 IB/100GbE VPI 2-port		
	Mellanox ConnectX-6 HDR100 IB/200GbE VPI 2-port		
	Mellanox ConnectX-6 Dx 100GbE 2-port		
	Intel E810-DA4 10/25GbE SFP28 4-port		
	NVIDIA ConnectX-7 NDR400 OSFP 1-port PCIe Gen5 Adapter		
	NVIDIA ConnectX-7 NDR200/200GbE QSFP112 2-port PCIe Gen5 x16 InfiniBand Adapter		
	Others	8	<ul style="list-style-type: none"> 1 CPU: 2, 3, 1, 7 2 CPU: 2, 5, 3, 6, 7, 8, 1, 4 Note: The Broadcom 57454 10/25GbE SFP28 4-port PCIe Ethernet Adapter requires a full-height bracket and must be installed in a full-height slot.
Internal SFF RAID/HBA	430-8i/4350-8i HBA	4	<ul style="list-style-type: none"> 1 CPU: 2, 3, 1, 7 2 CPU: 2, 3, 5, 6, 7, 8, 1, 4
	530-8i/5350-8i/540-8i/930-8i/940-8i RAID		
	430-16i/4350-16i/440-16i HBA	1	<ul style="list-style-type: none"> 1 CPU: 2, 3, 1, 7 2 CPU: 2, 3, 5, 6, 7, 8, 1, 4
	530-16i/540-16i/930-16i/940-16i/940-32i RAID		
	9350-8i	4	<ul style="list-style-type: none"> 1 CPU: <ul style="list-style-type: none"> With other SFF RAID adapters: 2, 3, 1, 7 Without other SFF RAID adapters: 3, 2, 1, 7 2 CPU: <ul style="list-style-type: none"> With other SFF RAID adapters: 2, 3, 5, 6, 7, 8, 1, 4 Without other SFF RAID adapters: 3, 2, 5, 6, 7, 8, 1, 4
	9350-16i	1	
Internal CFF RAID/HBA/RAID expander		1	Front chassis

PCIe adapters		Max. qty.	Slot priority
External RAID/ HBA	930-8e/940-8e RAID	4	NA
	Others	8	
NVMe Switch/ retimer	NVMe switch	4	<ul style="list-style-type: none"> • 32 NVMe config: 1, 2, 4, 5 • 16 NVMe config: <ul style="list-style-type: none"> – 1 CPU: 1, 2, 3 – 2 CPU: 1, 2, 4, 5, 3, 6, 7, 8
	Retimer card	4	<ul style="list-style-type: none"> • 24 NVMe config: 1, 2, 4, 5 • 16/8 NVMe config: <ul style="list-style-type: none"> – 1 CPU: 1, 2, 3 – 2 CPU: 1, 2, 4, 5, 3, 6, 7, 8 <p>Note: CM6-V, CM6-R and CM5-V NVMe drives are not supported when a system is configured with Retimer cards.</p>
FC HBA		8	<ul style="list-style-type: none"> • 1 CPU: 2, 3, 1, 7 • 2 CPU: 2, 5, 3, 6, 7, 8, 1, 4 <p>Note: For more information about supported FC HBA adapters, see https://lenovopress.com/lp1269-thinksystem-sr665-server#fibre-channel-host-bus-adapters.</p>
PCIe SSD		8	<ul style="list-style-type: none"> • 1 CPU: 2, 3, 1, 7 • 2 CPU: 2, 5, 3, 6, 7, 8, 1, 4
7mm drive cage		1	Slot 3 or 6
Serial port module		1	Slot 3 or 6
OCP 3.0		1	OCP slot

RAID rules

- Gen3 and Gen4 cannot be installed together on one riser card.
- RAID controllers of the same PCIe generation group can be installed on one riser card.
- RAID and HBA controllers can be installed on one riser card.
- The RAID/HBA 4350/5350/9350 adapters cannot be mixed with the following adapters in the same system:
 - Intel E810-DA2 OCP/PCIe Ethernet adapter
 - Intel E810-DA4 OCP/PCIe Ethernet adapter
 - RAID/HBA 430/530/930 adapters
 - RAID/HBA 440/940/540 adapters, except for external RAID/HBA 440-8e/440-16e/940-8e adapters
- PCIe SSD does not support RAID function.
- The RAID 940-8i or RAID 940-16i adapter supports Tri-mode. When Tri-mode is enabled, the server supports SAS, SATA and U.3 NVMe drives at the same time. NVMe drives are connected via a PCIe x1 link to the controller.

Note: To support Tri-mode with U.3 NVMe drives, **U.3 x1 mode** must be enabled for the selected drive slots on the backplane through the XCC Web GUI. Otherwise, the U.3 NVMe drives cannot be detected. For more information, see [“Install a hot-swap drive” on page 196](#).

- The HBA 430/440 adapters do not support the Self-Encrypting Drive (SED) management feature.
- 930/9350/940 RAID controllers require a super capacitor.
- Oversubscription occurs when the system supports 32 NVMe drives using NVMe switch adapters. For details, see [NVMe drive support](#).

Thermal rules

The topic provides the thermal rules for the server depending on the hardware configuration.

Model	CPU	Configuration	Max. Ambient Temp.
All models		<ul style="list-style-type: none"> Mellanox ConnectX-6 < 100 GbE Xilinx Alveo U25 NVIDIA Quadro P620 GPU Broadcom 57454 OCP 3.0 	35°C
		<ul style="list-style-type: none"> Mellanox ConnectX-6 100 GbE/200GbE with AOC Mellanox ConnectX-7 200GbE/400GbE with AOC Xilinx Alveo U50 Notes: <ul style="list-style-type: none"> When the Xilinx Alveo U50 is installed, fan redundancy and mid/rear drive bays are not supported. A maximum of six U50 cards are supported in 8 x 2.5", 16 x 2.5", and 8 x 3.5" models. 	30°C
8 x 2.5" models	Group C/B/A/D/Z/X	T4/A2/L4 GPU	35°C
		<ul style="list-style-type: none"> A10 GPU Double-wide GPUs 256 GB 3DS RDIMMs 	30°C
8 x 3.5" / 16 x 2.5" models	Group C/B/A/D/Z/X	<ul style="list-style-type: none"> Single-wide GPUs: T4/A2/L4, A10 Double-wide GPUs 256 GB 3DS RDIMMs 	30°C
24 x 2.5" models	Group C/B	<ul style="list-style-type: none"> Front drive bays only Mid/rear 2.5" drive bays 	35°C
	Group A/D/Z/X	Front drive bays only	35°C
		<ul style="list-style-type: none"> Mid/rear 2.5" drive bays 7373X or 7473X processors 	30°C
12 x 3.5" models	Group C/B	<ul style="list-style-type: none"> Front drive bays only Mid/rear 2.5" drive bays 	35°C
	Group A/D	Front drive bays only	35°C
		Mid/rear 2.5" drive bays	30°C
	Group Z/X	Front drive bays only	35°C
		<ul style="list-style-type: none"> Mid/rear 2.5" drive bays Mid/rear 3.5" drive bays 7373X or 7473X processors 	30°C

Notes: For the 12 x 3.5" SAS/SATA (front) + 8 x 2.5" NVMe (middle) configuration, the ambient temperature must be limited to 25°C or lower when the following NVMe SSDs are installed:

- 2.5" U.3 PM1733a 30.72TB RI NVMe SSD
- 2.5" U.3 PM1733a 15.36TB RI NVMe SSD
- 2.5" U.2 P5520 7.68TB RI NVMe SSD
- 2.5" U.2 P5520 15.36TB RI NVMe SSD
- 2.5" U.2 P5620 6.4TB NVMe SSD
- 2.5" U.2 P5620 12.8TB NVMe SSD

Chapter 2. Server components

This section provides information to help you locate your server components.

Front view

This section introduces front view of different server models.

- Server models with 2.5-inch front drive bays
 - [“Eight 2.5-inch front drive bays” on page 34](#)
 - [“Eight 2.5-inch front drive bays \(with LCD diagnostics panel\)” on page 35](#)
 - [“Sixteen 2.5-inch front drive bays” on page 36](#)
 - [“Sixteen 2.5-inch front drive bays \(with LCD diagnostics panel\)” on page 37](#)
 - [“Twenty-four 2.5-inch front drive bays” on page 38](#)
 - [“Backplane-less” on page 39](#)
- Server models with 3.5-inch front drive bays
 - [“Eight 3.5-inch front drive bays” on page 40](#)
 - [“Twelve 3.5-inch front drive bays” on page 41](#)
 - [“Backplane-less” on page 42](#)

Server models with eight 2.5-inch front drive bays

The following illustrates the front view of server models with eight 2.5-inch drive bays.

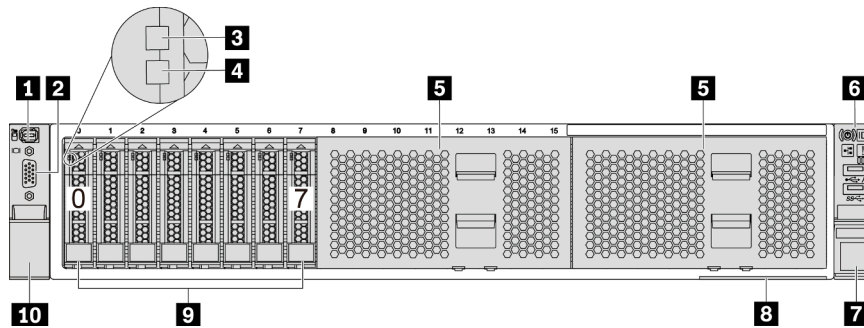


Figure 4. Server model with eight 2.5-inch front drive bays

Table 3. Components on the front of the server

Callout	Callout
1 External diagnostics connector	2 VGA connector (optional)
3 Drive activity LED	4 Drive status LED
5 Drive bay fillers (2)	6 Front I/O assembly with diagnostics panel
7 Rack latch (right)	8 Pull-out information tab
9 Drive bays (8)	10 Rack latch (left)

Note: For more information about each component, see [“Front components overview”](#) on page 43.

Server models with eight 2.5-inch front drive bays (with LCD diagnostics panel)

The following illustrates the front view of server models with eight 2.5-inch drive bays.

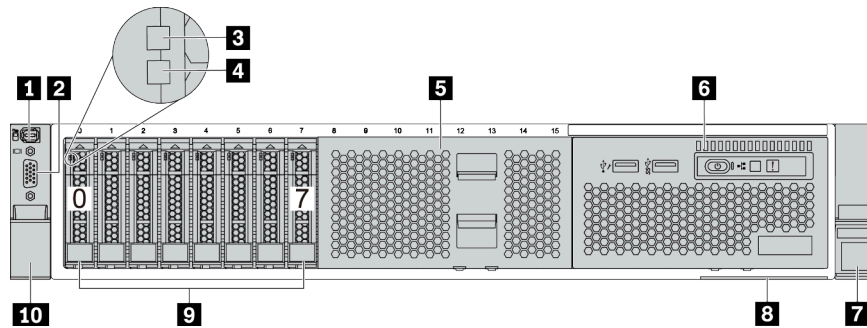


Table 4. Components on the front of the server

Callout	Callout
1 External diagnostics connector	2 VGA connector (optional)
3 Drive activity LED	4 Drive status LED
5 Drive bay filler	6 Front I/O assembly with LCD diagnostics panel
7 Rack latch (right)	8 Pull-out information tab
9 Drive bays (8)	10 Rack latch (left)

Note: For more information about each component, see [“Front components overview” on page 43](#).

Server models with sixteen 2.5-inch drive bays

The following illustrates the front view of server models with sixteen 2.5-inch drive bays.

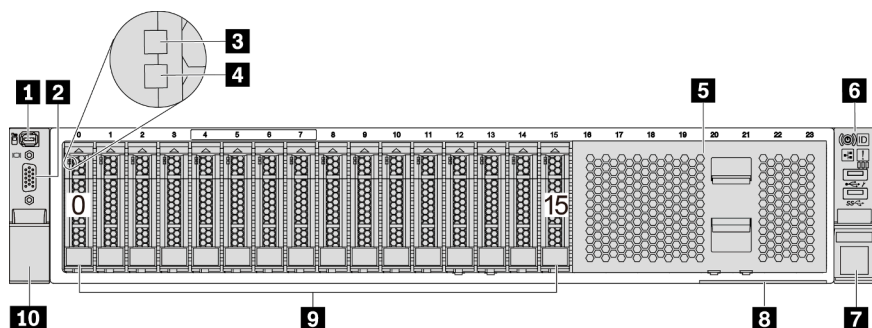


Table 5. Components on the front of server models

Callout	Callout
1 External diagnostics connector	2 VGA connector (optional)
3 Drive activity LED	4 Drive status LED
5 Drive bay filler	6 Front I/O assembly with diagnostics panel
7 Rack latch (right)	8 Pull-out information tab
9 Drive bays (16)	10 Rack latch (left)

Note: For more information about each component, see [“Front components overview”](#) on page 43.

Server models with sixteen 2.5-inch drive bays (with LCD diagnostics panel)

The following illustrates the front view of server models with sixteen 2.5-inch drive bays.

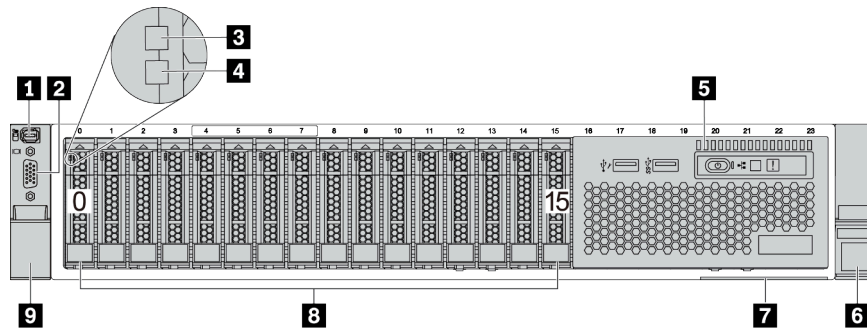


Table 6. Components on the front of the server

Callout	Callout
1 External diagnostics connector	2 VGA connector (optional)
3 Drive activity LED	4 Drive status LED
5 Front I/O assembly with LCD diagnostics panel	6 Rack latch (right)
7 Pull-out information tab	8 Drive bays (16)
9 Rack latch (left)	

Note: For more information about each component, see [“Front components overview” on page 43](#).

Server models with twenty-four 2.5-inch front drive bays

The following illustrates the front view of server models with twenty-four 2.5-inch front drive bays.

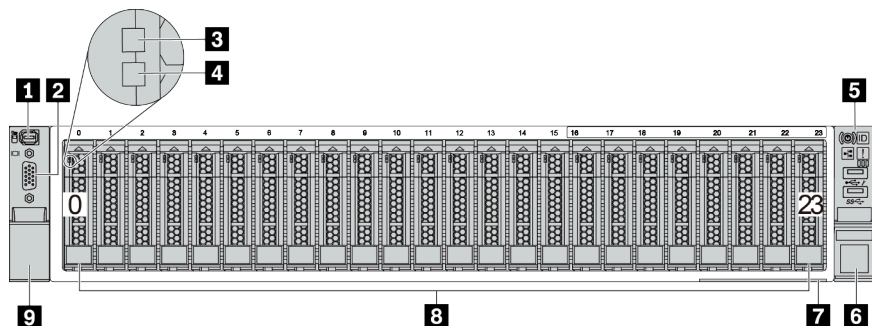


Table 7. Components on the front of server models

Callout	Callout
1 External diagnostics connector	2 VGA connector (optional)
3 Drive activity LED	4 Drive status LED
5 Front I/O assembly with diagnostics panel	6 Rack latch (right)
7 Pull-out information tab	8 Drive bays (24)
9 Rack latch (left)	

Note: For more information about each component, see [“Front components overview”](#) on page 43.

Server models with 2.5-inch front drive bays (backplane-less)

The following illustrates the front view of server models with 2.5-inch front drive bays (backplane-less).

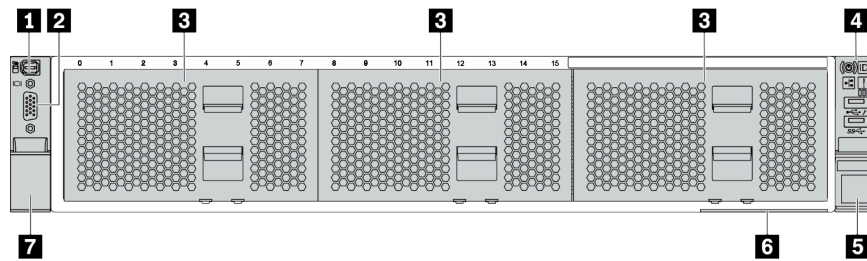


Table 8. Components on the front of server models

Callout	Callout
1 External diagnostics connector	2 VGA connector (optional)
3 Drive bay fillers(3)	4 Front I/O assembly with diagnostics panel
5 Rack latch (right)	6 Pull-out information tab
7 Rack latch (left)	

Note: For more information about each component, see [“Front components overview” on page 43](#).

Server models with eight 3.5-inch front drive bays

The following illustrates the front view of server models with eight 3.5-inch front drive bays.

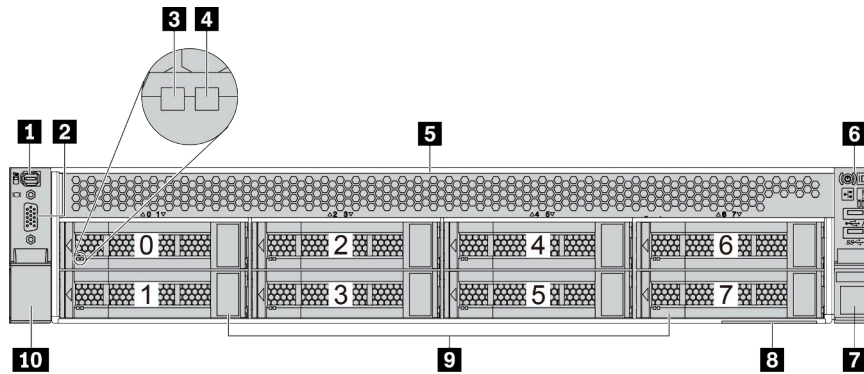


Table 9. Components on the front of server models

Callout	Callout
1 External diagnostics connector	2 VGA connector (optional)
3 Drive activity LED	4 Drive status LED
5 Drive bay filler	6 Front I/O assembly with diagnostics panel
7 Rack latch (right)	8 Pull-out information tab
9 Drive bays (8)	10 Rack latch (left)

Note: For more information about each component, see [“Front components overview” on page 43](#).

Server models with twelve 3.5-inch front drive bays

The following illustrates the front view of server models with twelve 2.5-inch drive bays.

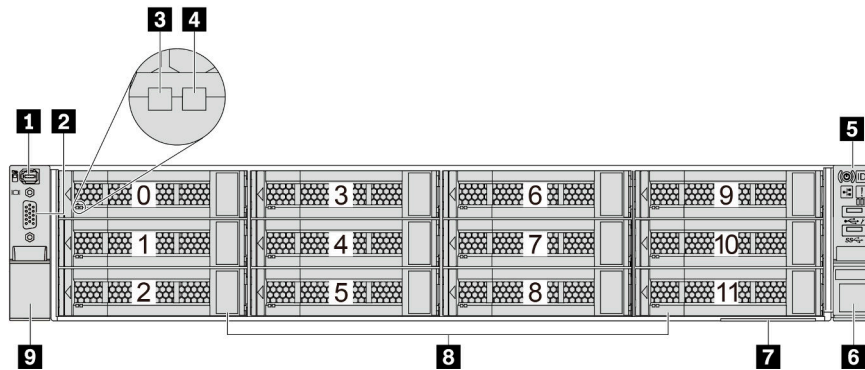


Table 10. Components on the front of server models

Callout	Callout
1 External diagnostics connector	2 VGA connector (optional)
3 Drive activity LED	4 Drive status LED
5 Front I/O assembly with diagnostics panel	6 Rack latch (right)
7 Pull-out information tab	8 Drive bays (12)
9 Rack latch (left)	

Note: For more information about each component, see [“Front components overview”](#) on page 43.

Front view of server models with 3.5-inch front drive bays (backplane-less)

The following illustrates the front view of server models with 3.5-inch drive bays (backplane-less).

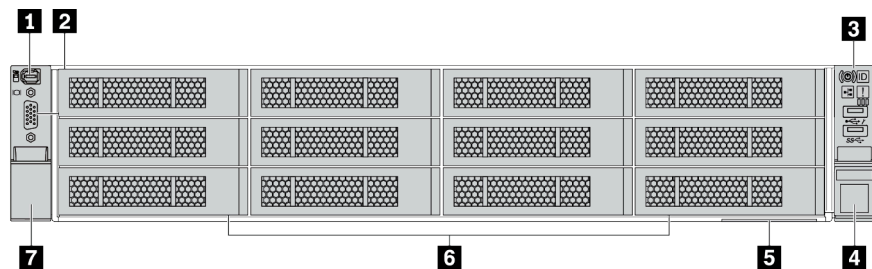


Table 11. Components on the front of server models

Callout	Callout
1 External diagnostics connector	2 VGA connector (optional)
3 Front I/O assembly with diagnostics panel	4 Rack latch (right)
5 Pull-out information tab	6 Drive bay fillers (12)
7 Rack latch (left)	

Note: For more information about each component, see [“Front components overview” on page 43](#).

Front components overview

Diagnostics panel

The diagnostics panel is integrated in front I/O assembly on some models. For information about the controls and status LEDs on the diagnostics panel, see [“Diagnostics panel” on page 45](#).

Drive LEDs

Each hot-swap drive comes with an activity LED and status LED and the signals are controlled by the backplanes. Different colors and speeds indicate different activities or status of the drive. The following illustrates the LEDs on a hard disk drive or solid-state drive.

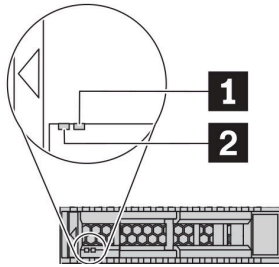


Figure 5. Drive LEDs

Drive LED	Status	Description
1 Drive status LED (right)	Solid yellow	The drive has an error.
	Blinking yellow (blinking slowly, about one flash per second)	The drive is being rebuilt.
	Blinking yellow (blinking rapidly, about four flashes per second)	The RAID adapter is locating the drive.
2 Drive activity LED (left)	Solid green	The drive is powered but not active.
	Blinking green	The drive is active.

External diagnostics connector

The connector is for connecting an external diagnostics handset. For more about its functions, see [“LCD diagnostics panel/handset” on page 48](#).

Front I/O assembly with LCD diagnostics panel

The assembly comes with an integrated LCD diagnostics panel that can be used to quickly obtain system status, firmware levels, network information, and health information about the system. For more about the panel functions, see [“LCD diagnostics panel/handset” on page 48](#).

Hot-swap drives and drive bays

The drive bays on the front and rear of your server are designed for hot-swap drives. The number of the installed drives in your server varies by model. When you install drives, follow the order of the drive bay numbers.

The EMI integrity and cooling of the server are protected by having all drive bays occupied. Vacant drive bays must be occupied by drive fillers.

Pull-out information tab

The Lenovo XClarity Controller network access label is attached on the pull-out information tab. The default Lenovo XClarity Controller hostname and the IPv6 Link Local Address (LLA) are provided on the tab.

For more information, see [“Set the network connection for the Lenovo XClarity Controller” on page 239](#).

Rack latches

If your server is installed in a rack, you can use the rack latches to help you slide the server out of the rack. You also can use the rack latches and screws to secure the server in the rack so that the server cannot slide out, especially in vibration-prone areas. For more information, refer to the *Rack Installation Guide* that comes with your rail kit.

USB 3.2 Gen 1 (5Gbps) connectors

The USB 3.2 Gen 1 (5Gbps) connectors can be used to attach a USB-compatible device, such as a USB keyboard, USB mouse, or USB storage device.

VGA connector

The VGA connectors on the front and rear of the server can be used to attach a high-performance monitor, a direct-drive monitor, or other devices that use a VGA connector.

XClarity Controller USB connector

The XClarity Controller USB connector can function as a regular USB 2.0 connector to the host OS. In addition, it can also be used to connect the server to an android or iOS device, where you can then install and launch the Lenovo XClarity Mobile app to manage the system using XClarity Controller.

For details about using the Lenovo XClarity Mobile app, refer to http://sysmgt.lenovofiles.com/help/topic/com.lenovo.lxca.doc/lxca_usemobileapp.html.

Diagnostics panel

The diagnostics panel provides controls, connectors, and LEDs.

Note: Diagnostics panel with an LCD display is available for some models. For details, see [“LCD diagnostics panel/handset” on page 48](#).

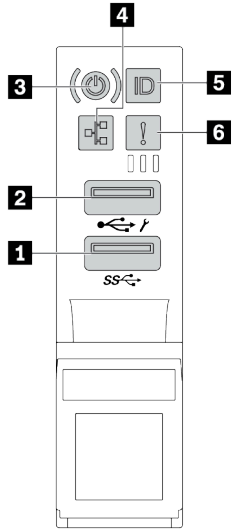


Figure 6. Front I/O assembly for server models

Table 12. Components on the front I/O assembly

Callout	Callout
1 USB 3.2 Gen 1 (5 Gbps) connector	2 USB 2.0 connector with XClarity Controller management
3 Power button with power status LED	4 Network activity LED (for OCP 3.0 Ethernet adapter)
5 System ID button with system ID LED	6 System error LED

1 USB 2.0 connector with XClarity Controller management

Depending on the setting, this connector supports USB 2.0 function, XClarity Controller management function, or both.

- If the connector is set for USB 2.0 function, you can attach a device that requires a USB 2.0 connection, such as a keyboard, a mouse, or a USB storage device.
- If the connector is set for XClarity Controller management function, you can attach a mobile device installed with the application to run XClarity Controller event logs.
- If the connector is set to have both functions, you can press the system ID button for three seconds to switch between the two functions.

2 USB 3.2 Gen 1 connector (5Gbps)

Used to attach a device that requires a USB 2.0 or 3.2 connection, such as a keyboard, a mouse, or a USB storage device.

3 Power button with power status LED

You can press the power button to turn on the server when you finish setting up the server. You also can hold the power button for several seconds to turn off the server if you cannot turn off the server from the operating system. The power status LED helps you determine the current power status.

Status	Color	Description
Solid on	Green	The server is on and running.
Slow blinking (about one flash per second)	Green	The server is off and is ready to be powered on (standby state).
Fast blinking (about four flashes per second)	Green	The server is off, but the XClarity Controller is initializing, and the server is not ready to be powered on.
Off	None	There is no ac power applied to the server.

4 Network activity LED

When an OCP 3.0 Ethernet adapter is installed, the network activity LED on the front I/O assembly helps you identify the network connectivity and activity.

Status	Color	Description
On	Green	The server is connected to a network.
Blinking	Green	The network is connected and active.
Off	None	The server is disconnected from the network.

Note: If no OCP 3.0 Ethernet adapter is installed, this LED is off.

System ID button with system ID LED

Use this system ID button and the blue system ID LED to visually locate the server. A system ID LED is also located on the rear of the server. Each time you press the system ID button, the state of both the system ID LEDs changes. The LEDs can be changed to on, blinking, or off.

If the XClarity Controller USB connector is set to have both the USB 2.0 function and XClarity Controller management function, you can press the system ID button for three seconds to switch between the two functions.

System error LED

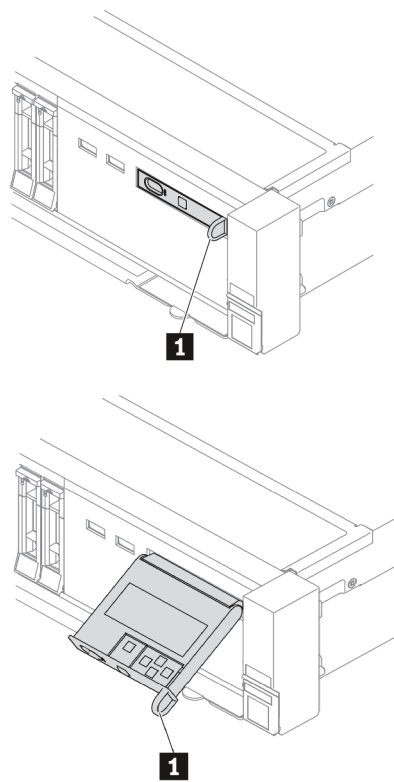
The system error LED provides basic diagnostic functions for your server. If the system error LED is lit, one or more LEDs elsewhere in the server might also be lit to direct you to the source of the error.

Status	Color	Description	Action
On	Yellow	An error has been detected on the server. Causes might include but are not limited to the following errors: <ul style="list-style-type: none">• A fan failure• A memory error• A storage failure• A PCIe device failure• A power supply failure• A CPU error• A system board error	Check the event log to determine the exact cause of the error. Alternatively, follow the light path diagnostics to determine if additional LEDs are lit that will direct you to identify the cause of the error. For information about light path diagnostics, see <i>Maintenance Manual</i> for your server.
Off	None	The server is off or the server is on and is working correctly.	None.

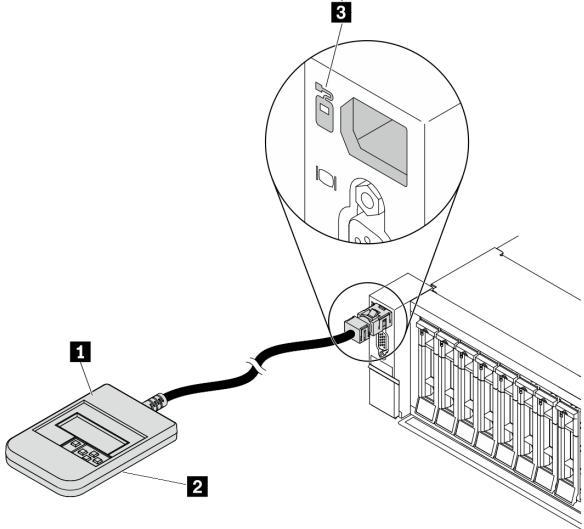
LCD diagnostics panel/handset

The LCD diagnostics panel is a component attached to the front of the server. The external LCD diagnostics handset is an external device that can be connected to the server with a cable. Functions of the integrated component and the external device are the same, both of them can be used to quickly access system information such as active errors, system status, firmware information, network information, and health information.

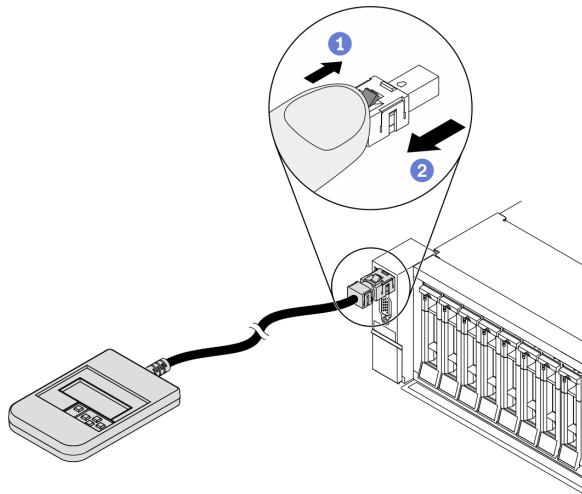
Where to find the LCD diagnostics panel

Location	Callout
<p>The LCD diagnostics panel is attached to the front of the server.</p> 	<p>1 The handle with which the panel can be pulled out and inserted into the rack.</p> <p>Notes:</p> <ul style="list-style-type: none">• The panel can be inserted or pulled out regardless of the system status.• When pulling out the panel, carefully hold it by the handle and avoid any hard pulling.

Where to find the external LCD diagnostics handset

Location	Callout
<p>The external LCD diagnostics handset is connected to the server with an external cable.</p> 	<p>1 The LCD diagnostics handset that can be connected to the server with an external cable.</p> <p>2 The magnetic bottom with which the device can be attached to the top or side of the rack. This is helpful and can free up both hands for certain service tasks.</p> <p>3 The external diagnostics connector on the front of the server that can be used to connect an external LCD diagnostics handset.</p>

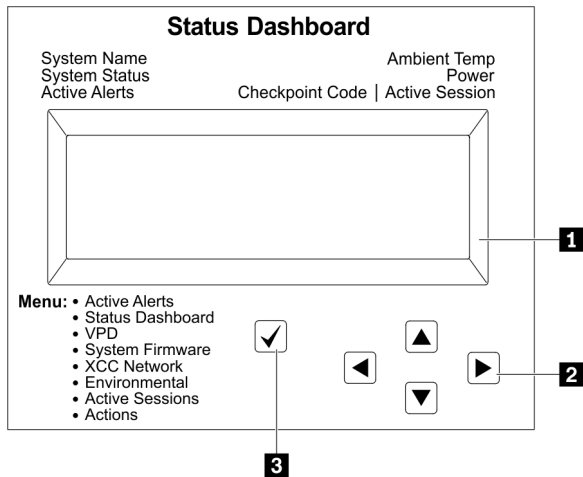
Note: Pay attention to the following steps when unplugging the external handset:



Step 1. Press the plastic clip on the plug in the shown direction.

Step 2. Gently pull out the cable from the connector while keeping the clip pressed down.

LCD diagnostics panel overview



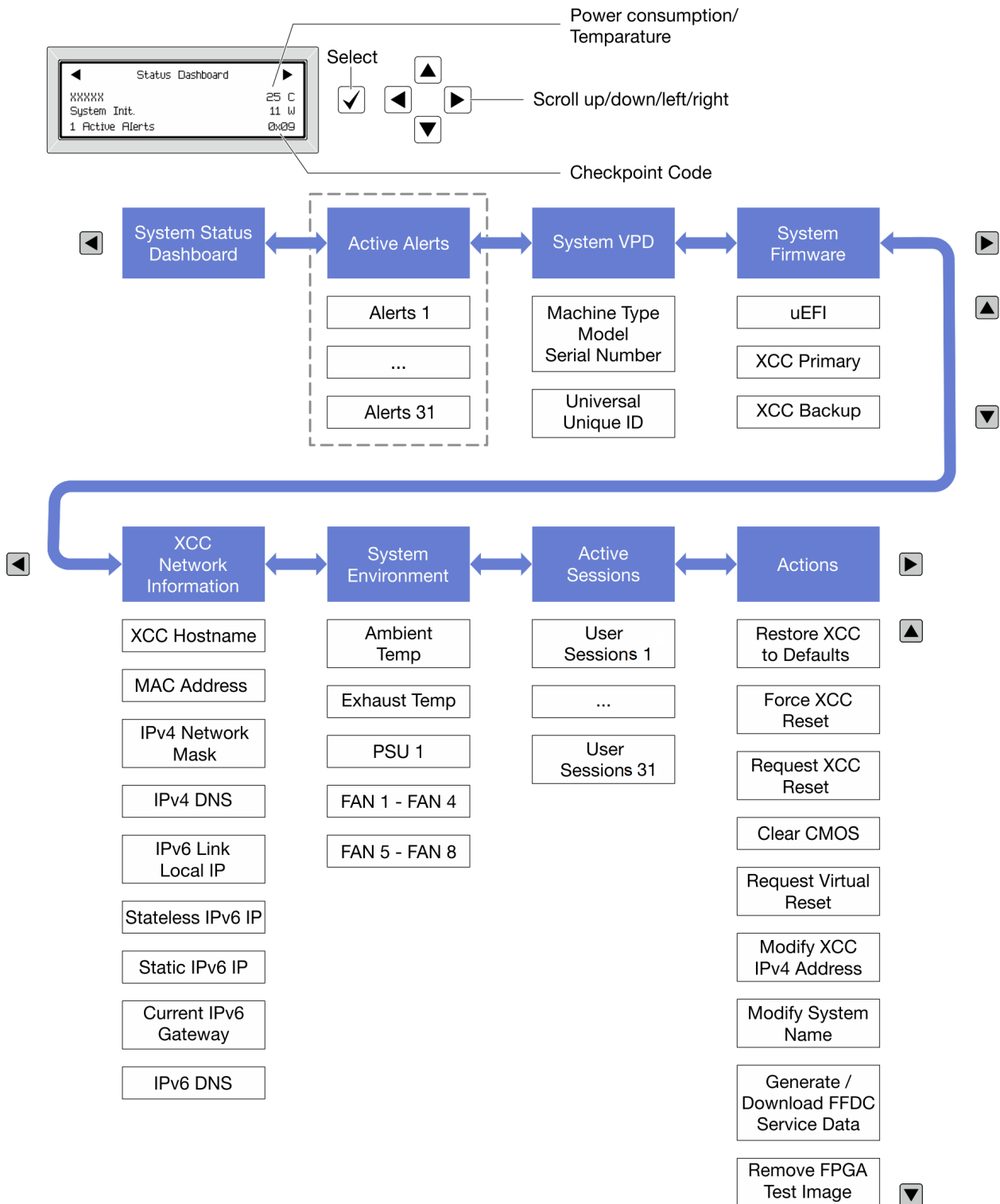
1 LCD display

2 Scroll buttons (up/down/left/right). Press the scroll buttons to locate and select system information.

3 Select button. Press the select button to select from the menu options.

Options flow diagram

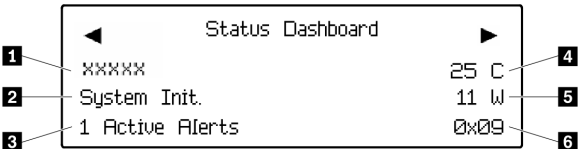
The LCD diagnostics panel/handset shows various system information. Navigate through the options with the scroll keys.



Full menu list

Following is the list of options available on the LCD diagnostics panel/handset. Switch between an option and the subordinate information entries with the select button, and switch among options or information entries with the scroll buttons.

Home Menu (System Status Dashboard)

Home Menu	Example
1 System name 2 System status 3 Active alert quantity 4 Temperature 5 Power consumption 6 Checkpoint code	 <p>The screenshot shows a 'Status Dashboard' menu with the following items: 'xxxxxx' (1), 'System Init.' (2), '1 Active Alerts' (3), '25 C' (4), '11 W' (5), and '0x09' (6). Navigation arrows are visible at the top.</p>

Active Alerts

Sub Menu	Example
Home screen: Active error quantity Note: The "Active Alerts" menu displays only the quantity of active errors. If no errors occur, the "Active Alerts" menu will not be available during navigation.	1 Active Alerts
Details screen: <ul style="list-style-type: none"> Error message ID (Type: Error/Warning/Information) Occurrence time Possible sources of the error 	Active Alerts: 1 Press ▼ to view alert details FQXSPPU009N(Error) 04/07/2020 02:37:39 PM CPU 1 Status: Configuration Error

System VPD Information

Sub Menu	Example
<ul style="list-style-type: none"> Machine type and serial number Universal Unique ID (UUID) 	Machine Type: xxxx Serial Num: xxxxxx Universal Unique ID: xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx

System Firmware

Sub Menu	Example
UEFI <ul style="list-style-type: none">Firmware level (status)Build IDVersion numberRelease date	UEFI (Inactive) Build: D0E101P Version: 1.00 Date: 2019-12-26
XCC Primary <ul style="list-style-type: none">Firmware level (status)Build IDVersion numberRelease date	XCC Primary (Active) Build: DVI399T Version: 4.07 Date: 2020-04-07
XCC Backup <ul style="list-style-type: none">Firmware level (status)Build IDVersion numberRelease date	XCC Backup (Active) Build: D8BT05I Version: 1.00 Date: 2019-12-30

XCC Network Information

Sub Menu	Example
<ul style="list-style-type: none">XCC hostnameMAC addressIPv4 Network MaskIPv4 DNSIPv6 Link Local IPStateless IPv6 IPStatic IPv6 IPCurrent IPv6 GatewayIPv6 DNS <p>Note: Only the MAC address that is currently in use is displayed (extension or shared).</p>	XCC Network Information XCC Hostname: XCC-xxxx-SN MAC Address: xx:xx:xx:xx:xx:xx IPv4 IP: xx.xx.xx.xx IPv4 Network Mask :x.x.x.x IPv4 Default Gateway : x.x.x.x

System Environmental Information

Sub Menu	Example
<ul style="list-style-type: none">• Ambient temperature• Exhaust temperature• PSU status• Spinning speed of fans by RPM	Ambient Temp: 24 C Exhaust Temp: 0 C PSU1: Vin= 213 w Inlet= 26 C FAN1 Front: 21000 RPM FAN2 Front: 21000 RPM FAN3 Front: 21000 RPM FAN4 Front: 21000 RPM

Active Sessions

Sub Menu	Example
Quantity of active sessions	Active User Sessions: 1

Actions

Sub Menu	Example
Several quick actions supported for users <ul style="list-style-type: none">• Restore XCC to Defaults• Force XCC Reset• Request XCC Reset• Clear CMOS• Request Virtual Reseat• Modify XCC Static IPv4 Address/Net mask/Gateway• Modify System Name• Generate/Download FFDC Service Data• Remove FPGA Test Image	Request XCC Reset? This will request the BMC to reboot itself. Hold ✓ for 3 seconds

Rear view

The rear of the server provides access to several connectors and components.

Refer to the following rear view for different server models:

- [“Server model with eight PCIe slots” on page 55](#)
- [“Server model with four 2.5-inch rear drive bays and six PCIe slots” on page 56](#)
- [“Server model with eight 2.5-inch rear drive bays and four PCIe slots” on page 57](#)
- [“Server model with two 3.5-inch rear drive bays and four PCIe slots” on page 58](#)
- [“Server model with four 3.5-inch rear drive bays and two PCIe slots” on page 59](#)

Server models with eight PCIe slots

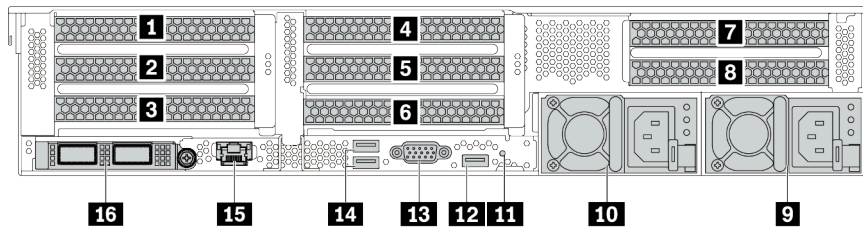


Table 13. Components on the rear of the server

Callout	Callout
1 PCIe slot 1 (on riser 1 assembly)	2 PCIe slot 2 (on riser 1 assembly)
3 PCIe slot 3 (on riser 1 assembly)	4 PCIe slot 4 (on riser 2 assembly)
5 PCIe slot 5 (on riser 2 assembly)	6 PCIe slot 6 (on riser 2 assembly)
7 PCIe slot 7 (on riser 3 assembly)	8 PCIe slot 8 (on riser 3 assembly)
9 Power supply 1	10 Power supply 2 (optional)
11 NMI button	12 USB 3.2 Gen 1 (5 Gbps) connector (1 DCI)
13 VGA connector	14 USB 3.2 Gen 1 (5 Gbps) connectors (2 DCIs)
15 XClarity Controller Network connector	16 Ethernet connectors on OCP 3.0 Ethernet adapter (optional, two or four connectors may be available)

Note: For more information about each component, see [“Rear components overview” on page 60](#).

Server models with four 2.5-inch rear drive bays and six PCIe slots

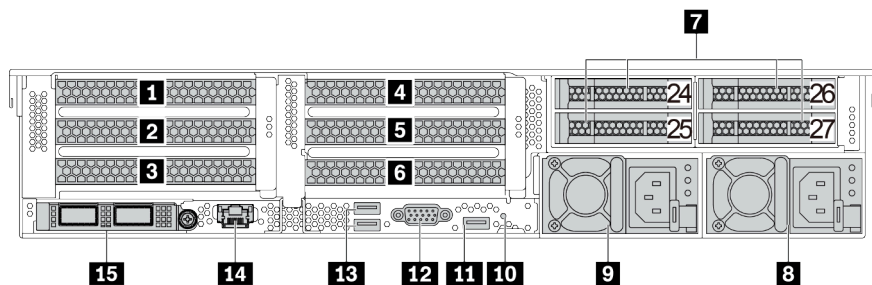


Table 14. Components on the rear of the server

Callout	Callout
1 PCIe slot 1 (on riser 1 assembly)	2 PCIe slot 2 (on riser 1 assembly)
3 PCIe slot 3 (on riser 1 assembly)	4 PCIe slot 4 (on riser 2 assembly)
5 PCIe slot 5 (on riser 2 assembly)	6 PCIe slot 6 (on riser 2 assembly)
7 2.5-inch rear drive bays (4)	8 Power supply 1
9 Power supply 2 (optional)	10 NMI button
11 USB 3.2 Gen 1 (5 Gbps) connector (1 DCI)	12 VGA connector
13 USB 3.2 Gen 1 (5 Gbps) connectors (2 DCIs)	14 XClarity Controller Network connector
15 Ethernet connectors on OCP 3.0 Ethernet adapter (optional, two or four connectors may be available)	

Note: For more information about each component, see [“Rear components overview”](#) on page 60.

Server models with eight 2.5-inch rear drive bays and four PCIe slots

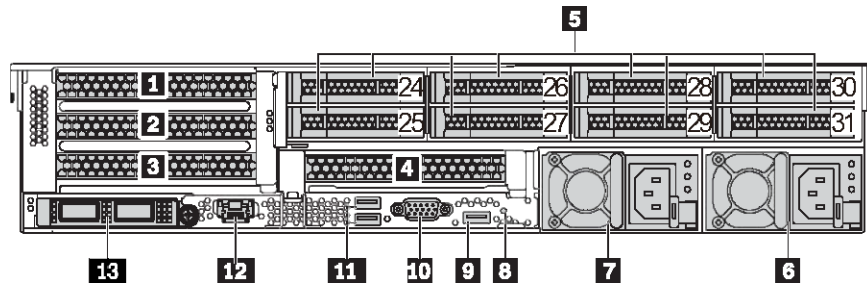


Table 15. Components on the rear of the server

Callout	Callout
1 PCIe slot 1 (on riser 1 assembly)	2 PCIe slot 2 (on riser 1 assembly)
3 PCIe slot 3 (on riser 1 assembly)	4 PCIe slot 6 (on riser 2 assembly)
5 2.5-inch rear drive bays (8)	6 Power supply 1
7 Power supply 2 (optional)	8 NMI button
9 USB 3.2 Gen 1 (5 Gbps) connector (1 DCI)	10 VGA connector
11 USB 3.2 Gen 1 (5 Gbps) connectors (2 DCIs)	12 XClarity Controller Network connector
13 Ethernet connectors on OCP 3.0 Ethernet adapter (optional, two or four connectors may be available)	

Note: For more information about each component, see [“Rear components overview” on page 60](#).

Server models with two 3.5-inch rear drive bays and four PCIe slots

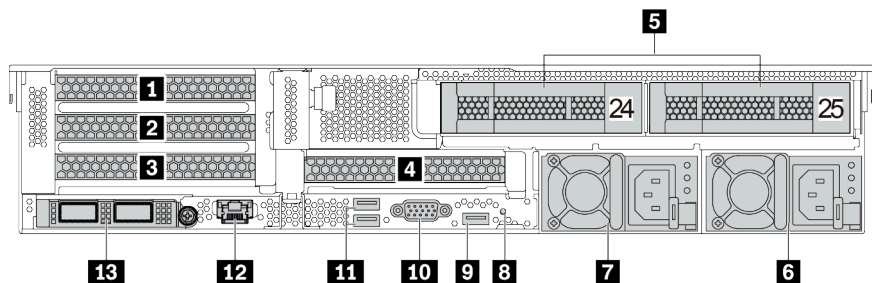


Table 16. Components on the rear of the server

Callout	Callout
1 PCIe slot 1 (on riser 1 assembly)	2 PCIe slot 2 (on riser 1 assembly)
3 PCIe slot 3 (on riser 1 assembly)	4 PCIe slot 6 (on riser 2 assembly)
5 3.5-inch rear drive bays (2)	6 Power supply 1
7 Power supply 2 (optional)	8 NMI button
9 USB 3.2 Gen 1 (5 Gbps) connector (1 DCI)	10 VGA connector
11 USB 3.2 Gen 1 (5 Gbps) connectors (2 DCIs)	12 XClarity Controller Network connector
13 Ethernet connectors on OCP 3.0 Ethernet adapter (optional, two or four connectors may be available)	

Note: For more information about each component, see [“Rear components overview” on page 60](#).

Server models with four 3.5-inch rear drive bays and two PCIe slots

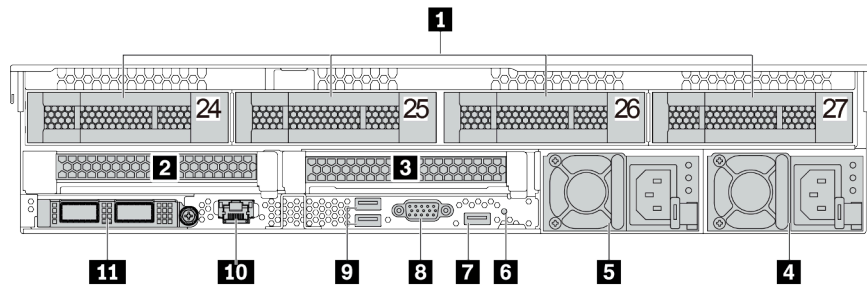


Table 17. Components on the rear of the server

Callout	Callout
1 3.5-inch rear drive bays (4)	2 PCIe slot 3 (on riser 1 assembly)
3 PCIe slot 6 (on riser 2 assembly)	4 Power supply 1
5 Power supply 2 (optional)	6 NMI button
7 USB 3.2 Gen 1 (5 Gbps) connector (1 DCI)	8 VGA connector
9 USB 3.2 Gen 1 (5 Gbps) connectors (2 DCIs)	10 XClarity Controller Network connector
11 Ethernet connectors on OCP 3.0 Ethernet adapter (optional, two or four connectors may be available)	

Note: For more information about each component, see [“Rear components overview”](#) on page 60.

Rear components overview

Drive LEDs

Each hot-swap drive comes with an activity LED and status LED and the signals are controlled by the backplanes. Different colors and speeds indicate different activities or status of the drive. The following illustrates the LEDs on a Hard disk drive or solid-state drive.

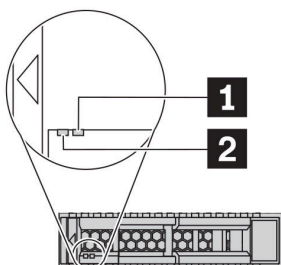


Figure 7. Drive LEDs

Drive LED	Status	Description
1 Drive status LED (right)	Solid yellow	The drive has an error.
	Blinking yellow (blinking slowly, about one flash per second)	The drive is being rebuilt.
	Blinking yellow (blinking rapidly, about four flashes per second)	The RAID adapter is locating the drive.
2 Drive activity LED (left)	Solid green	The drive is powered but not active.
	Blinking green	The drive is active.

Ethernet connectors



Figure 8. OCP module (two connectors)



Figure 9. OCP module (four connectors)

Notes:

- The OCP 3.0 Ethernet adapter provides two or four extra Ethernet connectors for network connections.
- By default, Ethernet connector 1 (the first port starting from the left in the rear server view) on the OCP 3.0 Ethernet adapter can also function as a management connector using the shared management capacity. If the shared management connector fails, traffic can automatically switch over to another connector on the adapter.

Hot-swap drives and drive bays

The drive bays on the front and rear of your server are designed for hot-swap drives. The number of the installed drives in your server varies by model. When you install drives, follow the order of the drive bay numbers.

The EMI integrity and cooling of the server are protected by having all drive bays occupied. Vacant drive bays must be occupied by drive fillers.

NMI button

Press this button to force a nonmaskable interrupt (NMI) to the processor. By this way, you can make the operating system halt (such as Windows Blue Screen of Death) and take a memory dump. You might have to use a pen or the end of a straightened paper clip to press the button.

PCIe slots

The PCIe slots are on the rear of the server and your server supports up to eight PCIe slots on riser 1, 2, and 3 assemblies. For more information about the PCIe slots, see [“PCIe slots and configurations” on page 29](#).

Below lists all supported parts in the slots:

- COM cable (slot 3 or 6 only)
- Fiber channel HBA adapters
- GPU adapters
- RAID/HBA adapters
- Network adapters
- NVMe switch adapter
- 7mm-thick 2.5-inch SSDs (slot 3 or 6 only)
- PCIe SSDs

Power supplies

The hot-swap redundant power supply helps you avoid significant interruption to the operation of the system when a power supply fails. You can purchase a power supply option from Lenovo and install the power supply to provide power redundancy without turning off the server.

On each power supply, there are three status LEDs near the power cord connector. For information about the LEDs, see [“Rear view LEDs” on page 61](#).

USB 3.2 Gen 1 (5 Gbps) connectors

The USB 3.2 Gen 1 (5 Gbps) connectors can be used to attach a USB-compatible device, such as a USB keyboard, USB mouse, or USB storage device.

VGA connector

The VGA connectors on the front and rear of the server can be used to attach a high-performance monitor, a direct-drive monitor, or other devices that use a VGA connector.

XClarity Controller network connector

The XClarity Controller network connector can be used to attach an Ethernet cable to manage the baseboard management controller (BMC).

Rear view LEDs

The illustration in this section shows the LEDs on the rear of the server.

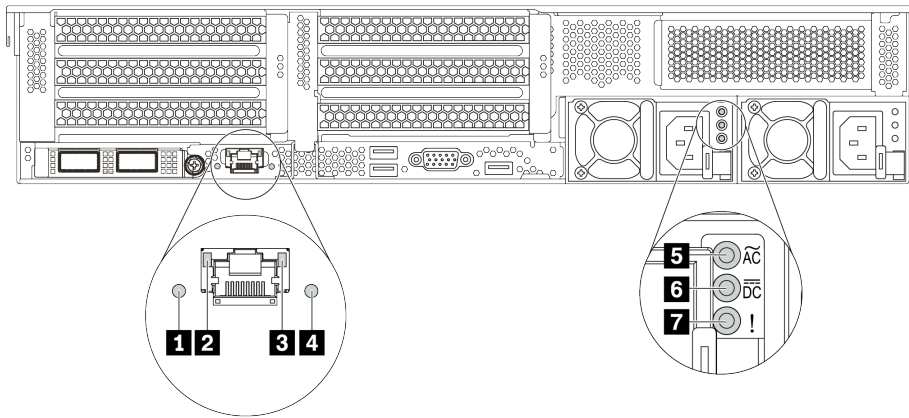


Figure 10. Rear view LEDs of the server

Table 18. LEDs on the rear of the server

Callout	Callout
1 System ID LED	2 Ethernet link LED
3 Ethernet activity LED	4 System error LED
5 Power input LED	6 Power output LED
7 Power supply error LED	

1 System ID LED

The blue system ID LED helps you visually locate the server. A system ID LED is also located on the front of the server. Each time you press the system ID button, the state of both the system ID LEDs changes. The LEDs can be changed to on, blinking, or off.

2 3 Ethernet status LEDs

The BMC management connector has two status LEDs.

Ethernet status LED	Color	Status	Description
2 Ethernet link LED	Green	On	Network link is established.
	None	Off	Network link is disconnected.
3 Ethernet activity LED	Green	Blinking	Network link is connected and active.
	None	Off	The server is disconnected from a LAN.

4 System error LED

The system error LED provides basic diagnostic functions for your server. If the system error LED is lit, one or more LEDs elsewhere in the server might also be lit to direct you to the source of the error. For more information, see [“Diagnostics panel” on page 45](#).

5 Power input LED

6 Power output LED

7 Power supply error LED

Each hot-swap power supply has three status LEDs.

LED	Description
5 Power input LED	<ul style="list-style-type: none">• Green: The power supply is connected to the ac power source.• Off: The power supply is disconnected from the ac power source or a power problem occurs.
6 Power output LED	<ul style="list-style-type: none">• Green: The server is on and the power supply is working normally.• Blinking green: The power supply is in zero-output mode (standby). When the server power load is low, one of the installed power supplies enters into the standby state while the other one delivers entire load. When the power load increases, the standby power supply will switch to active state to provide sufficient power to the server. To disable zero-output mode, log in to the Lenovo XClarity Controller web interface, choose Server Configuration → Power Policy, disable Zero Output Mode, and then click Apply. If you disable zero-output mode, both power supplies will be in the active state.• Off: The server is powered off, or the power supply is not working properly. If the server is powered on but the power output LED is off, replace the power supply.
7 Power supply error LED	<ul style="list-style-type: none">• Yellow: The power supply has failed. To resolve the issue, replace the power supply.• Off: The power supply is working normally.

System board

The illustration in this section shows the component locations on the system board.

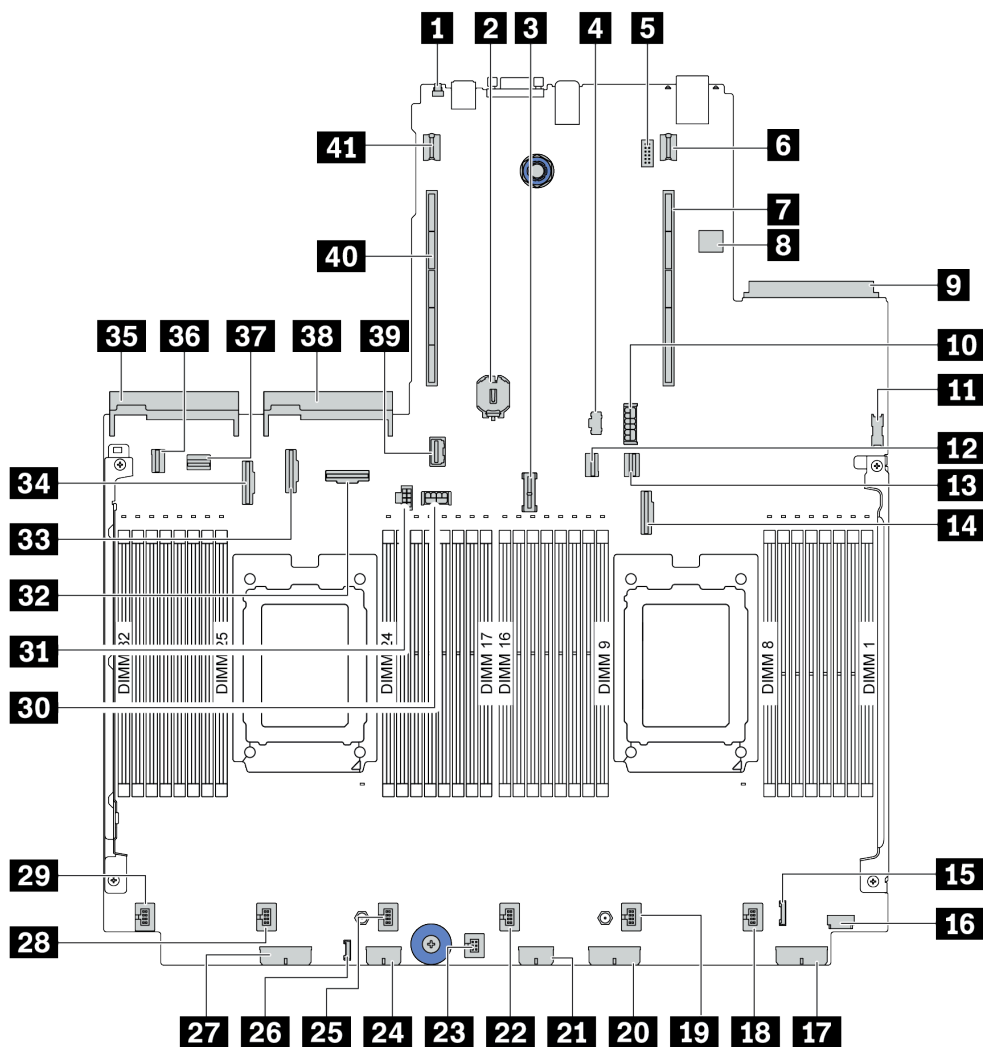


Figure 11. System board components

1 NMI button	2 CMOS battery (CR2032)
3 TPM module connector	4 M.2 power connector
5 Serial port module connector	6 Riser 1 power connector
7 Riser 1 slot	8 Internal USB connector
9 OCP 3.0 Ethernet adapter connector	10 7 mm SSD power connector
11 Front USB connector	12 PCIe connector 1
13 PCIe connector 2	14 PCIe connector 3
15 Front I/O connector	16 Front VGA connector

17 Backplane power connector 3	18 Fan 1 connector
19 Fan 2 connector	20 Backplane power connector 2
21 RAID expander power connector	22 Fan 3 connector
23 Intrusion switch connector	24 CFF RAID/HBA power connector
25 Fan 4 connector	26 External LCD connector
27 Backplane power connector 1	28 Fan 5 connector
29 Fan 6 connector	30 Riser 3 GPU power connector
31 Riser 3 power connector	32 PCIe connector 6
33 PCIe connector 8	34 PCIe connector 7
35 Power supply 1 connector	36 PCIe connector 4
37 PCIe connector 5	38 Power supply 2 connector
39 Riser 3 sideband connector	40 Riser 2 slot
41 Riser 2 power connector	

System board LEDs

The illustration in this section shows the LEDs on the system board.

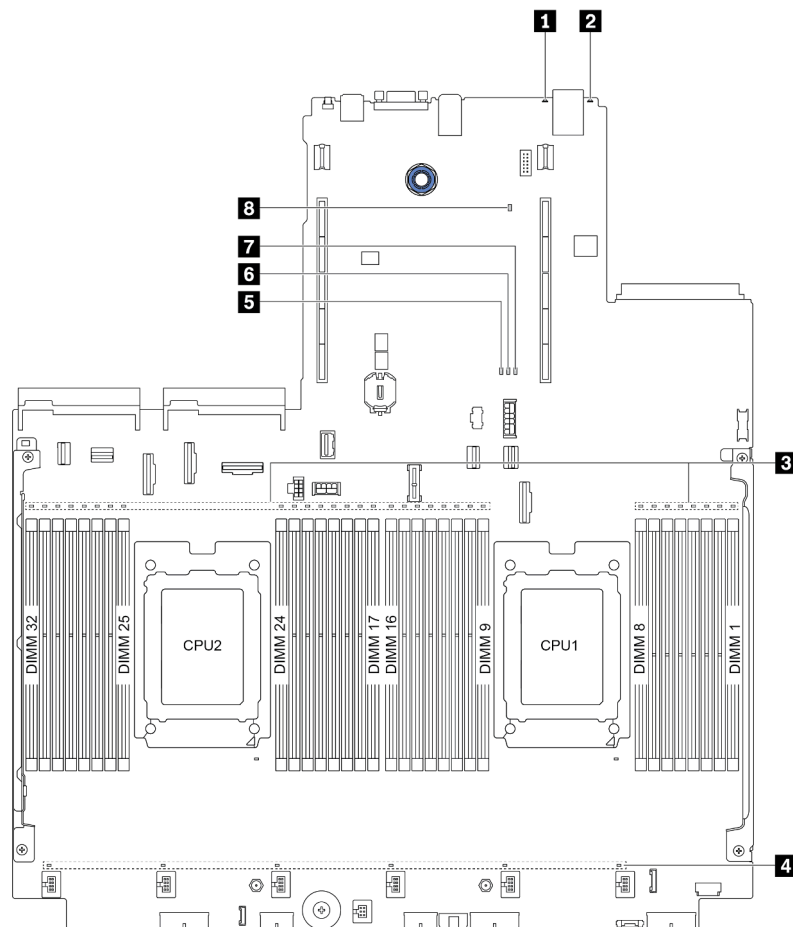


Figure 12. System board LEDs

Table 19. LEDs on the system board

Callout	Callout
1 System error LED	2 System ID LED
3 DIMM error LEDs (32)	4 Fan error LEDs (6)
5 FPGA error LED	6 FPGA heartbeat LED
7 FPGA power LED	8 XCC heartbeat LED

1 System error LED

When this yellow LED is lit, one or more LEDs elsewhere in the server might also be lit to direct you to the source of the error. For more information, see [“Diagnostics panel” on page 45](#).

2 System ID LED

The blue system ID LED helps you visually locate the server. A system ID LED is also located on the front of the server. Each time you press the system ID button, the state of both the system ID LEDs changes. The LEDs can be changed to on, blinking, or off.

3 DIMM error LEDs

When a DIMM error LED is lit, it indicates that the corresponding memory module has failed.

4 Fan error LEDs

When a fan error LED is lit, it indicates that the corresponding system fan is operating slowly or has failed.

5 FPGA error LED

The FPGA error LED helps you identify different FPGA errors.

Status	Color	Description
On	Green	FPGA running image is test build image.
Blinking	Green	<ul style="list-style-type: none">Blinking (blinking slowly, about one flash per second): One or more power faults occur.Blinking (blinking rapidly, about four flashes per second): FPGA does not assert RSMRST_N.
Off	None	No power faults occur.

6 FPGA heartbeat LED

The FPGA heartbeat LED helps you identify different FPGA errors.

Status	Color	Description
On or Off	Green	FPGA does not work.
Blinking	Green	FPGA works normally.

7 FPGA power LED

The FPGA power LED helps you identify different FPGA errors.

Status	Color	Description
On	Green	The FPGA power is on.
Blinking	Green	<ul style="list-style-type: none">Blinking (blinking slowly, about one flash per second): The FPGA power is off.Blinking (blinking rapidly, about four flashes per second): The FPGA permission is delayed.

8 XCC heartbeat LED

The XCC heartbeat LED helps you identify the XCC status.

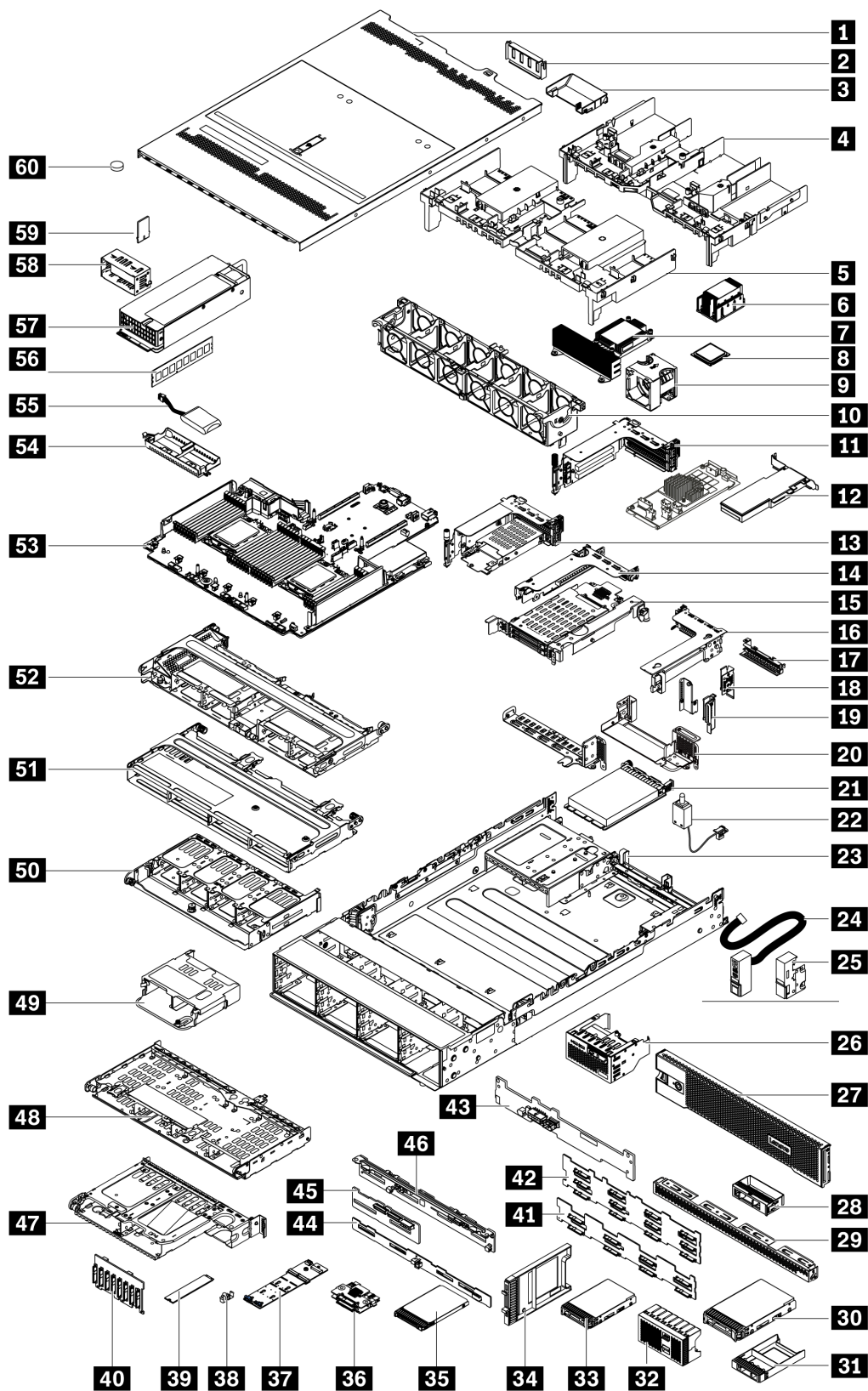
Status	Color	Description
On	Green	The XCC is not alive.
Blinking	Green	The XCC is alive.
Off	None	The XCC is not alive.

Parts list

Use the parts list to identify each of the components that are available for your server.

Note: Depending on the model, your server might look slightly different from the illustration. Some parts are available only on some models. For more information about ordering the parts, go to: <https://datacentersupport.lenovo.com/products/servers/thinksystem/sr665/7d2w/parts>

It is highly recommended that you check the power summary data for your server using Lenovo Capacity Planner before purchasing any new parts.



The parts listed in the following table are identified as one of the following:

- **T1:** Tier 1 customer replaceable unit (CRU). Replacement of Tier 1 CRUs is your responsibility. If Lenovo installs a Tier 1 CRU at your request with no service agreement, you will be charged for the installation.
- **T2:** Tier 2 customer replaceable unit (CRU). You may install a Tier 2 CRU yourself or request Lenovo to install it, at no additional charge, under the type of warranty service that is designated for your server.
- **F:** Field replaceable unit (FRU). FRUs must be installed only by trained service technicians.
- **C:** Consumable and Structural parts. Purchase and replacement of consumable and structural parts (components, such as a filler or bezel) is your responsibility. If Lenovo acquires or installs a structural component at your request, you will be charged for the service.

Description	Type	Description	Type
1 Top cover	T1	31 1 x 2.5-inch drive bay filler	C
2 GPU filler	C	32 4 x 2.5-inch drive bay filler	C
3 Add-on GPU air baffle	T1	33 2.5-inch HDD/SSD	T1
4 GPU air baffle	T1	34 7mm SSD filler	C
5 Standard air baffle	T1	35 7mm SSD	T1
6 Standard heat sink	F	36 7mm drive backplanes (top+bottom)	T2
7 Performance heat sink (T-shape)	F	37 M.2 adapter	F
8 Processor	F	38 M.2 retainer clip	T2
9 Fan module	T1	39 M.2 drive	F
10 Fan cage	T1	40 8 x 2.5-inch front drive backplane	T1
11 Riser 1/2 assembly, 3 FH	T1	41 8 x 3.5-inch front drive backplane	T1
12 PCIe adapter	T1	42 12 x 3.5-inch front drive backplane	T1
13 Riser 1 assembly, 7mm + 2 FH slots	T1	43 2 x 3.5-inch rear drive backplane	T1
14 Riser 2 assembly, 1FH	T1	44 8 x 2.5-inch rear drive backplane	T1
15 Riser 2 assembly, 7mm	T1	45 4 x 2.5-inch rear/middle drive backplane	T1
16 Riser 3 assembly, 2FH	T1	46 4 x 3.5-inch rear/middle drive backplane	T1
17 Riser 2 filler, 1FH	C	47 2 x 3.5-inch rear drive cage (BP4)	T1
18 Rearwall bracket A1	T1	48 4 x 3.5-inch rear drive cage (BP4)	T1
19 Rearwall brackets B1/B2	T1	49 4 x 2.5-inch rear drive cage (BP4)	T1
20 Rearwall bracket C1/C2	T1	50 8 x 2.5-inch rear drive cage (BP4)	T1
21 OCP 3.0 Ethernet adapter	T1	51 4 x 3.5-inch middle drive cage (BP5)	T1
22 Intrusion switch cable	T1	52 8 x 2.5-inch middle drive cage (BP5, BP6)	T1
23 Chassis	F	53 System board	F
24 Rack latch (with integrated front I/O)	T1	54 RAID super capacitor holder	C
25 Standard rack latch	T1	55 RAID super capacitor module	T1
26 Front I/O assembly with LCD diagnostics panel	T1	56 Memory module	T1
27 Security bezel	T1	57 Power supply unit	T1
28 1 x 3.5-inch drive bay filler	C	58 Power supply unit filler	C

Description	Type	Description	Type
29 4 x 3.5-inch drive bay filler	C	59 TPM adapter (for Chinese Mainland only)	F
30 3.5-inch HDD	T1	60 CMOS battery (CR2032)	C

Power cords

Several power cords are available, depending on the country and region where the server is installed.

To view the power cords that are available for the server:

1. Go to:
<http://dcsc.lenovo.com/#/>
2. Click **Preconfigured Model** or **Configure to order**.
3. Enter the machine type and model for your server to display the configurator page.
4. Click **Power** → **Power Cables** to see all line cords.

Notes:

- For your safety, a power cord with a grounded attachment plug is provided to use with this product. To avoid electrical shock, always use the power cord and plug with a properly grounded outlet.
- Power cords for this product that are used in the United States and Canada are listed by Underwriter's Laboratories (UL) and certified by the Canadian Standards Association (CSA).
- For units intended to be operated at 115 volts: Use a UL-listed and CSA-certified cord set consisting of a minimum 18 AWG, Type SVT or SJT, three-conductor cord, a maximum of 15 feet in length and a parallel blade, grounding-type attachment plug rated 15 amperes, 125 volts.
- For units intended to be operated at 230 volts (U.S. use): Use a UL-listed and CSA-certified cord set consisting of a minimum 18 AWG, Type SVT or SJT, three-conductor cord, a maximum of 15 feet in length and a tandem blade, grounding-type attachment plug rated 15 amperes, 250 volts.
- For units intended to be operated at 230 volts (outside the U.S.): Use a cord set with a grounding-type attachment plug. The cord set should have the appropriate safety approvals for the country in which the equipment will be installed.
- Power cords for a specific country or region are usually available only in that country or region.

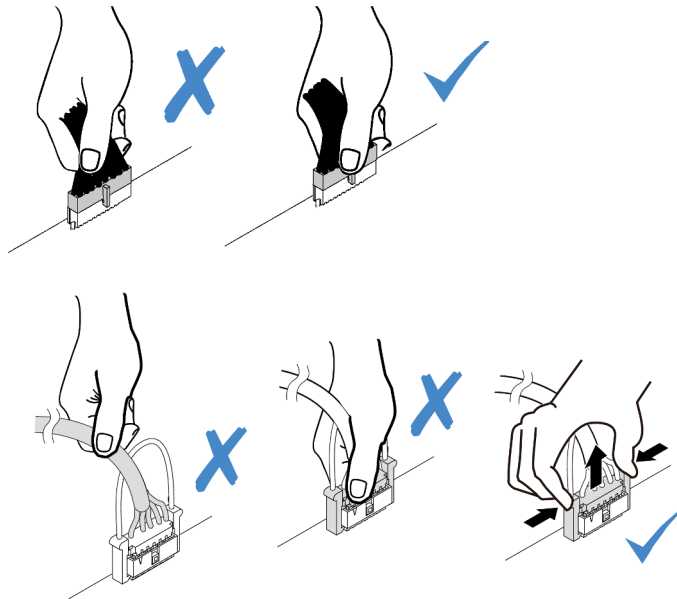
Chapter 3. Internal cable routing

Some of the components in the server have internal cables and cable connectors.

To connect cables, observe the following guidelines:

- Turn off the server before you connect or disconnect any internal cables.
- See the documentation that comes with any external devices for additional cabling instructions. It might be easier for you to route cables before you connect the devices to the server.
- Cable identifiers of some cables are printed on the cables that come with the server and optional devices. Use these identifiers to connect the cables to the correct connectors.
- Ensure that the cable is not pinched and does not cover any connectors or obstruct any components on the system board.
- Ensure that the relevant cables pass through the cable clips.

Note: Disengage all latches, release tabs, or locks on cable connectors when you disconnect cables from the system board. Failing to release them before removing the cables will damage the cable sockets on the system board, which are fragile. Any damage to the cable sockets might require replacing the system board.



Front I/O assembly

Use the section to understand the cable routing for front I/O assemblies.

Note: The illustration shows the cabling scenario for server models with twelve 3.5-inch front drive bays. Location of each connector on the front of the server varies by models. For detailed location of front I/O components for different models, see [“Front view” on page 33](#).

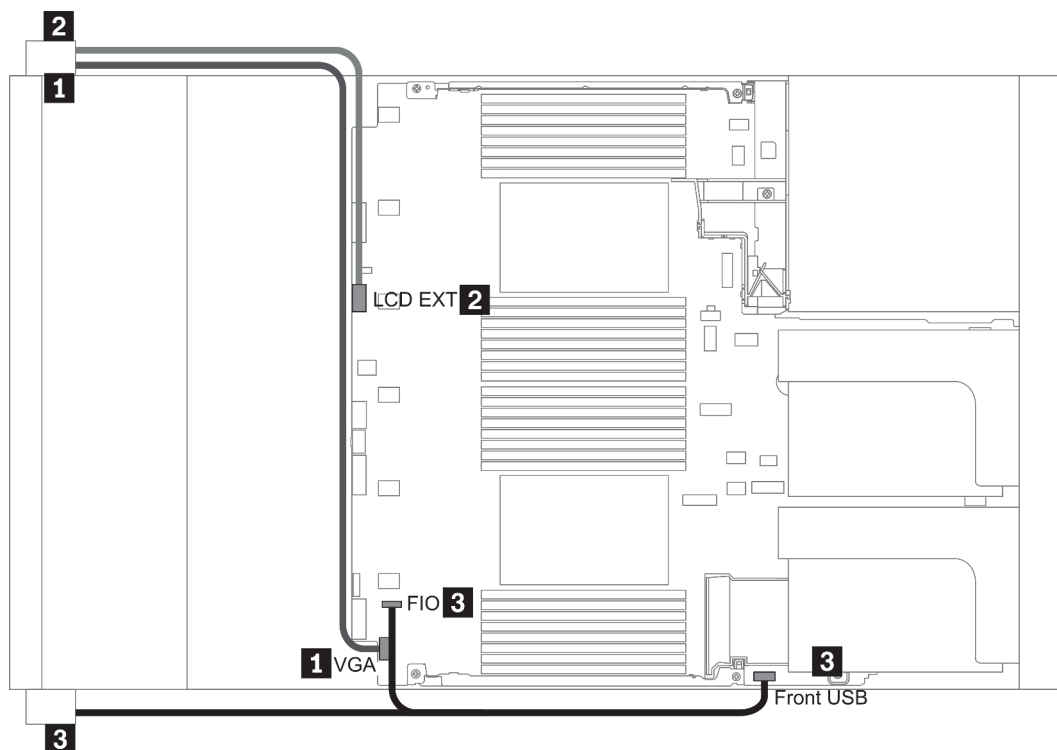


Figure 13. Front I/O assembly cable routing

From	To
1 VGA cable on the left rack latch	VGA connector on the system board
2 External diagnostics cable on the left rack latch	External LCD connector on the system board
3 Front USB and panel cable on the right rack latch	Front I/O and front USB connectors on the system board

GPUs

Use this section to understand the routing for GPUs.

Note: If your GPU adapter TDP is equal to or lower than 75 watts, the adapter can be powered directly by the riser slot. An extra power cable is needed for powering GPU adapters with TDP higher than 75 watts.

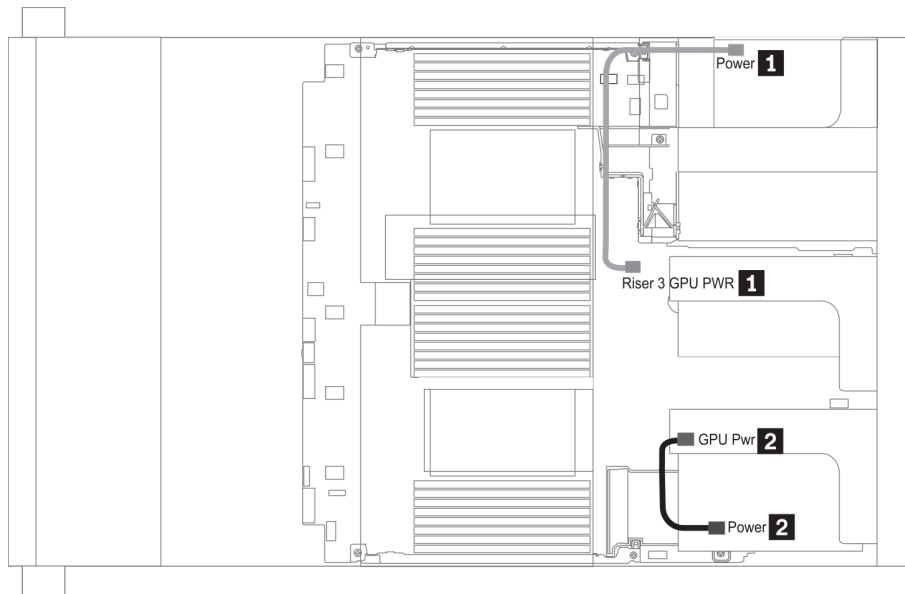
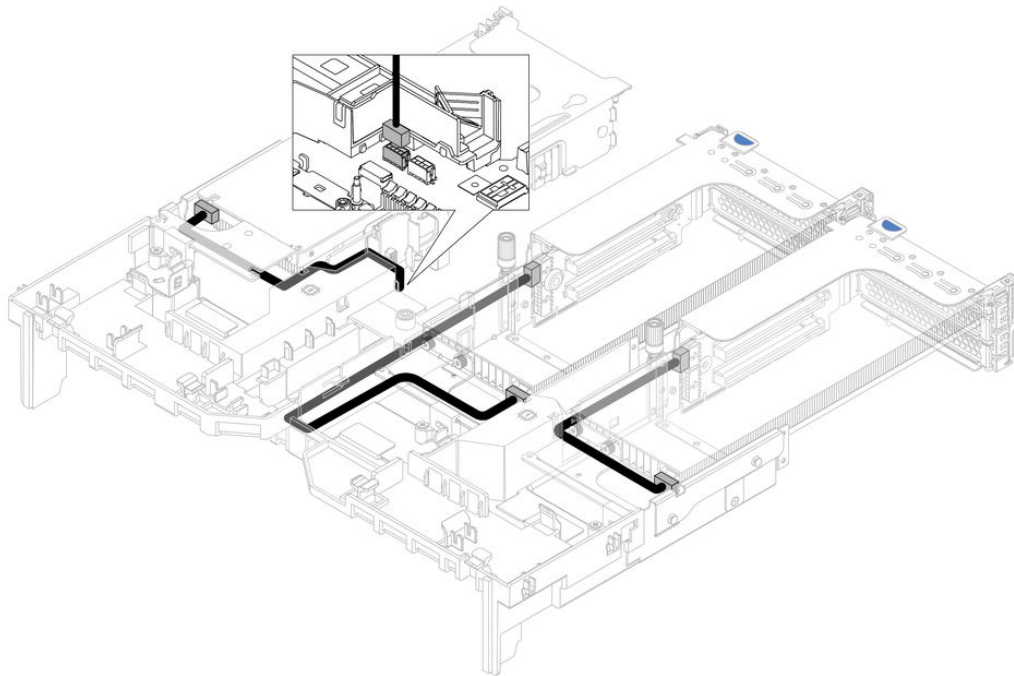


Figure 14. GPU cable routing

From	To
1 Power connector on a GPU adapter (on riser 3 assembly)	Riser 3 GPU Pwr connector on the system board
2 Power connector on a GPU adapter (on riser 1 or 2 assembly)	GPU Pwr connector on the riser card (on riser 1 or 2 assembly)

If you need to install an M.2 backplane on the GPU air baffle, route the GPU power cable from riser 2 beneath the M.2 backplane holder. Refer to below illustration for cable routing on the air baffle.



Riser cards

Use this section to understand the cable routing for riser cards.

The server supports up to three riser cards: riser card 1, riser card 2, and riser card 3. Among which, only riser card 3 needs cable connections:

- [“Riser card 3 power and sideband connection” on page 76](#)
- [“Riser card 3 \(x8/x8 or x16/x16 PCIe\) cable connection” on page 78](#)

The riser card types vary by server model. For detailed information, see [“Rear view” on page 54](#).

Riser card 3 power and sideband connection

Note: The power and sideband connections for x8/x8 PCIe riser card 3 and x16/x16 PCIe riser card 3 are the same.

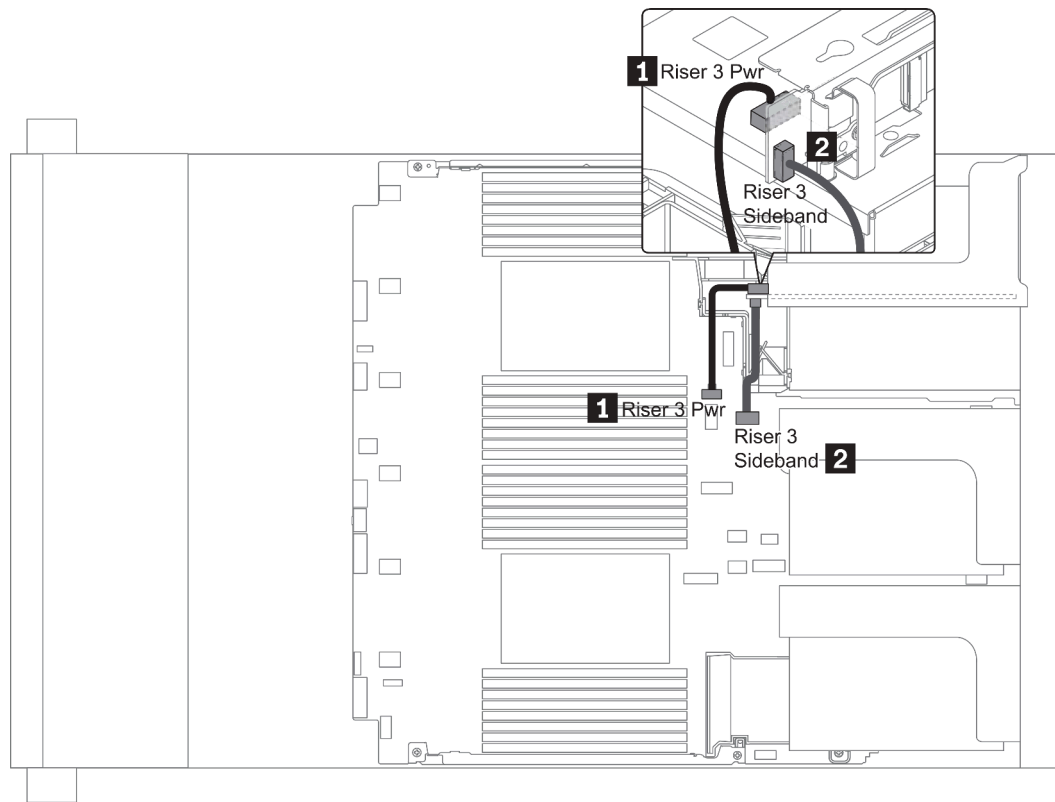


Figure 15. Riser card 3 power and sideband connection

From	To
1 Power connector on the riser card	Riser 3 power connector on the system board
2 Sideband connector on the riser card	Riser 3 sideband on the system board

Riser card 3 (x8/x8 or x16/x16 PCIe) cable connection

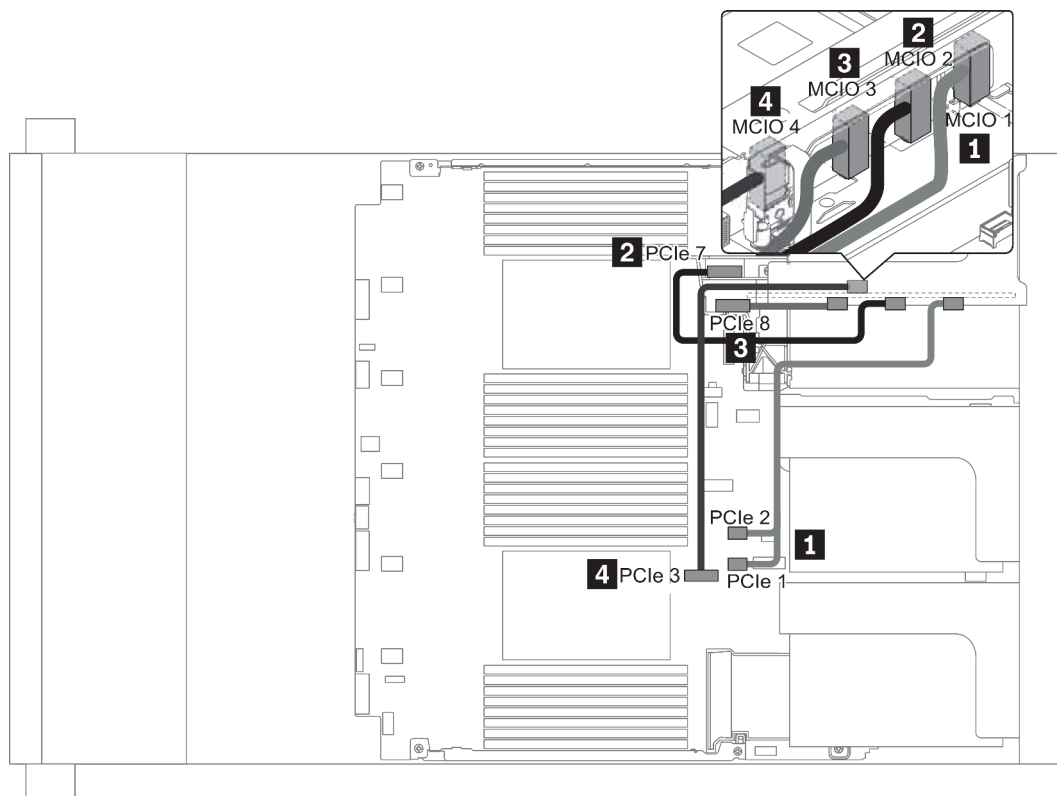


Figure 16. Cable routing for riser card 3 (x8/x8 or x16/x16 PCIe)

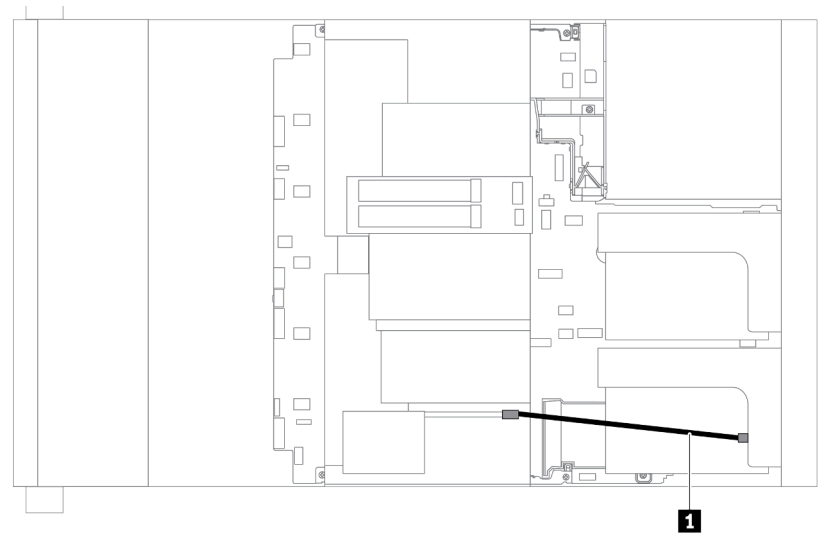
From	To
1 MCIO 1 on the riser card	PCIe connector 1-2 on the system board
2 MCIO 2 on the riser card	PCIe connectors 7 on the system board
3 MCIO 3 on the riser card	PCIe connector 8 on the system board
4 MCIO 4 on the riser card	PCIe connector 3 on the system board

Note: **3** and **4** are for x16/x16 PCIe riser card 3 only.

RAID super capacitor modules

Use this section to understand the cable routing for RAID super capacitor modules.

RAID super capacitor modules can be installed on the air baffle (scenario 1), the middle drive cage (scenario 2), or the front chassis (scenario 3). The following illustrates the cable connection for scenario 1. The cable connections for other scenarios are the similar.



Note: An extension cable is provided for each RAID super capacitor module for connection. Connect the super capacitor cable to the super capacitor connector on the corresponding RAID adapter as shown.

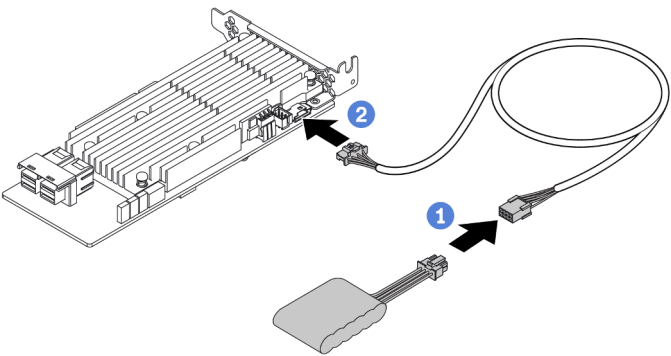


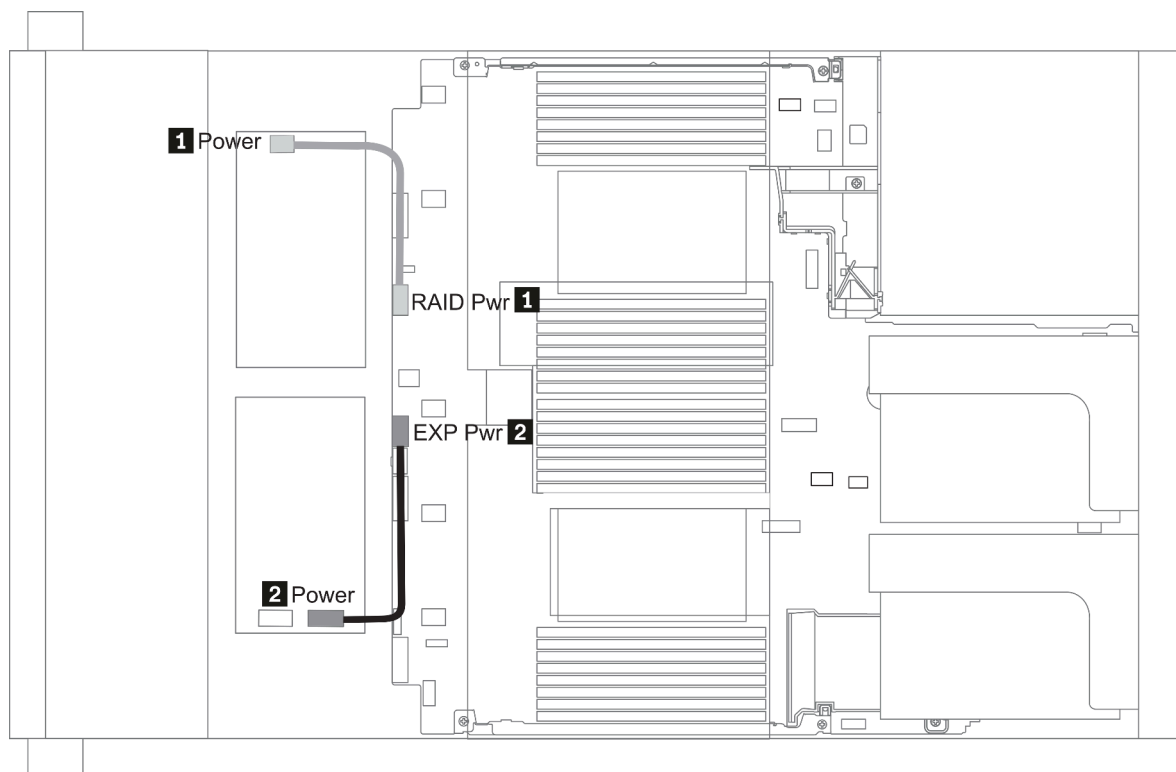
Figure 17. Connecting the RAID super capacitor module to the RAID adapter

From	To
RAID super capacitor module	Supercap connector on the RAID adapter

Internal CFF RAID/HBA/Expander adapters (power)

Use the section to understand the power cable routing for internal CFF RAID/HBA/Expander adapter.

Note: The illustration only involves power cable routing. For signal cable routing, see [“2.5-inch/3.5-inch drive backplane \(signal\)”](#) on page 89



From	To
1 Power connector on the CFF RAID/HBA adapter	RAID Pwr connector on the system board
1 Power connector on the CFF RAID Expander adapter	EXP Pwr connector on the system board

7mm drives

This section provides cable routing information for the 7mm drives.

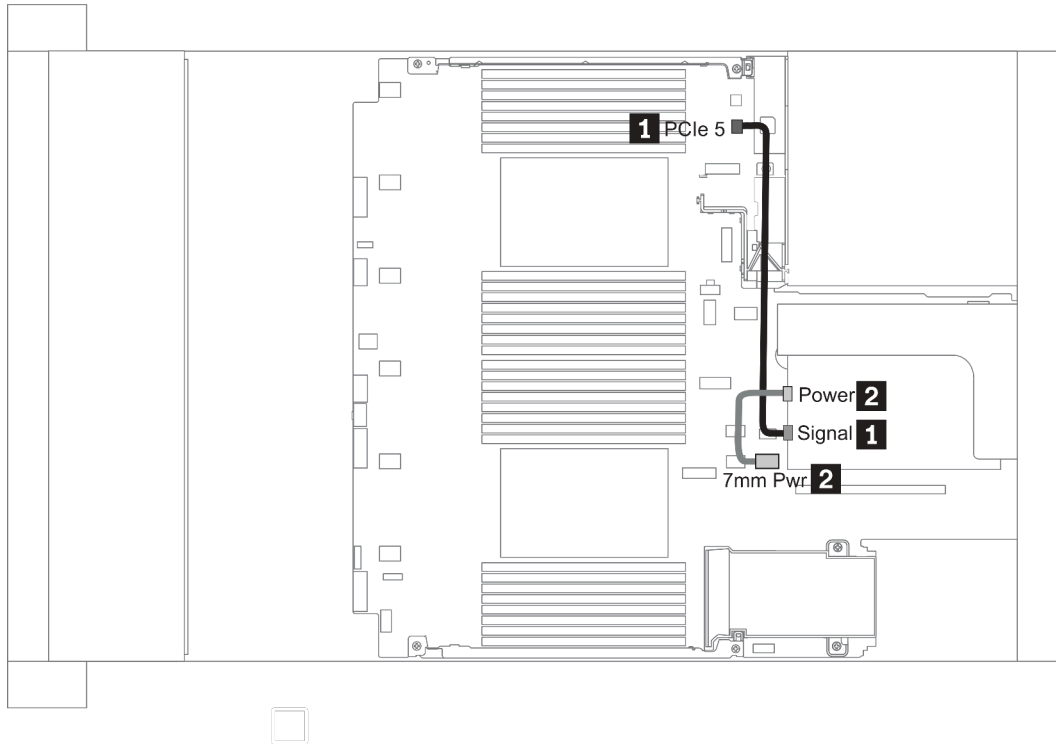


Figure 18. 7mm cable routing when two processors installed

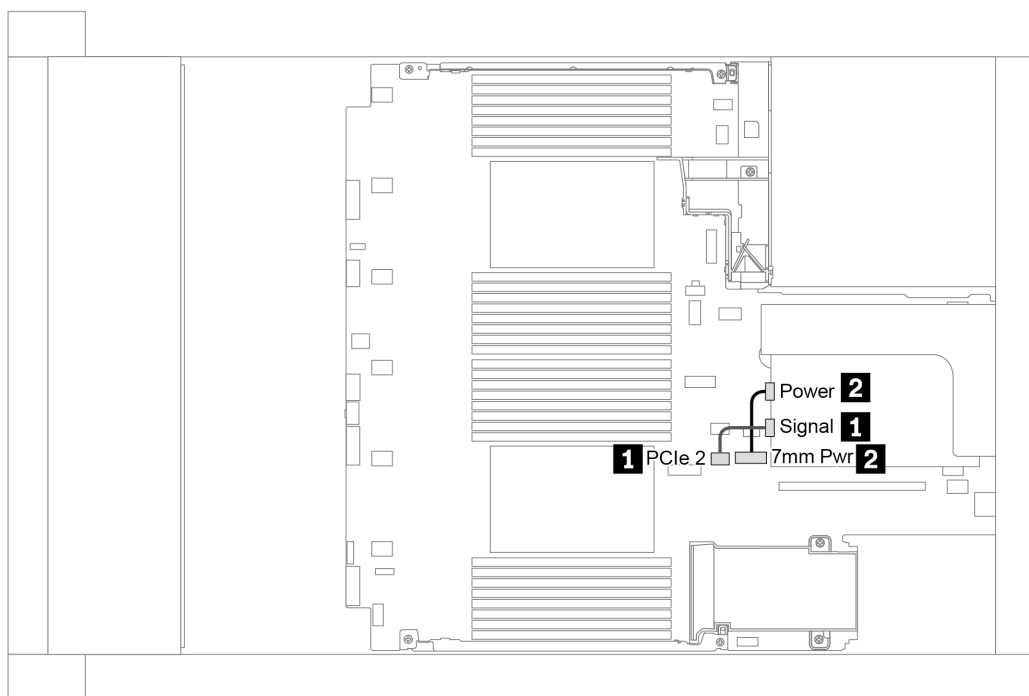


Figure 19. 7mm cable routing when one processor installed

From (7 mm drives in slot 6/ slot 3)	To
1 7mm signal cable	<ul style="list-style-type: none"> When two processors installed: PCIe connector 5 on the system board When one processor installed: PCIe connector 2 on the system board
2 Power cable	7mm power connector on the system board

M.2 drives

This section provides cable routing information for the M.2 drives.

M.2 drives can be installed on the standard air baffle (scenario 1), GPU air baffle (scenario 2), 2.5-inch middle drive cage (scenario 3), or 3.5-inch middle drive cage (scenario 4). The following illustrates the cable connection for scenario 1. The cable connections for other scenarios are the same.

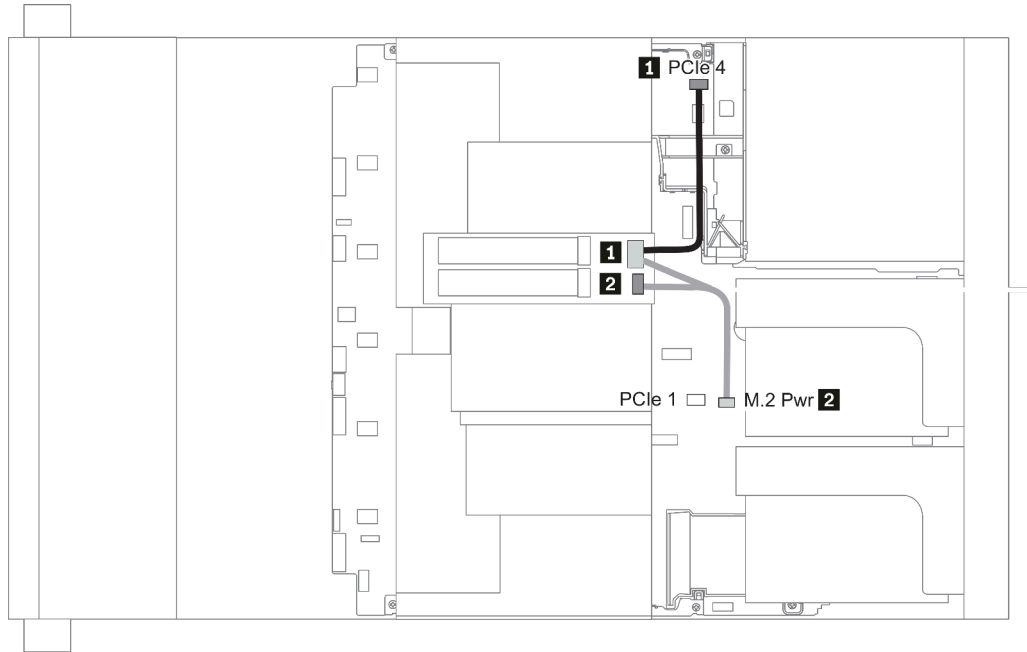


Figure 20. M.2 cable routing

From	To
1 M.2 signal cable	<ul style="list-style-type: none">• PCIe connector 4 on the system board (two processors installed)• PCIe connector 1 on the system board (one processor installed)
2 Power cable	M.2 power connector on the system board

2.5-inch/3.5-inch drive backplane (power)

This section provides information for backplane power connections.

- “Front BP” on page 84
- “Mid BP” on page 86
- “Rear BP” on page 88

Front BP

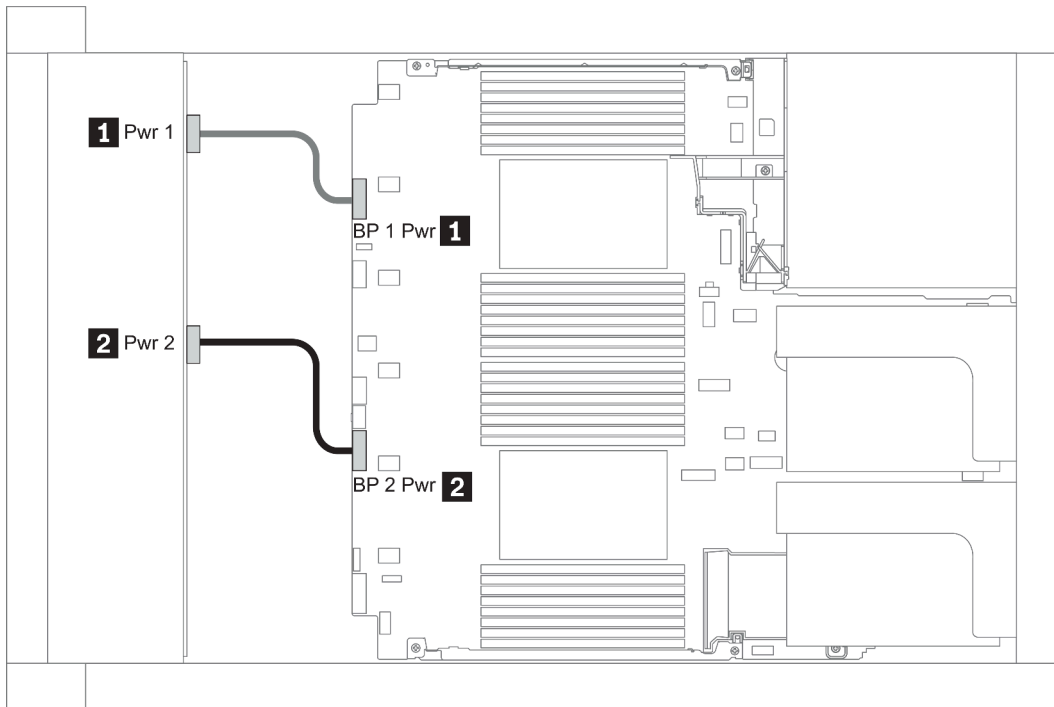


Figure 21. 3.5"

From	To
1 Power 1 connector on backplane	Front backplane 1 power connector on the system board
2 Power 2 connector on backplane	Front backplane 2 power connector on the system board

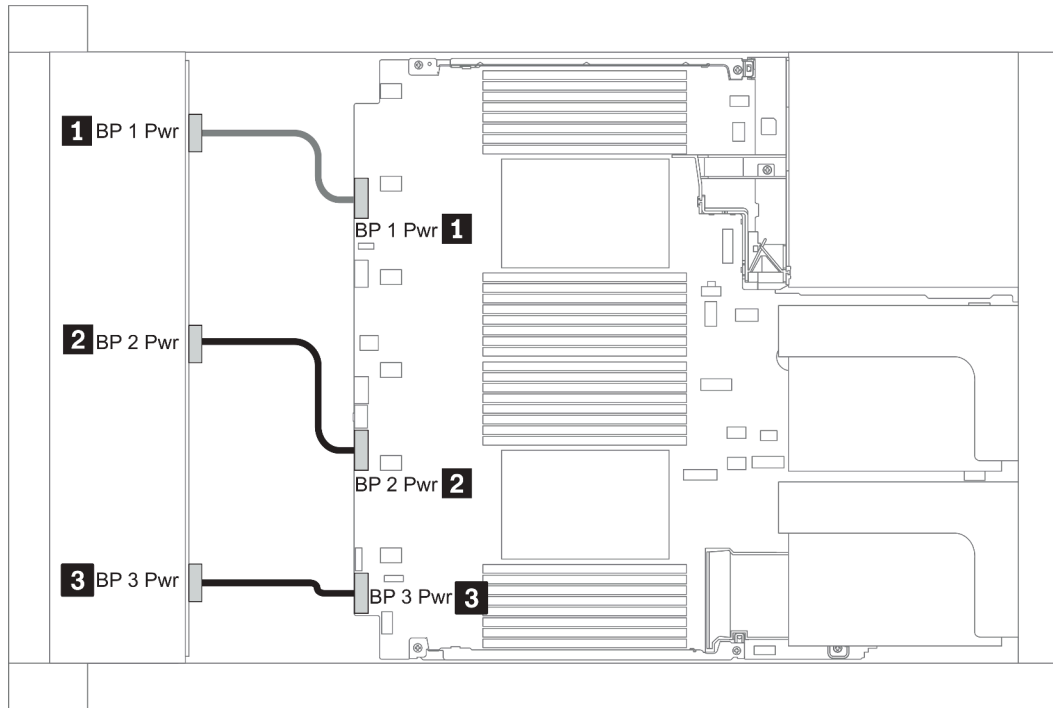


Figure 22. 2.5"

From	To
1 Power connector on backplane 1	Front backplane 1 power connector on the system board
2 Power connector on backplane 2	Front backplane 2 power connector on the system board
3 Power connector on backplane 3	Front backplane 3 power connector on the system board

Mid BP

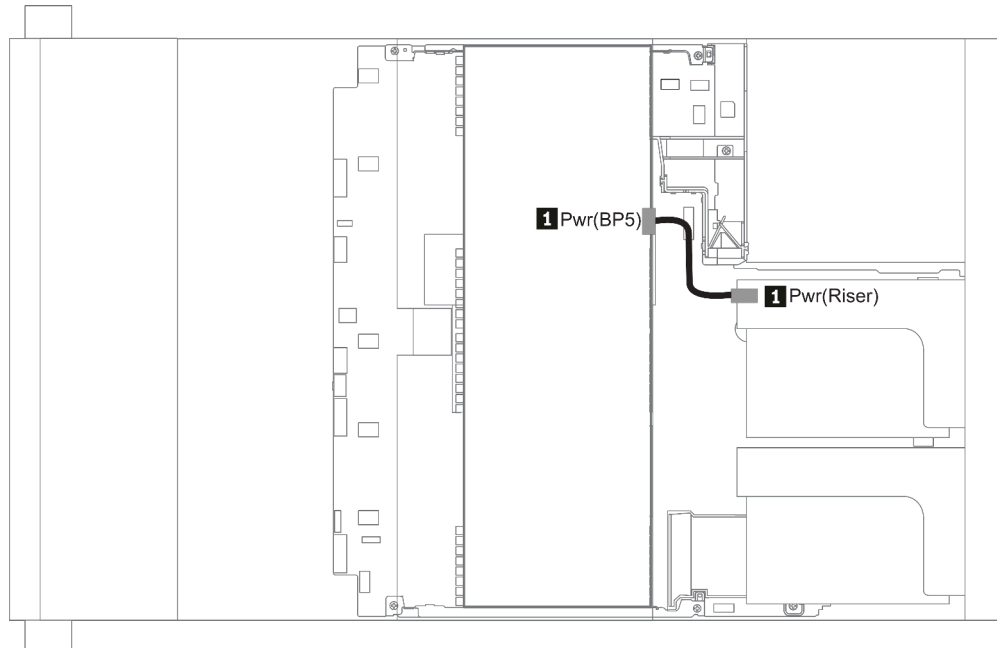


Figure 23. 3.5"

From	To
1 Power connector on backplane 5	Power connector on riser 1 or 2 assembly

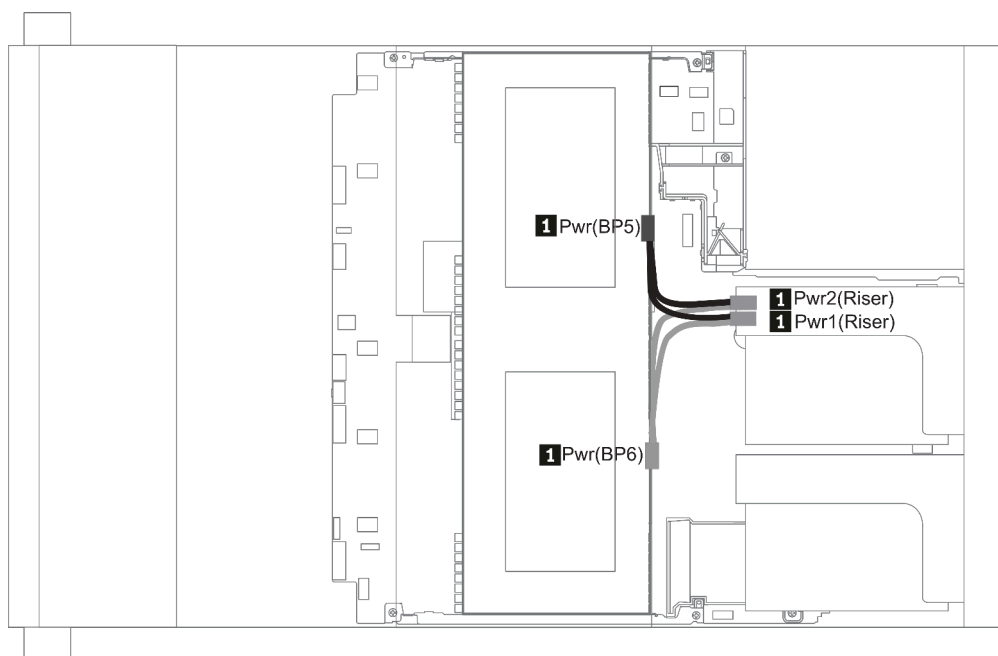


Figure 24. 2.5"

From	To
1 Power connector on backplane 5 and backplane 6	Power connector 1 and power connector 2 on riser 1 or 2 assembly

Rear BP

Note: The illustration shows the cable routing for the 4 x 2.5-inch rear drive backplane, routing for the other rear drive backplanes is similar.

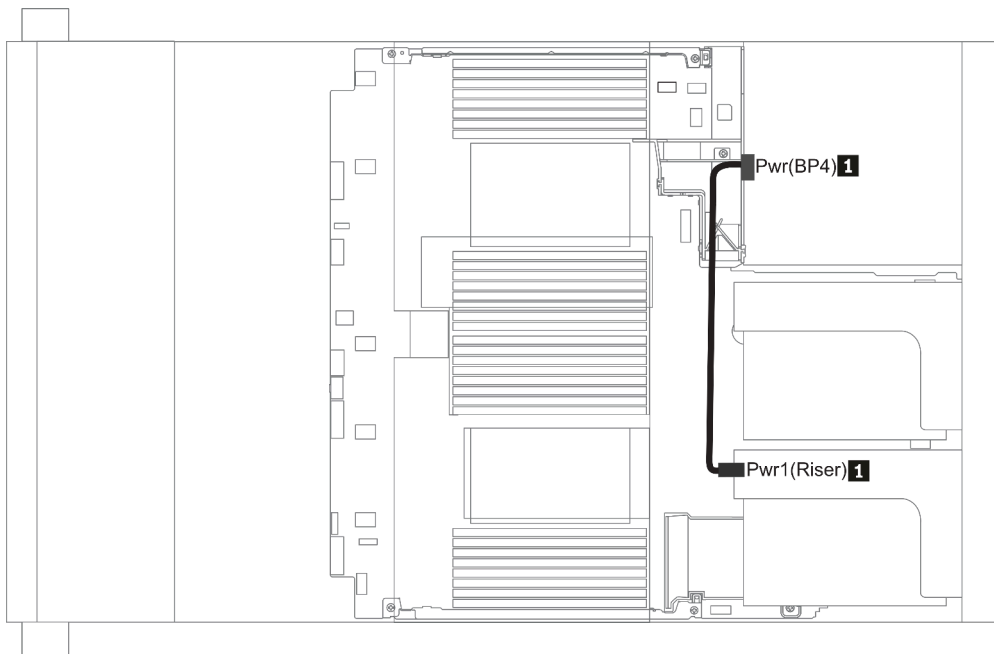


Figure 25. 2.5"/3.5"

From	To
1 Power connector on backplane 4	Power connector on riser 1 or 2 assembly

2.5-inch/3.5-inch drive backplane (signal)

Use the section to understand the cable routing for signal cable connections for 2.5-inch/3.5-inch drive backplanes.

Note: The cable routing figures in the following sections illustrate only PCIe Gen 4 adapters, the routing is similar for Gen 3 adapters.

3.5"

- [“8 x 3.5-inch front drive bays \(SAS/SATA\)” on page 127](#)
- [“12 x 3.5-inch front drive bays \(SAS/SATA\)” on page 128](#)
- [“12 x 3.5-inch front drive bays \(AnyBay\)” on page 133](#)

2.5"

- [“8 x 2.5-inch front drive bays \(SAS/SATA\)” on page 90](#)
- [“8 x 2.5-inch front drive bays \(AnyBay\)” on page 92](#)
- [“8 x 2.5-inch front drive bays \(NVMe\)” on page 94](#)
- [“16 x 2.5-inch front drive bays \(SAS/SATA\)” on page 95](#)
- [“16 x 2.5-inch front drive bays \(NVMe\)” on page 97](#)
- [“16 x 2.5-inch front drive bays \(AnyBay\)” on page 98](#)
- [“16 x 2.5-inch front drive bays \(8SAS+8AnyBay\)” on page 99](#)
- [“16 x 2.5-inch front drive bays \(8SAS/SATA+8NVMe\)” on page 101](#)
- [“16 x 2.5-inch front drive bays \(8AnyBay+8NVMe\)” on page 103](#)
- [“24 x 2.5-inch front drive bays \(8SAS/SATA+16NVMe\)” on page 105](#)
- [“24 x 2.5-inch front drive bays \(16SAS/SATA+8AnyBay\)” on page 107](#)
- [“24 x 2.5-inch front drive bays \(16SAS/SATA+8NVMe\)” on page 113](#)
- [“24 x 2.5-inch front drive bays \(SAS/SATA\)” on page 116](#)
- [“24 x 2.5-inch front drive bays \(NVMe\)” on page 123](#)
- [“8 x 3.5-inch front drive bays \(SAS/SATA\)” on page 127](#)
- [“12 x 3.5-inch front drive bays \(SAS/SATA\)” on page 128](#)
- [“12 x 3.5-inch front drive bays \(AnyBay\)” on page 133](#)

8 x 2.5-inch front drive bays (SAS/SATA)

This section provides cable routing information for the server model with 8 x 2.5-inch SAS/SATA front drive bays.

Configuration	Storage controller	
	Qty.	Type
Config. 1		
Config. 2	1	SFF 8i RAID/HBA
Config. 3	1	SFF 16i RAID/HBA
Config. 4	1	CFF 8i/16i RAID/HBA

Configuration 1 – 4:

BP1: 8 x 2.5" SAS/SATA BP

Con-fig.	Front BP	System board	Storage controller		
			SFF 8i RAID/HBA	SFF 16i RAID/HBA	CFF 8i/16i RAID/HBA
1	BP 1: SAS	PCIe 1, PCIe 2			
2	BP 1: SAS		Gen 4: C 0 Gen3: C 0, C 1		
3	BP 1: SAS			Gen 4: C 0 Gen3: C 0, C 1	
4	SAS				C 0, C1
		<ul style="list-style-type: none"> When two processors installed: PCIe 6 When one processor installed: PCIe 3 			MB

Example

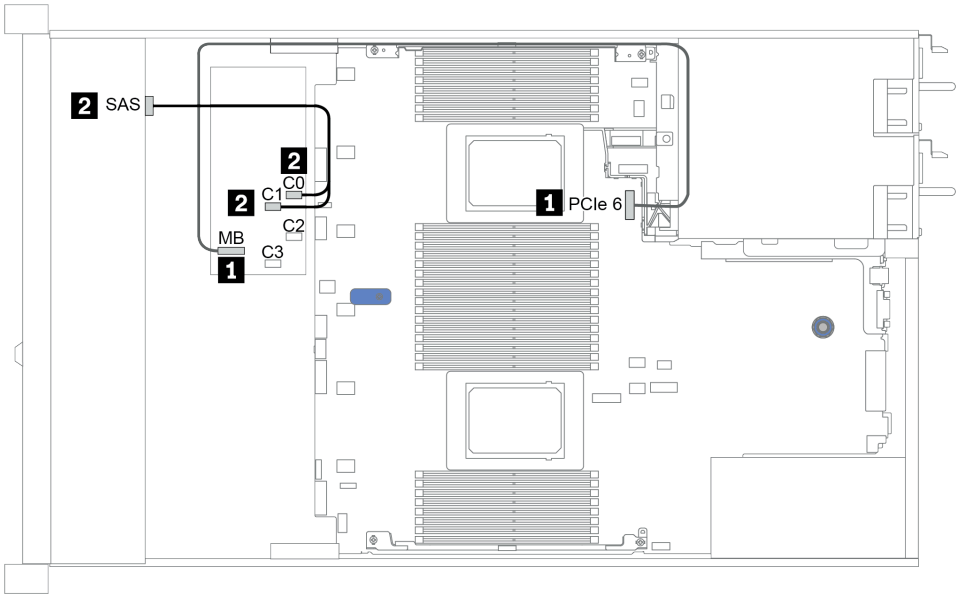


Figure 26. Configuration 4

8 x 2.5-inch front drive bays (AnyBay)

This section provides cable routing information for the server model with eight 2.5-inch front drive bays.

Configuration	Storage controllers	
	Qty.	Type
Config. 1	1	SFF 8i RAID/HBA
Config. 2	1	SFF 8i RAID (Tri-Mode)
Config. 3	1	SFF 16i RAID/HBA
Config. 4	1	SFF 16i RAID (Tri-Mode)
Config. 5	1	CFF 16i RAID/HBA
Config. 6	1	CFF 16i RAID (Tri-Mode)

Configuration 1 – 6:

BP1: 8 x 2.5" AnyBay BP

Con- fig.	Front BP	System board	Storage controller			
			SFF 8i RAID/HBA	SFF 8i RAID (Tri-Mode)	SFF 16i RAID/HBA	SFF 16i RAID (Tri- Mode)
1	BP1:NVMe 0–1	PCIe 1, PCIe 2				
	BP1: NVMe 2–3	PCIe 3				
	BP1: NVMe 4–5	PCIe 7				
	BP1: NVMe 6–7	PCIe 8				
	BP1: SAS		Gen 4: C 0 Gen3: C 0, C 1			
2	BP1: SAS			C 0		
3	BP1:NVMe 0–1	PCIe 1, PCIe 2				
	BP1: NVMe 2–3	PCIe 3				
	BP1: NVMe 4–5	PCIe 7				
	BP1: NVMe 6–7	PCIe 8				
	BP1: SAS				Gen 4: C 0 Gen3: C 0, C 1	
4	BP1: SAS					C 0

Con- fig.	Front BP	System board	Storage controller	
			CFF 16i RAID/HBA	CFF 16i RAID (Tri-Mode)
5	BP1:NVMe 0-1	PCIe 1, PCIe 2		
	BP1: NVMe 2-3	PCIe 3		
	BP1: NVMe 4-5	PCIe 7		
	BP1: NVMe 6-7	PCIe 8		
	BP1: SAS		C 0, C 1	
		PCIe 6	MB	
6	BP1: SAS			C 0, C 1
		PCIe 6		MB

Example

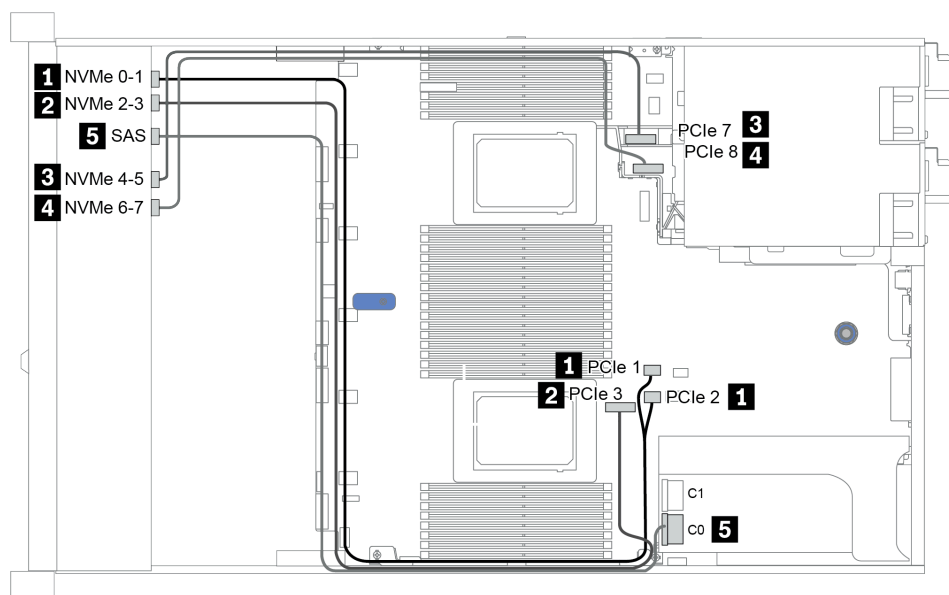


Figure 27. Configuration 3

8 x 2.5-inch front drive bays (NVMe)

This section provides cable routing information for the server model with eight 2.5-inch front drive bays.

Note: The AnyBay backplane (BP 1) is used as a pure NVMe backplane.

Configuration	Storage controller	
	Qty.	Type
Config. 1		
Config. 2	1	NVMe retimer

Configuration 1 – 2:

BP1: 8 x 2.5" NVMe BP

Config.	Front BP	System board	Storage controller
			NVMe retimer
1	BP1: NVMe 0–1	PCIe 1, PCIe 2	
	BP1: NVMe 2–3	PCIe 3	
	BP1: NVMe 4–5	PCIe 7	
	BP1: NVMe 6–7	PCIe 8	
2	BP1: NVMe 0–1	PCIe 1, PCIe 2	
	BP1: NVMe 2–3	PCIe 3	
	BP 1: NVMe 4–5, NVMe 6–7		C0, C1

Example

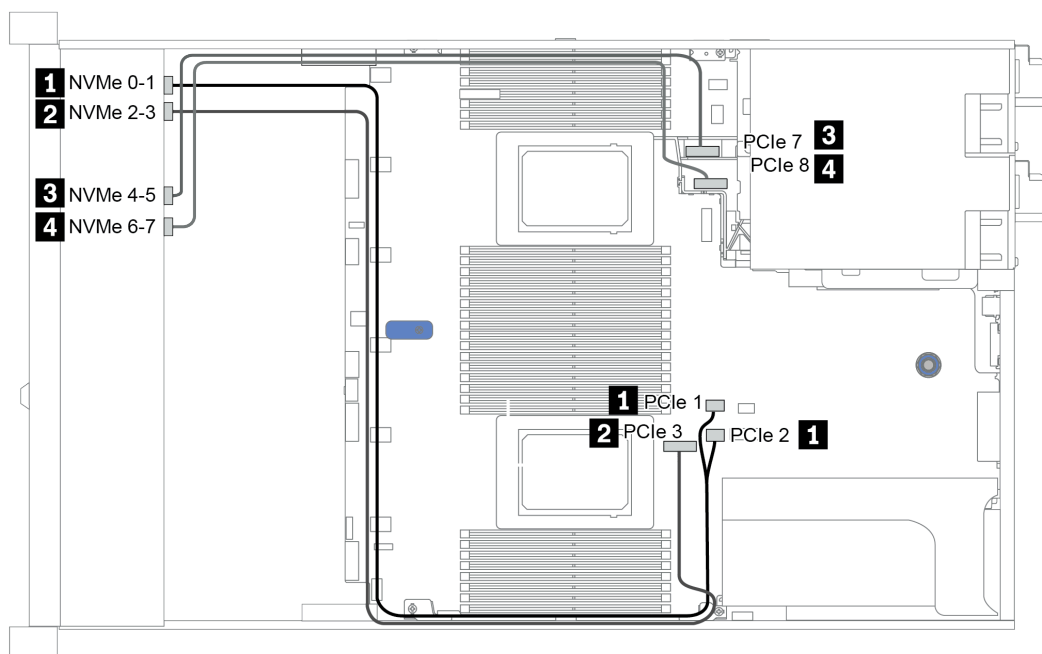


Figure 28. Configuration 2

16 x 2.5-inch front drive bays (SAS/SATA)

This section provides cable routing information for the server model with 16 x 2.5-inch SAS/SATA front drive bays.

Configuration	Storage controller	
	Qty.	Type
Config. 1		
Config. 2	2	SFF 8i RAID/HBA
Config. 3	1	SFF 16i RAID/HBA
Config. 4	1	CFF 16i RAID/HBA

Configuration 1 – 4:

BP 1 + BP 2: 16 x 2.5" SAS/SATA

Con- fig.	Front BP	System board	Storage controller		
			SFF 8i RAID/HBA	SFF 16i RAID/HBA	CFF 16i RAID/HBA
1	BP 1: SAS	PCle 1, PCle 2			
	BP 2: SAS	PCle 4, PCle 5			
2	BP 1: SAS		Gen 4: C 0 Gen3: C 0, C 1		
	BP 2: SAS		Gen 4: C 0 Gen3: C 0, C 1		
3	BP 1: SAS,			Gen 4: C 0 Gen3: C 0, C 1	
	BP 2: SAS			Gen 4: C 1 Gen3: C 2, C 3	
4	BP 1: SAS				C 0, C1
	BP 2: SAS				C 2, C3
		<ul style="list-style-type: none"> When two processors installed: PCle 6 When one processor installed: PCle 3 			MB

Example

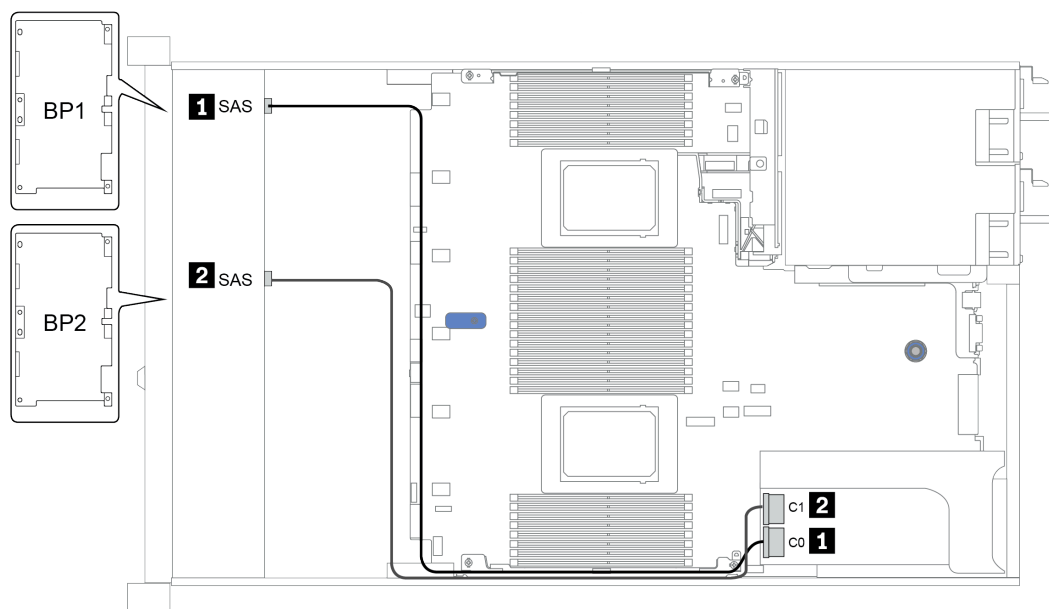


Figure 29. Configuration 3

16 x 2.5-inch front drive bays (NVMe)

This section provides cable routing information for the server model with 16 x 2.5-inch NVMe front drive bays.

Note: The two AnyBay backplanes are used as two pure NVMe backplanes.

Configuration	Storage controller	
	Qty.	Type
Config. 1	1	NVMe switch
Config. 2	1	NVMe retimer

Configuration 1 – 2:

BP 1 + BP 2: 2 x 8 x 2.5" NVMe

Config.	Front BP	System board	Storage controller
			NVMe switch/retimer
1/2	BP 1: NVMe 0–1	PCIe 1, PCIe 2	
	BP 1: NVMe 2–3	PCIe 3	
	BP 1: NVMe 4–5, NVMe 6–7		C 0, C1
	BP 2: NVMe 0–1	PCIe 4, PCIe 5	
	BP 2: NVMe 2–3	PCIe 6	
	BP 2: NVMe 4–5	PCIe 7	
	BP 2: NVMe 6–7	PCIe 8	

Example

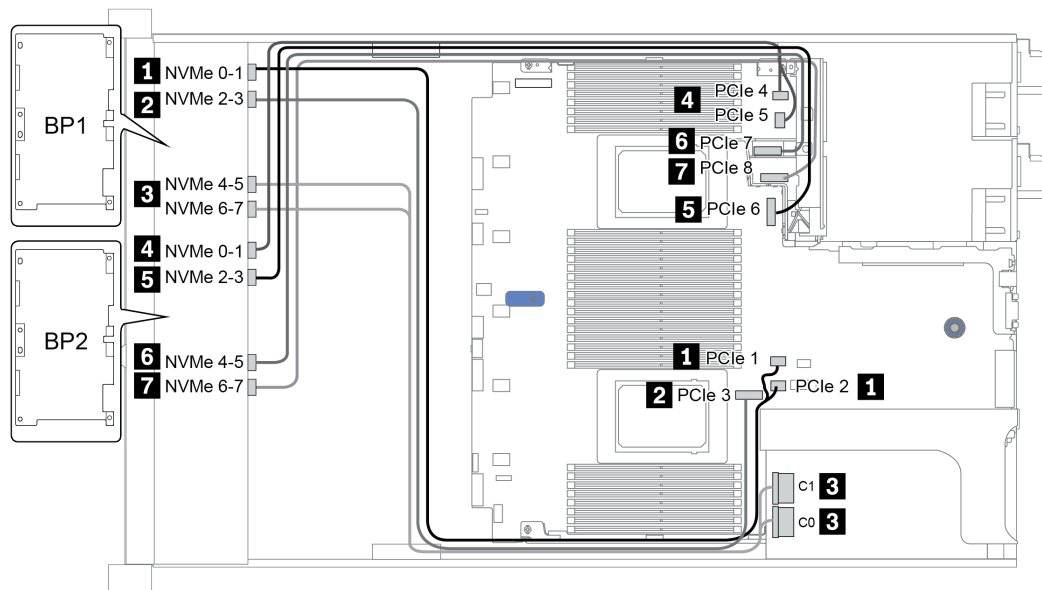


Figure 30. Configuration 1

16 x 2.5-inch front drive bays (AnyBay)

This section provides cable routing information for the server model with 16 x 2.5-inch AnyBay front drive bays.

Configuration	Storage controller	
	Qty.	Type
Config. 1	2	SFF 8i RAID (Tri-Mode)
Config. 2	1	SFF 16i RAID (Tri-Mode)
Config. 3	1	CFF 16i RAID (Tri-Mode)

Configuration 1 – 3:

BP 1 + BP 2: 2 x 8 x 2.5" AnyBay

Config.	Front BP	System board	Storage controller		
			SFF 8i RAID (Tri-Mode)	SFF 16i RAID (Tri-Mode)	CFF 16i RAID (Tri-Mode)
1	BP 1: SAS		C 0		
	BP 2: SAS		C 0		
2	BP 1: SAS			C 0	
	BP 2: SAS			C 1	
3	BP 1: SAS				C 0
	BP 2: SAS				C 1
		PCIe 6			MB

Example

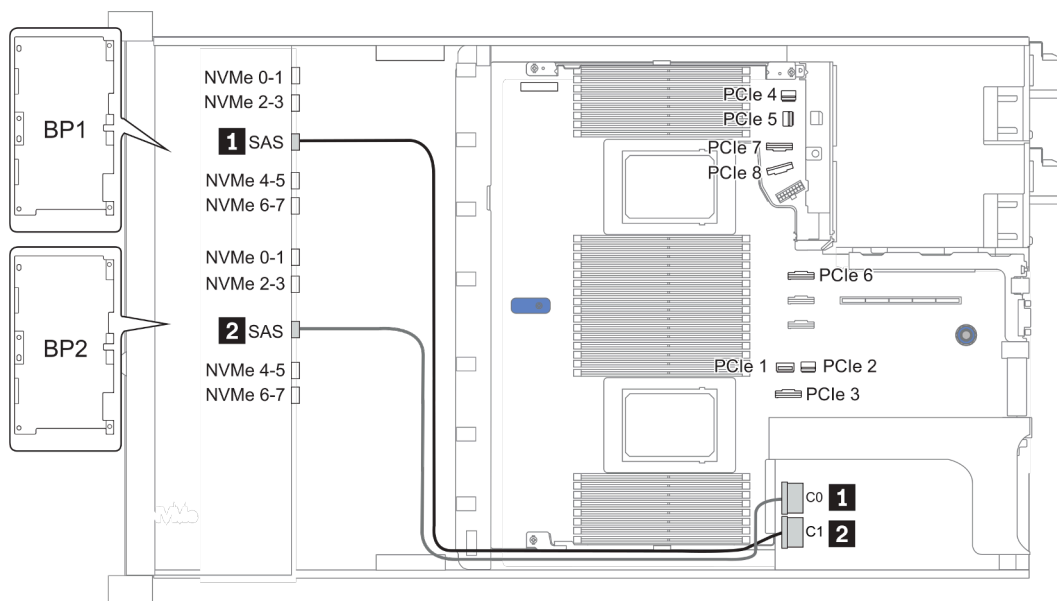


Figure 31. Configuration 2

16 x 2.5-inch front drive bays (8SAS+8AnyBay)

This section provides cable routing information for the server model with 16 x 2.5-inch front drive bays (8SAS+8AnyBay).

Configuration	Storage controller	
	Qty.	Type
Config. 1	2	SFF 8i RAID/HBA
Config. 2	1	SFF 16i RAID/HBA
Config. 3	1	CFF 16i RAID/HBA
Config. 4	1	SFF 32i RAID

Configuration 1 – 4:

BP 1 + BP 2: 8 x 2.5" SAS/SATA BP + 8 x 2.5" AnyBay BP

- SFF 8i RAID/HBA
- SFF 16i RAID/HBA

Config.	Front BP	System board	Storage controller	
			SFF 8i RAID/HBA	SFF 16i RAID/HBA
1	BP 1: SAS		Gen 4: C 0 Gen3: C 0, C 1	
	BP 2: SAS		Gen 4: C 0 Gen3: C 0, C 1	
	BP 2: NVMe 0–1	PCIe 1, PCIe 2		
	BP 2: NVMe 2–3	PCIe 3		
	BP 2: NVMe 4–5	PCIe 7		
	BP 2: NVMe 6–7	PCIe 8		
2	BP 1: SAS			Gen 4: C 0 Gen3: C 0, C 1
	BP 2: SAS			Gen 4: C 1 Gen3: C 2, C 3
	BP 2: NVMe 0–1	PCIe 1, PCIe 2		
	BP 2: NVMe 2–3	PCIe 3		
	BP 2: NVMe 4–5	PCIe 7		
	BP 2: NVMe 6–7	PCIe 8		

BP 1 + BP 2: 8 x 2.5" SAS/SATA BP + 8 x 2.5" AnyBay BP

- CFF 16i RAID/HBA
- SFF 32i RAID/HBA

Con- fig.	Front BP	System board	Storage controller	
			CFF 16i RAID/HBA	SFF 32i RAID/HBA
3	BP 1: SAS		C 0, C 1	
	BP 2: SAS		C 2, C 3	
	BP 2: NVMe 0–1	PCIe 1, PCIe 2		
	BP 2: NVMe 2–3	PCIe 3		
	BP 2: NVMe 4–5	PCIe 7		
	BP 2: NVMe 6–7	PCIe 8		
4	BP 1: SAS			C 0
	BP 2: SAS			C 1
	BP 2: NVMe 0–1	PCIe 1, PCIe 2		
	BP 2: NVMe 2–3	PCIe 3		
	BP 2: NVMe 4–5	PCIe 7		
	BP 2: NVMe 6–7	PCIe 8		

Example

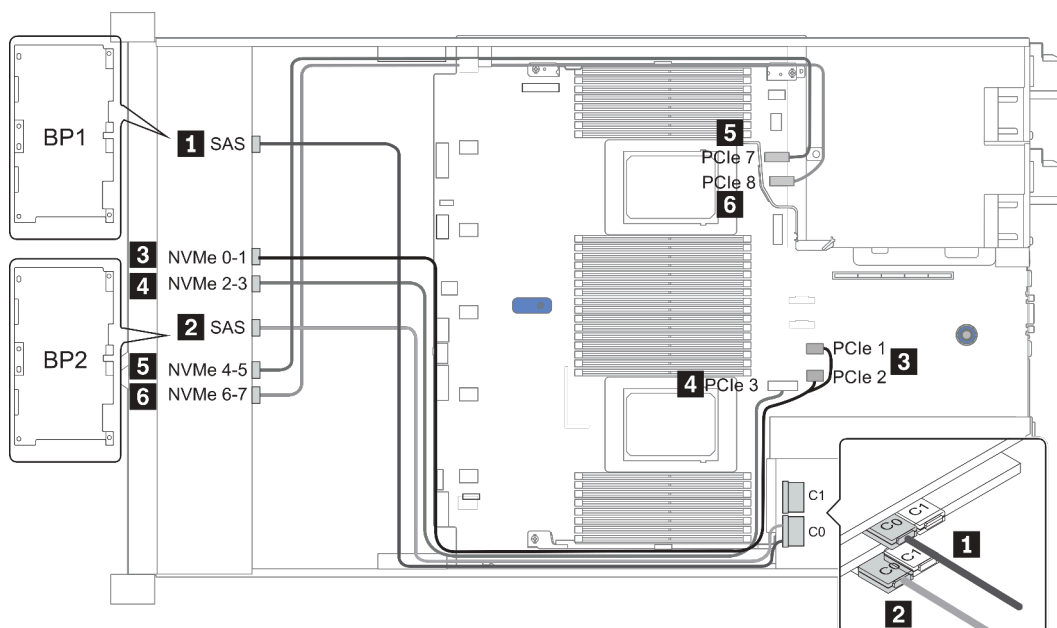


Figure 32. Configuration 1

16 x 2.5-inch front drive bays (8SAS/SATA+8NVMe)

This section provides cable routing information for the server model with 16 x 2.5-inch front drive bays (8SAS/SATA+8NVMe).

Note: The AnyBay backplane (BP2) is used as pure NVMe backplane.

Configuration	Storage controller	
	Qty.	Type
Config. 1		
Config. 2	2	SFF 8i RAID/HBA
Config. 3	1	SFF 16i RAID/HBA
Config. 4	1	CFF 16i RAID/HBA

Configuration 1 – 4:

BP 1 + BP 2: 8 x 2.5" SAS/SATA BP + 8 x 2.5" NVMe BP

Con- fig.	Front BP	System board	Storage controller		
			SFF 8i RAID/HBA	SFF 16i RAID/ HBA	CFF 16i RAID/ HBA
1	BP 1: SAS	PCle 4, PCle 5			
	BP 2: NVMe 0–1	PCle 1, PCle 2			
	BP 2: NVMe 2–3	PCle 3			
	BP 2: NVMe 4–5	PCle 7			
	BP 2: NVMe 6–7	PCle 8			
2	BP 1: SAS		Gen 4: C 0 Gen3: C 0, C 1		
	BP 2: NVMe 0–1	PCle 1, PCle 2			
	BP 2: NVMe 2–3	PCle 3			
	BP 2: NVMe 4–5	PCle 7			
	BP 2: NVMe 6–7	PCle 8			
3	BP 1: SAS			Gen 4: C 0 Gen3: C 0, C 1	
	BP 2: NVMe 0–1	PCle 1, PCle 2			
	BP 2: NVMe 2–3	PCle 3			
	BP 2: NVMe 4–5	PCle 7			
	BP 2: NVMe 6–7	PCle 8			
4	BP 1: SAS				C 0, C 1
		PCle 6			MB
	BP 2: NVMe 0–1	PCle 1, PCle 2			
	BP 2: NVMe 2–3	PCle 3			

16 x 2.5-inch front drive bays (8AnyBay+8NVMe)

This section provides cable routing information for the server model with 16 x 2.5-inch front drive bays (8AnyBay+8NVMe).

Note: The AnyBay backplane (BP2) is used as pure NVMe backplane.

Configuration	Storage controller	
	Qty.	Type
Config. 1	2	NVMe switch +SFF 8i RAID/HBA
Config. 3	2	NVMe switch +SFF 16i RAID/HBA

Configuration 1 – 2:

BP 1 + BP 2: 8 x 2.5" AnyBay BP + 8 x 2.5" NVMe BP

Con- fig.	Front BP	System board	Storage controller		
			NVMe switch	SFF 8i RAID/HBA	SFF 16i RAID/ HBA
1	BP 1: NVMe 0–1	PCle 1, PCle 2			
	BP 1: NVMe 2–3	PCle 3			
	BP 1: NVMe 4–5, NVMe 6–7		C 0, C 1		
	BP 1: SAS			Gen 4: C 0 Gen3: C 0, C 1	
	BP 2: NVMe 0–1	PCle 4, PCle 5			
	BP 2: NVMe 2–3	PCle 6			
	BP 2: NVMe 4–5	PCle 7			
	BP 2: NVMe 6–7	PCle 8			
2	BP 1: NVMe 0–1	PCle 1, PCle 2			
	BP 1: NVMe 2–3	PCle 3			
	BP 1: NVMe 4–5, NVMe 6–7		C 0, C 1		
	BP 1: SAS				Gen 4: C 0 Gen3: C 0, C 1
	BP 2: NVMe 0–1	PCle 4, PCle 5			
	BP 2: NVMe 2–3	PCle 6			
	BP 2: NVMe 4–5	PCle 7			
	BP 2: NVMe 6–7	PCle 8			

Example

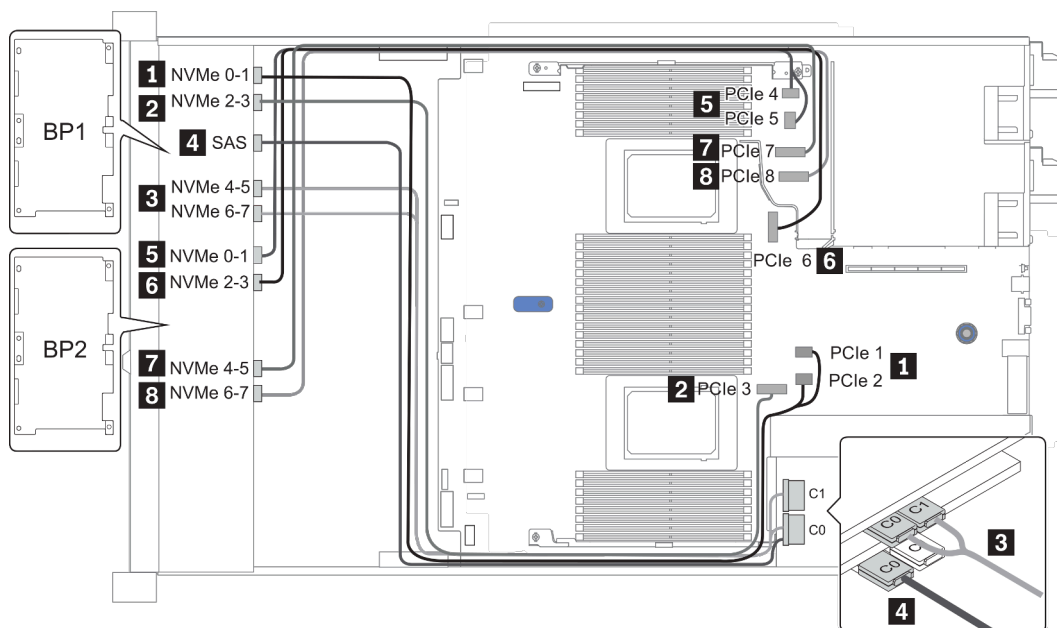


Figure 34. Configuration 2

24 x 2.5-inch front drive bays (8SAS/SATA+16NVMe)

This section provides cable routing information for the server model with 24 x 2.5-inch front drive bays (8SAS/SATA+16NVMe).

Note: The AnyBay backplanes (BP2 and BP3) are used as pure NVMe backplanes.

Configuration	Storage controller	
	Qty.	Type
Config. 1	2	NVMe switch +SFF 8i RAID/HBA
Config. 2	2	NVMe retimer +SFF 8i RAID/HBA
Config. 3	2	NVMe switch +SFF 16i RAID/HBA
Config. 4	2	NVMe retimer +SFF 16i RAID/HBA

Configuration 1 – 4:

BP 1 + BP 2 + BP 3: 8 x 2.5" SAS/SATA backplane + 2 x 8 x 2.5" NVMe BP

Co- nfig.	Front BP	System board	Storage controller		
			NVMe switch/ retimer	SFF 8i RAID/HBA	SFF 16i RAID/ HBA
1/2	BP 1: SAS			Gen 4: C 0 Gen3: C 0, C 1	
	BP 2: NVMe 0–1	PCle 1, PCle 2			
	BP 2: NVMe 2–3	PCle 3			
	BP 2: NVMe 4–5, NVMe 6–7		C 0, C 1		
	BP3: NVMe 0–1	PCle 4, PCle 5			
	BP3: NVMe 2–3	PCle 6			
	BP3: NVMe 4–5	PCle 7			
	BP3: NVMe 6–7	PCle 8			
3/4	BP 1: SAS				Gen 4: C 0 Gen3: C 0, C 1
	BP 2: NVMe 0–1	PCle 1, PCle 2			
	BP 2: NVMe 2–3	PCle 3			
	BP 2: NVMe 4–5, NVMe 6–7		C 0, C 1		
	BP3: NVMe 0–1	PCle 4, PCle 5			
	BP3: NVMe 2–3	PCle 6			
	BP3: NVMe 4–5	PCle 7			
	BP3: NVMe 6–7	PCle 8			

Example

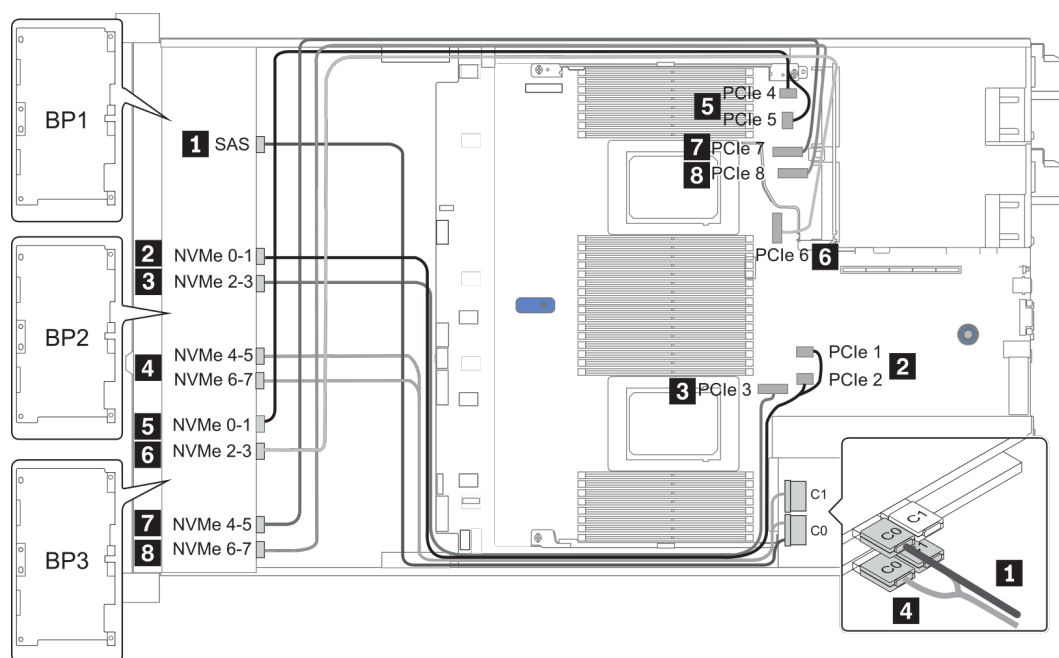


Figure 35. Configuration 3

24 x 2.5-inch front drive bays (16SAS/SATA+8AnyBay)

This section provides cable routing information for the server model with 24 x 2.5-inch front drive bays (16SAS/SATA+8AnyBay).

Configuration	Rear BP		Storage controller	
	Qty.	Type	Qty.	Type
Config. 1			2	CFF 16i RAID/HBA + CFF 48P RAID Expander
Config. 2			2	SFF 8i RAID/HBA +CFF 48P RAID Expander
Config. 3			3	SFF 8i RAID/HBA
Config. 4			1	SFF 32i RAID
Config. 5	1	Rear: 4 x 2.5" SAS/SATA	2	CFF 16i RAID/HBA + CFF 48P RAID Expander
Config. 6	1	Rear: 4 x 2.5" SAS/SATA	2	SFF 8i RAID/HBA + CFF 48P RAID Expander
Config. 7	1	Rear: 4 x 2.5" SAS/SATA	3	SFF 8i RAID/HBA
Config. 8	1	Rear: 4 x 2.5" SAS/SATA	1	SFF 32i RAID

Depending on your server configurations, refer to one of the following sections for cable routing information.

- [Configuration 1 – 4: BP 1 + BP 2 + BP 3](#)
- [Configuration 5 – 8: BP 1 + BP 2 + BP 3 + BP 4](#)

Configuration 1 – 4:

BP 1 + BP 2 + BP 3: 8 x 2.5" SAS/SATA BP + 8 x 2.5" SAS/SATA BP + 8 x 2.5" AnyBay BP

Con- fig.	Front BP	System board	Storage controller		
			CFF 48P RAID Expander	CFF 16i RAID/HBA	SFF 8i RAID/HBA
1	BP 1: SAS		C 0		
	BP 2: SAS		C 1		
	BP 3: SAS		C 2		
			RAID/HBA	C 0, C 1	
		PCIe 6		MB	
	BP 3: NVMe 0–1	PCIe 1, PCIe 2			
	BP 3: NVMe 2–3	PCIe 3			
	BP 3: NVMe 4–5	PCIe 7			
	BP3: NVMe 6–7	PCIe 8			
2	BP 1: SAS		C 0		
	BP 2: SAS		C 1		
	BP 3: SAS		C 2		
			RAID/HBA		Gen 4: C 0 Gen3: C 0, C 1
	BP 3: NVMe 0–1	PCIe 1, PCIe 2			
	BP 3: NVMe 2–3	PCIe 3			
	BP 3: NVMe 4–5	PCIe 7			
	BP3: NVMe 6–7	PCIe 8			

Configuration 5 – 8:

BP 1 + BP 2 + BP 3: 8 x 2.5" SAS/SATA BP + 8 x 2.5" SAS/SATA BP + 8 x 2.5" AnyBay BP

BP 4: 4 x 2.5" SAS/SATA BP

Co- nfi- g.	Front BP	Rear BP	System board	Storage controller		
				CFF 48P RAID Expander	CFF 16i RAID/HBA	SFF 8i RAID/HBA
5	BP 1: SAS			C 0		
	BP 2: SAS			C 1		
	BP 3: SAS			C 2		
				RAID/HBA	C 0/C 2, C 1/C 3	
			PCle 6		MB	
		BP 4: SAS		C 3		
	BP 3: NVMe 0–1		PCle 1, PCle 2			
	BP 3: NVMe 2–3		PCle 3			
	BP 3: NVMe 4–5		PCle 7			
	BP3: NVMe 6–7		PCle 8			
6	BP 1: SAS			C 0		
	BP 2: SAS			C 1		
	BP 3: SAS			C 2		
		BP 4: SAS		C 3		
				RAID/HBA		Gen 4: C 0 Gen3: C 0, C 1
	BP 3: NVMe 0–1		PCle 1, PCle 2			
	BP 3: NVMe 2–3		PCle 3			
	BP 3: NVMe 4–5		PCle 7			
	BP3: NVMe 6–7		PCle 8			

Co- nfi- g.	Front BP	Rear BP	System board	Storage controller	
				SFF 8i RAID/HBA	SFF 32i RAID
7	BP 1: SAS			Slot 2: Gen 4: C 0/C 1 Gen3: C 0	
	BP 2: SAS			Slot 3: Gen 4: C 0/C 1 Gen3: C 0	
	BP 3: SAS			Slot 4: Gen 4: C 0/C 2 Gen3: C 0/C 1	
		BP 4: SAS		Slot 5: C 0	
	BP 3: NVMe 0–1		PCle 1, PCle 2		
	BP 3: NVMe 2–3		PCle 3		
	BP 3: NVMe 4–5		PCle 7		
	BP3: NVMe 6–7		PCle 8		
8	BP 1: SAS				C 0
	BP 2: SAS				C 1
	BP 3: SAS				C 2
		BP 4: SAS			C 3
	BP 3: NVMe 0–1		PCle 1, PCle 2		
	BP 3: NVMe 2–3		PCle 3		
	BP 3: NVMe 4–5		PCle 7		
	BP3: NVMe 6–7		PCle 8		

Example

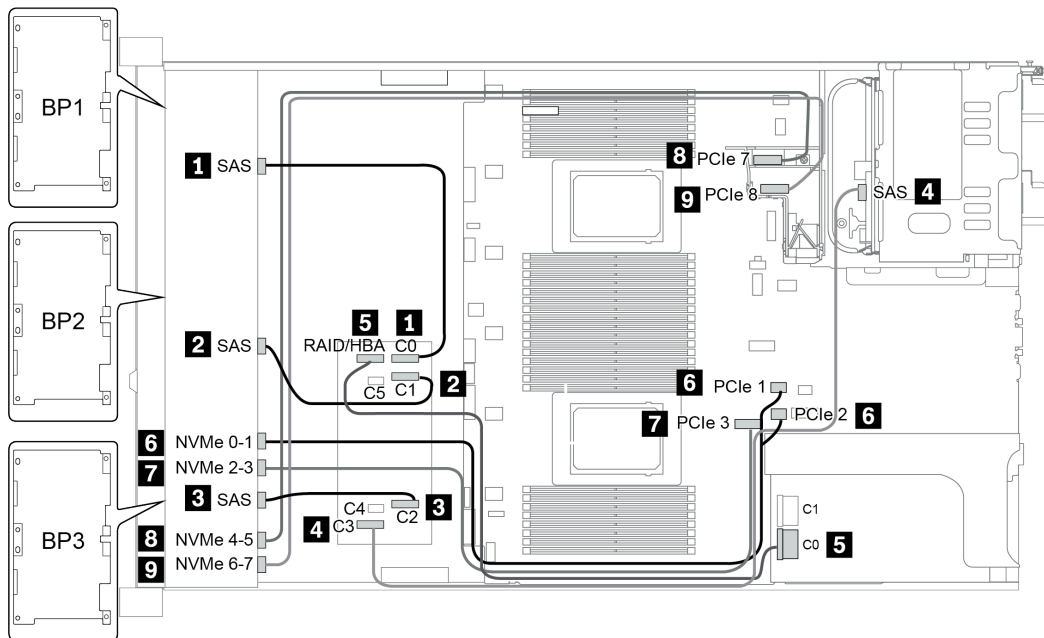


Figure 37. Configuration 5

24 x 2.5-inch front drive bays (16SAS/SATA+8NVMe)

This section provides cable routing information for the server model with 24 x 2.5-inch front drive bays (16SAS/SATA+8NVMe).

Note: The AnyBay backplane (BP3) is used as a pure NVMe backplane.

Configuration	Storage controller	
	Qty.	Type
Config. 1	2	SFF 8i RAID/HBA
Config. 2	1	SFF 16i RAID/HBA
Config. 3	1	CFF 16i RAID/HBA
Config. 4	1	SFF 32i RAID

Configuration 1 – 4:

BP 1 + BP 2 + BP 3: 8 x 2.5" SAS/SATA BP + 8 x 2.5" SAS/SATA BP + 8 x 2.5" pure NVMe BP

- SFF 8i RAID/HBA
- SFF 16i RAID/HBA

Co-nfig.	Front BP	System board	Storage controller	
			SFF 8i RAID/HBA	SFF 16i RAID/HBA
1	BP 1: SAS		Gen 4: C 0 Gen 3: C 0, C 1	
	BP 2: SAS		Gen 4: C 0 Gen3: C 0, C 1	
	BP 3: NVMe 0–1	PCle 1, PCle 2		
	BP 3: NVMe 2–3	PCle 3		
	BP 3: NVMe 4–5	PCle 7		
	BP3: NVMe 6–7	PCle 8		
2	BP 1: SAS			Gen 4: C 0 Gen3: C 0, C 1
	BP 2: SAS			Gen 4: C 1 Gen3: C 2, C 3
	BP 3: NVMe 0–1	PCle 1, PCle 2		
	BP 3: NVMe 2–3	PCle 3		
	BP 3: NVMe 4–5	PCle 7		
	BP3: NVMe 6–7	PCle 8		

- CFF 16i RAID/HBA
- SFF 32i RAID/HBA

Co-nfi-g.	Front BP	System board	Storage controller	
			CFF 16i RAID/HBA	SFF 32i RAID/HBA
3	BP 1/BP 2: SAS		C 0/C 2, C 1/C 3	
		PCle 6	MB	
	BP 3: NVMe 0–1	PCle 1, PCle 2		
	BP 3: NVMe 2–3	PCle 3		
	BP 3: NVMe 4–5	PCle 7		
	BP3: NVMe 6–7	PCle 8		
4	BP 1: SAS			C 0
	BP 2: SAS			C 1
	BP 3: NVMe 0–1	PCle 1, PCle 2		
	BP 3: NVMe 2–3	PCle 3		
	BP 3: NVMe 4–5	PCle 7		

	BP3: NVMe 6–7	PCIe 8		
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Example

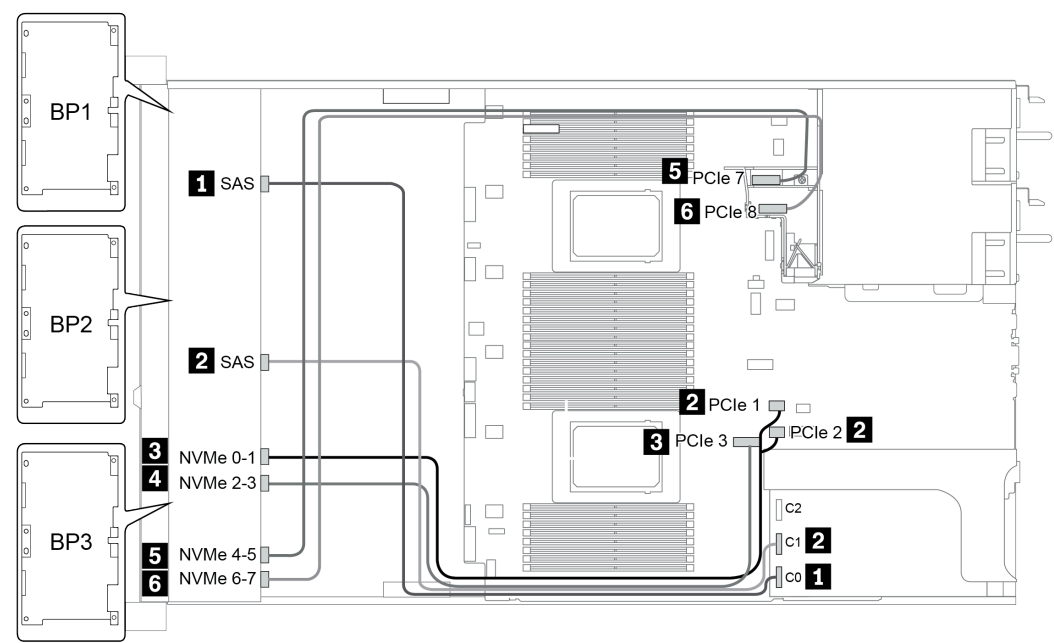


Figure 38. Configuration 4

24 x 2.5-inch front drive bays (SAS/SATA)

This section provides cable routing information for the server model with 24 x 2.5-inch front drive bays (SAS/SATA).

Configuration	Mid or Rear BP		Storage controller	
	Qty.	Type	Qty.	Type
Config. 1			2	CFF 8i/16i RAID/HBA + CFF 48P RAID Expander
Config. 2			2	SFF 8i RAID/HBA + CFF 48P RAID Expander
Config. 3			3	SFF 8i RAID/HBA
Config. 4			1	SFF 32i RAID
Config. 5	1	Rear: 4 x 2.5" SAS/SATA	2	CFF 8i/16i RAID/HBA + CFF 48P RAID Expander
Config. 6	1	Rear: 4 x 2.5" SAS/SATA	2	SFF 8i RAID/HBA + CFF 48P RAID Expander
Config. 7	1	Rear: 4 x 2.5" SAS/SATA	4	SFF 8i RAID/HBA
Config. 8	1	Rear: 4 x 2.5" SAS/SATA	1	SFF 32i RAID
Config. 9	3	Mid: 4 x 2.5" SAS/SATA Mid: 4 x 2.5" SAS/SATA Rear: 8 x 2.5" SAS/SATA	2	CFF 16i RAID/HBA + CFF 48P RAID Expander
Config. 10	3	Mid: 4 x 2.5" SAS/SATA Mid: 4 x 2.5" SAS/SATA Rear: 4 x 2.5" SAS/SATA	2	CFF 16i RAID/HBA + CFF 48P RAID Expander
Config. 11	3	Mid: 4 x 2.5" SAS/SATA Mid: 4 x 2.5" SAS/SATA Rear: 4 x 2.5" SAS/SATA	2	SFF 8i RAID/HBA + CFF 48P RAID Expander

Depending on your server configurations, refer to one of the following sections for cable routing information.

- [Configuration 1 – 4: BP 1 + BP 2 + BP 3](#)
- [Configuration 5 – 8: BP 1 + BP 2 + BP 3 + BP4](#)
- [Configuration 9 – 11: BP 1 + BP 2 + BP 3 + BP4 + BP5](#)

Configuration 1 – 4:

BP 1 + BP 2 + BP 3: 3 x 8 x 2.5-inch SAS/SATA BP

- CFF RAID expander + CFF 8i/16i RAID/HBA
- CFF RAID expander + SFF 8i RAID/HBA

Co-nfig.	Front BP	System board	Storage controller			
			CFF 48P RAID Expander	CFF 8i/16i RAID/HBA	SFF 8i RAID/HBA	SFF 32i RAID
1	BP 1: SAS		C 0			
	BP 2: SAS		C 1			
	BP 3: SAS		C 2			
			RAID/HBA	C 0, C 1		
		<ul style="list-style-type: none"> • When two processors installed: PCIe 6 • When one processor installed: PCIe 3 		MB		
2	BP 1: SAS		C 0			
	BP 2: SAS		C 1			
	BP 3: SAS		C 2			
			RAID/HBA		Gen 4: C 0 Gen 3: C 0/C 1	
3	BP 1: SAS				Gen 4: C 0 Gen 3: C 0/C 1	
	BP 2: SAS				Gen 4: C 0 Gen 3: C 0/C 1	
	BP 3: SAS				Gen 4: C 0/C 2 Gen 3: C 0/C 1	
4	BP 1: SAS					C 0
	BP 2: SAS					C 1
	BP 3: SAS					C 2

Example

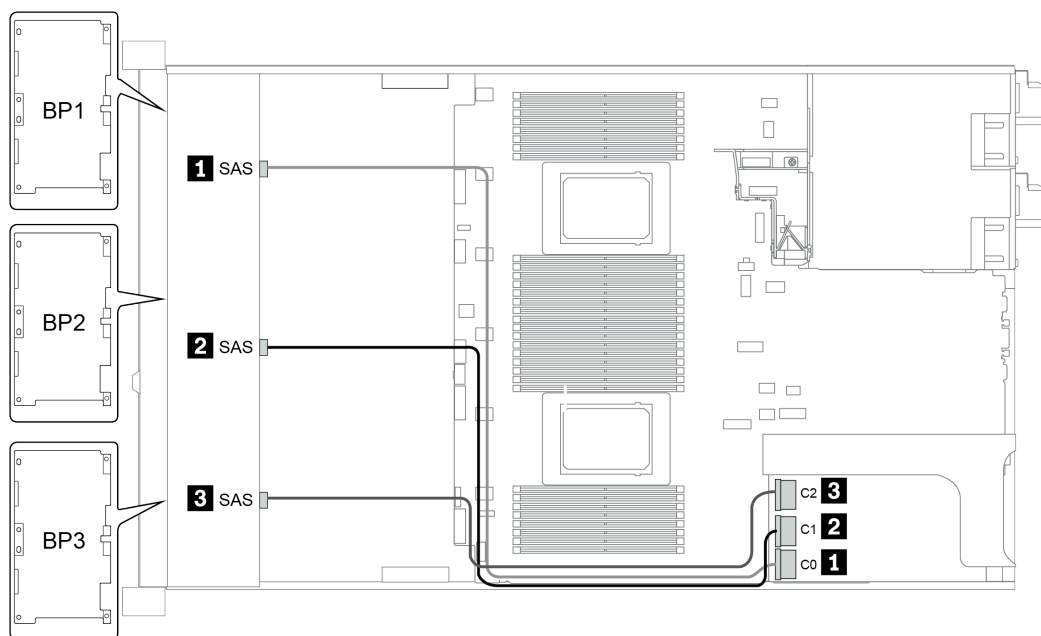


Figure 39. Configuration 4

Configuration 5 – 8:

BP 1 + BP 2 + BP 3: 3 x 8 x 2.5-inch SAS/SATA BP

BP4: 4 x 2.5" SAS/SATA BP

Co- nfi- g.	Front BP	Rear BP	System board	Storage controller		
				CFF 48P RAID Expander	CFF 8i/16i RAID/HBA	SFF 8i RAID/ HBA
5	BP 1: SAS			C 0		
	BP 2: SAS			C 1		
	BP 3: SAS			C 2		
		BP 4: SAS		C 3		
			<ul style="list-style-type: none"> When two processors installed: PCIe 6 When one processor installed: PCIe 3 		MB	
				RAID/HBA	C 0, C 1	
6	BP 1: SAS			C 0		
	BP 2: SAS			C 1		
	BP 3: SAS			C 2		
		BP 4: SAS		C 3		
				RAID/HBA		Gen 4: C 0 Gen 3: C 0/C 1

Configura- tion option	Front BP	Rear BP	Storage controller	
			SFF 8i RAID/HBA	SFF 32i RAID
7	BP 1: SAS		Slot 2: Gen 4: C 0 Gen 3: C 0/C 1	
	BP 2: SAS		Slot 3: Gen 4: C 0 Gen 3: C 0/C 1	
	BP 3: SAS		Slot 5: Gen 4: C 0/C 2 Gen 3: C 0/C 1	

		BP 4: SAS	Slot 6: Gen 4: C 0 Gen 3: C 0/C 1	
8	BP 1: SAS			C 0
	BP 2: SAS			C 1
	BP 3: SAS			C 2
		BP 4: SAS		C 3

Example

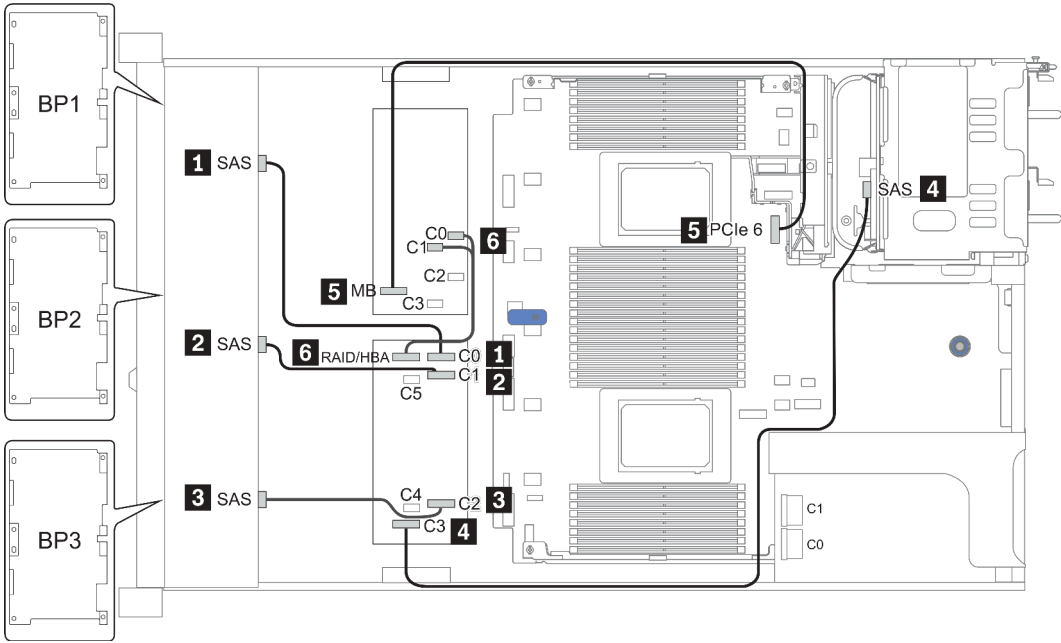


Figure 40. Configuration 5

Configuration 9 – 11:

BP 1 + BP 2 + BP 3: 3 x 8 x 2.5-inch SAS/SATA BP

BP 4: 8 x 2.5" SAS/SATA BP

BP 5 + BP 6: 2 x 4 x 2.5" SAS/SATA BP

Config.	Front BP	Mid/Rear BP	System board	Storage controller	
				CFF 48P RAID Expander	CFF 16i RAID/HBA
9	BP 1: SAS			C 0	
	BP 2: SAS			C 1	
	BP 3: SAS			C 2	
		BP 4: SAS 0			C 2
		BP 4: SAS 1			C 3
		BP5: SAS, SAS		C 3	
			PCIe 6		MB
				RAID/HBA	C 0, C 1

Con- fig.	Front BP	Mid/Rear BP	Sys- tem board	Storage controller		
				CFF 48P RAID Expander	CFF 16i RAID/HBA	SFF 8i RAID/HBA
10	BP 1: SAS			C 0		
	BP 2: SAS			C 1		
	BP 3: SAS			C 2		
		BP 4: SAS, BP 5: SAS		C 3		
		BP 6: SAS		C 4		
				RAID/HBA	C 0, C 1	
			PCIe 6		MB	
11	BP 1: SAS			C 0		
	BP 2: SAS			C 1		
	BP 3: SAS			C 2		
		BP 4: SAS, BP 5: SAS		C 3		
		BP 6: SAS		C 4		
				RAID/HBA		Gen 4: C 0 Gen 3: C 0/C 1

Example

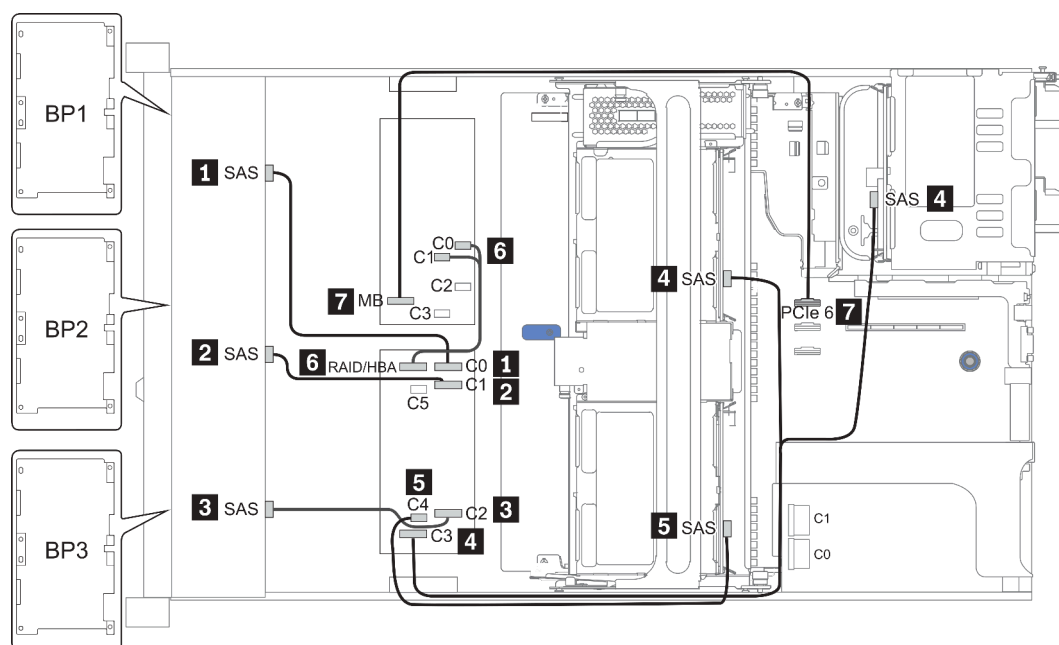


Figure 41. Configuration 10

24 x 2.5-inch front drive bays (NVMe)

This section provides cable routing information for the server model with 24 x 2.5-inch front drive bays (NVMe).

Note: The AnyBay backplanes are used as pure NVMe backplanes.

Configuration	Mid or Rear BP		Storage controller	
	Qty.	Type	Qty.	Type
Config. 1			3	NVMe switch
Config. 2			4	NVMe retimer
Config. 3	2	Mid: 4 x 2.5" NVMe	4	NVMe switch

Depending on your server configurations, refer to one of the following sections for cable routing information.

- [Configuration 1 – 2: BP 1 + BP 2 + BP 3](#)
- [Configuration 3: BP 1 + BP 2 + BP 3 +BP 5 + BP 6](#)

Configuration 1 – 2:

BP 1 + BP 2 + BP 3: 3 x 8 x 2.5-inch NVMe BP

Con-fig.	Front BP	System board	Storage controller	
			NVMe switch	NVMe retimer
1	BP1: NVMe 0–1		Slot 1 C 0, C 1, C3, C4	
	BP1: NVMe 2–3			
	BP1: NVMe 4–5			
	BP1: NVMe 6–7			
	BP2: NVMe 0–1		Slot 2 C 0, C 1, C3, C4	
	BP2: NVMe 2–3			
	BP2: NVMe 4–5			
	BP2: NVMe 6–7			
	BP3: NVMe 0–1		Slot 4 C 0, C 1, C3, C4	
	BP3: NVMe 2–3			
	BP3: NVMe 4–5			
	BP3: NVMe 6–7			
2	BP1: NVMe 0–1	PCIe 1, PCIe 2		
	BP1: NVMe 2–3	PCIe 3		
	BP1: NVMe 4–5, NVMe 6–7			Slot 1 C 0, C 1
	BP2: NVMe 0–1, NVMe 2–3			Slot 2 C 0, C 1
	BP2: NVMe 4–5, NVMe 6–7			Slot 5 C 0, C 1
	BP3: NVMe 0–1	PCIe 7		
	BP3: NVMe 2–3	PCIe 8		
	BP3: NVMe 4–5, NVMe 6–7			Slot 4 C 0, C 1

Example

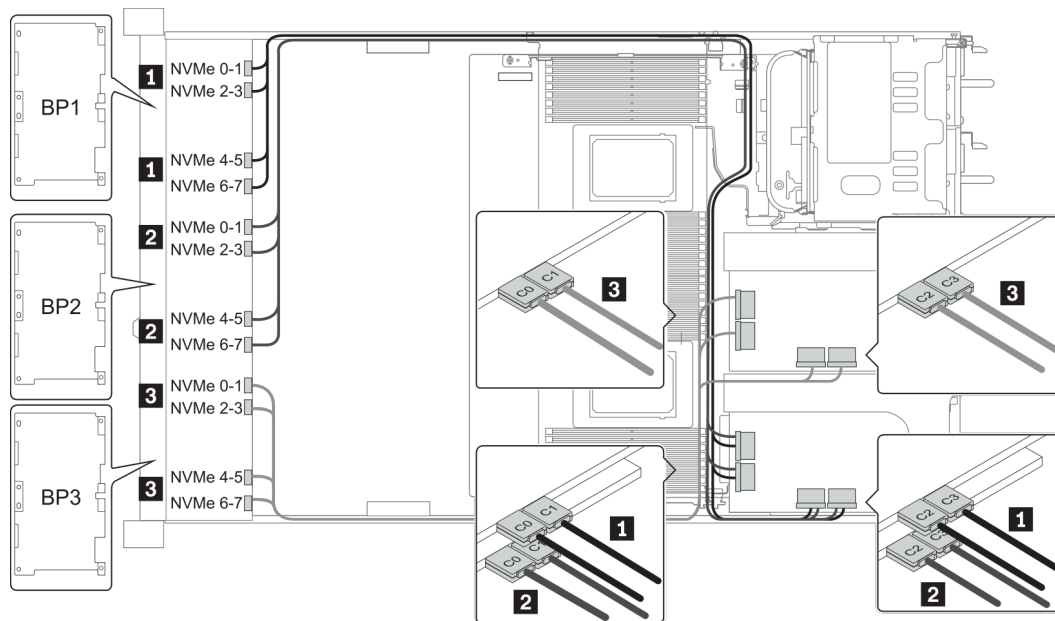


Figure 42. Configuration 1

Configuration 3:

BP 1 + BP 2 + BP 3: 3 x 8 x 2.5-inch NVMe BP

BP 5+BP 6: 2 x 4 x 2.5" NVMe BP

Co-nfig.	Front BP	Mid BP	Storage controller
			NVMe switch
3	BP 1: NVMe 0-1, NVMe 2-3 NVMe 4-5, NVMe 6-7		Slot 1 C 0, C 1, C 2, C 3
	BP 2: NVMe 0-1, NVMe 2-3 NVMe 4-5, NVMe 6-7		Slot 2 C 0, C 1, C 2, C 3
	BP 3: NVMe 0-1, NVMe 2-3 NVMe 4-5, NVMe 6-7		Slot 4 C 0, C 1, C 2, C 3
		BP 5: NVMe 0-1, NVMe 2-3 BP 6: NVMe 0-1, NVMe 2-3	Slot 5 C 0, C 1, C 2, C 3

Example

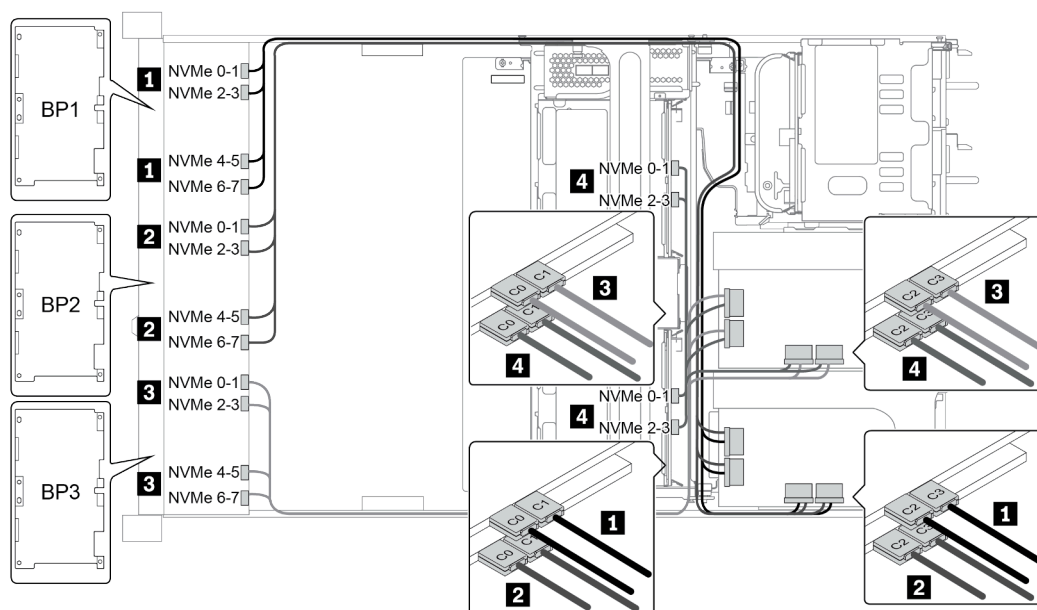


Figure 43. Configuration 3

8 x 3.5-inch front drive bays (SAS/SATA)

This section provides cable routing information for the server model with 8 x 2.5-inch SAS/SATA front drive bays.

Configuration	Storage controller	
	Qty.	Type
Config. 1		
Config. 2	1	SFF 8i RAID/HBA

Configuration 1 – 2:

BP1: 8 x 3.5-inch SAS/SATA BP

Con-fig.	Front BP	System board	Storage controller
			SFF 16i RAID/HBA
1	SAS 0	PCIe 1	
	SAS 1	PCIe 2	
2	SAS 0, SAS 1		Gen 4: C 0 Gen3: C 0, C 1

Example

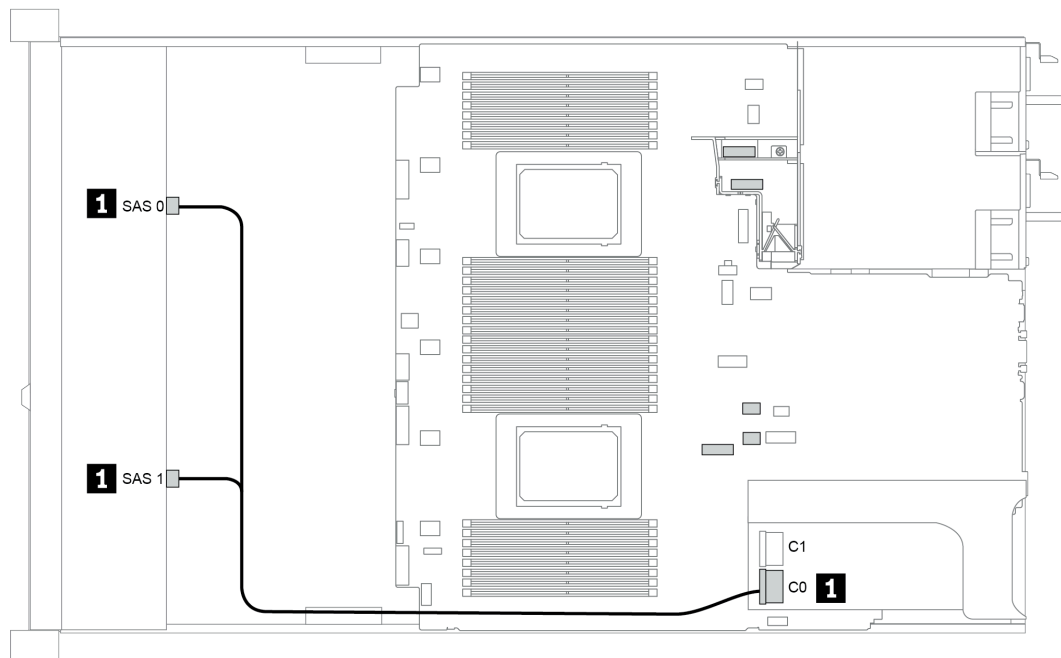


Figure 44. Configuration 2

12 x 3.5-inch front drive bays (SAS/SATA)

This section provides cable routing information for the server model with 12 x 3.5-inch SAS/SATA front drive bays.

Configuration	Mid/Rear BP		Storage controller	
	Qty.	Type	Qty.	Type
Config. 1				
Config. 2			1	SFF 16i RAID/HBA
Config. 3	2	Mid: 4 x 2.5" NVMe	1	SFF 16i RAID/HBA
Config. 4	1	Rear: 2 x 3.5" SAS/SATA	1	SFF 16i RAID/HBA
Config. 5	1	Rear: 2 x 3.5" SAS/SATA	2	SFF 8i HBA + SFF 16i RAID/HBA
Config. 6	1	Rear: 4 x 3.5" SAS/SATA	1	SFF 16i RAID/HBA
Config. 7	1	Rear: 4 x 3.5" SAS/SATA	2	SFF 8i HBA + SFF 16i RAID/HBA
Config. 8	1	Rear: 4 x 2.5" SAS/SATA	1	SFF 16i RAID/HBA
Config. 9	1	Rear: 4 x 2.5" SAS/SATA	2	SFF 8i HBA + SFF 16i RAID/HBA
Config. 10	2	Mid: 4 x 3.5" SAS/SATA Rear: 4 x 3.5" SAS/SATA	1	SFF 8i HBA
Config. 11	2	Mid: 4 x 3.5" SAS/SATA Rear: 4 x 3.5" SAS/SATA	1	SFF 32i RAID
Config. 12	2	Mid: 4 x 3.5" SAS/SATA Rear: 4 x 2.5" SAS/SATA	1	SFF 8i HBA
Config. 13	2	Mid: 4 x 3.5" SAS/SATA Rear: 4 x 2.5" SAS/SATA	1	SFF 32i RAID

Depending on your server configurations, refer to one of the following sections for cable routing information.

- [“Configuration 1 – 2: BP 1” on page 129](#)
- [“Configuration 3: BP 1 + BP 5” on page 130](#)
- [“Configuration 4 – 11: BP 1 + BP 4” on page 131](#)
- [“Configuration 12 – 13: BP1 + BP 4 + BP 5” on page 132](#)

Configuration 1 – 2:

BP 1: 12 x 3.5" SAS/SATA BP

Con-fig.	Front BP	System board	Storage controller	
			SFF 16i RAID/HBA	SFF 16i RAID (Tri-Mode)
1	SAS 0	PCle 1		
	SAS 1	PCle 2		
2	SAS 0, SAS 1		Gen 4: C 0 Gen3: C 0/ C 1	
	SAS 2		Gen 4: C 1 Gen3: C 2/ C 3	

Example

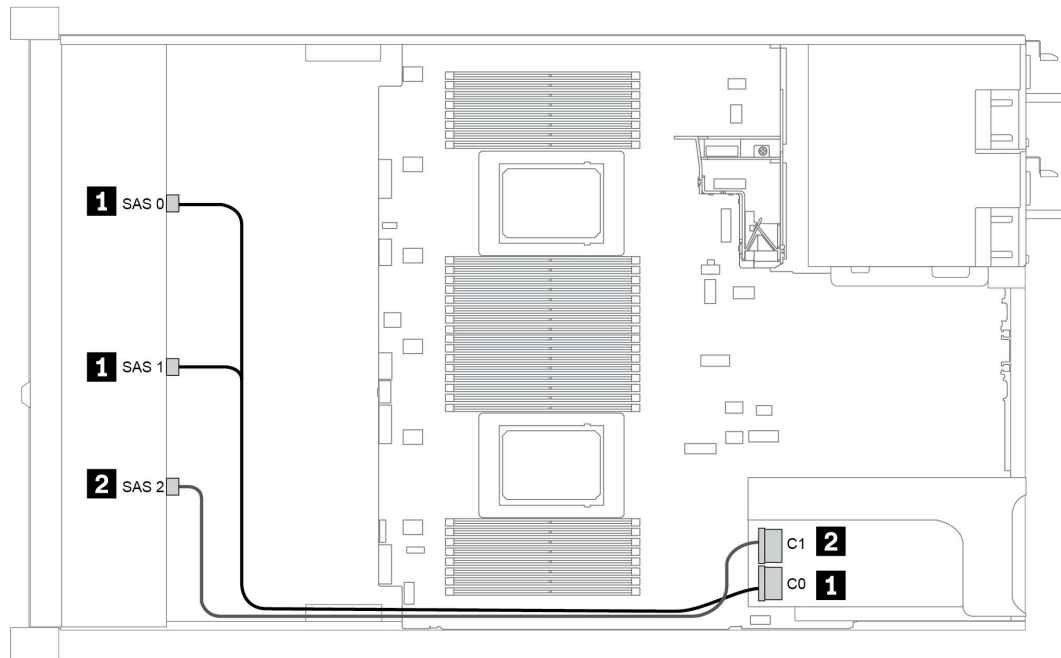


Figure 45. Configuration 2

Configuration 3:

BP 1: 12 x 3.5" SAS/SATA BP

BP 5 + BP 6: 2 x 4 x 2.5" NVMe BP

Con- fig.	Front BP	Mid BP	System board	Storage controller
				SFF 16i RAID/HBA
3	SAS 0, SAS 1			Gen 4: C 0 Gen3: C 0/ C 1
	SAS 2			C 1
		BP 5: NVMe 0-1	PCle 1, PCle 2	
		BP 5: NVMe 2-3	PCle 3	
		BP 6: NVMe 0-1	PCle 7	
		BP 6: NVMe 2-3	PCle 8	

Example

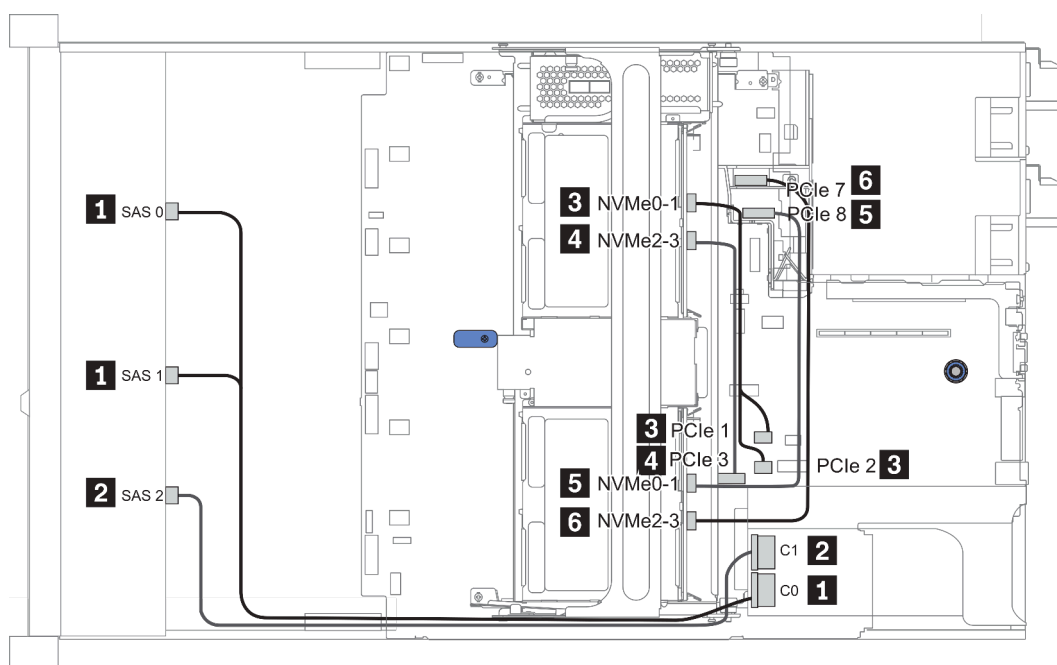


Figure 46. Configuration 3

Configuration 4 – 9:

BP 1: 12 x 3.5" SAS/SATA BP

BP 4: 4 x 2.5" SAS/SATA BP/ 2 x 3.5" SAS/SATA BP/ 4 x 3.5" SAS/SATA BP

Config.	Front BP	Rear BP	Storage controller	
			SFF 16i RAID/HBA	SFF 8i RAID
4/6/8	SAS 0, SAS 1		Gen 4: C 0 Gen3: C 0/C 1	
	SAS 2	BP 4: SAS	Gen 4: C 1 Gen3: C 2/C 3	
5/7/9	SAS 0, SAS 1		Gen 4: C 0 Gen3: C 0/C 1	
	SAS 2		Gen 4: C 1 Gen3: C 2	
		BP 4: SAS		Gen 4: C 0 Gen3: C 0

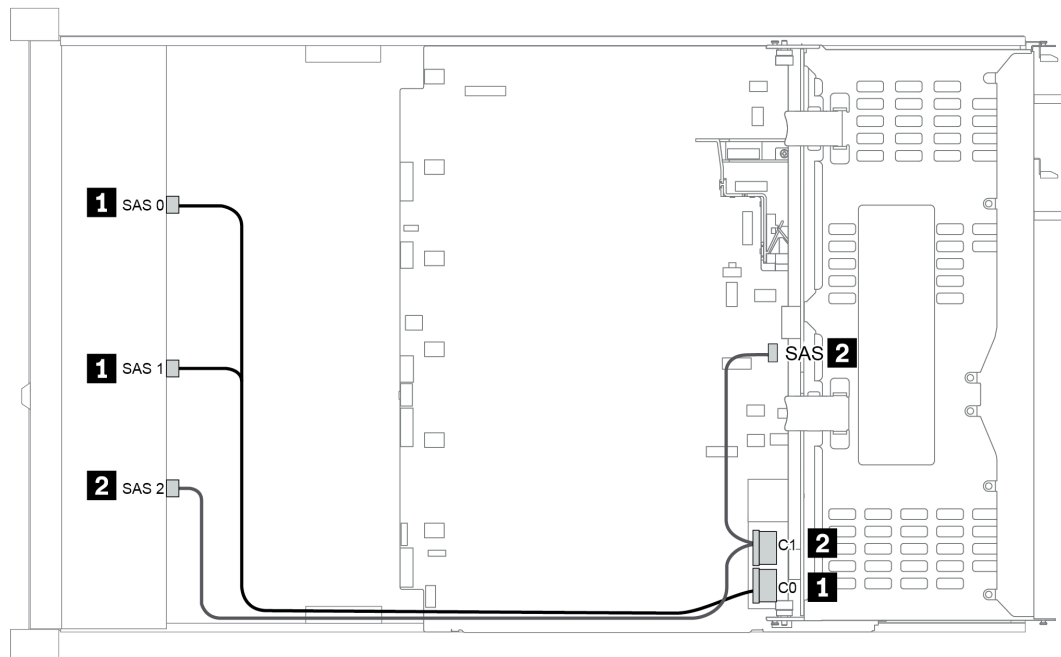
Example

Figure 47. Configuration 6

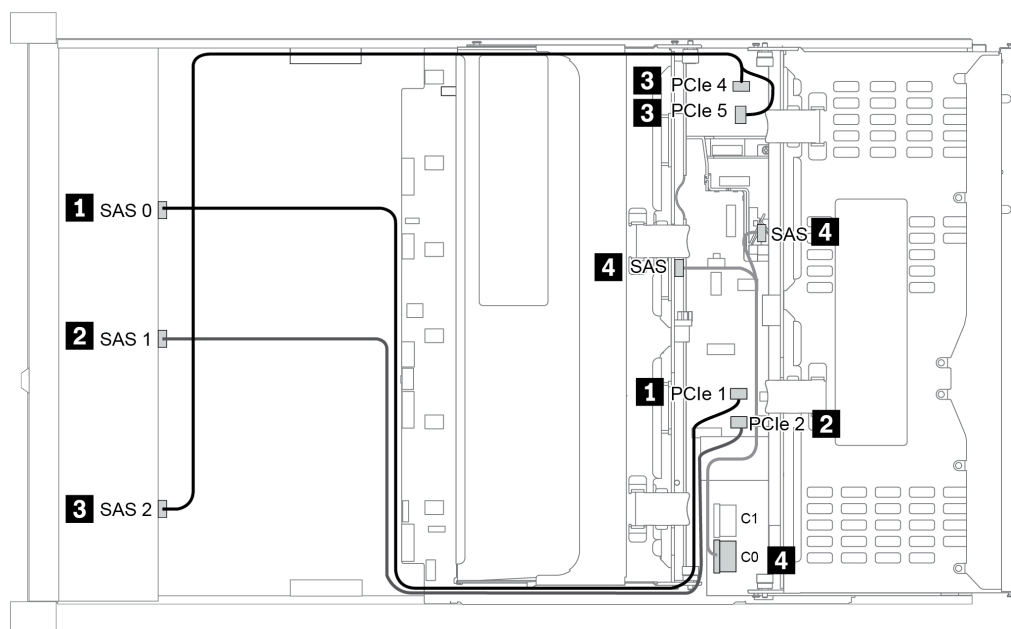
Configuration 10 – 13:

BP 1: 12 x 3.5" SAS/SATA BP

BP 4: 4 x 2.5" SAS/SATA BP/ 4 x 3.5" SAS/SATA BP

BP 5: 4 x 3.5" SAS/SATA BP

Co-nfig.	Front BP	Mid/Rear BP	System board	Storage controller	
				SFF 8i HBA	SFF 32i RAID
10/ 12	SAS 0		PCle 1		
	SAS 1		PCle 2		
	SAS 2		PCle 4, PCle 5		
		BP 4: SAS BP 5: SAS		Gen 4: C 0 Gen3: C 0/C 1	
11/ 13	SAS 0, SAS 1				C 0
	SAS 2	BP 4: SAS			C 1
		BP 5: SAS			C 2

Example*Figure 48. Configuration 10*

12 x 3.5-inch front drive bays (AnyBay)

This section provides cable routing information for the server model with 12 x 3.5-inch AnyBay front drive bays.

Configuration	Mid/Rear BP		Storage controller	
	Qty.	Type	Qty.	Type
Config. 1			1	SFF 16i RAID/HBA
Config. 2			1	SFF 16i RAID (Tri-Mode)
Config. 3	1	Rear: 4 x 3.5" SAS/SATA	1	SFF 16i RAID/HBA
Config. 4	1	Rear: 4 x 3.5" SAS/SATA	2	SFF 8i HBA + SFF 16i RAID/HBA
Config. 5	2	Mid: 4 x 3.5" SAS/SATA Rear: 4 x 3.5" SAS/SATA	1	SFF 32i RAID

Depending on your server configurations, refer to one of the following sections for cable routing information.

- [“Configuration 1 – 2: BP 1” on page 134](#)
- [“Configuration 3 – 4: BP 1 + BP 4” on page 135](#)
- [“Configuration 5: BP 1 + BP 4 + BP 5” on page 136](#)

Configuration 1 – 2:

BP 1: 12 x 3.5" AnyBay BP

Con- fig.	Front BP	System board	Storage controller
			SFF 16i RAID/HBA
1	NVMe 0–1	PCIe 1, PCIe 2	
	NVMe 2–3	PCIe 3	
	NVMe 4–5	PCIe 4, PCIe 5	
	NVMe 6–7	PCIe 6	
	NVMe 8–9	PCIe 7	
	NVMe 10–11	PCIe 8	
	SAS 0, SAS 1		Gen 4: C 0 Gen3: C 0/ C 1
	SAS 2		C 1
2	SAS 0, SAS 1		Gen 4: C 0 Gen3: C 0/ C 1
	SAS 2		Gen 4: C 1 Gen3: C 2/ C 3

Configuration 3 – 4:

BP 1: 12 x 3.5" AnyBay BP

BP 4: 4 x 3.5" SAS/SATA BP

Co- nfig.	Front BP	Rear BP	System board	Storage controller	
				SFF 16i RAID/HBA	SFF 8i RAID
3	NVMe 0–1		PCIe 1, PCIe 2		
	NVMe 2–3		PCIe 3		
	NVMe 4–5		PCIe 4, PCIe 5		
	NVMe 6–7		PCIe 6		
	NVMe 8–9		PCIe 7		
	NVMe 10–11		PCIe 8		
	SAS 0, SAS 1			Gen 4: C 0 Gen3: C 0/ C 1	
	SAS 2	BP 4: SAS		Gen 4: C 1 Gen3: C 2/C 3	
4	NVMe 0–1		PCIe 1, PCIe 2		
	NVMe 2–3		PCIe 3		
	NVMe 4–5		PCIe 4, PCIe 5		
	NVMe 6–7		PCIe 6		
	NVMe 8–9		PCIe 7		
	NVMe 10–11		PCIe 8		
	SAS 0, SAS 1			Gen 4: C 0 Gen3: C 1	
	SAS 2			Gen 4: C 1 Gen3: C 0	
		BP 4: SAS			Gen 4: C 0 Gen3: C 0

Configuration 5:

BP 1: 12 x 3.5" AnyBay BP

BP 4: 4 x 3.5" SAS/SATA BP

BP 5: 4 x 3.5" SAS/SATA BP

Con- fig.	Front BP	Rear BP	System board	Storage controller
				SFF 32i RAID
5	NVMe 0–1		PCle 1, PCle 2	
	NVMe 2–3		PCle 3	
	NVMe 4–5		PCle 4, PCle 5	
	NVMe 6–7		PCle 6	
	NVMe 8–9		PCle 7	
	NVMe 10–11		PCle 8	
	SAS 0, SAS 1			C 0
	SAS 2	BP 4: SAS		C 1
		BP 5: SAS		C 2

Example

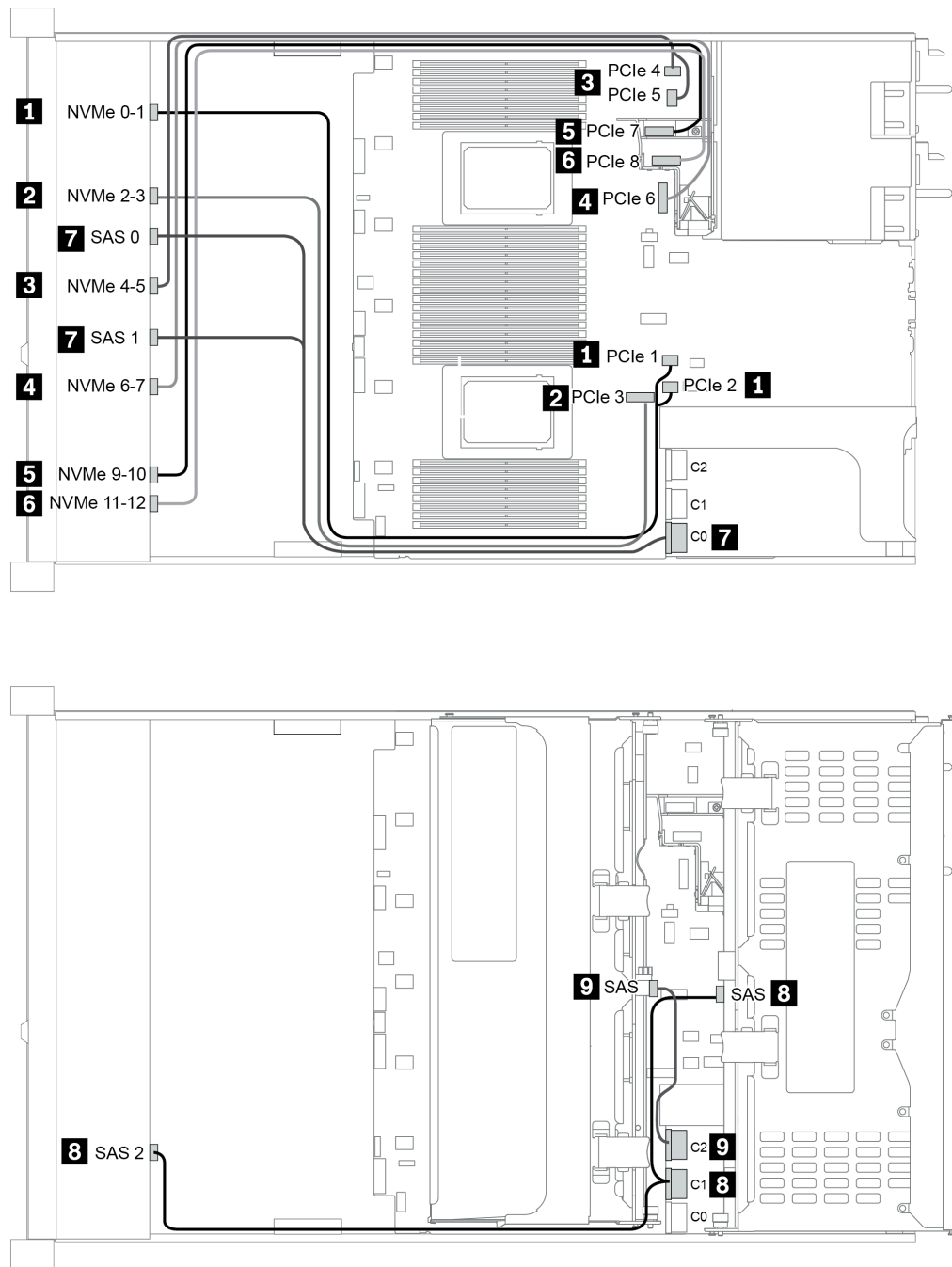


Figure 49. Configuration 5

Chapter 4. Server hardware setup

To set up the server, install any options that have been purchased, cable the server, configure and update the firmware, and install the operating system.

Server setup checklist

Use the server setup checklist to ensure that you have performed all tasks that are required to set up your server.

The server setup procedure varies depending on the configuration of the server when it was delivered. In some cases, the server is fully configured and you just need to connect the server to the network and an ac power source, and then you can power on the server. In other cases, the server needs to have hardware options installed, requires hardware and firmware configuration, and requires an operating system to be installed.

The following steps describe the general procedure for setting up a server:

1. Unpack the server package. See [“Package contents” on page 4](#).
2. Set up the server hardware.
 - a. Install any required hardware or server options. See the related topics in [“Install server hardware options” on page 149](#).
 - b. If necessary, install the server into a standard rack cabinet by using the rail kit shipped with the server. See the *Rack Installation Guide* that comes with optional rail kit.
 - c. Connect the Ethernet cables and power cords to the server. See [“Rear view” on page 54](#) to locate the connectors. See [“Cable the server” on page 235](#) for cabling best practices.
 - d. Power on the server. See [“Power on the server” on page 236](#).

Note: You can access the management processor interface to configure the system without powering on the server. Whenever the server is connected to power, the management processor interface is available. For details about accessing the management server processor, see:

“Opening and Using the XClarity Controller Web Interface” section in the XCC documentation version compatible with your server at https://sysmgt.lenovofiles.com/help/topic/ixcc_frontend/ixcc_overview.html.

- e. Validate that the server hardware was set up successfully. See [“Validate server setup” on page 236](#).
3. Configure the system.
 - a. Connect the BMC to the management network. See [“Set the network connection for the Lenovo XClarity Controller” on page 239](#).
 - b. Update the firmware for the server, if necessary. See [“Update the firmware” on page 240](#).
 - c. Configure the firmware for the server. See [“Configure the firmware” on page 244](#).

The following information is available for RAID configuration:

- <https://lenovopress.com/lp0578-lenovo-raid-introduction>
 - <https://lenovopress.com/lp0579-lenovo-raid-management-tools-and-resources>
- d. Install the operating system. See [“Deploy the operating system” on page 247](#).
 - e. Back up the server configuration. See [“Back up the server configuration” on page 250](#).
 - f. Install the applications and programs for which the server is intended to be used.

Installation Guidelines

Use the installation guidelines to install components in your server.

Before installing optional devices, read the following notices carefully:

Attention: Prevent exposure to static electricity, which might lead to system halt and loss of data, by keeping static-sensitive components in their static-protective packages until installation, and handling these devices with an electrostatic-discharge wrist strap or other grounding system.

- Read the safety information and guidelines to ensure your safety at work:
http://thinksystem.lenovofiles.com/help/topic/safety_documentation/pdf_files.html
- Make sure the components you are installing are supported by the server. For a list of supported optional components for the server, see <https://serverproven.lenovo.com/>.
- When you install a new server, download and apply the latest firmware. This will help ensure that any known issues are addressed, and that your server is ready to work with optimal performance. Go to [ThinkSystem SR665 Drivers and Software](#) to download firmware updates for your server.

Important: Some cluster solutions require specific code levels or coordinated code updates. If the component is part of a cluster solution, verify the latest Best Recipe code level menu for cluster supported firmware and driver before you update the code.

- It is good practice to make sure that the server is working correctly before you install an optional component.
- Keep the working area clean, and place removed components on a flat and smooth surface that does not shake or tilt.
- Do not attempt to lift an object that might be too heavy for you. If you have to lift a heavy object, read the following precautions carefully:
 - Make sure that you can stand steadily without slipping.
 - Distribute the weight of the object equally between your feet.
 - Use a slow lifting force. Never move suddenly or twist when you lift a heavy object.
 - To avoid straining the muscles in your back, lift by standing or by pushing up with your leg muscles.
- Back up all important data before you make changes related to the disk drives.
- Have a small flat-blade screwdriver, a small Phillips screwdriver, and a T8 torx screwdriver available.
- To view the error LEDs on the system board and internal components, leave the power on.
- You do not have to turn off the server to remove or install hot-swap power supplies, hot-swap fans, or hot-plug USB devices. However, you must turn off the server before you perform any steps that involve removing or installing adapter cables, and you must disconnect the power source from the server before you perform any steps that involve removing or installing a riser card, memory, or processor.
- Blue on a component indicates touch points, where you can grip to remove a component from or install it in the server, open or close a latch, and so on.
- The Red strip on the drives, adjacent to the release latch, indicates that the drive can be hot-swapped if the server and operating system support hot-swap capability. This means that you can remove or install the drive while the server is still running.

Note: See the system specific instructions for removing or installing a hot-swap drive for any additional procedures that you might need to perform before you remove or install the drive.

- After finishing working on the server, make sure you reinstall all safety shields, guards, labels, and ground wires.

Safety inspection checklist

Use the information in this section to identify potentially unsafe conditions with your server. As each machine was designed and built, required safety items were installed to protect users and service technicians from injury.

Notes:

1. The product is not suitable for use at visual display workplaces according to §2 of the Workplace Regulations.
2. The set-up of the server is made in the server room only.

CAUTION:

This equipment must be installed or serviced by trained personnel, as defined by the NEC, IEC 62368-1 & IEC 60950-1, the standard for Safety of Electronic Equipment within the Field of Audio/Video, Information Technology and Communication Technology. Lenovo assumes you are qualified in the servicing of equipment and trained in recognizing hazards energy levels in products. Access to the equipment is by the use of a tool, lock and key, or other means of security, and is controlled by the authority responsible for the location.

Important: Electrical grounding of the server is required for operator safety and correct system function. Proper grounding of the electrical outlet can be verified by a certified electrician.

Use the following checklist to verify that there are no potentially unsafe conditions:

1. Make sure that the power is off and the power cord is disconnected.
2. Check the power cord.
 - Make sure that the third-wire ground connector is in good condition. Use a meter to measure third-wire ground continuity for 0.1 ohm or less between the external ground pin and the frame ground.
 - Make sure that the power cord is the correct type.

To view the power cords that are available for the server:

- a. Go to:
 - <http://dcsc.lenovo.com/#/>
 - b. Click **Preconfigured Model** or **Configure to order**.
 - c. Enter the machine type and model for your server to display the configurator page.
 - d. Click **Power → Power Cables** to see all line cords.
 - Make sure that the insulation is not frayed or worn.
3. Check for any obvious non-Lenovo alterations. Use good judgment as to the safety of any non-Lenovo alterations.
 4. Check inside the server for any obvious unsafe conditions, such as metal filings, contamination, water or other liquid, or signs of fire or smoke damage.
 5. Check for worn, frayed, or pinched cables.
 6. Make sure that the power-supply cover fasteners (screws or rivets) have not been removed or tampered with.

System reliability guidelines

The system reliability guidelines to ensure proper system cooling.

Make sure the following requirements are met:

- When the server comes with redundant power, a power supply must be installed in each power-supply bay.
- Adequate space around the server must be spared to allow server cooling system to work properly. Leave approximately 50 mm (2.0 in.) of open space around the front and rear of the server. Do not place any object in front of the fans.
- For proper cooling and airflow, refit the server cover before you turn the power on. Do not operate the server for more than 30 minutes with the server cover removed, for it might damage server components.
- Cabling instructions that come with optional components must be followed.
- A failed fan must be replaced within 48 hours after malfunction.
- A removed hot-swap fan must be replaced within 30 seconds after removal.
- A removed hot-swap drive must be replaced within two minutes after removal.
- A removed hot-swap power supply must be replaced within two minutes after removal.
- Every air baffle that comes with the server must be installed when the server starts (some servers might come with more than one air baffle). Operating the server with a missing air baffle might damage the processor.
- All processor sockets must contain either a socket cover or a processor with heat sink.
- When more than one processor is installed, fan population rules for each server must be strictly followed.

Working inside the server with the power on

Guidelines to work inside the server with the power on.

Attention: The server might stop and data loss might occur when internal server components are exposed to static electricity. To avoid this potential problem, always use an electrostatic-discharge wrist strap or other grounding systems when working inside the server with the power on.

- Avoid loose-fitting clothing, particularly around your forearms. Button or roll up long sleeves before working inside the server.
- Prevent your necktie, scarf, badge rope, or hair from dangling into the server.
- Remove jewelry, such as bracelets, necklaces, rings, cuff links, and wrist watches.
- Remove items from your shirt pocket, such as pens and pencils, in case they fall into the server as you lean over it.
- Avoid dropping any metallic objects, such as paper clips, hairpins, and screws, into the server.

Handling static-sensitive devices

Use this information to handle static-sensitive devices.

Attention: Prevent exposure to static electricity, which might lead to system halt and loss of data, by keeping static-sensitive components in their static-protective packages until installation, and handling these devices with an electrostatic-discharge wrist strap or other grounding system.

- Limit your movement to prevent building up static electricity around you.
- Take additional care when handling devices during cold weather, for heating would reduce indoor humidity and increase static electricity.
- Always use an electrostatic-discharge wrist strap or other grounding system, particularly when working inside the server with the power on.
- While the device is still in its static-protective package, touch it to an unpainted metal surface on the outside of the server for at least two seconds. This drains static electricity from the package and from your body.
- Remove the device from the package and install it directly into the server without putting it down. If it is necessary to put the device down, put it back into the static-protective package. Never place the device on the server or on any metal surface.
- When handling a device, carefully hold it by the edges or the frame.
- Do not touch solder joints, pins, or exposed circuitry.
- Keep the device from others' reach to prevent possible damages.

Memory module installation rules and order

Memory modules must be installed in a specific order based on the memory configuration that you implement on your server.

General mixing rules:

DIMMs	Coexist in a channel	Coexist in a system
RDIMMs and Performance+ RDIMMs		
3DS RDIMMs and other DIMM types		
128 GB 3DS RDIMMs and 256 GB 3DS RDIMMs		
DIMMs of different DRAM density (8Gbit and 16 Gbit)	√ ¹	√ ¹
DIMMs of different DRAM data width (x4 and x8)		√
DIMMs of different rank	√ ²	√ ²
DIMMs manufactured by different vendors	√	√
DIMMs of different voltage ³		
ECC and Non-ECC DIMMs ⁴		
<ol style="list-style-type: none">1. Install the one with the higher density first.2. Install the one with the higher rank first.3. Only support 1.2 V.4. Only support ECC DIMMs.		

DIMM compatibility (based on general mixing rules)

Type	Option	Capacity	DRAM data width	DRAM density
RDIMM	1	16 GB	x8	8 Gbit
	2	32 GB	x4	8 Gbit
	3	32 GB	x8	16 Gbit
	4	64 GB	x4	16 Gbit
Performance+ RDIMM	5	32 GB	x8	16 Gbit
	6	64 GB	x4	16 Gbit
3DS RDIMM	7	128 GB	x4	16 Gbit
	8	256 GB	x4	16 Gbit
Support mixing within a channel: <ul style="list-style-type: none"> Options 1 and 3 Options 2 and 4 Support mixing within a system: <ul style="list-style-type: none"> Options 1 to 4 (Install the one with higher DRAM density first.) Options 5 and 6 (Install the one with higher capacity first.) 				

Alternatively, for balancing memory and for better performance, consider below rules:

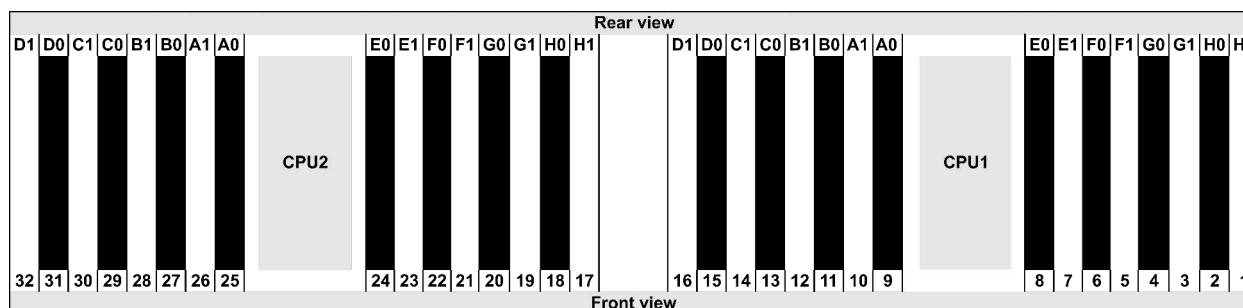
- Balance memory capacity per channel pair on a given CPU.
- Balance memory capacity per CPU socket when 2 CPUs are installed.
- In cases of using Performance+ RDIMMs to maximize memory operating speed, ensure that Performance+ RDIMMs with the same capacity are populated on 2DPC. Otherwise, there will be no performance gain.
- When only one DIMM is to be populated in a given channel, it must be populated in DIMM slot 1 (physically farthest away from the CPU).
- The server supports single DIMM as a minimum configuration, however, full memory bandwidth requires one DIMM per channel (A–H) be populated. For best performance, populate all 8 channels per socket, with every channel having the same capacity.

Note: Detailed instructions for balancing memory configurations for your server can be found at:

[Balanced Memory Configurations with Second-or-Third-Generation AMD EPYC Processors](#)

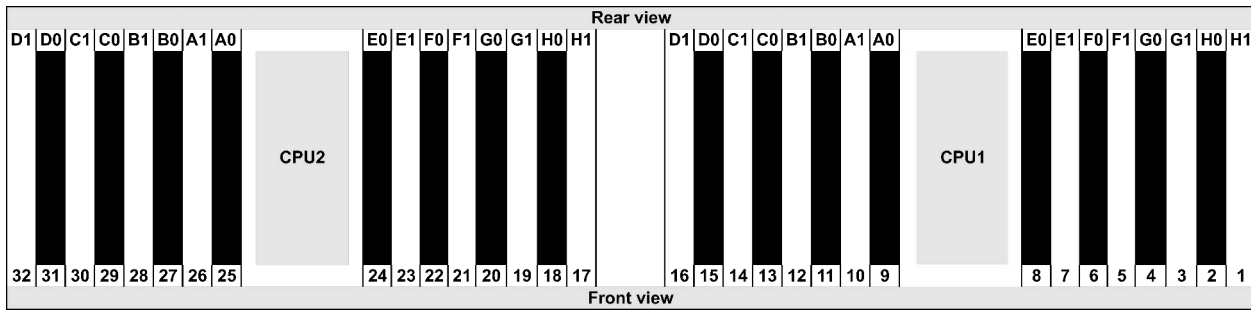
Recommended population order (based on general rules)

1 CPU installed:



Qty.	DIMM population order															
1 DIMM	14															
2 DIMMs	14	16														
3 DIMMs	14	16	3													
4 DIMMs	14	16	3	1												
5 DIMMs	14	16	3	1	10											
6 DIMMs	14	16	3	1	10	12										
7 DIMMs	14	16	3	1	10	12	7									
8 DIMMs	14	16	3	1	10	12	7	5								
9 DIMMs	14	16	3	1	10	12	7	5	13							
10 DIMMs	14	16	3	1	10	12	7	5	13	15						
11 DIMMs	14	16	3	1	10	12	7	5	13	15	4					
12 DIMMs	14	16	3	1	10	12	7	5	13	15	4	2				
13 DIMMs	14	16	3	1	10	12	7	5	13	15	4	2	9			
14 DIMMs	14	16	3	1	10	12	7	5	13	15	4	2	9	11		
15 DIMMs	14	16	3	1	10	12	7	5	13	15	4	2	9	11	8	
16 DIMMs	14	16	3	1	10	12	7	5	13	15	4	2	9	11	8	6

2 CPUs installed:



Qty.	DIMM population order																															
1 DIMM	14																															
2 DIMMs	14	30																														
3 DIMMs	14	30	16																													
4 DIMMs	14	30	16	32																												
5 DIMMs	14	30	16	32	3																											
6 DIMMs	14	30	16	32	3	19																										
7 DIMMs	14	30	16	32	3	19	1																									
8 DIMMs	14	30	16	32	3	19	1	17																								
9 DIMMs	14	30	16	32	3	19	1	17	10																							
10 DIMMs	14	30	16	32	3	19	1	17	10	26																						
11 DIMMs	14	30	16	32	3	19	1	17	10	26	12																					
12 DIMMs	14	30	16	32	3	19	1	17	10	26	12	28																				
13 DIMMs	14	30	16	32	3	19	1	17	10	26	12	28	7																			
14 DIMMs	14	30	16	32	3	19	1	17	10	26	12	28	7	23																		
15 DIMMs	14	30	16	32	3	19	1	17	10	26	12	28	7	23	5																	
16 DIMMs	14	30	16	32	3	19	1	17	10	26	12	28	7	23	5	21																
17 DIMMs	14	30	16	32	3	19	1	17	10	26	12	28	7	23	5	21	13															
18 DIMMs	14	30	16	32	3	19	1	17	10	26	12	28	7	23	5	21	13	29														
19 DIMMs	14	30	16	32	3	19	1	17	10	26	12	28	7	23	5	21	13	29	15													
20 DIMMs	14	30	16	32	3	19	1	17	10	26	12	28	7	23	5	21	13	29	15	31												
21 DIMMs	14	30	16	32	3	19	1	17	10	26	12	28	7	23	5	21	13	29	15	31	4											
22 DIMMs	14	30	16	32	3	19	1	17	10	26	12	28	7	23	5	21	13	29	15	31	4	20										
23 DIMMs	14	30	16	32	3	19	1	17	10	26	12	28	7	23	5	21	13	29	15	31	4	20	2									
24 DIMMs	14	30	16	32	3	19	1	17	10	26	12	28	7	23	5	21	13	29	15	31	4	20	2	18								
25 DIMMs	14	30	16	32	3	19	1	17	10	26	12	28	7	23	5	21	13	29	15	31	4	20	2	18	9							
26 DIMMs	14	30	16	32	3	19	1	17	10	26	12	28	7	23	5	21	13	29	15	31	4	20	2	18	9	25						
27 DIMMs	14	30	16	32	3	19	1	17	10	26	12	28	7	23	5	21	13	29	15	31	4	20	2	18	9	25	11					
28 DIMMs	14	30	16	32	3	19	1	17	10	26	12	28	7	23	5	21	13	29	15	31	4	20	2	18	9	25	11	27				
29 DIMMs	14	30	16	32	3	19	1	17	10	26	12	28	7	23	5	21	13	29	15	31	4	20	2	18	9	25	11	27	8			
30 DIMMs	14	30	16	32	3	19	1	17	10	26	12	28	7	23	5	21	13	29	15	31	4	20	2	18	9	25	11	27	8	24		
31 DIMMs	14	30	16	32	3	19	1	17	10	26	12	28	7	23	5	21	13	29	15	31	4	20	2	18	9	25	11	27	8	24	6	
32 DIMMs	14	30	16	32	3	19	1	17	10	26	12	28	7	23	5	21	13	29	15	31	4	20	2	18	9	25	11	27	8	24	6	22

Note: There are performance-optimized 6-DIMM and 12-DIMM configurations for server models with one 7003 series CPU and 12-DIMM and 24-DIMM configurations for server models with two 7003 series CPUs. For details, see the table below.

CPU Qty.	DIMM Qty.	Performance-optimized DIMM population order
1	6	1, 3, 7, 10, 14, 16
	12	1, 2, 3, 4, 7, 8, 9, 10, 13, 14, 15, 16
2	12	1, 3, 7, 10, 14, 16, 17, 19, 23, 26, 30, 32
	24	1, 2, 3, 4, 7, 8, 9, 10, 13, 14, 15, 16, 17, 18, 19, 20, 23, 24, 25, 26, 29, 30, 31, 32

Install server hardware options

This section includes instructions for performing initial installation of optional hardware. Each component installation procedure references any tasks that need to be performed to gain access to the component being replaced.

Installation procedures are presented in the optimum sequence to minimize work.

Attention: To ensure the components you install work correctly without problems, read the following precautions carefully.

- Make sure the components you are installing are supported by the server. For a list of supported optional components for the server, see <https://serverproven.lenovo.com/>.
- Always download and apply the latest firmware. This will help ensure that any known issues are addressed, and that your server is ready to work with optimal performance. Go to [ThinkSystem SR665 Drivers and Software](#) to download firmware updates for your server.
- It is good practice to make sure that the server is working correctly before you install an optional component.
- Follow the installation procedures in this section and use appropriate tools. Incorrectly installed components can cause system failure from damaged pins, damaged connectors, loose cabling, or loose components.

Remove the security bezel

Use this information to remove the security bezel.

About this task

Attention:

- Read [“Installation Guidelines” on page 140](#) to ensure that you work safely.
- Before you ship the rack with the server installed, reinstall and lock the security bezel into place.

Procedure

Step 1. Use the key to unlock the security bezel.

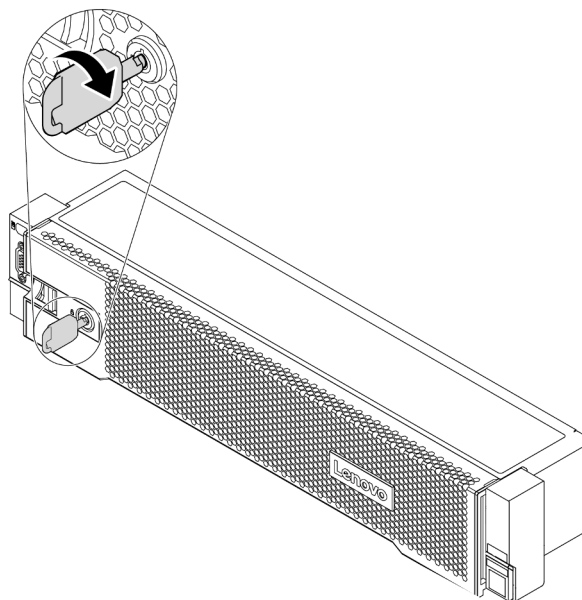


Figure 50. Unlocking the security bezel

Step 2. Press the release latch **1** and rotate the security bezel outward to remove it from the chassis.

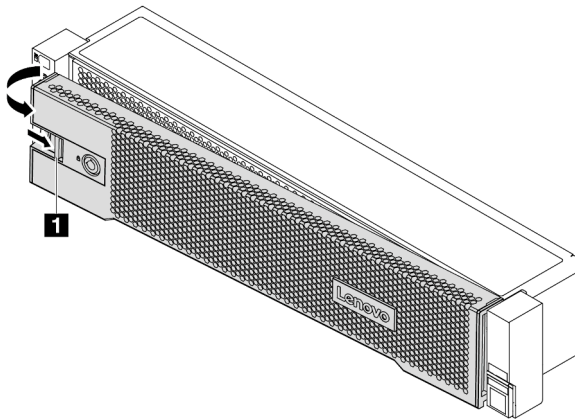


Figure 51. Security bezel removal

Demo video

[Watch the procedure on YouTube](#)

Remove the top cover

Use this information to remove the top cover.

About this task

S033



CAUTION:

Hazardous energy present. Voltages with hazardous energy might cause heating when shorted with metal, which might result in spattered metal, burns, or both.

S014



CAUTION:

Hazardous voltage, current, and energy levels might be present. Only a qualified service technician is authorized to remove the covers where the label is attached.

Attention:

- Read [“Installation Guidelines” on page 140](#) to ensure that you work safely.
- Power off the server and disconnect all power cords for this task.

Procedure

- Step 1. If the server is installed in a rack, remove the server from the rack. See the Rack Installation Guide that comes with the rail kit for your server.
- Step 2. Remove the top cover.

Attention: Handle the top cover carefully. Dropping the top cover with the cover latch open might damage the cover latch.

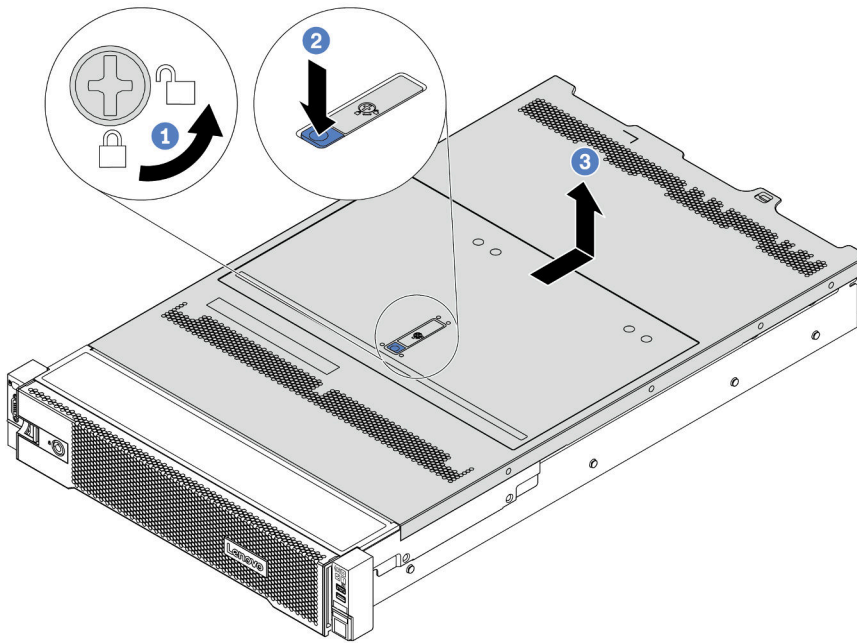


Figure 52. Top cover removal

- Use a screwdriver to turn the cover lock to the unlocked position as shown.
- Press the release button on the cover latch and then fully open the cover latch.
- Slide the top cover to the rear until it is disengaged from the chassis. Then, lift the top cover off the chassis and place the top cover on a flat clean surface.

Demo video

[Watch the procedure on YouTube](#)

Remove the air baffle

Use this information to remove the air baffle. If you intend to install hardware options in the server, you must first remove the air baffle from the server.

About this task

S033



CAUTION:

Hazardous energy present. Voltages with hazardous energy might cause heating when shorted with metal, which might result in spattered metal, burns, or both.

S017



CAUTION:

Hazardous moving fan blades nearby. Keep fingers and other body parts away.

Attention:

- Read [“Installation Guidelines” on page 140](#) to ensure that you work safely.
- Prevent exposure to static electricity, which might lead to system halt and loss of data, by keeping static-sensitive components in their static-protective packages until installation, and handling these devices with an electrostatic-discharge wrist strap or other grounding system.

Procedure

Step 1. Prepare your server.

1. Power off the server.
2. Remove the top cover. See [“Remove the top cover” on page 151](#).
3. Record and disconnect any cables. See [Chapter 3 “Internal cable routing” on page 73](#).
4. Remove any components that are impeding the procedure.
5. Install any components that are required before installing or removing the component(s).

Step 2. (Only for GPU air baffle) Remove the air baffle fillers or extenders (if any).

Step 3. Grasp the air baffle and carefully lift it out of the server.

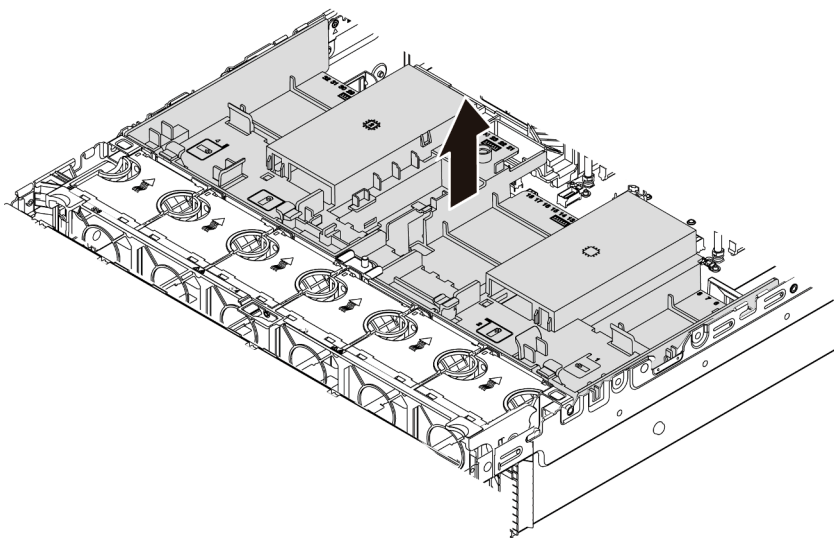


Figure 53. Removal of the standard air baffle

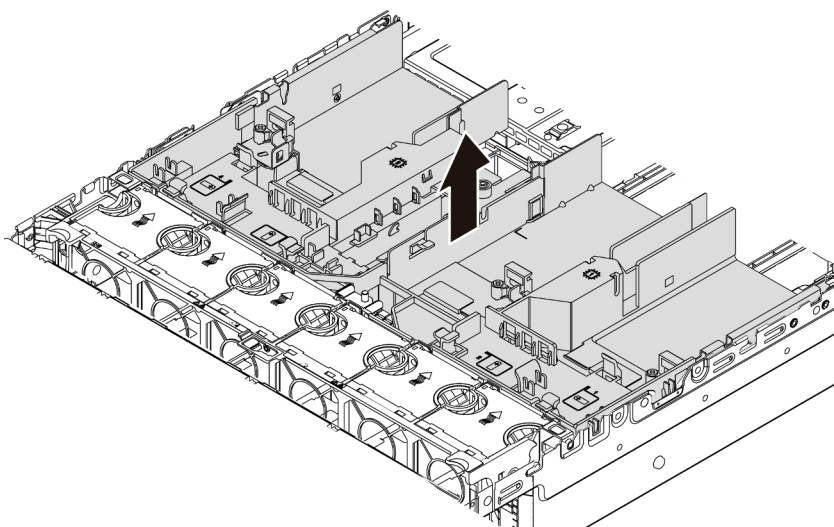


Figure 54. Removal of the GPU air baffle

Attention: For proper cooling and airflow, install the air baffle before you turn on the server. Operating the server without the air baffle might damage server components.

- Step 4. If you are using 1U standard heat sinks and need to change to 2U standard or performance heat sinks, remove the fillers from the air baffle after air baffle removal.

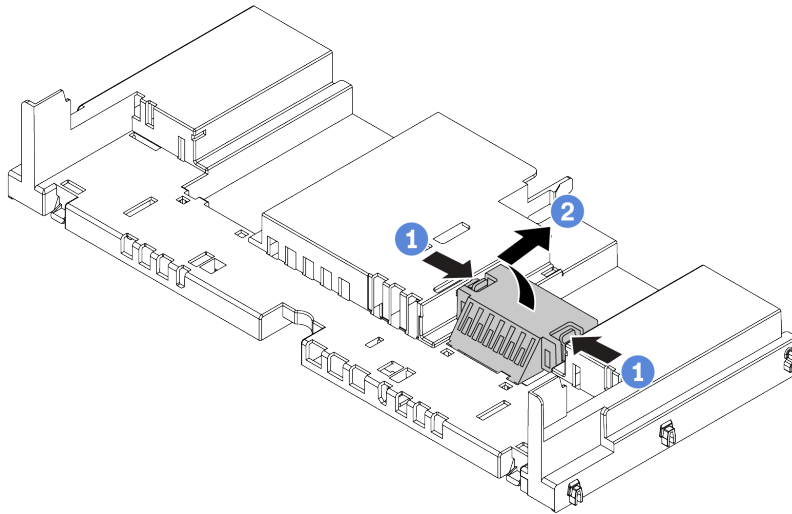


Figure 55. Removal of the fillers from standard air baffle

Demo video

[Watch the procedure on YouTube](#)

Remove the system fan cage

Use this information to remove the system fan cage.

About this task

The system fan cage might impede your access to some connectors. You must remove the system fan cage before you route cables.

Attention:

- Read [“Installation Guidelines” on page 140](#) to ensure that you work safely.
- Power off the server and disconnect all power cords for this task.
- Prevent exposure to static electricity, which might lead to system halt and loss of data, by keeping static-sensitive components in their static-protective packages until installation, and handling these devices with an electrostatic-discharge wrist strap or other grounding system.

Procedure

Step 1. Prepare your server.

1. Power off the server.
2. Remove the top cover. See [“Remove the top cover” on page 151](#).
3. Record and disconnect any cables. See [Chapter 3 “Internal cable routing” on page 73](#).
4. Remove any components that are impeding the procedure.
5. Install any components that are required before installing or removing the component(s).

Step 2. Remove the system fan cage.

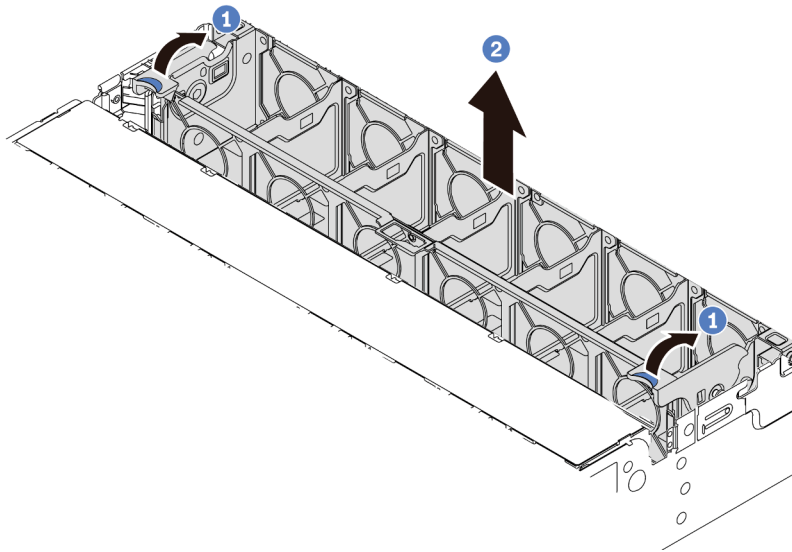


Figure 56. System fan cage removal

- a. Rotate the levers of the system fan cage to the rear of the server.
- b. Lift the system fan cage straight up and out of the chassis.

After you finish

Begin installing any options that you have purchased.

Demo video

[Watch the procedure on YouTube](#)

Install a processor-heat-sink module

This task has instructions for installing processors and heat sinks. Heat sink replacement requires a Torx #T20 screwdriver.

About this task

CAUTION:

Make sure that all server power cords are disconnected from their power sources before performing this procedure.

Attention:

- Read [“Installation Guidelines” on page 140](#) to ensure that you work safely.
- Power off the server and disconnect all power cords for this task.
- Prevent exposure to static electricity, which might lead to system halt and loss of data, by keeping static-sensitive components in their static-protective packages until installation, and handling these devices with an electrostatic-discharge wrist strap or other grounding system.
- The heat sink is necessary to maintain proper thermal conditions for the processor. Do not power on the server with the heat sink removed.
- Do not touch the processor socket or processor contacts. Processor-socket contacts are very fragile and easily damaged. Contaminants on the processor contacts, such as oil from your skin, can cause connection failures.
- Do not allow the thermal grease on the processor or heat sink to come in contact with anything. Contact with any surface can compromise the thermal grease, rendering it ineffective. Thermal grease can damage components, such as electrical connectors in the processor socket. Do not remove the grease cover from a heat sink until you are instructed to do so.
- See <https://serverproven.lenovo.com/> for a list of processors supported for your server. All processors on the system board must have the same speed, number of cores, and frequency.
- Before you install a new processor, update your system firmware to the latest level. See [“Update the firmware” on page 240](#).
- Optional devices available for your system might have specific processor requirements. See [“Technical rules” on page 22](#).

Procedure

Step 1. Take the new part out of the package and place it on a static-protective surface.

Step 2. Prepare your server.

1. Power off the server.
2. Remove the top cover. See [“Remove the top cover” on page 151](#).
3. Record and disconnect any cables. See [Chapter 3 “Internal cable routing” on page 73](#).
4. Remove any components that are impeding the procedure.
5. Install any components that are required before installing or removing the component(s).

Step 3. Install the processors.

- a. Slide the processor carrier into the rail frame.
- b. Push the rail frame down until the blue latches lock into place.
- c. Close the force frame.
- d. Tighten the screws in the *installation sequence* shown on the force frame.

Note: Use an ESD safe screwdriver and set the maximum torque value to 14.0 ± 0.5 inch-pounds.

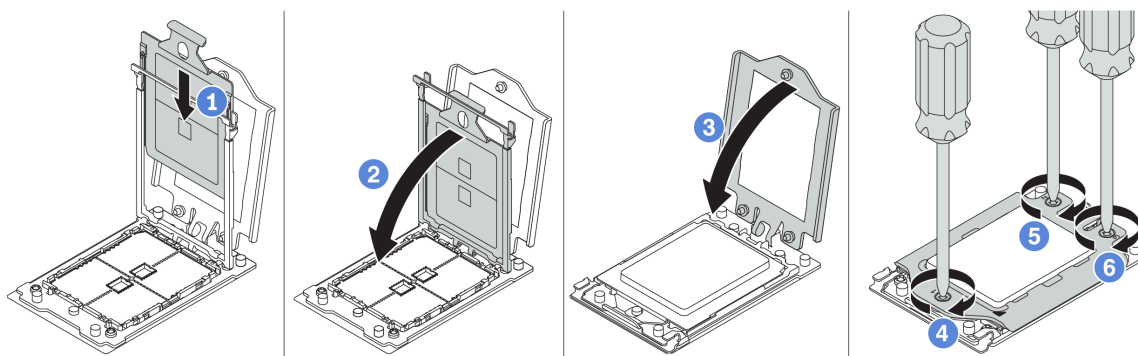


Figure 57. Processor installation

Step 4. Install the standard or performance heat sink.

Note: For a new heat sink, the thermal grease is pre-applied to the heat sink. Remove the protective cover and install the heat sink.

Note: Use an ESD safe screwdriver and set the maximum torque value to 14.0 ± 0.5 inch-pounds.

- a. Orient the heat sink with the screw holes on the processor plate. The captive screws on the heat sink should align with the screw holes on the processor plate.
- b. Tighten all the captive screws in the *installation sequence* shown on the heat-sink label.
- c. (Optional) Tighten the two screws located in the front of the performance heat sink.

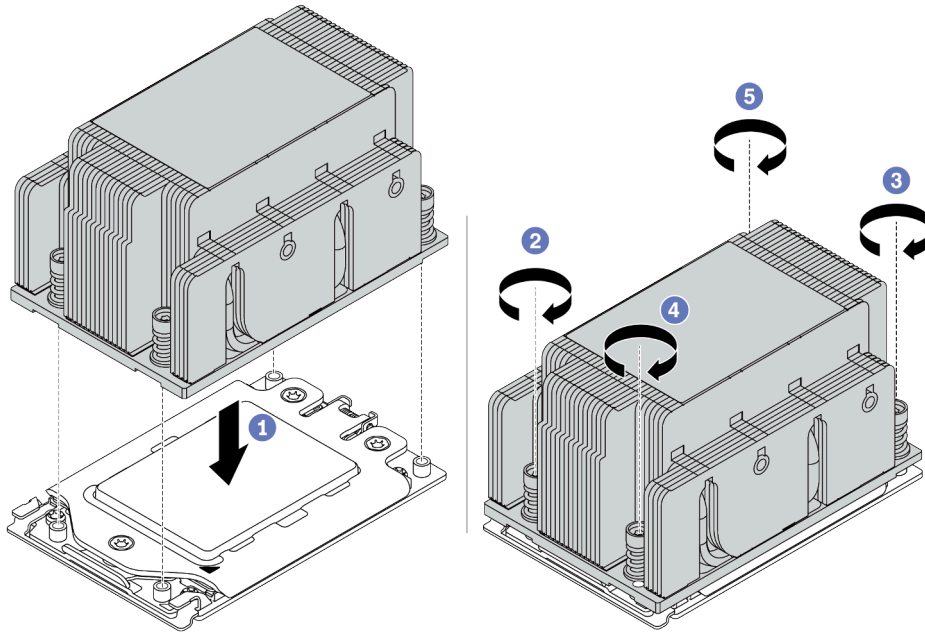


Figure 58. Installing a standard heat sink

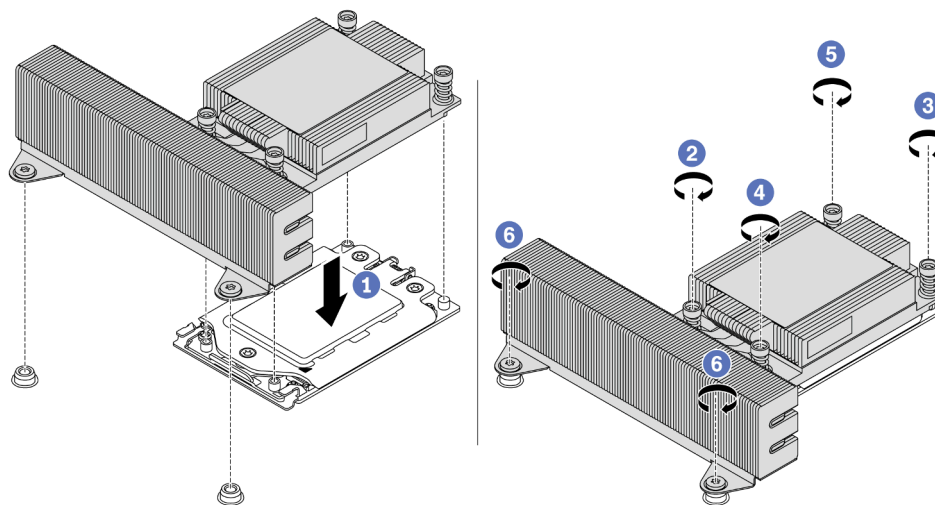


Figure 59. Installing a performance heat sink

After you finish

Install any options that you have purchased.

Demo video

[Watch the procedure on YouTube](#)

Install a memory module

Use this information to install a memory module.

Attention:

- Read [“Installation Guidelines” on page 140](#) to ensure that you work safely.
- Power off the server and disconnect all power cords for this task.
- Memory modules are sensitive to static discharge and require special handling. Refer to the standard guidelines for [“Handling static-sensitive devices” on page 144](#):
 - Always wear an electrostatic-discharge strap when removing or installing memory modules. Electrostatic-discharge gloves can also be used.
 - Never hold two or more memory modules together so that they do not touch each other. Do not stack memory modules directly on top of each other during storage.
 - Never touch the gold memory module connector contacts or allow these contacts to touch the outside of the memory module connector housing.
 - Handle memory modules with care: never bend, twist, or drop a memory module.
 - Do not use any metal tools (such as jigs or clamps) to handle the memory modules, because the rigid metals may damage the memory modules.
 - Do not insert memory modules while holding packages or passive components, which can cause package cracks or detachment of passive components by the high insertion force.

Procedure

Step 1. Take the new part out of the package and place it on a static-protective surface.

Step 2. Prepare your server.

1. Power off the server.
2. Remove the top cover. See [“Remove the top cover” on page 151](#).
3. Record and disconnect any cables. See [Chapter 3 “Internal cable routing” on page 73](#).
4. Remove any components that are impeding the procedure.
5. Install any components that are required before installing or removing the component(s).

Step 3. Locate the required memory module slot on the system board.

Note: Ensure that you observe the installation rules and sequence in [“DIMM population rules” on page 24](#).

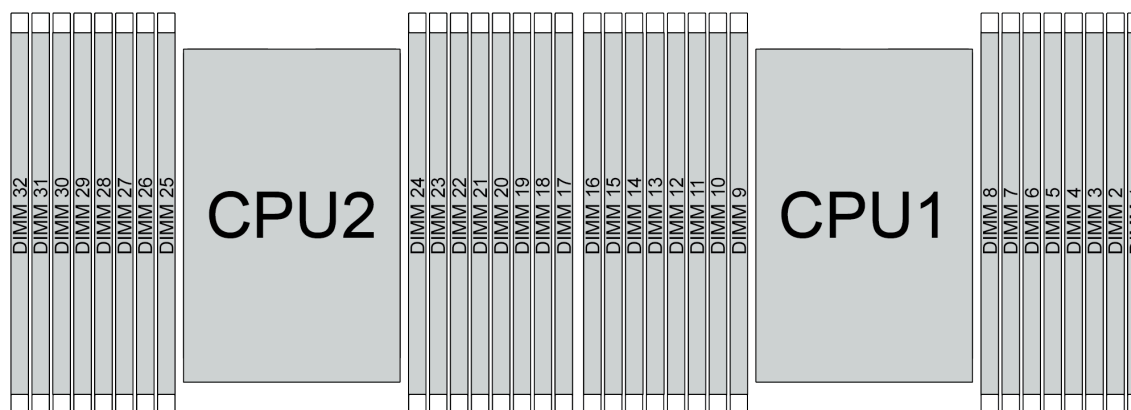


Figure 60. Memory module locations

Table 20. Memory slot and channel identification

Channel	D1	D0	C1	C0	B1	B0	A1	A0	E0	E1	F0	F1	G0	G1	H0	H1
Slot number	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1
	32	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17

Step 4. Install the memory module into the slot.

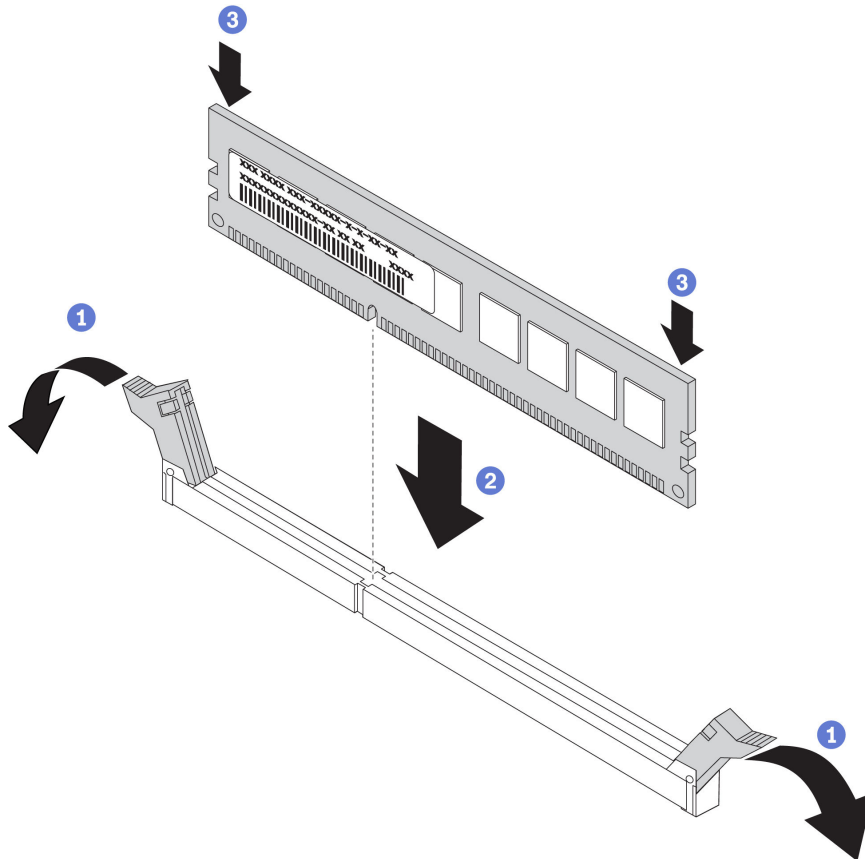


Figure 61. Memory module installation

- Open the retaining clip on each end of the memory module slot.

Attention: To avoid breaking the retaining clips or damaging the memory module slots, open and close the clips gently.

- Align the memory module with the slot, and gently place the memory module on the slot with both hands.
- Firmly press both ends of the memory module straight down into the slot until the retaining clips snap into the locked position.

Note: If there is a gap between the memory module and the retaining clips, the memory module has not been correctly inserted. In this case, open the retaining clips, remove the memory module, and then reinsert it.

Demo video

[Watch the procedure on YouTube](#)

Install a backplane

Use this information to remove and install a hot-swap-drive backplane.

This topic contains the following information:

- [“Install the front 2.5-inch-drive backplane” on page 163](#)
- [“Install the middle or rear 2.5-inch-drive backplane” on page 167](#)
- [“Install the front 3.5-inch-drive backplane” on page 166](#)
- [“Install the middle or rear 3.5-inch-drive backplane” on page 169](#)
- [“Install the 7mm drive backplanes” on page 171](#)

Install the front 2.5-inch-drive backplane

Use this information to install the front 2.5-inch-drive backplane.

About this task

Your server supports two types of 2.5-inch-drive front backplanes: SATA/SAS 8-bay backplane and Anybay 8-bay backplane. Depending on the backplane type and quantity, the installation location of the backplanes varies.

- One backplane

Always install the backplane to drive bays 0–7.

- Two backplanes
 - Two SATA/SAS 8-bay backplanes: install the two backplanes to drive bays 0–7 and drive bays 8–15
 - Two Anybay 8-bay backplanes: install the Anybay 8-bay backplane that supports SATA/SAS/NVMe drives to drive bays 0–7; install the Anybay backplane that supports pure NVMe drives to drive bays 8–15
 - One SATA/SAS 8-bay backplane and one Anybay 8-bay backplane: install the SATA/SAS backplane to drive bays 0–7; install the Anybay backplane to drive bays 8–15
- Three backplanes
 - Three SATA/SAS 8-bay backplanes or Anybay backplanes that support pure NVMe drives: install the three backplanes to drive bays 0–7, drive bays 8–15, and drive bays 16–23
 - One SATA/SAS 8-bay backplane and two Anybay 8-bay backplanes that support pure NVMe drives: install the SATA/SAS 8-bay backplane to drive bays 0–7; install the Anybay 8-bay backplanes to drive bays 8–15 and drive bays 16–23.
 - One Anybay 8-bay backplane and two SATA/SAS 8-bay backplanes: install the SATA/SAS 8-bay backplanes to drive bays 0–7, drive bays 8–15; install the Anybay 8-bay backplane to drive bays 16–23.

Attention:

- Read [“Installation Guidelines” on page 140](#) to ensure that you work safely.
- Prevent exposure to static electricity, which might lead to system halt and loss of data, by keeping static-sensitive components in their static-protective packages until installation, and handling these devices with an electrostatic-discharge wrist strap or other grounding system.

Procedure

- Step 1. Touch the static-protective package that contains the new backplane to any unpainted surface on the outside of the server. Then, take the new backplane out of the package and place it on a static-protective surface.

Step 2. Connect the cables to the backplane. See [“2.5-inch/3.5-inch drive backplane \(power\)”](#) on page 84 and [“2.5-inch/3.5-inch drive backplane \(signal\)”](#) on page 89.

Step 3. Install the 2.5-inch-drive front backplane.

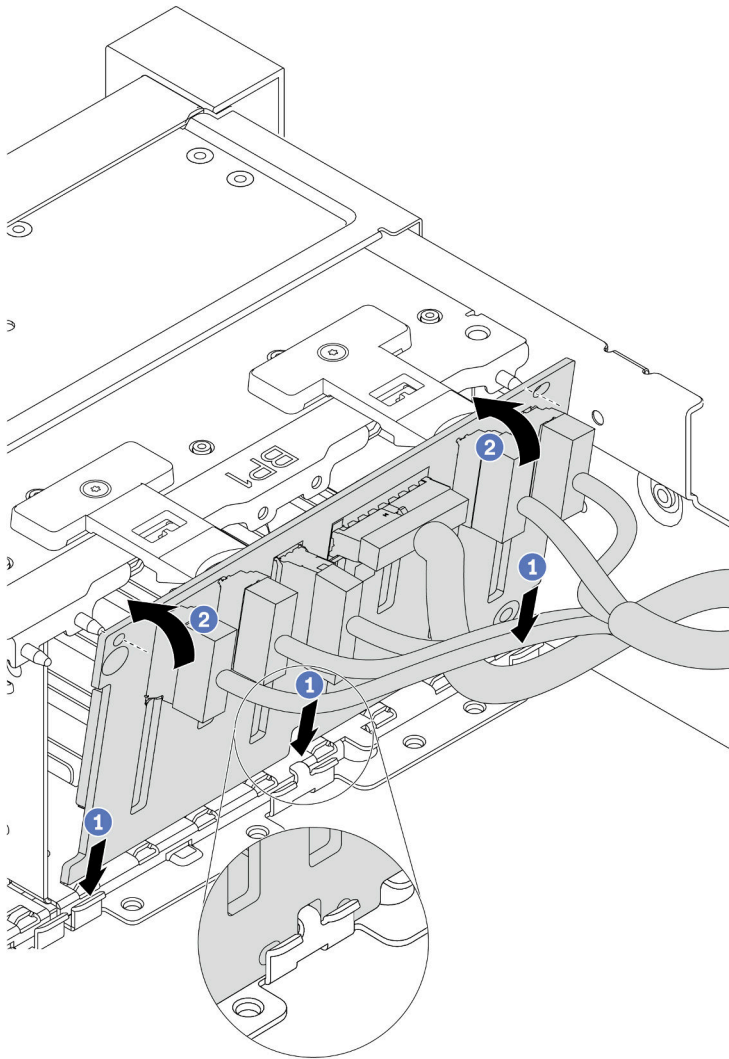



Figure 62. 2.5-inch-drive backplane installation

- a. Align the bottom of the backplane in the slots on the bottom of the chassis.
- b. Rotate the backplane to the vertical position and align the holes in the backplane with the pins on the chassis and press the backplane into position. The release tabs will secure the backplane in place.

Step 4. Connect the cables to the system board. See “2.5-inch/3.5-inch drive backplane (power)” on page 84 and “2.5-inch/3.5-inch drive backplane (signal)” on page 89.

After you finish

1. Reinstall all the drives and fillers (if any) into the drive bays. See “Install a hot-swap drive” on page 196.
2. Use the Lenovo XClarity Provisioning Manager to configure the RAID if necessary. For more information, see the “RAID Setup” section in the LXPM documentation compatible with your server at https://sysmgmt.lenovofiles.com/help/topic/lxpm_frontend/lxpm_product_page.html.

3. If you have installed an Anybay backplane with U.3 NVMe drives for Trimode, enable **U.3 x1 mode** for the selected drive slots on the backplane through the XCC Web GUI.
 - a. Log into the XCC Web GUI, and choose **Storage → Detail** from the navigation tree on the left.
 - b. In the window that is displayed, click the icon  next to **Backplane**.
 - c. In the dialog box that is displayed, select the target drive slots and click **Apply**.
 - d. Do a DC power cycle to make the setting take effect.

Demo video

[Watch the procedure on YouTube](#)

Install the front 3.5-inch-drive backplane

Use this information to install the front 3.5-inch-drive backplane.

About this task

Your server supports one SAS/SATA 12-bay backplane.

Attention:

- Read [“Installation Guidelines” on page 140](#) to ensure that you work safely.
- Power off the server and disconnect all power cords for this task.
- Prevent exposure to static electricity, which might lead to system halt and loss of data, by keeping static-sensitive components in their static-protective packages until installation, and handling these devices with an electrostatic-discharge wrist strap or other grounding system.

Procedure

- Step 1. Touch the static-protective package that contains the new backplane to any unpainted surface on the outside of the server. Then, take the new backplane out of the package and place it on a static-protective surface.
- Step 2. Connect the cables to the backplane. See [“2.5-inch/3.5-inch drive backplane \(power\)” on page 84](#) and [“2.5-inch/3.5-inch drive backplane \(signal\)” on page 89](#).
- Step 3. Install the 3.5-inch-drive backplane.

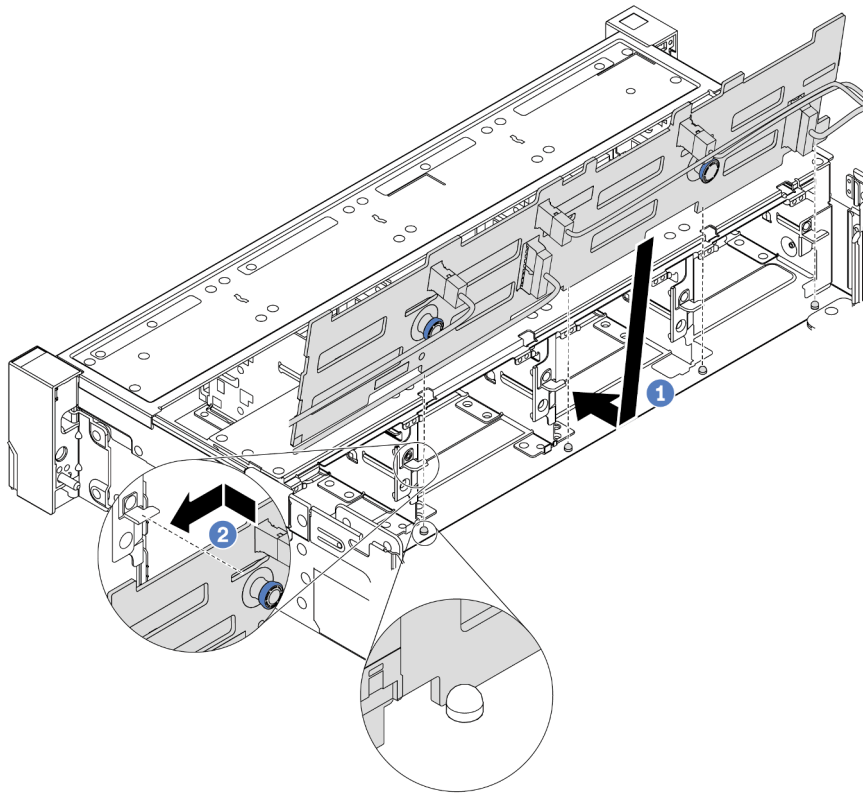


Figure 63. 3.5-inch-drive backplane installation

- a. Align the backplane with the chassis and lower it into the chassis. Then, put the backplane into place with it leaning backward slightly.
- b. Rotate the backplane to vertical position to ensure that the four hooks on the chassis pass through the corresponding holes in the backplane. Then, slide the new backplane as shown until it is secured into place.

Step 4. Connect the cables to the system board. See [“2.5-inch/3.5-inch drive backplane \(power\)” on page 84](#) and [“2.5-inch/3.5-inch drive backplane \(signal\)” on page 89](#).

Demo video

[Watch the procedure on YouTube](#)

Install the middle or rear 2.5-inch-drive backplane

Use this information to install the middle or rear 2.5-inch-drive backplane.

About this task

Your server supports:

- Two types of middle 2.5-inch-drive backplane
 - 4 x 2.5-inch SAS/SATA backplane
 - 4 x 2.5-inch NVMe backplane
- Three types of rear 2.5-inch-drive backplane
 - 4 x 2.5-inch SAS/SATA backplane

- 4 x 2.5-inch NVMe backplane
- 8 x 2.5-inch SAS/SATA backplane

Notes:

- The procedure shows the installation of the backplane on the rear drive cage. The procedure is the same for installing the backplane on the middle drive cage.

Attention:

- Read [“Installation Guidelines” on page 140](#) to ensure that you work safely.
- Prevent exposure to static electricity, which might lead to system halt and loss of data, by keeping static-sensitive components in their static-protective packages until installation, and handling these devices with an electrostatic-discharge wrist strap or other grounding system.

Procedure

- Step 1. Touch the static-protective package that contains the new backplane to any unpainted surface on the outside of the server. Then, take the new backplane out of the package and place it on a static-protective surface.
- Step 2. Connect the cables to the backplane.
- Step 3. Align the bottom of the backplane with the studs at the bottom of the drive cage. Rotate the backplane to vertical position so that the holes in the backplane pass through the pins on the drive cage, and press the backplane into position. The release latches will secure the backplane in place.

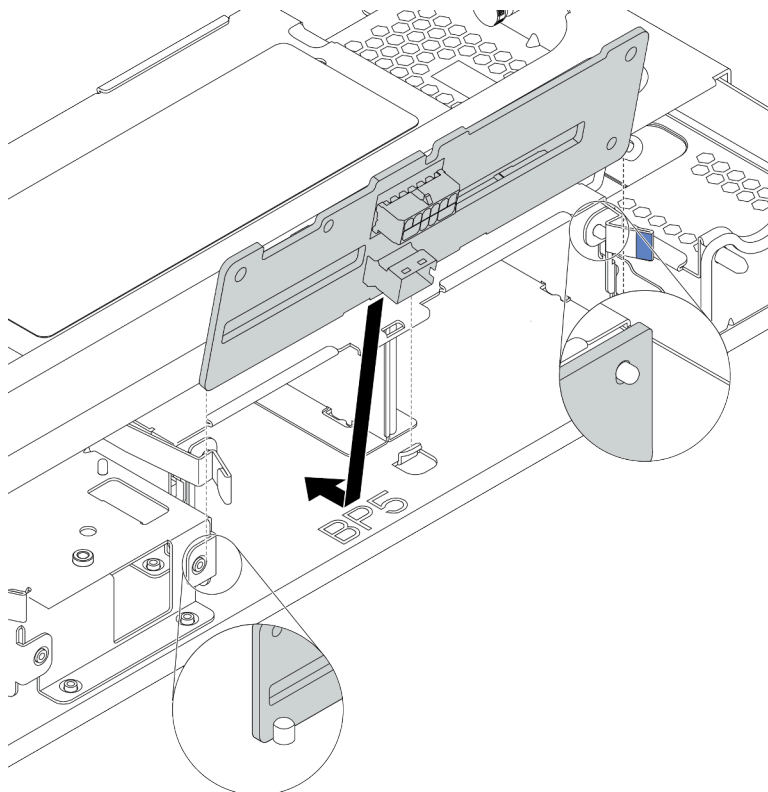


Figure 64. Installing the 4 x 2.5-inch-drive backplane

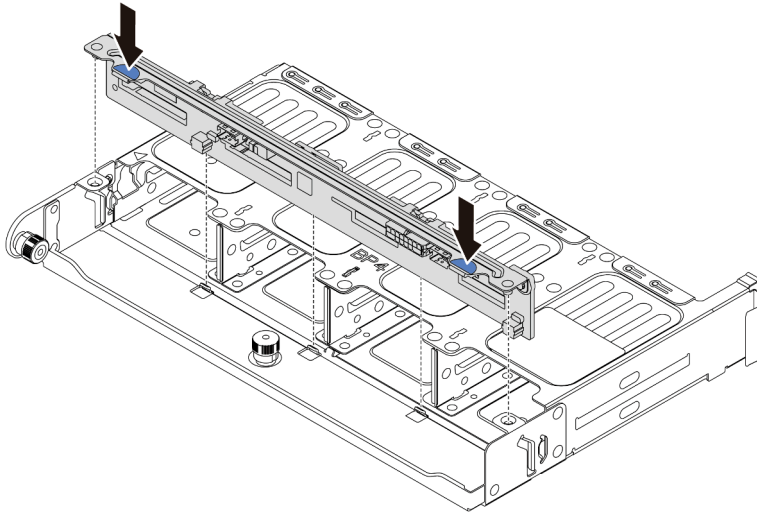


Figure 65. Installing the 8 x 2.5-inch-drive backplane

After you finish

Reinstall all the drives and fillers (if any) into the drive bays. See [“Install a hot-swap drive” on page 196](#).

Demo video

[Watch the procedure on YouTube](#)

Install the middle or rear 3.5-inch-drive backplane

Use this information to install the middle or rear 3.5-inch-drive backplane.

About this task

Your server supports:

- One type of middle 3.5-inch-drive backplane
 - 4 x 3.5-inch SAS/SATA backplane
- Two types of rear 3.5-inch-drive backplane
 - 2 x 3.5-inch SAS/SATA backplane
 - 4 x 3.5-inch SAS/SATA backplane

Notes:

- The procedure shows the installation of the backplane on the rear drive cage. The procedure is the same for installing the backplane on the middle drive cage.

Attention:

- Read [“Installation Guidelines” on page 140](#) to ensure that you work safely.
- Prevent exposure to static electricity, which might lead to system halt and loss of data, by keeping static-sensitive components in their static-protective packages until installation, and handling these devices with an electrostatic-discharge wrist strap or other grounding system.

Procedure

- Step 1. Touch the static-protective package that contains the new backplane to any unpainted surface on the outside of the server. Then, take the new backplane out of the package and place it on a static-protective surface.
- Step 2. Connect the cables to the backplane.
- Step 3. Align the bottom of the backplane with the studs at the bottom of the drive cage. Rotate the backplane to vertical position so that the holes in the backplane pass through the pins on the drive cage, and press the backplane into position. The release latches will secure the backplane in place.

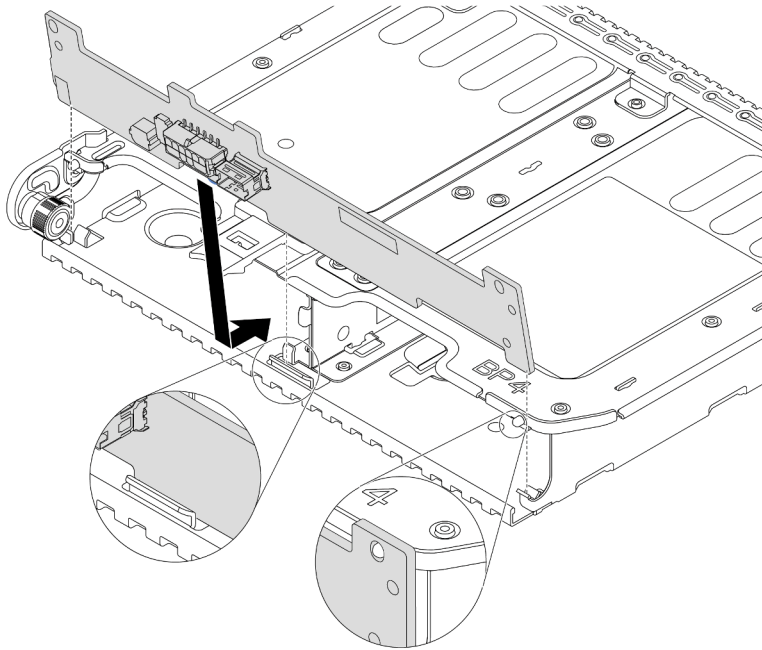


Figure 66. Installing the 2 x 3.5-inch-drive backplane

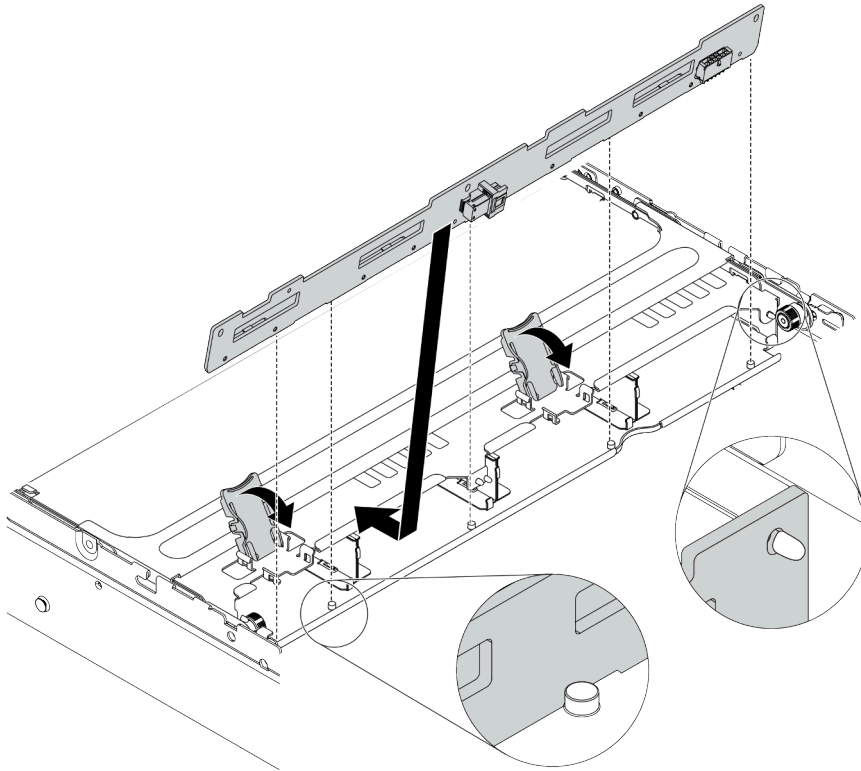


Figure 67. Installing the 4 x 3.5-inch-drive backplane

After you finish

Reinstall all the drives and fillers (if any) into the drive bays. See [“Install a hot-swap drive” on page 196](#).

Demo video

[Watch the procedure on YouTube](#)

Install the 7mm drive backplanes

Use this information to install the 7mm drive backplanes.

About this task

Attention:

- Read [“Installation Guidelines” on page 140](#) to ensure that you work safely.
- Power off the server and disconnect all power cords for this task.
- Prevent exposure to static electricity, which might lead to system halt and loss of data, by keeping static-sensitive components in their static-protective packages until installation, and handling these devices with an electrostatic-discharge wrist strap or other grounding system.

Procedure

Step 1. Take the new part out of the package and place it on a static-protective surface.

Step 2. Prepare your server.

1. Power off the server.

2. Remove the top cover. See [“Remove the top cover” on page 151](#).
 3. Record and disconnect any cables. See [Chapter 3 “Internal cable routing” on page 73](#).
 4. Remove any components that are impeding the procedure.
 5. Install any components that are required before installing or removing the component(s).
- Step 3. Connect the cables to the backplanes. See [“7mm drives” on page 81](#).

Step 4. Install the 7mm drive backplane at the bottom.

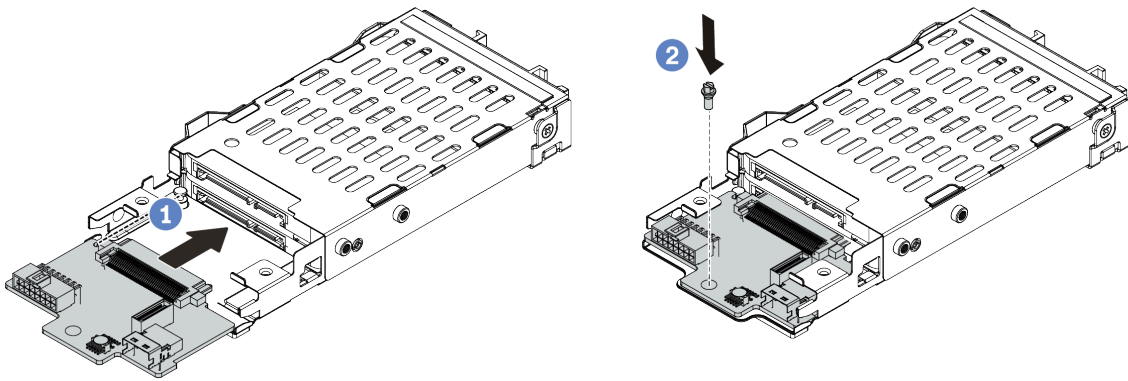


Figure 68. 7mm drive backplane installation (bottom)

- a. Align the pin on the cage and slightly slide the backplane into the cage until it is fully seated.
- b. Install the screw as shown.

Step 5. Install the 7mm drive backplane on the top.

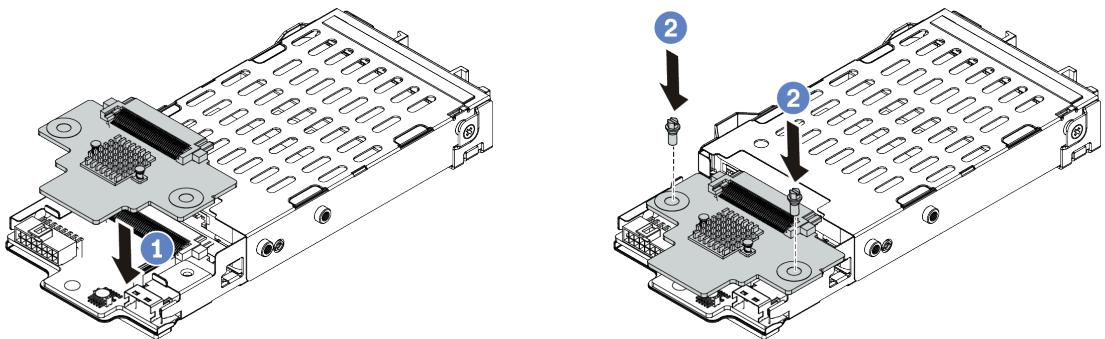


Figure 69. 7mm drive backplane installation (top)

- a. Put the backplane down on the cage as shown.
- b. Install the two screws to secure the backplane in place

Step 6. Connect the cables to the system board. See [“7mm drives” on page 81](#).

After you finish

Reinstall all the drives and fillers (if any) into the drive bays.

Demo video

[Watch the procedure on YouTube](#)

Install the cable holders

Use this information to install the cable holders.

About this task

Attention:

- Read [“Installation Guidelines” on page 140](#) to ensure that you work safely.
- Prevent exposure to static electricity, which might lead to system halt and loss of data, by keeping static-sensitive components in their static-protective packages until installation, and handling these devices with an electrostatic-discharge wrist strap or other grounding system.

Procedure

Step 1. Take the new part out of the package and place it on a static-protective surface.

Step 2. Prepare your server.

1. Power off the server.
2. Remove the top cover. See [“Remove the top cover” on page 151](#).
3. Record and disconnect any cables. See [Chapter 3 “Internal cable routing” on page 73](#).
4. Remove any components that are impeding the procedure.
5. Install any components that are required before installing or removing the component(s).

Step 3. Install the cable holders.

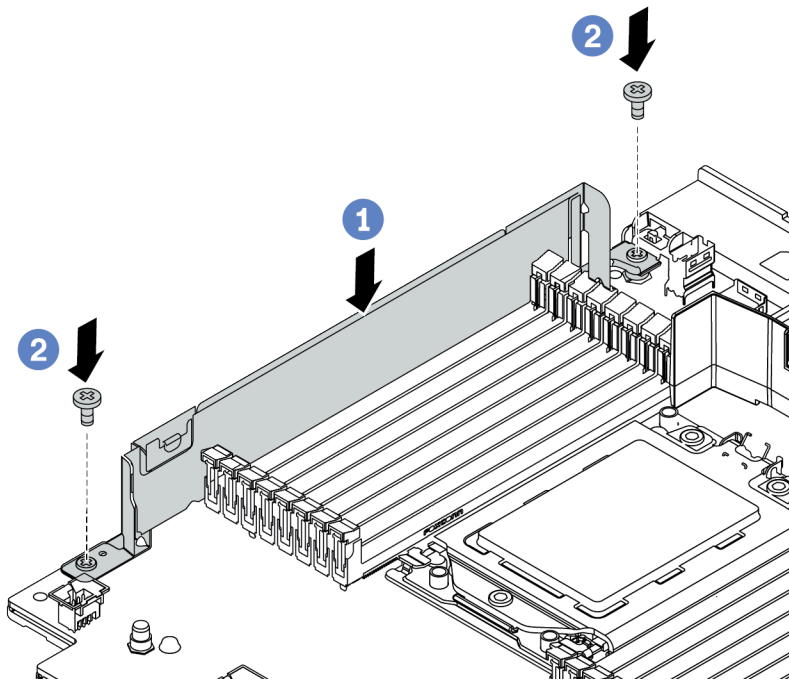


Figure 70. Cable holder installation

- a. Align the two holes on the system board. Install the holder to the system board as shown.
- b. Install the two screws to secure the holder.

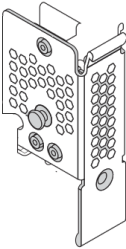
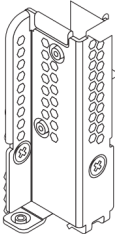
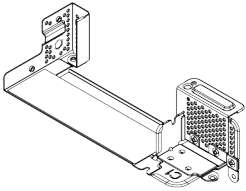
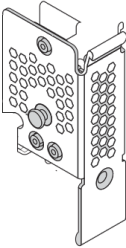
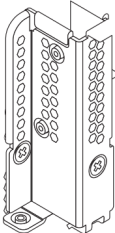
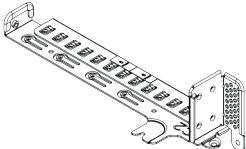
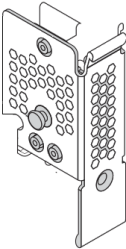
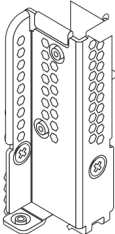
After you finish

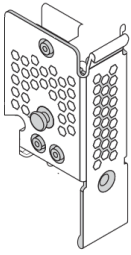
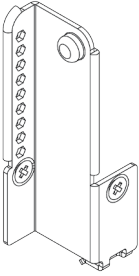
Connect any cables. See [Chapter 3 “Internal cable routing” on page 73](#).

Install the rearwall brackets

Use this information to remove and install a rearwall bracket.

Rearwall bracket matrix

Server model	Required rearwall brackets		
Server model with 8 PCIe slots	The server requires 3 rearwall brackets:		
	A1 	B1 	C1 
Server model with 4 x 2.5-inch rear drives	The server requires 3 rearwall brackets:		
	A1 	B1 	C2 
Server model with 2 x 3.5-inch rear drives	The server requires 2 rearwall brackets:		
	A1 	B1 	
Server model with 8 x 2.5-inch rear drives	The server requires 2 rearwall bracket:		

Server model	Required rearwall brackets
	<div style="display: flex; justify-content: space-around; align-items: center;"> <div style="text-align: center;"> <p>A1</p>  </div> <div style="text-align: center;"> <p>B2</p>  </div> </div>
Server model with 4 x 3.5-inch rear drives	The server requires no rearwall brackets

Install an A1 rearwall bracket (left)

Use this information to install an A1 rearwall on the left of the rear chassis.

About this task

Attention:

- Read [“Installation Guidelines” on page 140](#) to ensure that you work safely.
- Prevent exposure to static electricity, which might lead to system halt and loss of data, by keeping static-sensitive components in their static-protective packages until installation, and handling these devices with an electrostatic-discharge wrist strap or other grounding system.

Procedure

Step 1. Take the new part out of the package and place it on a static-protective surface.

Step 2. Prepare your server.

1. Power off the server.
2. Remove the top cover. See [“Remove the top cover” on page 151](#).
3. Record and disconnect any cables. See [Chapter 3 “Internal cable routing” on page 73](#).
4. Remove any components that are impeding the procedure.
5. Install any components that are required before installing or removing the component(s).

Step 3. Install an A1 rearwall bracket.

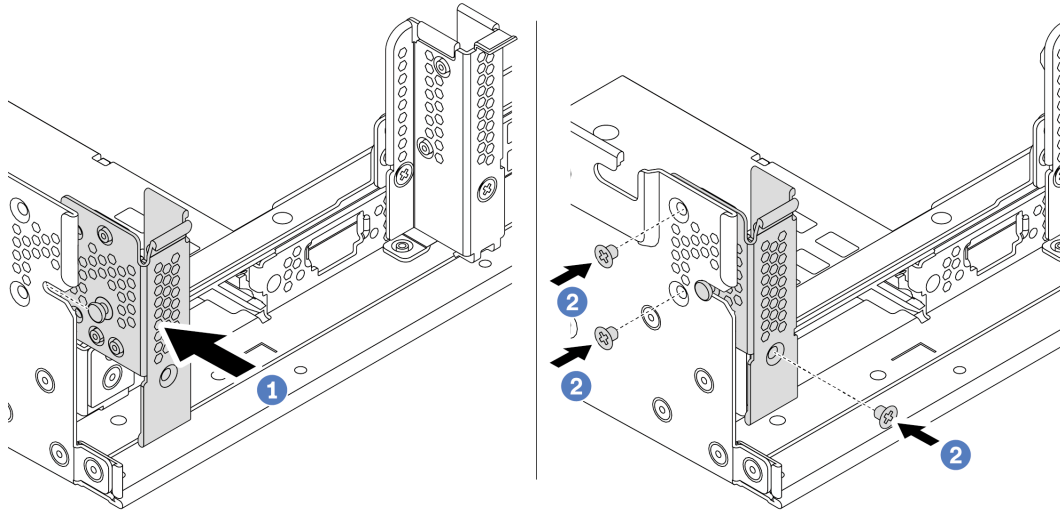


Figure 71. A1 rearwall bracket installation

- a. Align the pin on the rearwall bracket and the pin slot on the left side of the rear chassis. Install the bracket to the chassis as shown.
- b. Install the three screws to secure the rearwall bracket.

After you finish

Install a rear drive cage or riser assemblies. See

- [“Install the 4 x 2.5-inch rear drive cage” on page 188](#)
- [“Install the 8 x 2.5-inch rear drive cage” on page 189](#)
- [“Install the 2 x 3.5-inch rear drive cage” on page 185](#)
- [“Install the 4 x 3.5-inch rear drive cage” on page 186](#)
- [“Install a riser 1/2 assembly” on page 205](#)

Demo video

[Watch the procedure on YouTube](#)

Install a B1/B2 rearwall bracket (middle)

Use this information to install a B1/B2 rearwall on the middle of the rear chassis.

About this task

Attention:

- Read [“Installation Guidelines” on page 140](#) to ensure that you work safely.
- Prevent exposure to static electricity, which might lead to system halt and loss of data, by keeping static-sensitive components in their static-protective packages until installation, and handling these devices with an electrostatic-discharge wrist strap or other grounding system.

Procedure

Step 1. Take the new part out of the package and place it on a static-protective surface.

Step 2. Prepare your server.

1. Power off the server.
2. Remove the top cover. See [“Remove the top cover” on page 151.](#)
3. Record and disconnect any cables. See [Chapter 3 “Internal cable routing” on page 73.](#)
4. Remove any components that are impeding the procedure.
5. Install any components that are required before installing or removing the component(s).

Step 3. Install a B1 rearwall bracket.

Note: The figure illustrates only the installation of B1 rearwall bracket, the B2 rearwall bracket can be installed in the same way.

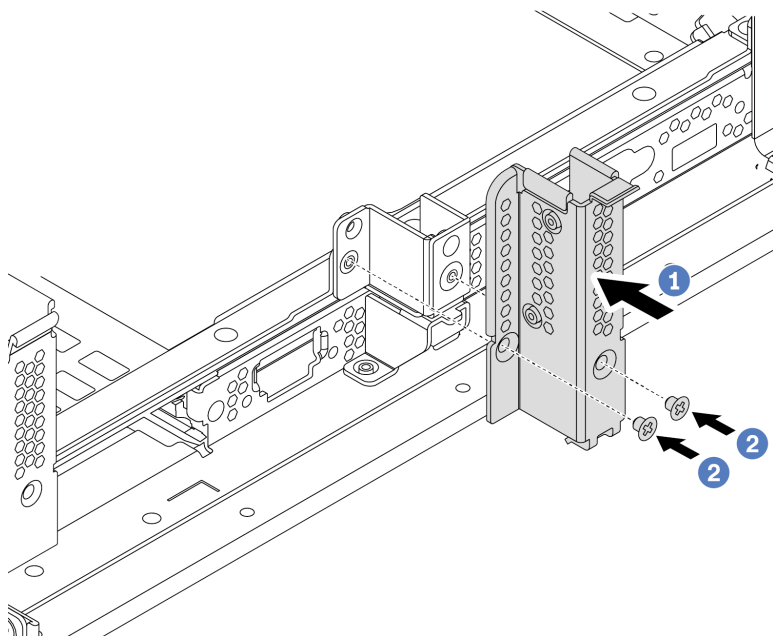


Figure 72. B1 rearwall bracket installation

- a. Align the holes on the rearwall bracket and the chassis. Install the bracket to the chassis as shown.
- b. Install the two screws to secure the rearwall bracket.

After you finish

Install a rear drive cage or riser assemblies. See

- [“Install the 4 x 2.5-inch rear drive cage” on page 188](#)
- [“Install the 2 x 3.5-inch rear drive cage” on page 185](#)
- [“Install a riser 1/2 assembly” on page 205](#)

Demo video

[Watch the procedure on YouTube](#)

Install a C1/C2 rearwall bracket (right)

Use this information to install a C1/C2 rearwall on the right of the rear chassis.

About this task

Attention:

- Read [“Installation Guidelines” on page 140](#) to ensure that you work safely.
- Prevent exposure to static electricity, which might lead to system halt and loss of data, by keeping static-sensitive components in their static-protective packages until installation, and handling these devices with an electrostatic-discharge wrist strap or other grounding system.

Procedure

Step 1. Take the new part out of the package and place it on a static-protective surface.

Step 2. Prepare your server.

1. Power off the server.
2. Remove the top cover. See [“Remove the top cover” on page 151](#).
3. Record and disconnect any cables. See [Chapter 3 “Internal cable routing” on page 73](#).
4. Remove any components that are impeding the procedure.
5. Install any components that are required before installing or removing the component(s).

Step 3. Install a C1 rearwall bracket.

Note: The figure illustrates only the installation of C1 rearwall bracket, the C2 rearwall bracket can be installed in the same way.

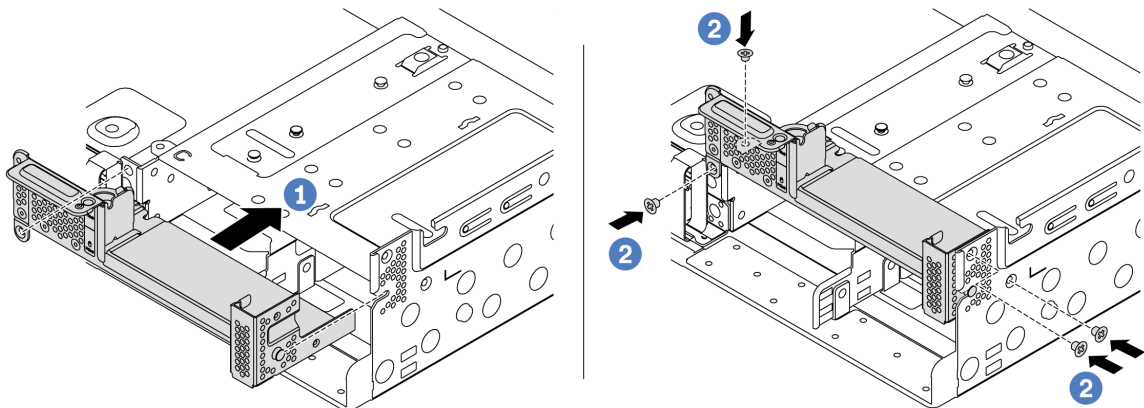


Figure 73. C1 rearwall bracket installation

- a. Align the pin on the rearwall bracket and the pin slot on the right side of the rear chassis. Install the bracket to the chassis as shown.
- b. Install the four screws to secure the rearwall bracket.

After you finish

Install a rear drive cage or riser assemblies. See

- [“Install the 4 x 2.5-inch rear drive cage” on page 188](#)
- [“Install a riser 1/2 assembly” on page 205](#)

Demo video

[Watch the procedure on YouTube](#)

Install a rear/middle drive cage

Use this information to remove and install a hot-swap-drive backplane.

This topic contains the following information:

- [“Install the 2.5-inch middle drive cage” on page 181](#)
- [“Install the 3.5-inch middle drive cage” on page 183](#)
- [“Install the 2 x 3.5-inch rear drive cage” on page 185](#)
- [“Install the 4 x 3.5-inch rear drive cage” on page 186](#)
- [“Install the 4 x 2.5-inch rear drive cage” on page 188](#)
- [“Install the 8 x 2.5-inch rear drive cage” on page 189](#)
- [“Install the 7mm drive cage\(3-slot\)” on page 191](#)
- [“Install the 7mm drive cage\(1-slot\)” on page 193](#)

Install the 2.5-inch middle drive cage

Use this information to install the middle 2.5-inch drive bay.

About this task

The middle drive cage is supported on some server models at certain conditions. For detailed information, see [“Technical rules” on page 22](#).

Attention:

- Read [“Installation Guidelines” on page 140](#) to ensure that you work safely.
- Prevent exposure to static electricity, which might lead to system halt and loss of data, by keeping static-sensitive components in their static-protective packages until installation, and handling these devices with an electrostatic-discharge wrist strap or other grounding system.

Procedure

- Step 1. Connect cables to the backplane.
- Step 2. Align the bottom of the backplane with the studs at the bottom of the drive cage. Rotate the backplane to vertical position so that the holes in the backplane pass through the pins on the drive cage, and press the backplane into position. The release latches will secure the backplane in place.

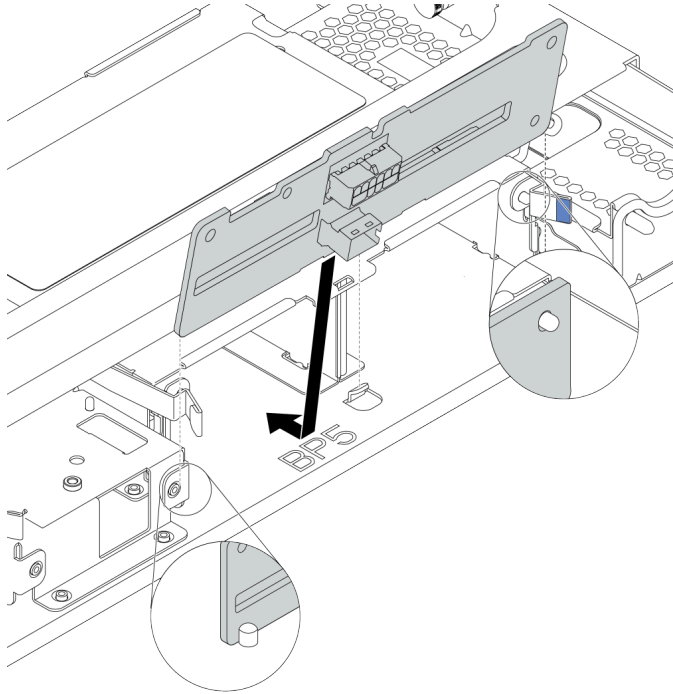


Figure 74. Installing the backplane

Step 3. Install the middle drive cage onto chassis and drives into drive bays. Then close the handle.

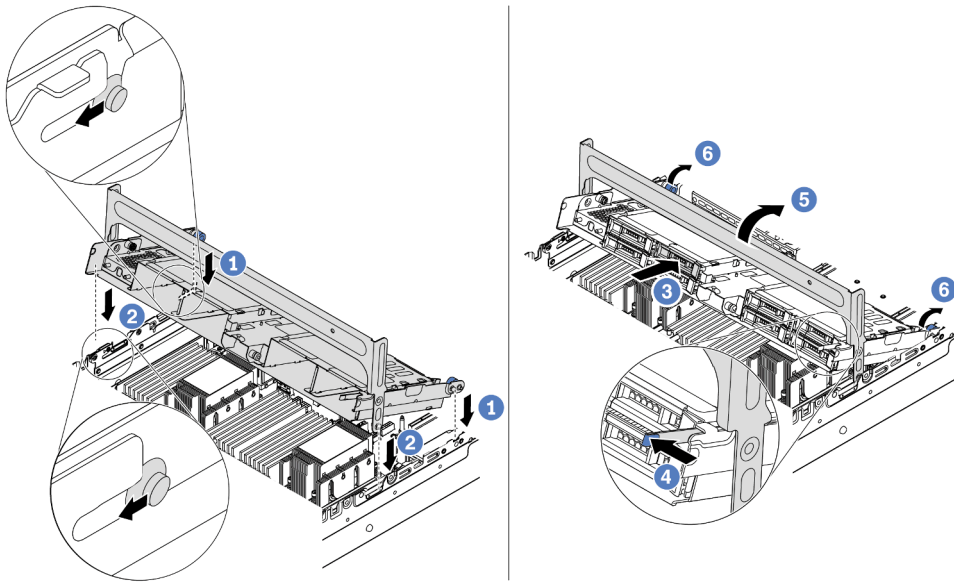


Figure 75. Installing the middle 2.5-inch drive cage and drives

1. Put the rear pins into the chassis slots.
2. Rotate the front of the drive cage down into place.
3. Install drives into the middle drive cage. See [“Install a hot-swap drive” on page 196](#).
4. Press the latch as shown.
5. Rotate the handle to close it.

After you finish

Connect cables from the backplanes to a RAID/HBA adapter. See [Chapter 3 “Internal cable routing” on page 73](#).

Demo video

[Watch the procedure on YouTube](#)

Install the 3.5-inch middle drive cage

Use this information to install the middle 3.5-inch drive cage.

About this task

The middle drive cage is supported on some server models at certain conditions. For detailed information, see [“Technical rules” on page 22](#).

Attention:

- Read [“Installation Guidelines” on page 140](#) to ensure that you work safely.
- Prevent exposure to static electricity, which might lead to system halt and loss of data, by keeping static-sensitive components in their static-protective packages until installation, and handling these devices with an electrostatic-discharge wrist strap or other grounding system.

Procedure

- Step 1. Connect cables to the backplane.
- Step 2. Align the bottom of the backplane with the studs at the bottom of the drive cage. Rotate the backplane to vertical position so that the holes in the backplane pass through the pins on the drive cage, and press the backplane into position. The release latches will secure the backplane in place.

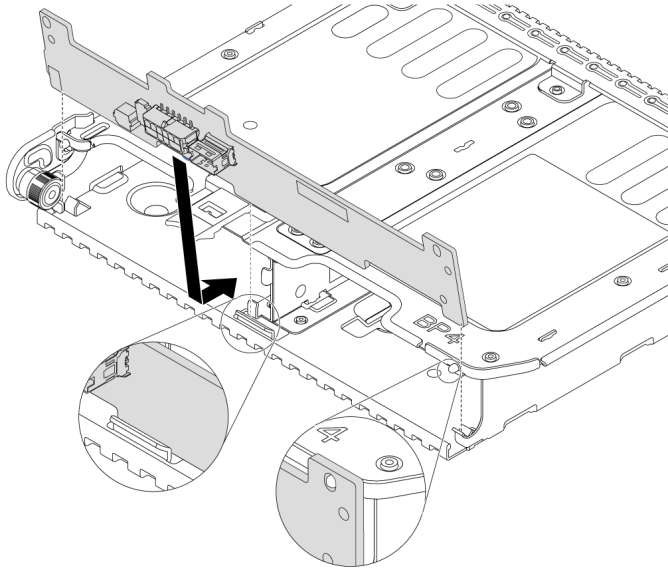


Figure 76. Installing the backplane

Step 3. Install the middle drive cage onto chassis and drives into the drive bays. Then close the handle.

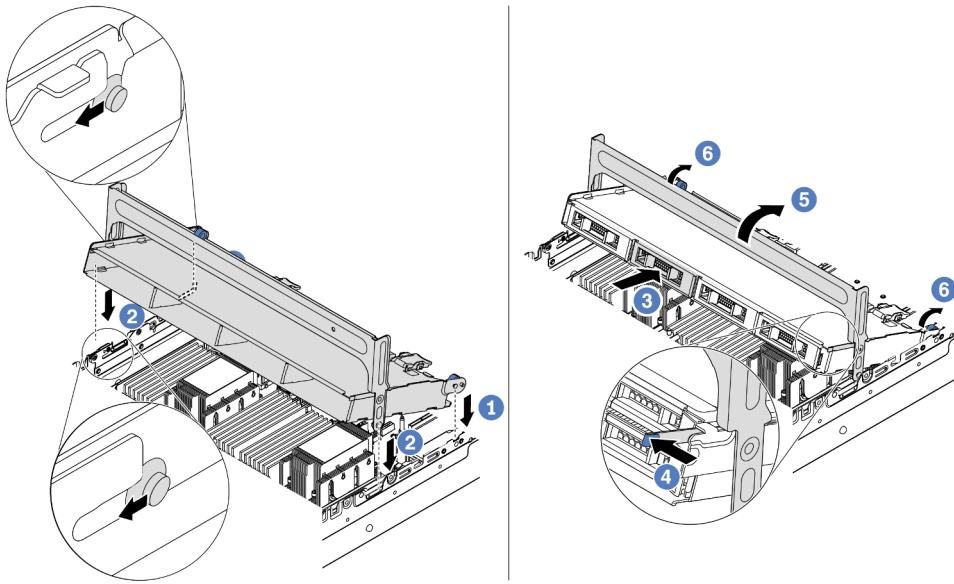


Figure 77. Installing the middle 3.5-inch drive cage and drives

1. Put the rear pins into the chassis slots.
2. Rotate the front of the drive cage down into place.
3. Install drives into the middle drive cage. See [“Install a hot-swap drive” on page 196](#).
4. Press the latch as shown.
5. Rotate the handle to close it.

After you finish

Connect cables from the backplanes to a RAID/HBA adapter. See [Chapter 3 “Internal cable routing” on page 73](#).

Demo video

[Watch the procedure on YouTube](#)

Install the 2 x 3.5-inch rear drive cage

Use this information to install the 2 x 3.5-inch rear drive cage.

About this task

The rear drive cage is supported on some server models at certain conditions. For detailed information, see [“Technical rules” on page 22](#).

Attention:

- Read [“Installation Guidelines” on page 140](#) to ensure that you work safely.
- Prevent exposure to static electricity, which might lead to system halt and loss of data, by keeping static-sensitive components in their static-protective packages until installation, and handling these devices with an electrostatic-discharge wrist strap or other grounding system.

Procedure

Step 1. Prepare your server.

1. Power off the server.
2. Remove the top cover. See [“Remove the top cover” on page 151](#).
3. Record and disconnect any cables. See [Chapter 3 “Internal cable routing” on page 73](#).
4. Remove any components that are impeding the procedure.
5. Install any components that are required before installing or removing the component(s).

Step 2. Install the 2 x 3.5-inch rear drive cage.

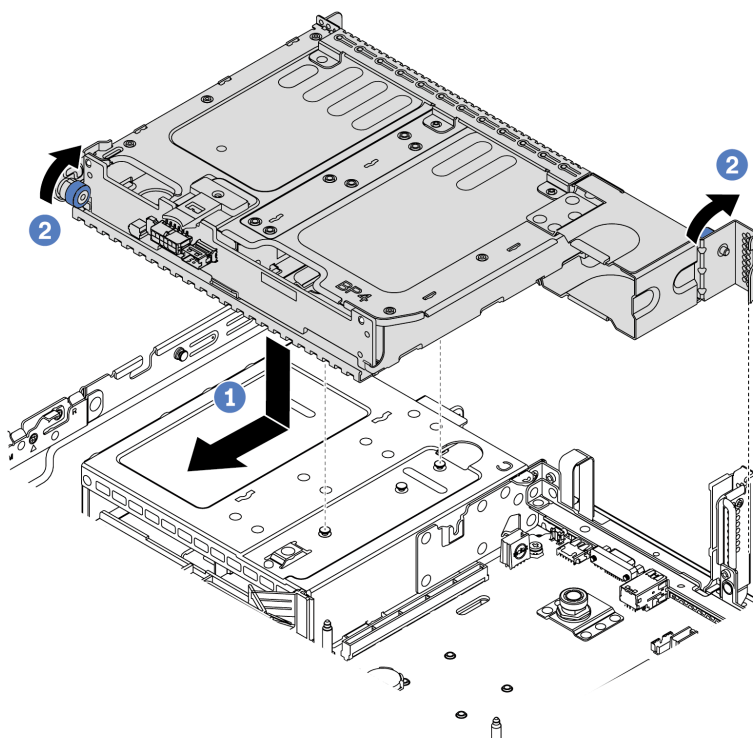


Figure 78. Installing the 2 x 3.5-inch rear drive cage

1. Align the rear drive cage with the chassis, and lower the drive cage into the chassis. Move the rear drive cage forward until it clicks into position.
2. Twist and release the blue plunger to secure the drive cage

Step 3. Check and ensure that the blue plungers are latched into place to secure the rear drive cage.

After you finish

1. Install the drives or drive fillers into the rear drive cage. See [“Install a hot-swap drive” on page 196](#).
2. Connect cables to the rear drive backplane. See [Chapter 3 “Internal cable routing” on page 73](#).

Install the 4 x 3.5-inch rear drive cage

Use this information to install the 4 x 3.5-inch rear drive cage.

About this task

The rear drive cage is supported on some server models at certain conditions. For detailed information, see [“Technical rules” on page 22](#).

Attention:

- Read [“Installation Guidelines” on page 140](#) to ensure that you work safely.
- Prevent exposure to static electricity, which might lead to system halt and loss of data, by keeping static-sensitive components in their static-protective packages until installation, and handling these devices with an electrostatic-discharge wrist strap or other grounding system.

Procedure

Step 1. Prepare your server.

1. Power off the server.
2. Remove the top cover. See [“Remove the top cover” on page 151](#).
3. Record and disconnect any cables. See [Chapter 3 “Internal cable routing” on page 73](#).
4. Remove any components that are impeding the procedure.
5. Install any components that are required before installing or removing the component(s).

Step 2. Align the rear drive cage with the chassis, and lower the drive cage into the chassis. Move the rear drive cage forward until it clicks into position.

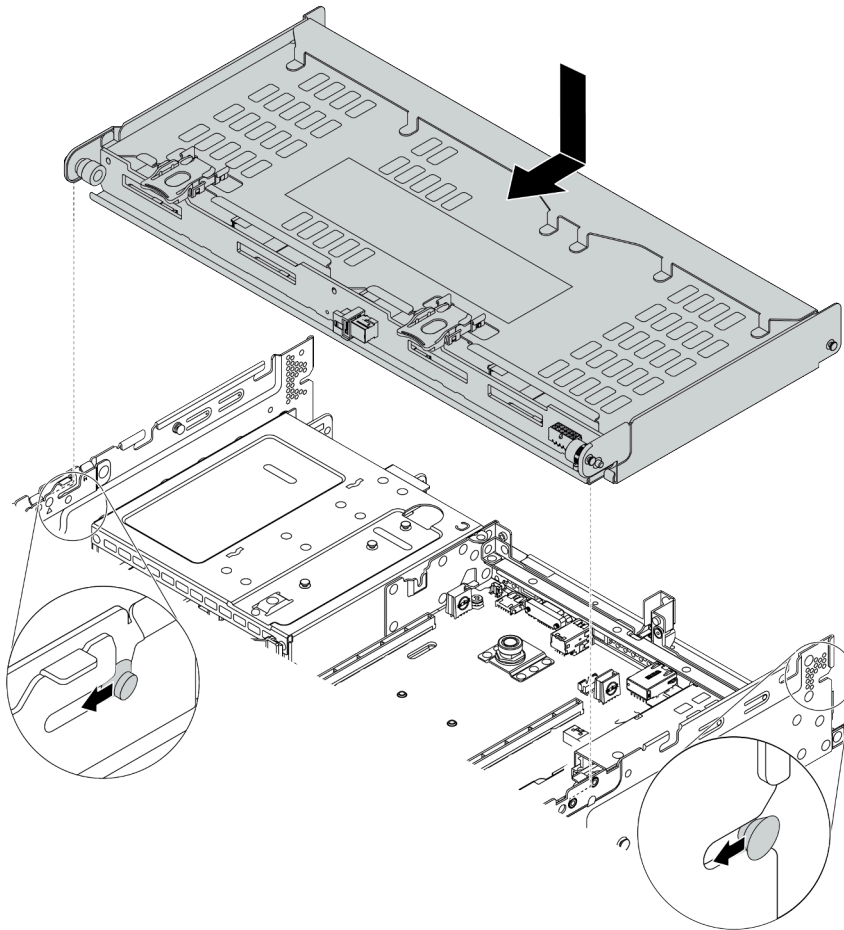


Figure 79. Installing the 4 x 3.5-inch rear drive cage

- Step 3. Check and ensure that the blue plungers are latched into place to secure the rear drive cage.
- Step 4. Install the top cover support bracket.

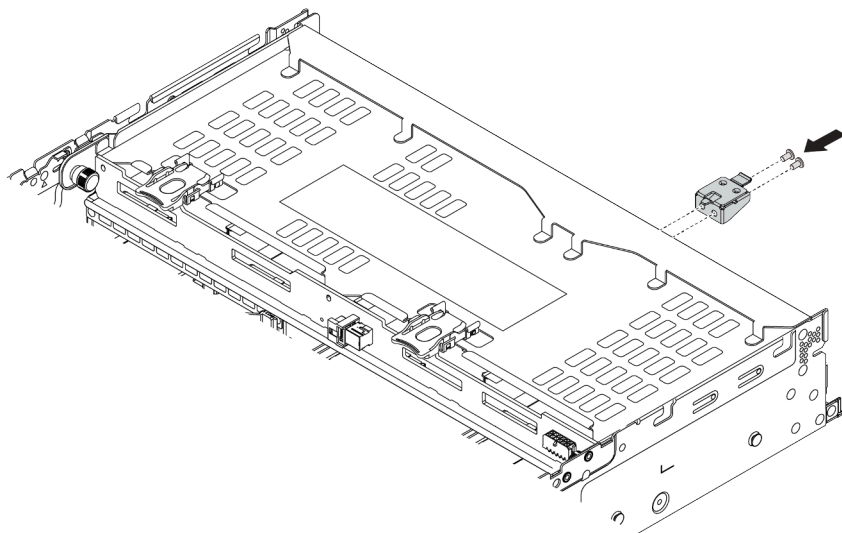


Figure 80. Installing the top cover support bracket

After you finish

1. Install the drives or drive fillers into the rear drive cage. See [“Install a hot-swap drive” on page 196](#).
2. Connect cables to the rear drive cage. See [Chapter 3 “Internal cable routing” on page 73](#).

Demo video

[Watch the procedure on YouTube](#)

Install the 4 x 2.5-inch rear drive cage

Use this information to install the 4 x 2.5-inch rear drive cage.

About this task

The rear drive cage is supported on some server models at certain conditions. For detailed information, see [“Technical rules” on page 22](#).

Attention:

- Read [“Installation Guidelines” on page 140](#) to ensure that you work safely.
- Prevent exposure to static electricity, which might lead to system halt and loss of data, by keeping static-sensitive components in their static-protective packages until installation, and handling these devices with an electrostatic-discharge wrist strap or other grounding system.

Procedure

Step 1. Prepare your server.

1. Install the required performance system fans. See [“Install a system fan” on page 226](#).
2. Install the required riser brackets. See
 - [“Install a riser 1/2 assembly” on page 205](#)

- [“Install a riser 3 assembly” on page 209](#)
3. Install the backplane to the drive cage. See [“Install the middle or rear 2.5-inch-drive backplane” on page 167.](#)
 4. Remove irrelevant rearwall brackets(if any) and install the rearwall bracket required for installing 4 x 2.5-inch rear drive cage.
 - The rearwall bracket combinations matrix in the “Rearwall bracket replacement” section in *Maintenance Manual*.
 - [“Install a C1/C2 rearwall bracket \(right\)” on page 178](#)

Step 2. Install the 4 x 2.5-inch rear drive cage.

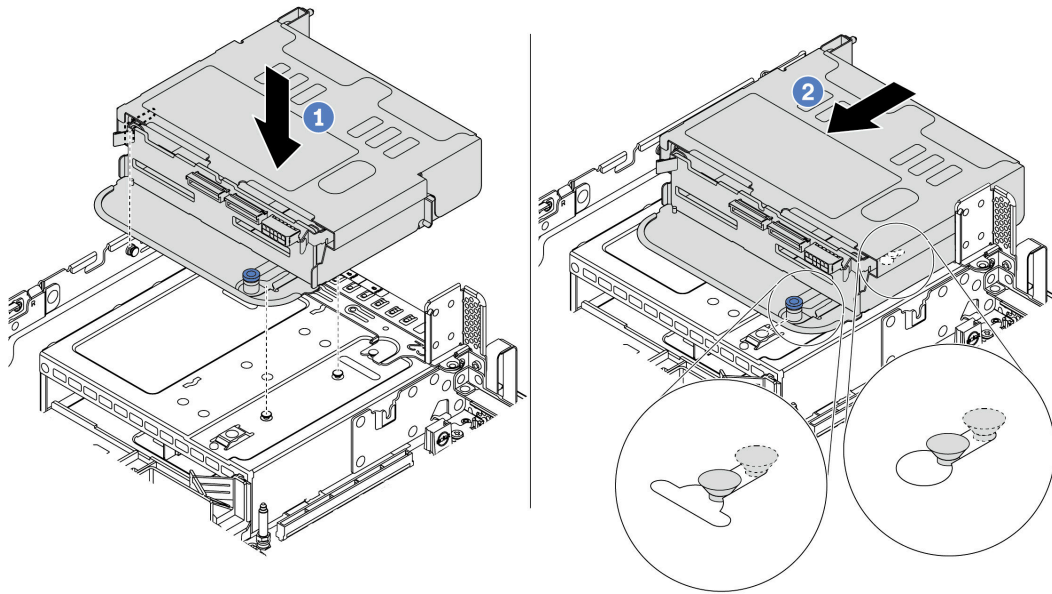


Figure 81. Installing the 4 x 2.5-inch rear drive cage

1. Align the rear drive cage with the chassis, and lower the drive cage into the chassis.
2. Move the rear drive cage forward until it clicks into position.

Step 3. Check and ensure that the plunger is latched into place to secure the rear drive cage.

After you finish

1. Reinstall the drives or drive fillers into the rear drive cage. See [“Install a hot-swap drive” on page 196.](#)
2. Connect cables to the rear drive cage. See [Chapter 3 “Internal cable routing” on page 73.](#)

Install the 8 x 2.5-inch rear drive cage

Use this information to install the 8 x 2.5-inch rear drive cage.

About this task

The rear drive cage is supported on some server models at certain conditions. For detailed information, see [“Technical rules” on page 22.](#)

Attention:

- Read [“Installation Guidelines” on page 140](#) to ensure that you work safely.
- Prevent exposure to static electricity, which might lead to system halt and loss of data, by keeping static-sensitive components in their static-protective packages until installation, and handling these devices with an electrostatic-discharge wrist strap or other grounding system.

Procedure

Step 1. Prepare your server.

1. Power off the server.
2. Remove the top cover. See [“Remove the top cover” on page 151](#).
3. Record and disconnect any cables. See [Chapter 3 “Internal cable routing” on page 73](#).
4. Remove any components that are impeding the procedure.
5. Install any components that are required before installing or removing the component(s).

Step 2. Install the 8 x 2.5-inch rear drive cage.

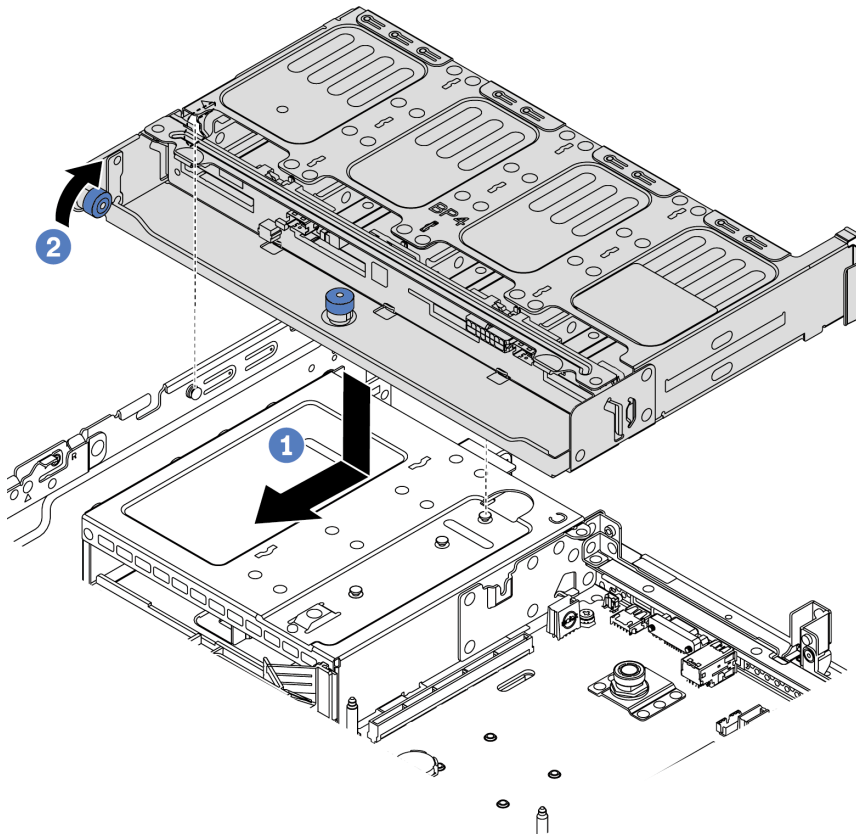


Figure 82. Installing the 8 x 2.5-inch rear drive cage

1. Align the rear drive cage with the chassis, and lower the drive cage into the chassis. Move the rear drive cage forward until it clicks into position.
2. Twist and put down the blue plunger.

After you finish

1. Install the drives or drive fillers into the rear drive cage. See [“Install a hot-swap drive” on page 196](#).
2. Connect cables to the rear drive cage. See [Chapter 3 “Internal cable routing” on page 73](#).

Demo video

[Watch the procedure on YouTube](#)

Install the 7mm drive cage(3-slot)

Use this information to install the 7mm drive cage(two full-height slots + one 7mm cage).

About this task

Attention:

- Read [“Installation Guidelines” on page 140](#) to ensure that you work safely.
- Power off the server and disconnect all power cords for this task.
- Prevent exposure to static electricity, which might lead to system halt and loss of data, by keeping static-sensitive components in their static-protective packages until installation, and handling these devices with an electrostatic-discharge wrist strap or other grounding system.

Procedure

Step 1. Take the new part out of the package and place it on a static-protective surface.

Step 2. Prepare your server.

1. Power off the server.
2. Remove the top cover. See [“Remove the top cover” on page 151](#).
3. Record and disconnect any cables. See [Chapter 3 “Internal cable routing” on page 73](#).
4. Remove any components that are impeding the procedure.
5. Install any components that are required before installing or removing the component(s).

Step 3. Install the two 7mm backplanes to the 7mm drive cage.

Step 4. Hook the securing clip over the riser adapter on the riser cage.

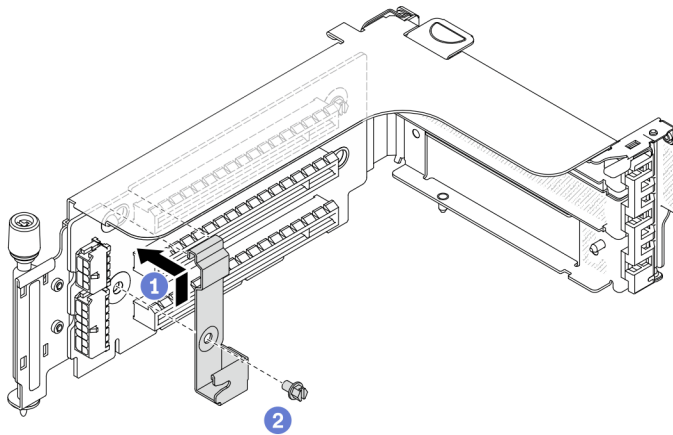


Figure 83. 7mm drive cage securing clip installation

Step 5. Install the 7mm drive cage to the riser cage.

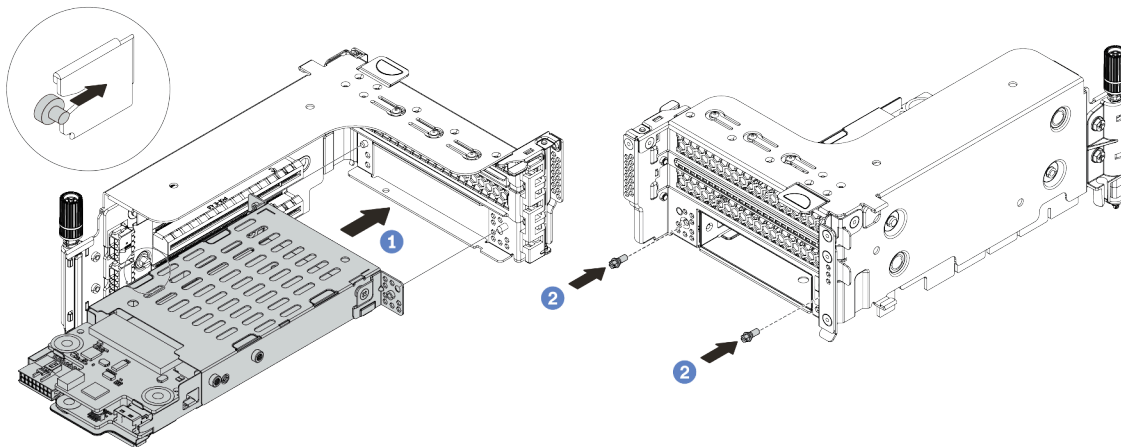


Figure 84. 7mm drive cage installation

- a. Align the left-side pin on the 7mm drive cage with the positioning slot on the securing clip, the two holes on the side brackets of the 7mm drive cage with the two holes on the front of the riser cage.
- b. Install the two screws to secure the 7mm drive cage in place.

Step 6. Install the 7mm drive assembly on the system board.

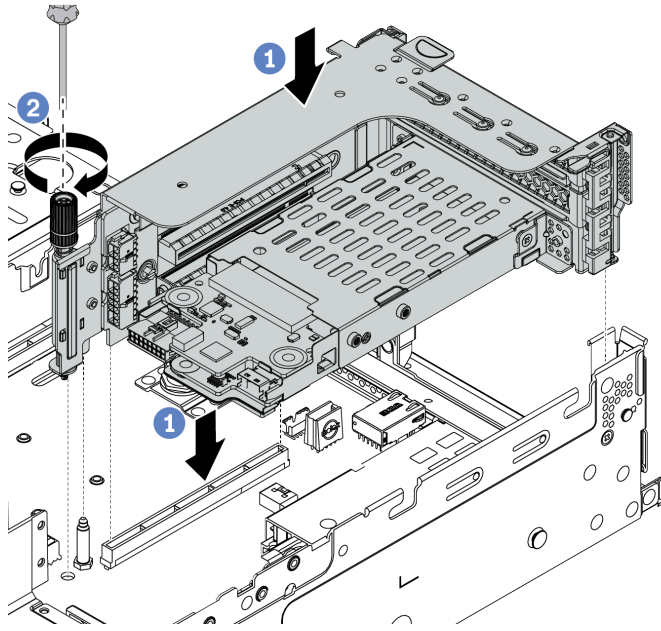


Figure 85. 7mm drive cage installation

Step 7. Connect any cables from the 7mm drive backplanes. See [“7mm drives” on page 81](#).

After you finish

Install all the drives and fillers (if any) into the drive bays. See [“Install a hot-swap drive” on page 196](#).

Demo video

[Watch the procedure on YouTube](#)

Install the 7mm drive cage(1-slot)

Use this information to install the 7mm drive cage(one 7mm cage).

About this task

Attention:

- Read [“Installation Guidelines” on page 140](#) to ensure that you work safely.
- Power off the server and disconnect all power cords for this task.
- Prevent exposure to static electricity, which might lead to system halt and loss of data, by keeping static-sensitive components in their static-protective packages until installation, and handling these devices with an electrostatic-discharge wrist strap or other grounding system.

Procedure

Step 1. Take the new part out of the package and place it on a static-protective surface.

Step 2. Prepare your server.

1. Power off the server.
2. Remove the top cover. See [“Remove the top cover” on page 151](#).
3. Record and disconnect any cables. See [Chapter 3 “Internal cable routing” on page 73](#).

4. Remove any components that are impeding the procedure.
5. Install any components that are required before installing or removing the component(s).

Step 3. Install the two 7mm backplanes to the 7mm drive cage.

Step 4. Hook the securing clip over the riser adapter on the riser cage.

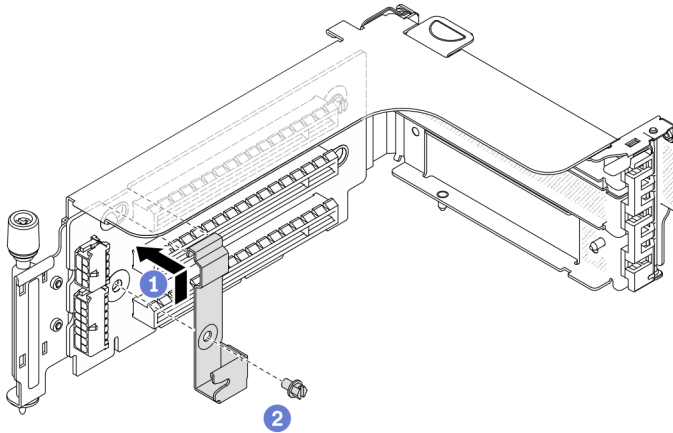


Figure 86. 7mm drive cage securing clip installation

Step 5. Install the 7mm drive cage to the riser cage.

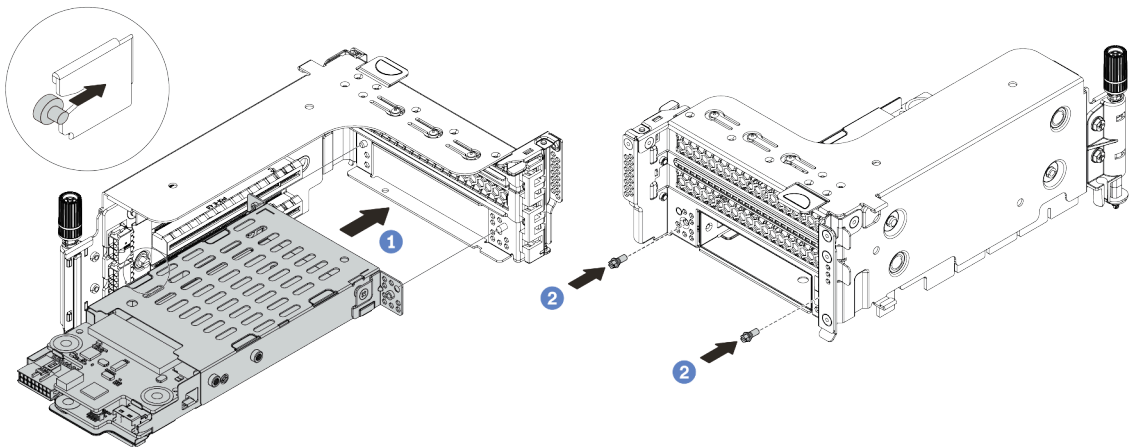


Figure 87. 7mm drive cage installation

- a. Align the left-side pin on the 7mm drive cage with the positioning slot on the securing clip, the two holes on the side brackets of the 7mm drive cage with the two holes on the front of the riser cage.
- b. Install the two screws to secure the 7mm drive cage in place.

Step 6. Install the 7mm drive assembly on the system board.

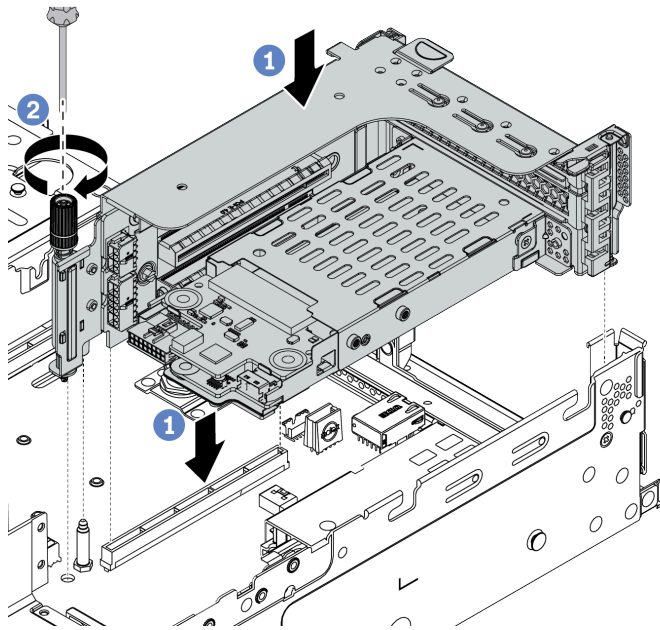


Figure 88. 7mm drive cage installation

Step 7. Connect any cables from the 7mm drive backplanes. See [“7mm drives” on page 81](#).

After you finish

Install all the drives and fillers (if any) into the drive bays. See [“Install a hot-swap drive” on page 196](#).

Install a hot-swap drive

Use this information to install a hot-swap drive.

About this task

Attention:

- Read [“Installation Guidelines” on page 140](#) to ensure that you work safely.
- Prevent exposure to static electricity, which might lead to system halt and loss of data, by keeping static-sensitive components in their static-protective packages until installation, and handling these devices with an electrostatic-discharge wrist strap or other grounding system.

Procedure

Step 1. Touch the static-protective package that contains the drive to any unpainted surface on the outside of the server. Then, take the drive out of the package and place it on a static-protective surface.

Note: Ensure that drive installation meets [“Technical rules” on page 22](#).

Step 2. Remove the drive filler from the drive bay and keep the drive filler in a safe place.

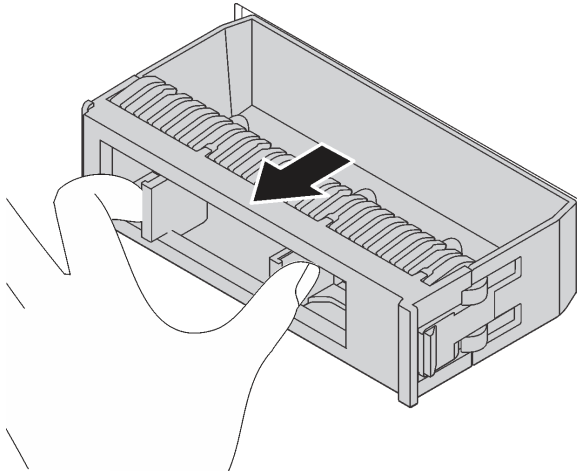


Figure 89. Drive filler removal

Step 3. Install the drive in the drive bay.

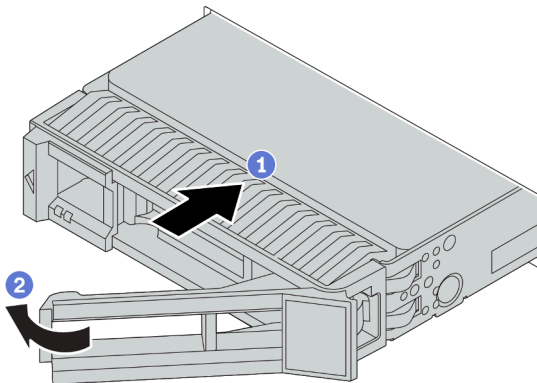


Figure 90. Hot-swap drive installation


- Ensure that the drive tray handle is in the open position. Slide the drive into the drive bay until it snaps into position.
- Close the drive tray handle to lock the drive in place.

Step 4. Check the drive status LED to verify that the drive is operating correctly.

- If the yellow drive status LED is lit continuously, that drive is faulty and must be replaced.
- If the green drive activity LED is flashing, the drive is being accessed.

Step 5. Continue to install additional hot-swap drives if necessary.

After you finish

- Use the Lenovo XClarity Provisioning Manager to configure the RAID if necessary. For more information, see the “RAID Setup” section in the LXPM documentation compatible with your server at https://sysmgt.lenovofiles.com/help/topic/lxpm_frontend/lxpm_product_page.html.
- If you have installed U.3 NVMe drives on a 2.5-inch AnyBay 8-bay backplane for Tri-mode, enable **U.3 x1 mode** for the selected drive slots on the backplane through the XCC Web GUI.
 - Log into the XCC Web GUI, and choose **Storage → Detail** from the navigation tree on the left.
 - In the window that is displayed, click the icon  next to **Backplane**.

- c. In the dialog box that is displayed, select the target drive slots and click **Apply**.
- d. Do a DC power cycle to make the setting take effect.

Demo video

[Watch the procedure for a 2.5-inch hot-swap drive on YouTube](#)

[Watch the procedure for a 3.5-inch hot-swap drive on YouTube](#)

Install the M.2 adapter and M.2 drive

Use this information to install the M.2 adapter and M.2 drive.

Attention:

- Read [“Installation Guidelines” on page 140](#) to ensure that you work safely.
- Power off the server and disconnect all power cords for this task.
- Prevent exposure to static electricity, which might lead to system halt and loss of data, by keeping static-sensitive components in their static-protective packages until installation, and handling these devices with an electrostatic-discharge wrist strap or other grounding system.

Procedure

Step 1. Touch the static-protective package that contains the new M.2 adapter and M.2 drive to any unpainted surface on the outside of the server. Then, take the new M.2 adapter and M.2 drive out of the package and place them on a static-protective surface.

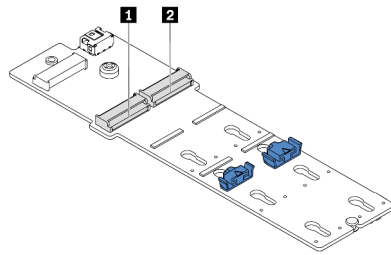
Notes:

- The M.2 adapter is shipped with a loose screw, but the screw is not necessarily used for the installation.
- The M.2 adapter you want to install might be different from the following illustrations, but the installation method is the same.

Step 2. Adjust the retainer on the M.2 adapter to accommodate the particular size of the M.2 drive you wish to install. See [“Adjust the retainer on the M.2 adapter” on page 204](#).

Step 3. Locate the connector on the M.2 adapter.

Note: Some M.2 adapters support two identical M.2 drives. Install the M.2 drive in slot 0 first.



- 1** Slot 0
- 2** Slot 1

Figure 91. M.2 drive slot

Step 4. Install the M.2 adapter into the M.2 tray.

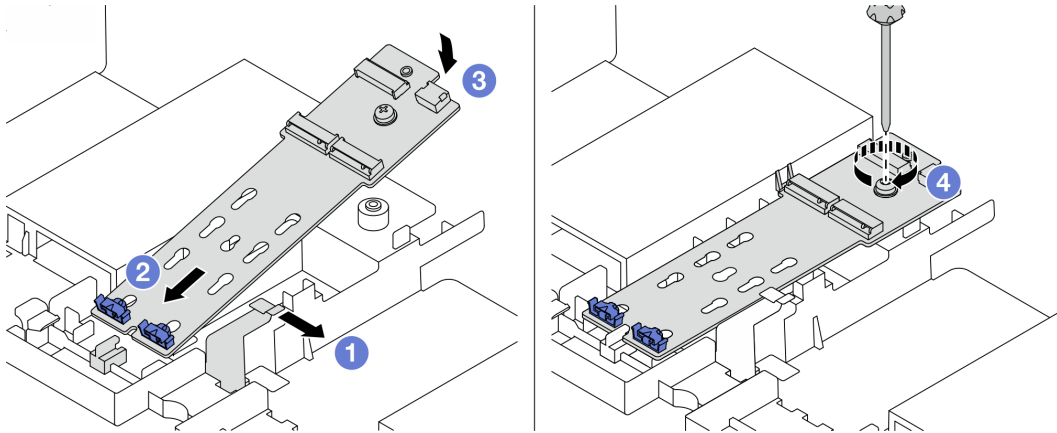


Figure 92. M.2 adapter installation

- a. Open the retention clip on the air baffle.
- b. Insert the M.2 adapter at an angle of approximately 30 degrees into the tray as shown.
- c. Rotate the M.2 adapter downward until it snaps into place.
- d. Tighten the screw to secure the M.2 adapter.

Step 5. Install the M.2 drive on the M.2 adapter.

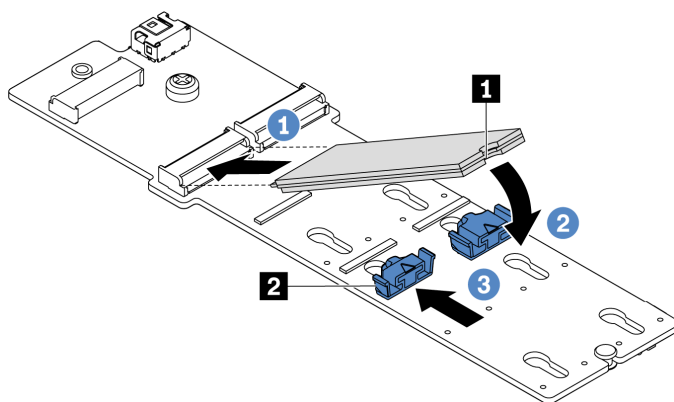


Figure 93. M.2 drive installation

- Insert the M.2 drive at an angle of approximately 30 degrees into the connector.
- Rotate the M.2 drive down until the notch **1** catches on the lip of the retainer **2**.
- Slide the retainer forward (toward the connector) to secure the M.2 drive into place.

Step 6. Connect the cables to the M.2 backplane and system board. See “M.2 drives” on page 83.

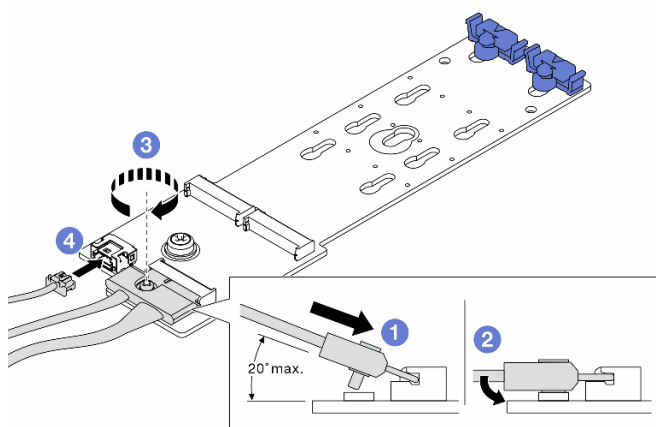


Figure 94. Connecting M.2 cables

- Tilt the connector at an angle of 20 degrees or lower, and insert it until its bottom surface reaches the ramp.
- Press the connector down flat.
- Tighten the screw on the signal cable.
- Connect the power cable.

After you finish

Use the Lenovo XClarity Provisioning Manager to configure the RAID. For more information, see the “RAID Setup” section in the LXPM documentation compatible with your server at https://sysmgmt.lenovofiles.com/help/topic/lxpm_frontend/lxpm_product_page.html.

Demo video

[Watch the procedure on YouTube](#)

Adjust the retainer on the M.2 adapter

Use this information to adjust the retainer on the M.2 adapter.

Attention:

- Read [“Installation Guidelines” on page 140](#) to ensure that you work safely.
- Power off the server and disconnect all power cords for this task.
- Prevent exposure to static electricity, which might lead to system halt and loss of data, by keeping static-sensitive components in their static-protective packages until installation, and handling these devices with an electrostatic-discharge wrist strap or other grounding system.

Procedure

- Step 1. Locate the correct keyhole that the retainer should be installed into to accommodate the particular size of the M.2 drive you wish to install.
- Step 2. Adjust the M.2 retainer.

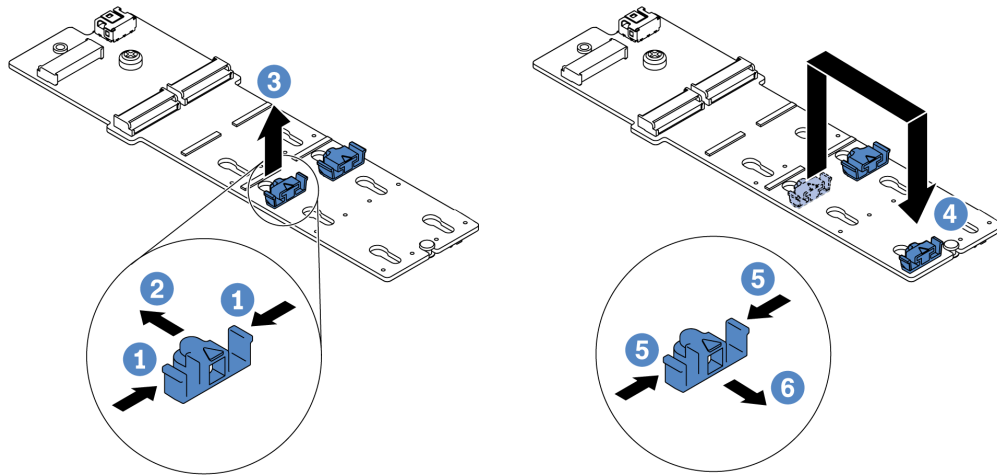


Figure 95. M.2 retainer adjustment

- a. Press both sides of the retainer.
- b. Move the retainer forward until it is in the large opening of the keyhole.
- c. Take the retainer out of the keyhole.
- d. Insert the retainer into the correct keyhole.
- e. Press both sides of the retainer.
- f. Slide the retainer backwards (toward the small opening of the keyhole) until it is seated in place.

Install a riser 1/2 assembly

Use this information to install a riser 1 assembly or riser 2 assembly.

About this task

Attention:

- Read [“Installation Guidelines” on page 140](#) to ensure that you work safely.
- Prevent exposure to static electricity, which might lead to system halt and loss of data, by keeping static-sensitive components in their static-protective packages until installation, and handling these devices with an electrostatic-discharge wrist strap or other grounding system.

Procedure

- Step 1. Touch the static-protective package that contains the new riser card to any unpainted surface on the outside of the server. Then, take the new riser card out of the package and place it on a static-protective surface.
- Step 2. Install a riser card in a riser cage.

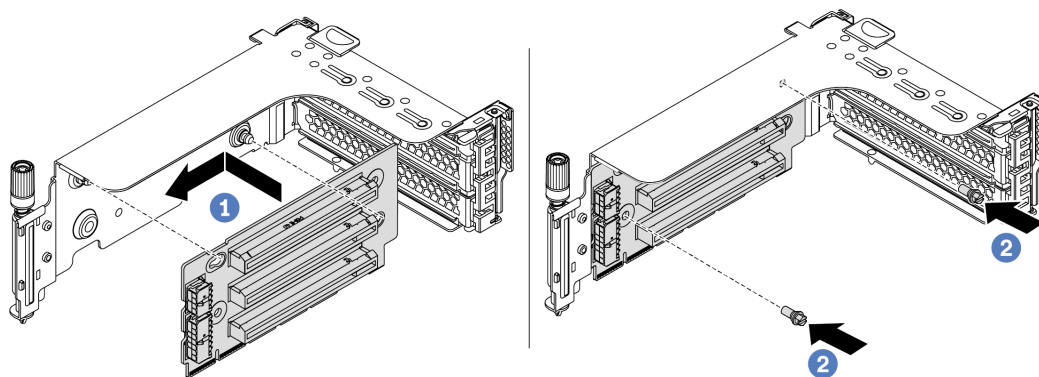


Figure 96. Riser card installation (three-slot riser bracket)

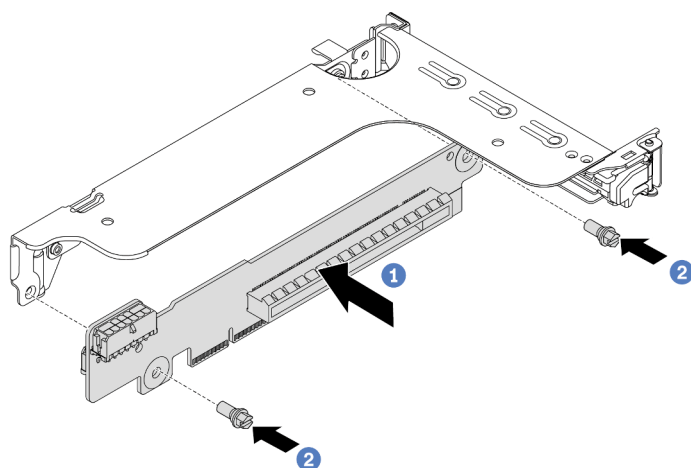


Figure 97. Riser card installation (one-slot or two-slot riser bracket)

- a. Align the holes in the riser card with the mounting studs on the bracket. Install the riser card to the bracket in the direction as shown.
- b. Install the two screws to secure the riser card to the bracket.

Step 3. Install PCIe adapters. For information about supported PCIe adapters and PCIe slots, see [“PCIe slots and configurations” on page 29](#).

Note: Carefully handle the PCIe adapter by its edges.

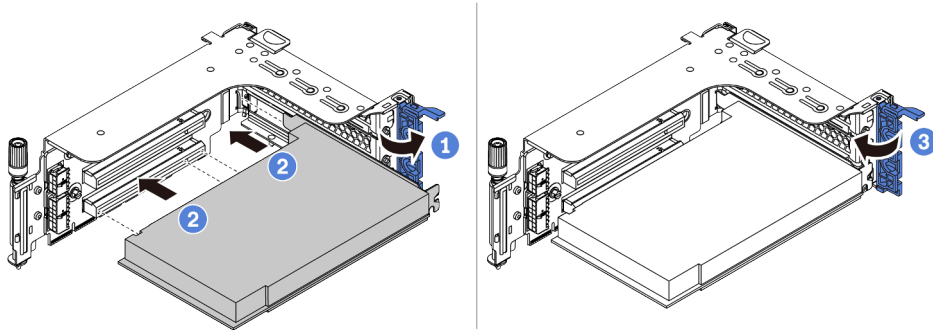


Figure 98. PCIe adapter installation

- a. Align the PCIe adapter with the PCIe slot on the riser card. Carefully press the PCIe adapter straight into the slot until it is securely seated and its bracket also is secured.
 - b. Rotate the PCIe adapter retention latch to the closed position.
- Step 4. Check the rearwall matrix and decide which rearwall brackets need to be installed or removed for installing your riser assemblies. See [“Install the rearwall brackets” on page 175](#), [“Install the rearwall brackets” on page 175](#) and [“Install a B1/B2 rearwall bracket \(middle\)” on page 177](#).

Step 5. Install a riser 1 assembly or riser 2 assembly. The illustration shows installing the riser 1 assemblies. The procedure is the same for installing riser 2 assemblies.

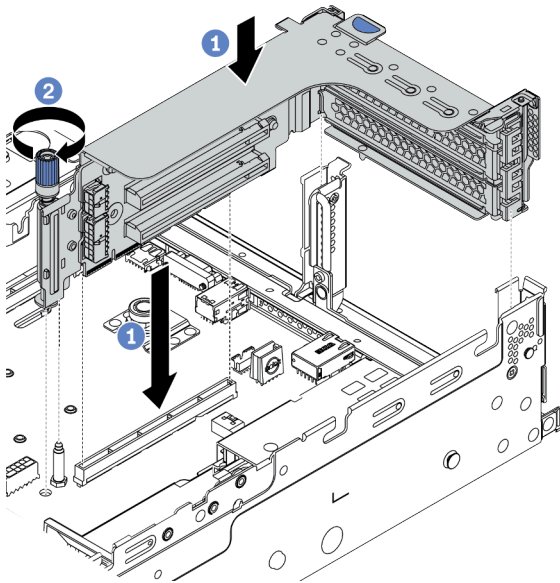


Figure 99. Riser 1 assembly installation (three-slot bracket)

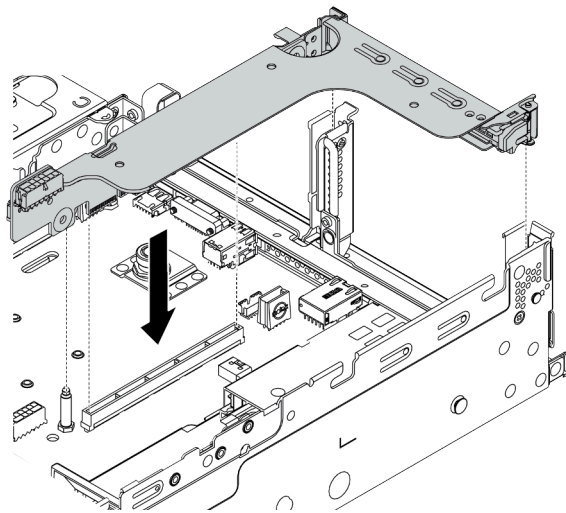


Figure 100. Riser 1 assembly installation (one-slot riser bracket)

- a. Align the riser adapter in the riser cage with the riser slot on the system board. Carefully press the riser card straight into the slot until it is securely seated.
- b. (Optional) If there is one screw on the riser cage, tighten the screw.

After you finish

Refer to [Chapter 3 “Internal cable routing” on page 73](#) to connect any cables to the PCIe adapters.

Demo video

[Watch the procedure on YouTube](#)

Install a riser 3 assembly

Use this information to install a riser 3 assembly.

About this task

Attention:

- Read [“Installation Guidelines” on page 140](#) to ensure that you work safely.
- Prevent exposure to static electricity, which might lead to system halt and loss of data, by keeping static-sensitive components in their static-protective packages until installation, and handling these devices with an electrostatic-discharge wrist strap or other grounding system.

Procedure

- Step 1. Touch the static-protective package that contains the new riser card to any unpainted surface on the outside of the server. Then, take the new riser card out of the package and place it on a static-protective surface.
- Step 2. Install the riser card to the riser bracket. See [Step 2 Install a riser card on page 205](#).
- Step 3. Install PCIe adapters. See [Step 3 Install a PCIe adapter on page 207](#).
- Step 4. Check the rearwall matrix and decide which rearwall brackets need to be installed or removed for installing your riser assemblies. See [“Install the rearwall brackets” on page 175](#) and [“Install a C1/C2 rearwall bracket \(right\)” on page 178](#)

Step 5. Install a riser 3 assembly.

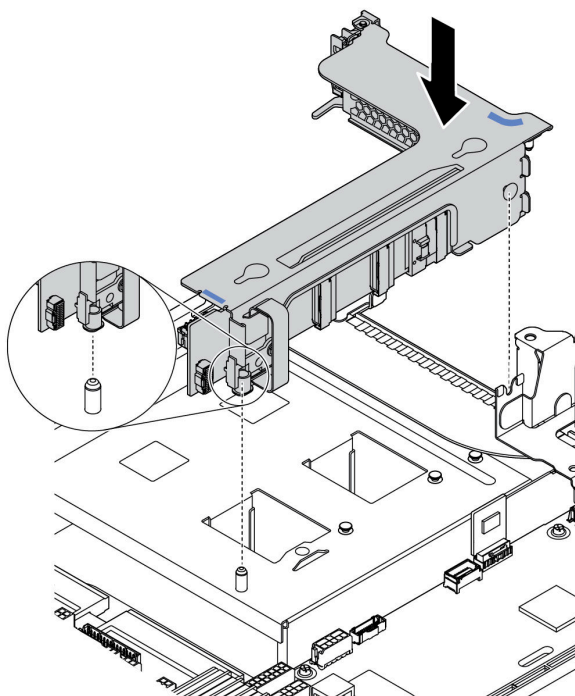


Figure 101. Riser 3 assembly installation

- a. Align the securing clip at the end of the riser cage with the pin on the rear chassis, the pin on the right side of the riser cage with the pin slot on the C1 rearwall bracket. Carefully put down the riser 3 assembly until it is securely seated.

After you finish

Refer to [Chapter 3 “Internal cable routing” on page 73](#) to connect any cables to the PCIe adapters.

Install the internal CFF RAID/HBA/RAID expander adapter

Use this information to install the internal CFF RAID adapter, internal CFF HBA adapter, or internal CFF RAID expander adapter.

About this task

Attention:

- Read [“Installation Guidelines” on page 140](#) to ensure that you work safely.
- Power off the server and disconnect all power cords for this task.
- Prevent exposure to static electricity, which might lead to system halt and loss of data, by keeping static-sensitive components in their static-protective packages until installation, and handling these devices with an electrostatic-discharge wrist strap or other grounding system.

Procedure

Step 1. Take the new part out of the package and place it on a static-protective surface.

Step 2. Prepare your server.

1. Power off the server.

2. Remove the top cover. See [“Remove the top cover” on page 151](#).
 3. Record and disconnect any cables. See [Chapter 3 “Internal cable routing” on page 73](#).
 4. Remove any components that are impeding the procedure.
 5. Install any components that are required before installing or removing the component(s).
- Step 3. Align the notches on the mounting bracket with the pins on the chassis, place down the adapter, and slightly slide it as shown to secure it on the chassis.

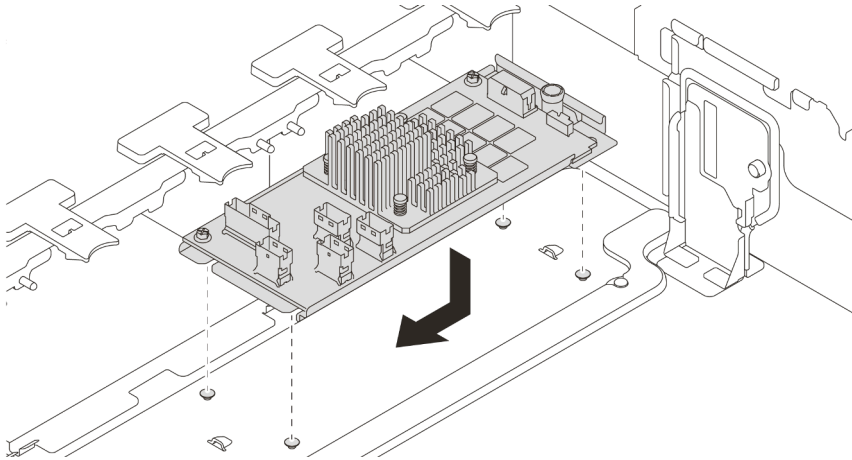


Figure 102. Internal CFF RAID/HBA adapter installation

- Step 4. Connect cables to the adapter.

After you finish

Reinstall the components that you have been removed for installing the adapter.

Demo video

[Watch the procedure on YouTube](#)

Install a serial port module

Use this information to install a serial port module.

About this task

Attention:

- Read [“Installation Guidelines” on page 140](#) to ensure that you work safely.
- Power off the server and disconnect all power cords for this task.
- Prevent exposure to static electricity, which might lead to system halt and loss of data, by keeping static-sensitive components in their static-protective packages until installation, and handling these devices with an electrostatic-discharge wrist strap or other grounding system.
- Read the [“PCIe slots and configurations” on page 29](#) for the PCIe slots to ensure that you install the serial port module to a correct PCIe slot.

Procedure

- Step 1. Touch the static-protective package that contains the new component to any unpainted surface on the outside of the server. Then, take the component out of the package and place it on a static-protective surface.
- Step 2. Use a 5 mm wrench to install the serial port cable into the bracket.

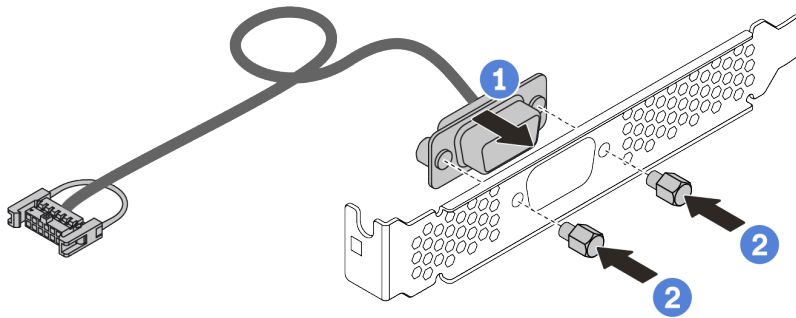


Figure 103. Serial port module assembling

- Step 3. Remove the riser bracket from the server.
- Step 4. Install the serial port module to the riser bracket.
- Step 5. Install the riser assembly back to the server.
- Step 6. Connect the cable of the serial port module to the serial-port-module connector on the system board. For the location of the serial-port-module connector, refer to [“System board” on page 64](#).

After you finish

1. Complete the parts replacement.
2. To enable the serial port module, do one of the following according to the installed operating system:
 - For Linux operating system:

Open the ipmitool and enter the following command to disable the Serial over LAN (SOL) feature:

```
-I lanplus -H IP -U USERID -P PASSWORD sol deactivate
```

- For Microsoft Windows operating system:
 - a. Open the ipmitool and enter the following command to disable the SOL feature:

```
-I lanplus -H IP -U USERID -P PASSWORD sol deactivate
```

- b. Open Windows PowerShell and enter the following command to disable the Emergency Management Services (EMS) feature:
`Bcdedit /ems no`
- c. Restart the server to ensure that the EMS setting takes effect.

Install a GPU adapter

Use this information to install a GPU adapter.

About this task

Higher GPU power requires higher PSU power. Use Lenovo Capacity Planner to calculate the required power capacity for what is configured for the server. More information about Lenovo Capacity Planner is available at:

[Lenovo Capacity Planner website](#)

Attention:

- Read [“Installation Guidelines” on page 140](#) to ensure that you work safely.
- Prevent exposure to static electricity, which might lead to system halt and loss of data, by keeping static-sensitive components in their static-protective packages until installation, and handling these devices with an electrostatic-discharge wrist strap or other grounding system.
- GPU adapters are supported on some server models with requirements. See [“Technical rules” on page 22](#).
- Depending on the specific type, your GPU adapter might look different from the illustration in this topic.
- Use any documentation that comes with the GPU adapter and follow those instructions in addition to the instructions in this topic.

Procedure

- Step 1. Install the GPU air baffle.
- Step 2. Locate the appropriate PCIe slot for the GPU adapter. See [“Technical rules” on page 22](#)
- Step 3. (Optional) If a single-wide 150W GPU adapter (FHFL) is installed on PCIe slot 1, 4, or 7, but the adjacent slot (slot 2, 5, or 8 respectively) is left empty or is installed with a half-length adapter, install an add-on air baffle on the GPU air baffle.

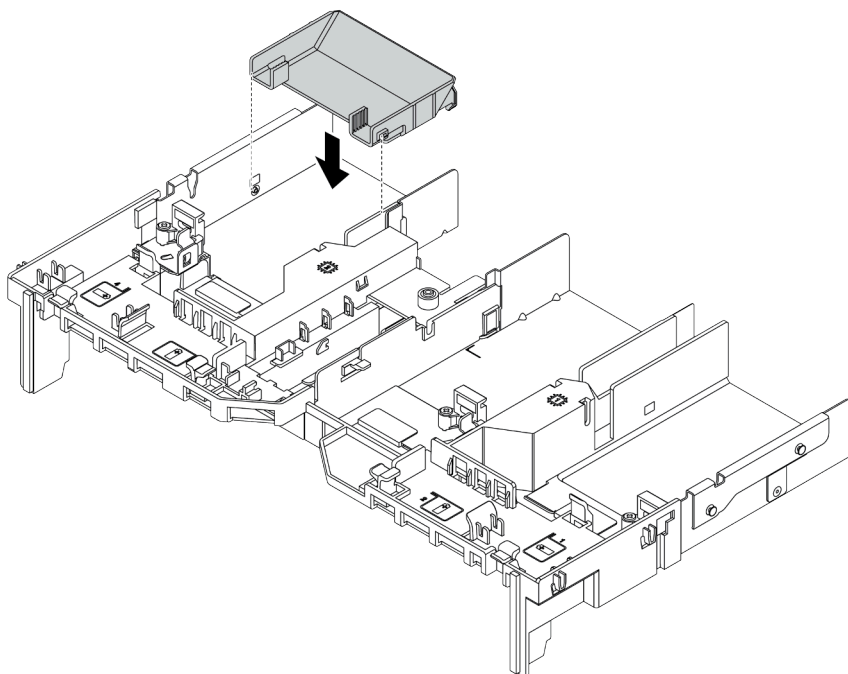


Figure 104. Installing the add-on GPU air baffle

- Step 4. Install the GPU adapter to the riser cage.
1. Open the blue latch on the riser cage.
 2. Align the GPU adapter with the PCIe slot on the riser card. Then, carefully press the GPU adapter straight into the slot until it is securely seated.
 3. Close the blue latch.

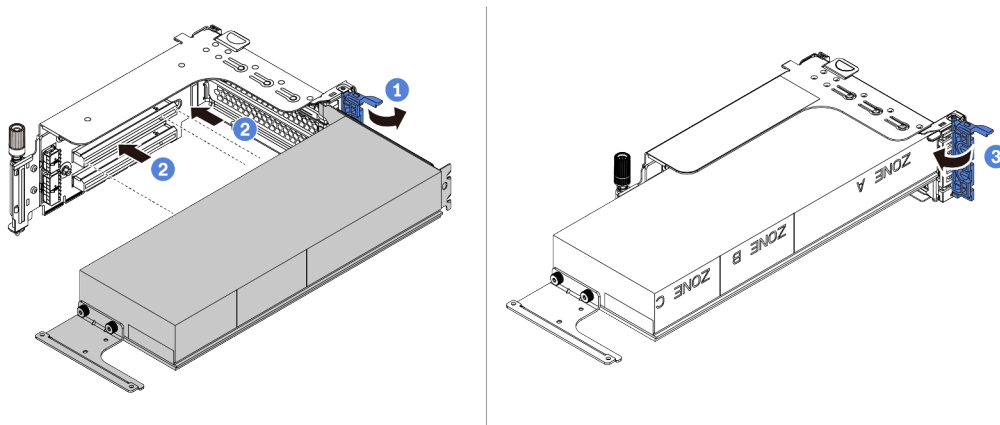


Figure 105. Installing the GPU adapter to the riser cage

- Step 5. (Optional) Connect the power cable to the power connector on the GPU adapter. See [“GPUs” on page 75](#).

Note: If your GPU adapter TDP is equal to or lower than 75 watts, the adapter can be powered directly by the riser slot. An extra power cable is required for powering GPU adapters with TDP higher than 75 watts.

- Step 6. Install the riser assembly to the system.

Notes: If a full-length GPU is installed in the riser cage, perform the following steps to ensure that the other end of the assembly is securely fixed to the GPU air baffle.

1. Align the slots and slightly put down the riser assembly.
2. Open the blue latch on the GPU air baffle and fix the end of the GPU adapter. Then, close the blue latch.
3. Tighten the riser cage screw.

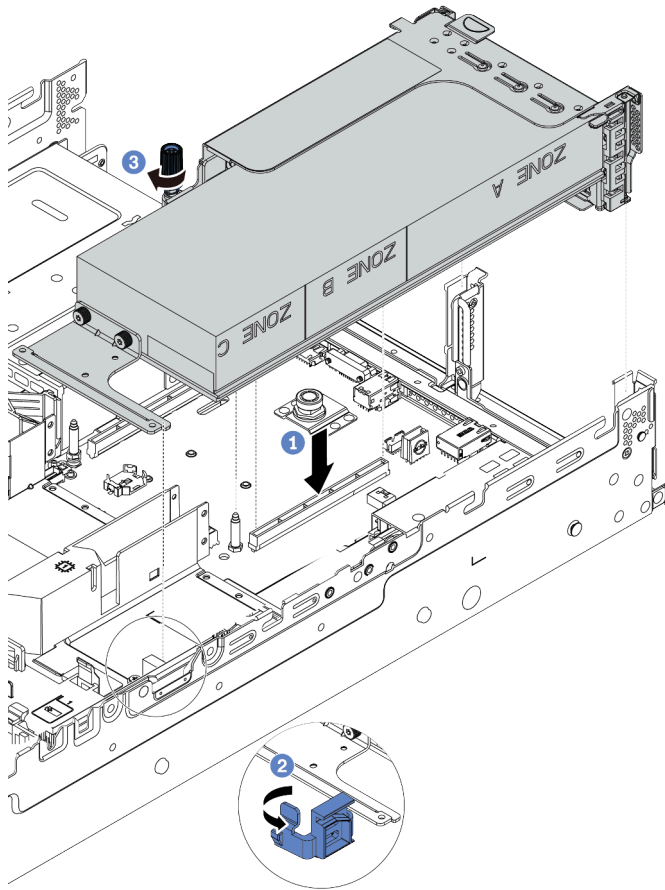


Figure 106. Installing the riser assembly

Step 7. If a certain slot is not installed with a GPU adapter, install a filler as shown.

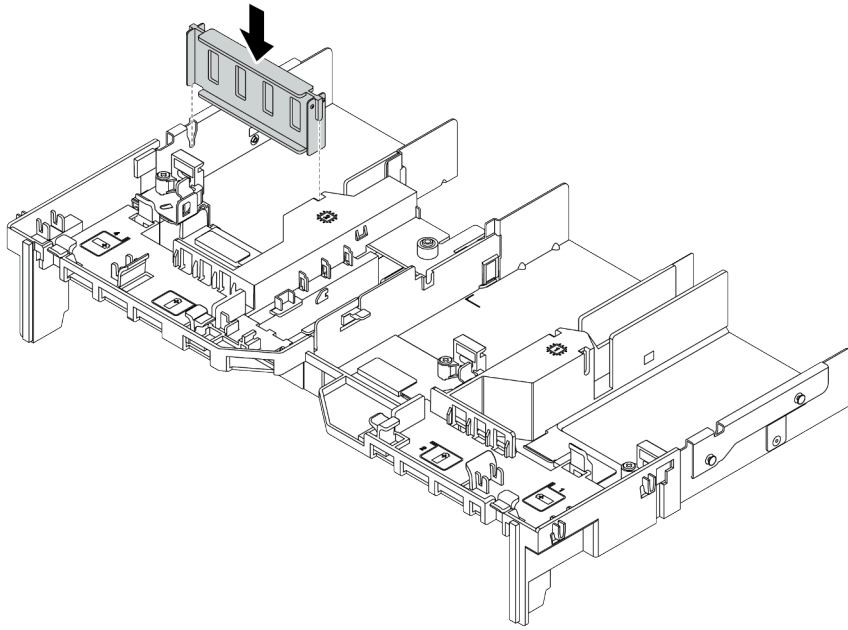


Figure 107. Installing the GPU filler

Install the OCP 3.0 Ethernet adapter

Use this information to install the OCP 3.0 Ethernet adapter.

About this task

CAUTION:

Make sure that all server power cords are disconnected from their power sources before performing this procedure.

Attention:

- Read [“Installation Guidelines” on page 140](#) to ensure that you work safely.
- Power off the server and disconnect all power cords for this task.
- Prevent exposure to static electricity, which might lead to system halt and loss of data, by keeping static-sensitive components in their static-protective packages until installation, and handling these devices with an electrostatic-discharge wrist strap or other grounding system.

Procedure

- Step 1. Touch the static-protective package that contains the new OCP 3.0 Ethernet adapter to any unpainted surface on the outside of the server. Then, take the new OCP 3.0 Ethernet adapter out of the package and place it on a static-protective surface.
- Step 2. Remove the OCP 3.0 Ethernet adapter filler if there is.
- Step 3. Install the OCP 3.0 Ethernet adapter.

Notes:

- Ensure that the Ethernet adapter is fully seated and the thumbscrew is securely tightened. Otherwise, the OCP 3.0 Ethernet adapter will not get full connection and may not function.
- If there is an OCP 3.0 Ethernet adapter installed, when the system is powered off but still plugged in to AC power, system fans will continue to spin at a much lower speed. This is the system design to provide proper cooling for the OCP 3.0 Ethernet adapter.

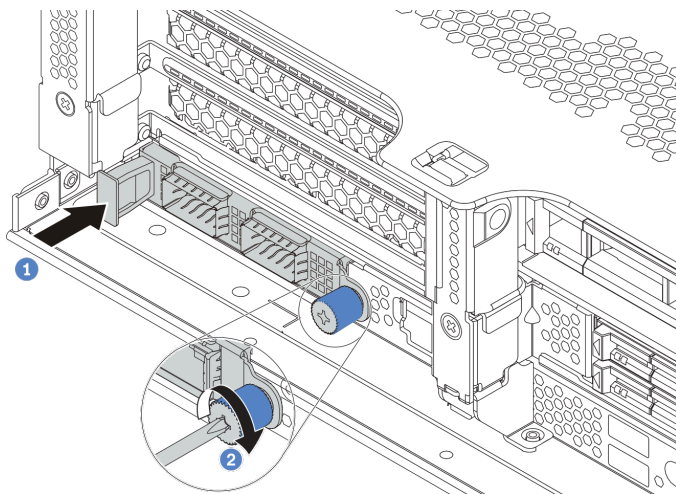


Figure 108. OCP 3.0 Ethernet adapter installation

- a. Push the OCP 3.0 Ethernet adapter as shown to insert it into the connector on the system board.
- b. Tighten the thumbscrew to secure the card.

Step 4. Connect the cables to the OCP 3.0 Ethernet adapter.

Demo video

[Watch the procedure on YouTube](#)

Install a RAID super capacitor module

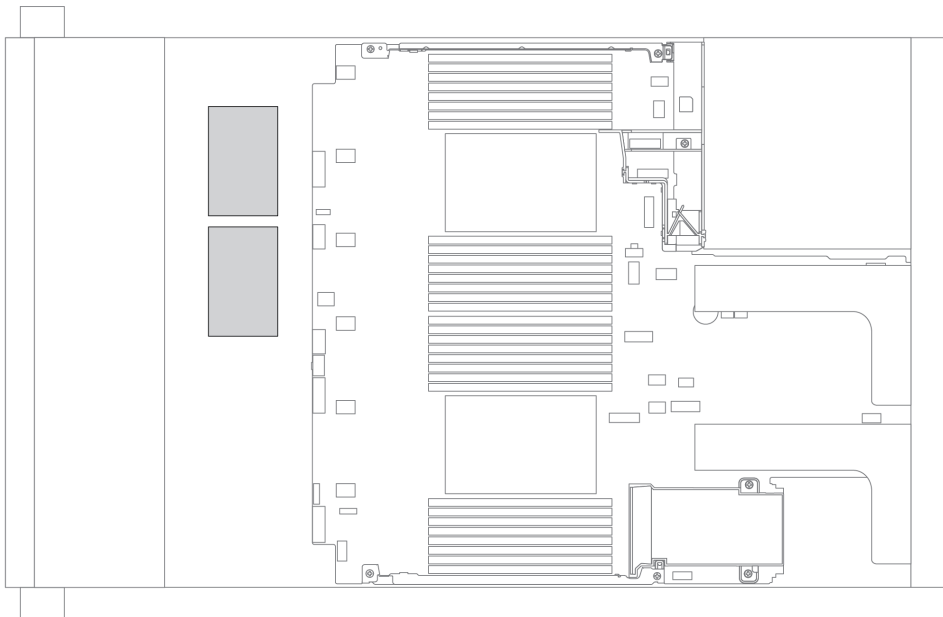
Use this information to install a RAID super capacitor module.

Depending on your hardware configuration, refer to the specific topic for the installation procedure.

- [“Install a super capacitor on the chassis” on page 220](#)
- [“Install a super capacitor module on the air baffle” on page 222](#)
- [“Install a super capacitor module on the 2.5-inch middle drive cage” on page 223](#)

Super capacitor locations in the system

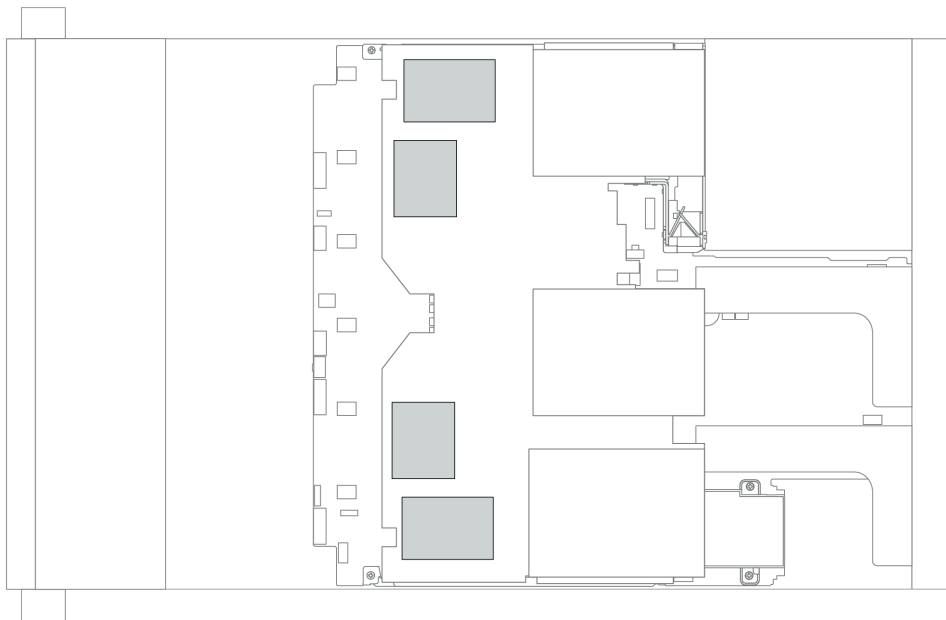
On the chassis



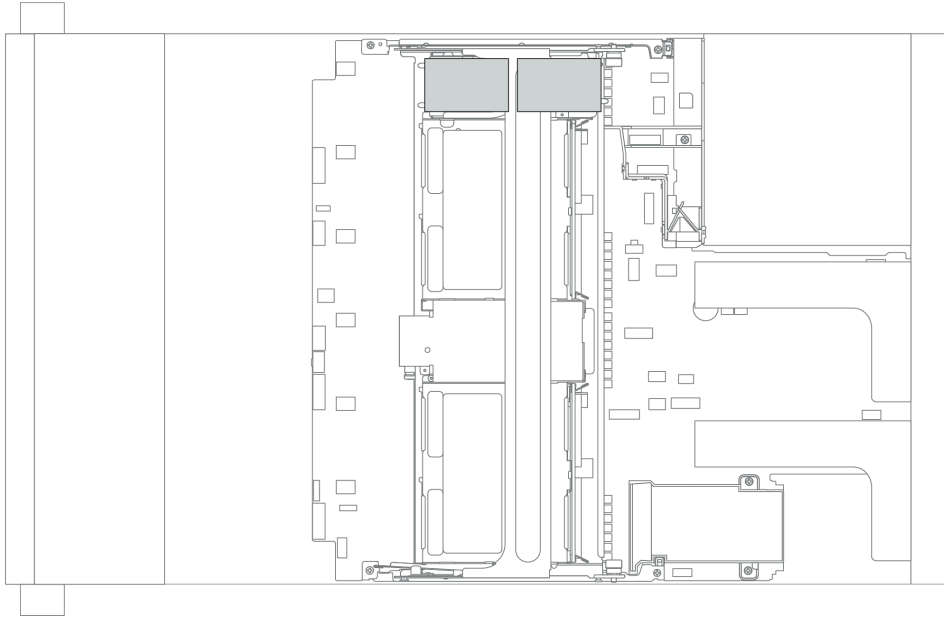
On standard air baffle



On GPU air baffle



On the 2.5-inch middle drive cage



Install a super capacitor on the chassis

Use this information to install a super capacitor module on the chassis.

About this task

Attention:

- Read [“Installation Guidelines” on page 140](#) to ensure that you work safely.
- Prevent exposure to static electricity, which might lead to system halt and loss of data, by keeping static-sensitive components in their static-protective packages until installation, and handling these devices with an electrostatic-discharge wrist strap or other grounding system.

Procedure

- Step 1. Touch the static-protective package that contains the new RAID super capacitor module to any unpainted surface on the outside of the server. Then, take the new RAID super capacitor module out of the package and place it on a static-protective surface.

Step 2. Install the super capacitor holder.

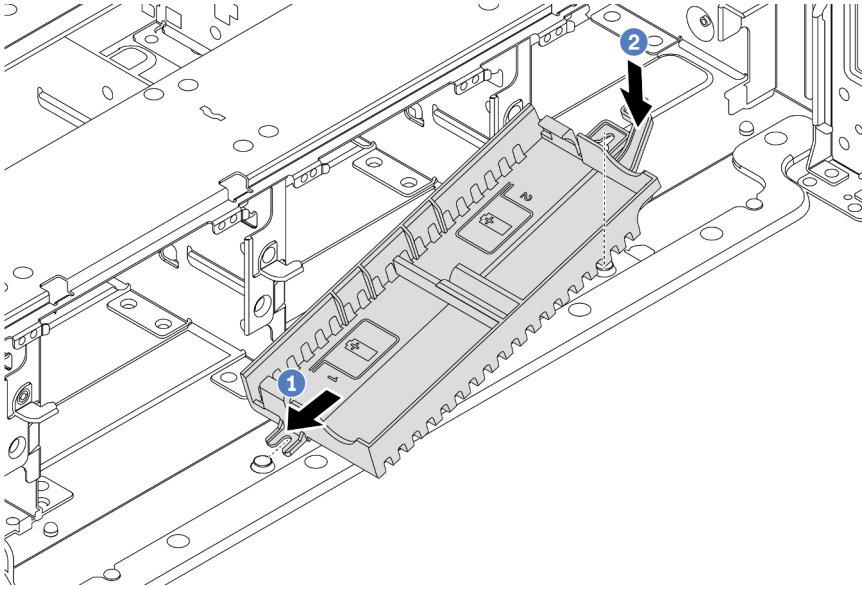


Figure 109. Super capacitor box installation

1. Align the notch on the super capacitor holder with the pin on the chassis as shown.
2. Pivot the super capacitor holder downward until the other side clicks into place.

Step 3. Install the super capacitor module.

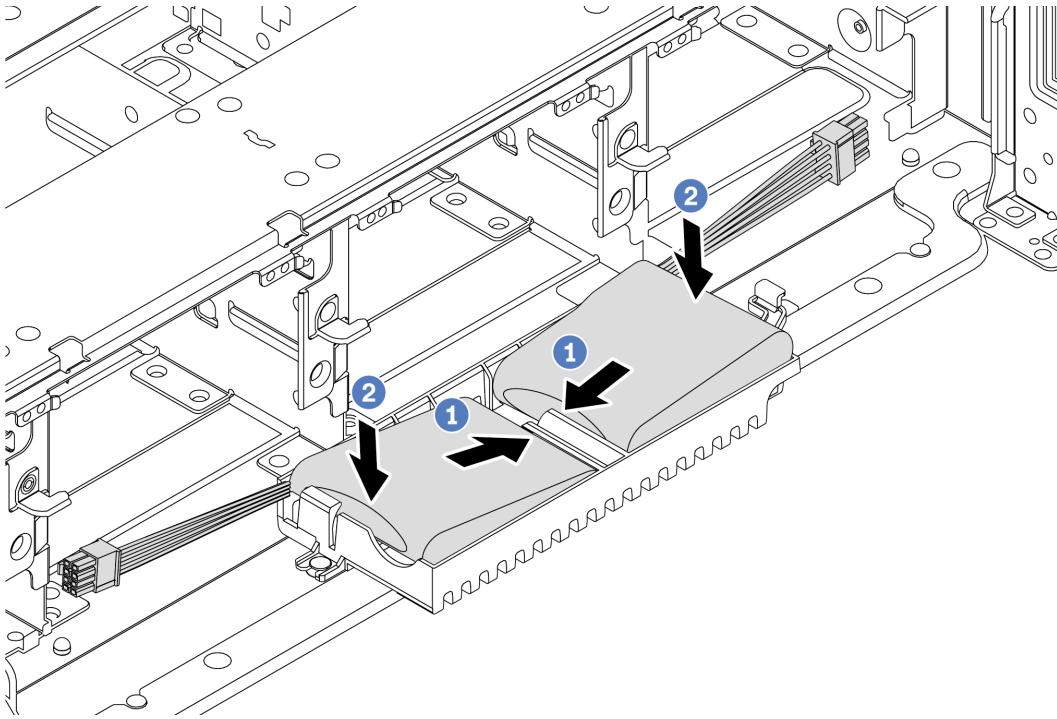


Figure 110. Super capacitor module installation

1. Insert the RAID super capacitor module into the retaining clip at one side as shown.
2. Press the RAID super capacitor module down on the other side until it snaps into place.

Step 4. Connect the super capacitor module to an adapter with the extension cable that comes with the super capacitor module. See [“RAID super capacitor modules” on page 79](#).

Install a super capacitor module on the air baffle

Use this information to install a super capacitor module on the air baffle.

About this task

Attention:

- Read [“Installation Guidelines” on page 140](#) to ensure that you work safely.
- Power off the server and disconnect all power cords for this task.
- Prevent exposure to static electricity, which might lead to system halt and loss of data, by keeping static-sensitive components in their static-protective packages until installation, and handling these devices with an electrostatic-discharge wrist strap or other grounding system.

Procedure

Step 1. Touch the static-protective package that contains the new RAID super capacitor module to any unpainted surface on the outside of the server. Then, take the new RAID super capacitor module out of the package and place it on a static-protective surface.

Step 2. Install the super capacitor module.

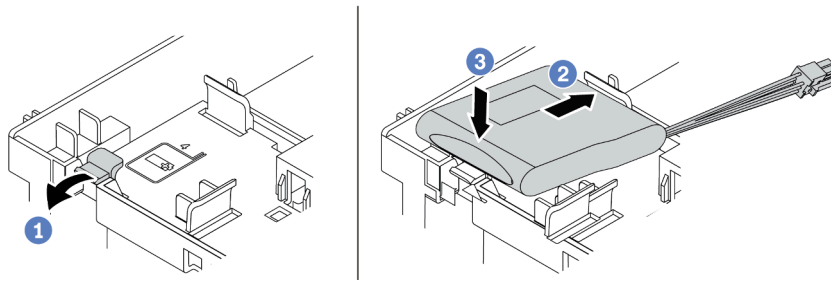


Figure 111. Super capacitor installation on the air baffle

- a. Open the retention clip on the holder.
- b. Put the super capacitor module into the holder.
- c. Press it down to secure it into the holder.

Step 3. Connect the super capacitor module to an adapter with the extension cable that comes with the super capacitor module. See [“RAID super capacitor modules” on page 79](#).

Demo video

[Watch the procedure on YouTube](#)

Install a super capacitor module on the 2.5-inch middle drive cage

Use this information to install a super capacitor module the 2.5-inch middle drive cage.

About this task

Attention:

- Read [“Installation Guidelines” on page 140](#) to ensure that you work safely.
- Prevent exposure to static electricity, which might lead to system halt and loss of data, by keeping static-sensitive components in their static-protective packages until installation, and handling these devices with an electrostatic-discharge wrist strap or other grounding system.

Procedure

- Step 1. Touch the static-protective package that contains the new RAID super capacitor module to any unpainted surface on the outside of the server. Then, take the new RAID super capacitor module out of the package and place it on a static-protective surface.
- Step 2. Open the drive cage handle.

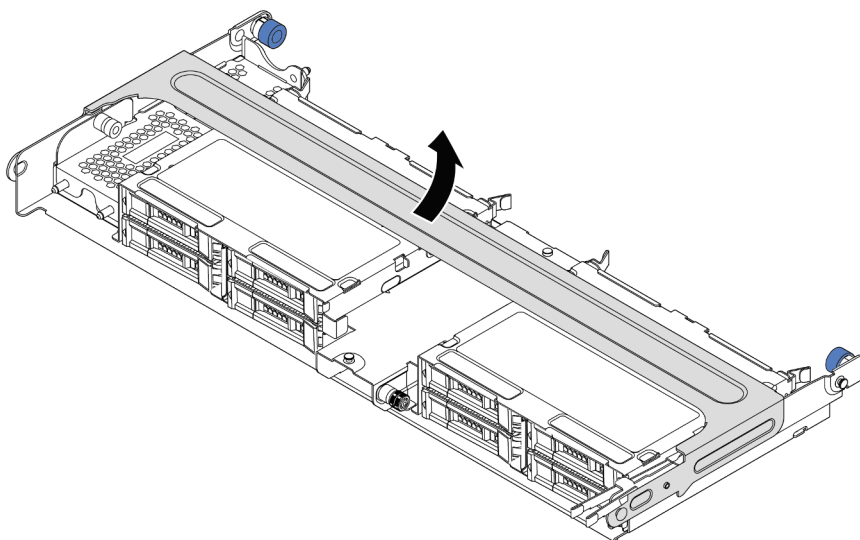


Figure 112. Opening the handle of the middle drive cage

Step 3. Remove the metal cover.

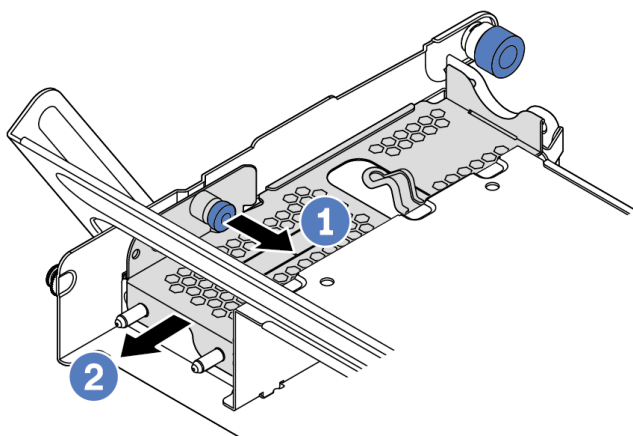


Figure 113. Removing the metal cover

1. Pull out the blue plunger.
2. Slide the metal cover out of the drive cage.

Step 4. Install the super capacitor module.

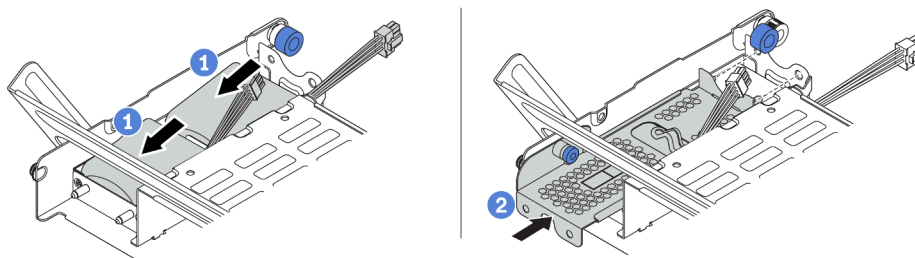


Figure 114. Installing the super capacitor module

1. Put a super capacitor module into the holder, and press it down to secure it into the holder.
2. Align the pins on the metal cover with the holes in the super capacitor holder, pull out the blue latch on the cover, and slide the cover into the holder until the pins pass through the holes. Then, release the blue latch to lock the cover into place.

Step 5. Connect the super capacitor module to an adapter with the extension cable that comes with the super capacitor module. See [“RAID super capacitor modules” on page 79](#).

Demo video

[Watch the procedure on YouTube](#)

Install the system fan cage

Use this information to install the system fan cage.

About this task

Attention:

- Read [“Installation Guidelines” on page 140](#) to ensure that you work safely.
- Power off the server and disconnect all power cords for this task.
- Prevent exposure to static electricity, which might lead to system halt and loss of data, by keeping static-sensitive components in their static-protective packages until installation, and handling these devices with an electrostatic-discharge wrist strap or other grounding system.

Procedure

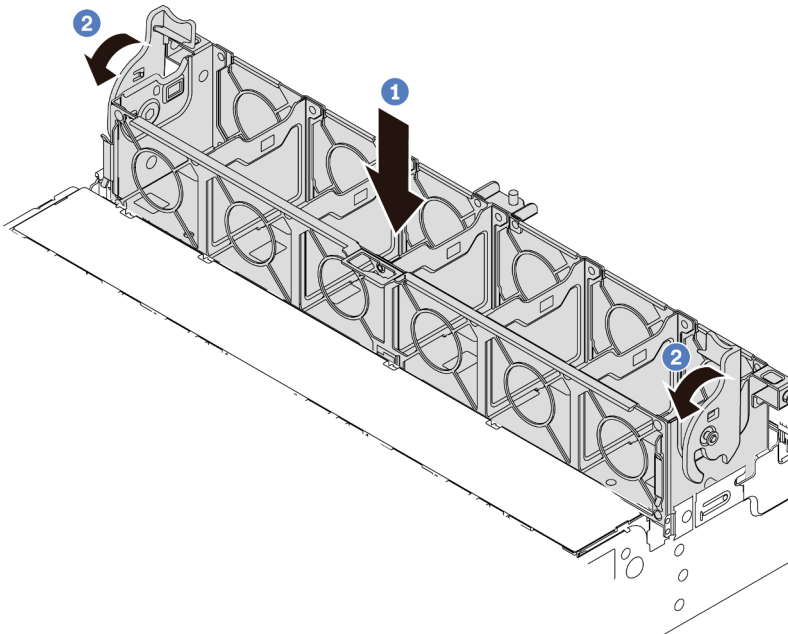


Figure 115. System fan cage installation

- Step 1. Align both sides of the system fan cage with the corresponding mounting posts in the chassis. Then, press the system fan cage straight down into the chassis.

Note: If there are system fans installed in the system fan cage, ensure that the system fans are correctly connected to the system fan connectors on the system board.

Step 2. Rotate the levers of the system fan cage to the front of the server to secure the system fan cage.

Demo video

[Watch the procedure on YouTube](#)

Install a system fan

Use this information to install a system fan.

About this task

Attention:

- Read [“Installation Guidelines” on page 140](#) to ensure that you work safely.
- Power off the server and disconnect all power cords for this task.
- Prevent exposure to static electricity, which might lead to system halt and loss of data, by keeping static-sensitive components in their static-protective packages until installation, and handling these devices with an electrostatic-discharge wrist strap or other grounding system.
- Before installing a system fan, ensure that you have selected the required system fan. See [“Technical rules” on page 22](#).

S033



CAUTION:

Hazardous energy present. Voltages with hazardous energy might cause heating when shorted with metal, which might result in spattered metal, burns, or both.

S017



CAUTION:

Hazardous moving fan blades nearby. Keep fingers and other body parts away.

Procedure

Step 1. Touch the static-protective package that contains the new system fan to any unpainted surface on the outside of the server. Then, take the new system fan out of the package and place it on a static-protective surface.

Step 2. Position the system fan above the system fan cage. The system fan connector on the bottom of the system fan should face the rear of the chassis. Press the system fan straight down until it is seated into place.

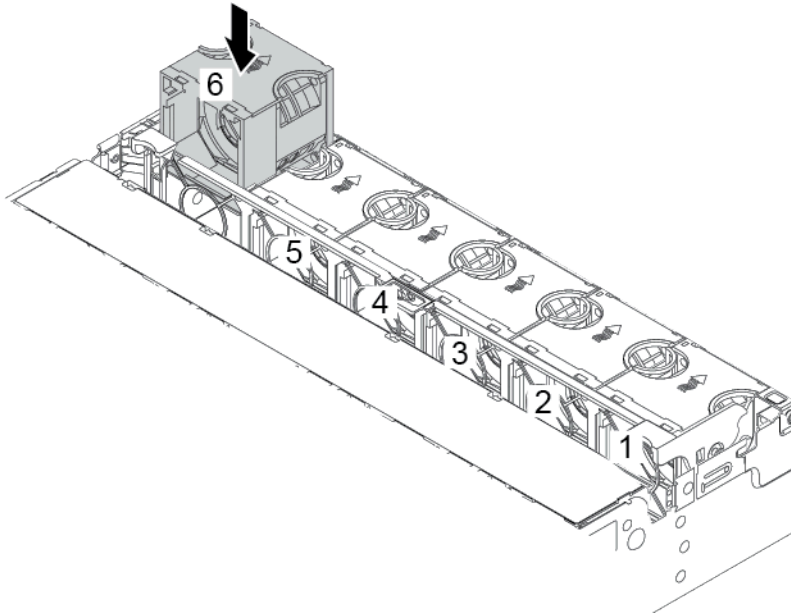


Figure 116. System fan installation

Demo video

[Watch the procedure on YouTube](#)

Install the air baffle

Use this information to install the air baffle.

About this task

S033



CAUTION:

Hazardous energy present. Voltages with hazardous energy might cause heating when shorted with metal, which might result in spattered metal, burns, or both.

S017



CAUTION:

Hazardous moving fan blades nearby. Keep fingers and other body parts away.

Attention:

- Read [“Installation Guidelines” on page 140](#) to ensure that you work safely.
- Prevent exposure to static electricity, which might lead to system halt and loss of data, by keeping static-sensitive components in their static-protective packages until installation, and handling these devices with an electrostatic-discharge wrist strap or other grounding system.

Procedure

Step 1. Take the new part out of the package and place it on a static-protective surface.

Step 2. Prepare your server.

1. Power off the server.
2. Remove the top cover. See [“Remove the top cover” on page 151](#).
3. Record and disconnect any cables. See [Chapter 3 “Internal cable routing” on page 73](#).
4. Remove any components that are impeding the procedure.
5. Install any components that are required before installing or removing the component(s).

Step 3. If 1U standard heat sink is installed, install the 2 fillers to fill the gap between the heat sink and the air baffle.

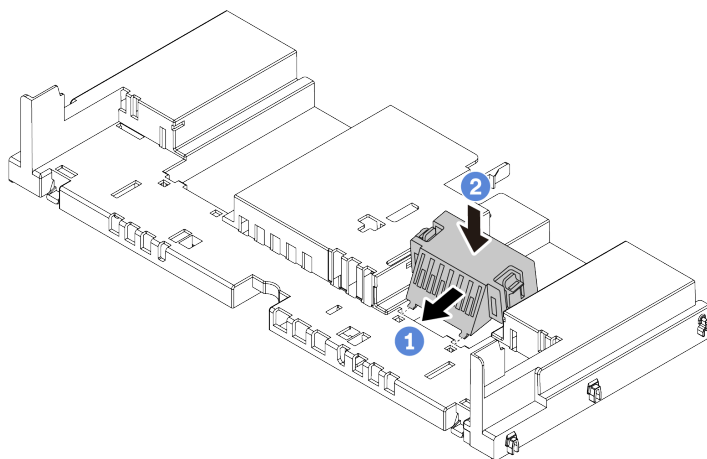


Figure 117. Installing the fillers to the standard air baffle

Step 4. Note the orientation of the air baffle.

Step 5. Align the tabs on both sides of the air baffle with the corresponding slots on both sides of the chassis. Then, lower the air baffle into the chassis and press the air baffle down until it is securely seated.

Note: The illustrated air baffle is a standard air baffle. The installation procedure is the same for GPU air baffle.

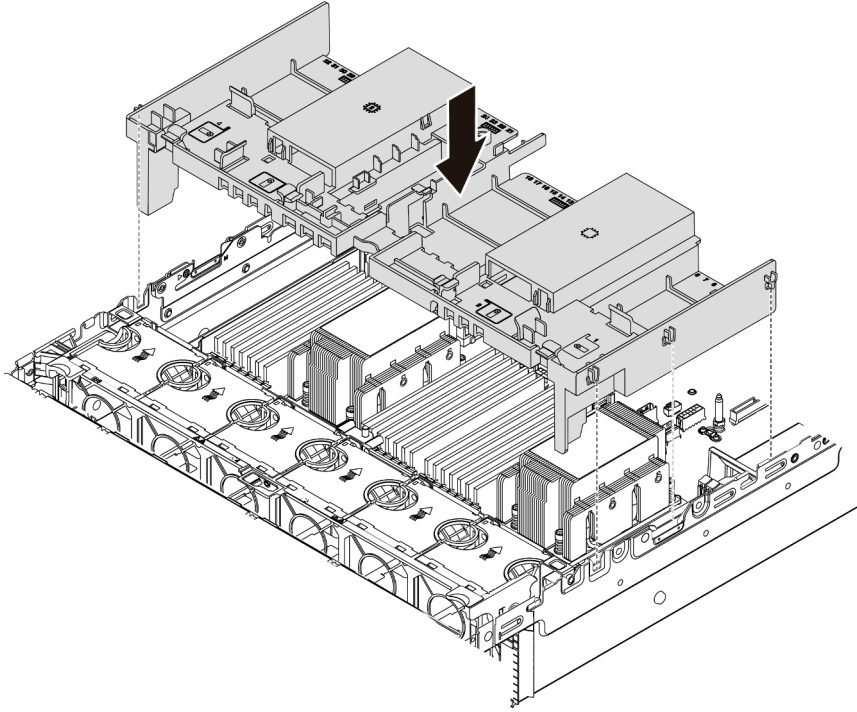


Figure 118. Installing the standard air baffle

Demo video

[Watch the procedure on YouTube](#)

Install the top cover

Use this information to install the top cover.

About this task

Attention:

- Read [“Installation Guidelines” on page 140](#) to ensure that you work safely.
- Power off the server and disconnect all power cords for this task.
- Prevent exposure to static electricity, which might lead to system halt and loss of data, by keeping static-sensitive components in their static-protective packages until installation, and handling these devices with an electrostatic-discharge wrist strap or other grounding system.

Procedure

Step 1. Check your server and ensure that:

- All cables, adapters, and other components are installed and seated correctly and that you have not left loose tools or parts inside the server.
- All internal cables are connected and routed correctly. See [Chapter 3 “Internal cable routing” on page 73](#).

Step 2. Install the top cover to your server.

Attention: Handle the top cover carefully. Dropping the top cover with the cover latch open might damage the cover latch.

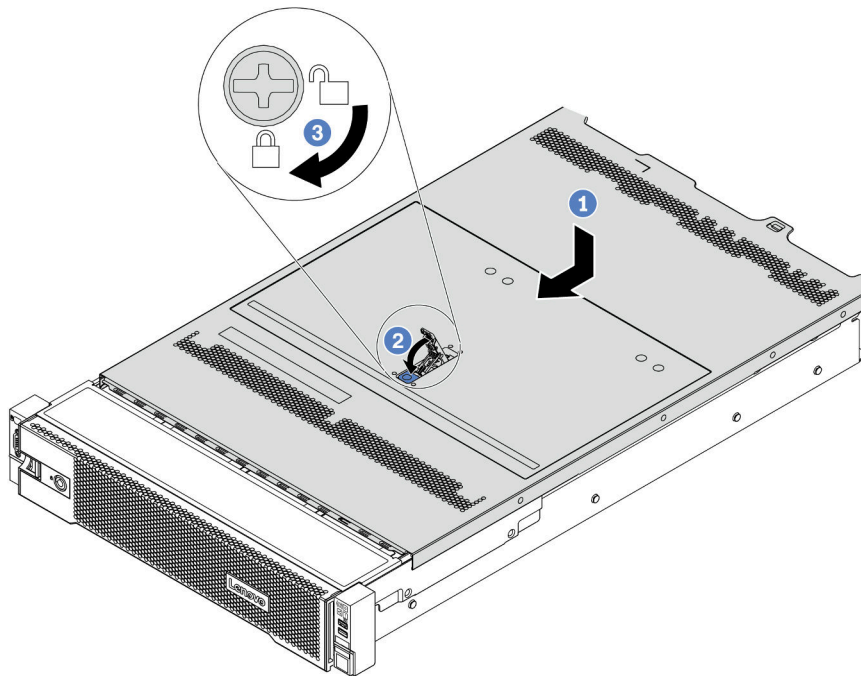


Figure 119. Top cover installation

- Ensure that the cover latch is in the open position. Lower the top cover onto the chassis until both sides of the top cover engage the guides on both sides of the chassis. Then, slide the top cover to the front of the chassis.

Note: Before you slide the top cover forward, ensure that all the tabs on the top cover engage the chassis correctly.

- Pivot the cover latch until the top cover snaps into position. Ensure that the cover latch is completely closed.
- Use a screwdriver to turn the cover lock to the locked position.

Demo video

[Watch the procedure on YouTube](#)

Install a hot-swap power supply unit

Use this information to install a hot-swap power supply.

About this task

- The server is shipped with only one power supply by default. In this case, the power supply is non-hot-swap and before removing it, you must turn off the server first. To support redundancy mode or hot-swap, install an additional hot-swap power supply.

- The server does not support setting the redundancy mode manually. The BMC of the server can automatically set it based on the installed power supply unit quantity.
 - When only 1 power supply unit is installed, the redundancy mode is set to “Non-redundant mode”.
 - When 2 power supply units are installed, the redundancy mode is set to “Redundant (N+N)”. If one of the power supply units fails or has been removed, the BMC will report an event and set the redundancy mode to “Non-redundant mode” automatically.
- If you are replacing the existing power supply with a new power supply:
 - Use Lenovo Capacity Planner to calculate the required power capacity for what is configured for your server. For details, see: <https://datacentersupport.lenovo.com/solutions/Invo-lcp>
 - Ensure that the devices that you are installing are supported. For details, see: <https://serverproven.lenovo.com/>
 - Attach the label coming with this option onto the existing label near the power supply.



Figure 120. Example label

Attention:

- Read “Installation Guidelines” on page 140 to ensure that you work safely.
- Prevent exposure to static electricity, which might lead to system halt and loss of data, by keeping static-sensitive components in their static-protective packages until installation, and handling these devices with an electrostatic-discharge wrist strap or other grounding system.

Procedure

- Step 1. Take the new part out of the package and place it on a static-protective surface.
- Step 2. If there is a power-supply filler installed, remove it.

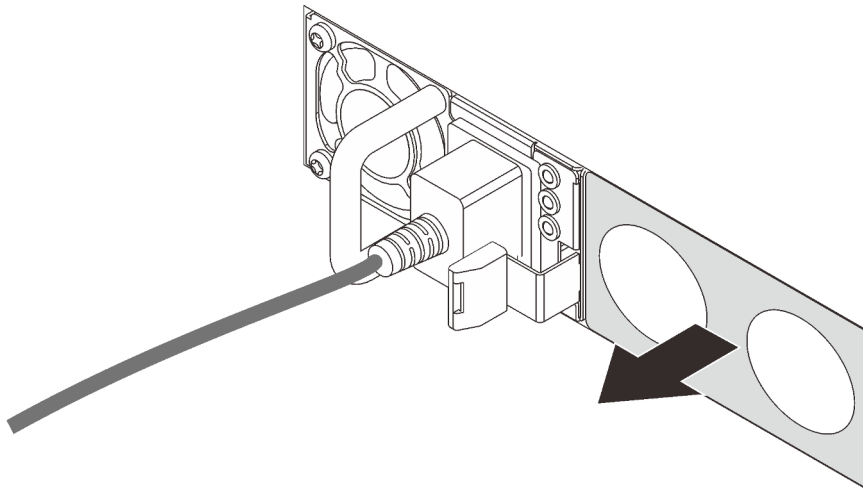


Figure 121. Hot-swap power supply filler removal

- Step 3. Slide the new hot-swap power supply into the bay until it snaps into position.

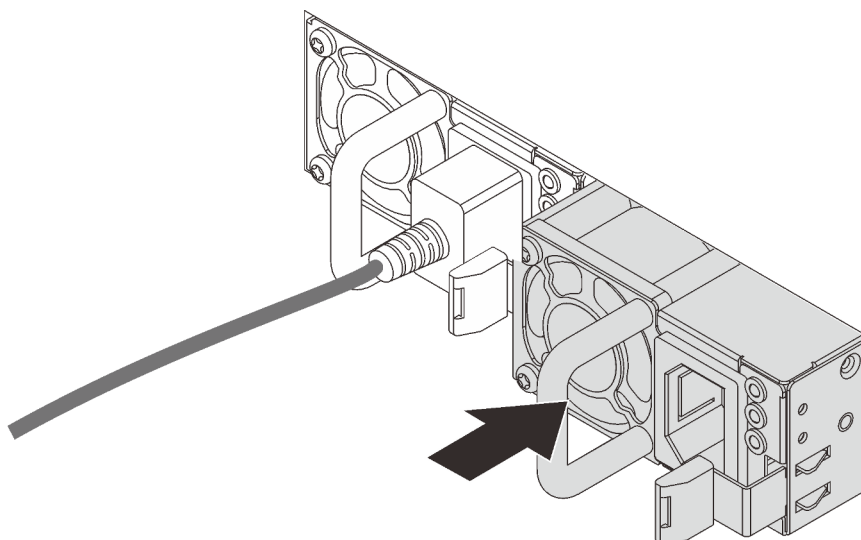



Figure 122. Hot-swap power supply installation

Step 4. Connect the power cord(s).

- For 240 V DC power supply units:
 1. Turn off the server.
 2. Connect one end of the power cord to the power connector on the power supply unit.
 3. Connect the other end of the power cord to a properly grounded electrical outlet.
- For AC power supply units:
 1. Connect one end of the power cord to the power connector on the power supply unit.
 2. Connect the other end of the power cord to a properly grounded electrical outlet.
- For –48V DC power supply units:
 1. Use a slotted screwdriver to loosen the 3 captive screws on the power supply terminal block.
 2. Check the type label on the power supply block and each power cord.

Type	PSU terminal block	Power cord
Input	-Vin	-Vin
Ground		GND
Output	RTN	RTN

3. Face the groove side of each power cord pin upwards, and then plug the pins into corresponding holes on the power block. Use the table above for guidance to ensure that the pins find correct slots.
4. Tighten the captive screws on the power block. Ensure that the screws and cord pins are secured in place and no bare metal parts are shown.
5. Connect the other end of the cables to a properly grounded electrical outlet. Ensure that the cable ends find correct outlets.

Demo video

[Watch the procedure on YouTube](#)

Safety precautions

Understand and apply the safety precautions before removing or installing a power supply unit.

AC power supply units

S001



Electrical current from power, telephone, and communication cables is hazardous.
To avoid a shock hazard:

- Connect all power cords to a properly wired and grounded electrical outlet/source.
- Connect any equipment that will be attached to this product to properly wired outlets/sources.
- When possible, use one hand only to connect or disconnect signal cables.
- Never turn on any equipment when there is evidence of fire, water, or structural damage.
- The device might have more than one power cord, to remove all electrical current from the device, ensure that all power cords are disconnected from the power source.

S002



CAUTION:

The power-control button on the device and the power switch on the power supply do not turn off the electrical current supplied to the device. The device also might have more than one power cord. To remove all electrical current from the device, ensure that all power cords are disconnected from the power source.

S035



CAUTION:

Never remove the cover on a power supply or any part that has this label attached. Hazardous voltage, current, and energy levels are present inside any component that has this label attached. There are no serviceable parts inside these components. If you suspect a problem with one of these parts, contact a service technician.

DC power supply units

CAUTION:



240 V DC input (input range: 180-300 V) is supported in Chinese Mainland **ONLY**.

Perform the following steps to safely remove the power cord of one 240 V DC power supply unit. Otherwise, there can be data loss and other damages to the equipment. Damages and losses resulting from inappropriate operations will not be covered by the manufacturer's warranty.

1. Turn off the server.
2. Disconnect the power cord from the power source.
3. Disconnect the power cord from the power supply unit.

S035



CAUTION:

Never remove the cover on a power supply or any part that has this label attached. Hazardous voltage, current, and energy levels are present inside any component that has this label attached. There are no serviceable parts inside these components. If you suspect a problem with one of these parts, contact a service technician.

S019



CAUTION:

The power-control button on the device does not turn off the electrical current supplied to the device. The device also might have more than one connection to dc power. To remove all electrical current from the device, ensure that all connections to dc power are disconnected at the dc power input terminals.

S029



DANGER

**For -48V dc power supply, electrical current from power cords is hazardous.
To avoid a shock hazard:**

- **To connect or disconnect -48V dc power cords when you need to remove/install redundancy power supply unit(s).**

To Connect:

1. Turn OFF subject dc power source(s) and equipment (s) that are attached to this product.
2. Install the power supply unit(s) into the system housing.
3. Attach dc power cord(s) to the product.
 - Ensure correct polarity of -48 V dc connections: RTN is + and -Vin (typical -48 V) dc is -. Earth ground should be connected very well.
4. Connect dc power cord(s) to subject power source (s).
5. Turn ON all the power source(s).

To Disconnect:

1. Disconnect or turn off the subject dc power source(s) (at the breaker panel) before removing the power supply unit(s).
2. Remove the subject dc cords(s) and make sure the wire terminal of power cord(s) is insulated.
3. Unplug the subject power supply unit(s) from the system housing.

Install the server in a rack

To install the server in a rack, follow the instructions that are provided in the Rail Installation Kit for the rails on which the server will be installed.

Cable the server

Attach all external cables to the server. Typically, you will need to connect the server to a power source, to the data network, and to storage. In addition, you will need to connect the server to the management network.

Connect the server to power.

Connect the server to the network.

Connect the server to any storage devices.

Power on the server

After the server performs a short self-test (power status LED flashes quickly) when connected to input power, it enters a standby state (power status LED flashes once per second).

The server can be turned on (power LED on) in any of the following ways:

- You can press the power button.
- The server can respond to remote power-on requests sent to Lenovo XClarity Controller via Lenovo XClarity Essentials OneCLI, IPMITool, or SSH CLI.

For example, run the following command on Lenovo XClarity Essentials OneCLI to power on your server:

```
OneCli.exe ospower turnon --bmc <userid>:<password>@<host>
```

For more information about running the `ospower` command, see https://sysmgt.lenovofiles.com/help/topic/toolctr_cli_lenovo/onecli_r_ospower_command.html.

If the system UEFI power policy is set to “always on”, the system will be powered on automatically when an AC source is plugged in.

For information about powering off the server, see [“Power off the server” on page 237](#).

Validate server setup

After powering up the server, make sure that the LEDs are lit and that they are green.

Power off the server

The server remains in a standby state when it is connected to a power source, allowing the BMC to respond to remote power-on requests. To remove all power from the server (power status LED off), you must disconnect all power cables.

To place the server in a standby state (power status LED flashes once per second):

Note: The Lenovo XClarity Controller can place the server in a standby state as an automatic response to a critical system failure.

- Start an orderly shutdown using the operating system (if supported by your operating system).
- Press the power button to start an orderly shutdown (if supported by your operating system).
- Press and hold the power button for more than 4 seconds to force a shutdown.
- Send remote power-off commands to Lenovo XClarity Controller via Lenovo XClarity Essentials OneCLI, IPMITool, or SSH CLI.

When in a standby state, the server can respond to remote power-on requests sent to the Lenovo XClarity Controller. For information about powering on the server, see [“Power on the server” on page 236](#).

Chapter 5. System configuration

Complete these procedures to configure your system.

Access UEFI Setup utility

Use these instructions to access the UEFI Setup interface.

You can access the UEFI Setup utility:

- Either remotely through Lenovo XClarity Provisioning Manager.
(Detailed steps can be found at: [UEFI Setup](#))
- Or locally by completing the following steps:
 1. Start the server and when Press <F1> Setup is prompted, press F1.
 2. Follow the instructions on the screen.

Notes:

- If you have set a UEFI password, type the password to access the full Setup menu.
- Use Switch 1 on system board if you need to clear UEFI password.
For more information, see “System board jumpers” in the *Maintenance Manual*.

Set the network connection for the Lenovo XClarity Controller

Before you can access the Lenovo XClarity Controller over your network, you need to specify how Lenovo XClarity Controller will connect to the network. Depending on how the network connection is implemented, you might need to specify a static IP address as well.

The following methods are available to set the network connection for the Lenovo XClarity Controller if you are not using DHCP:

- If a monitor is attached to the server, you can use Lenovo XClarity Provisioning Manager to set the network connection.

Complete the following steps to connect the Lenovo XClarity Controller to the network using the Lenovo XClarity Provisioning Manager.

1. Start the server.
2. Press the key specified in the on-screen instructions to display the Lenovo XClarity Provisioning Manager interface. (For more information, see the “Startup” section in the LXPM documentation compatible with your server at https://sysmgt.lenovofiles.com/help/topic/lxpm_frontend/lxpm_product_page.html.)
3. Go to **LXPM → UEFI Setup → BMC Settings** to specify how the Lenovo XClarity Controller will connect to the network.
 - If you choose a static IP connection, make sure that you specify an IPv4 or IPv6 address that is available on the network.
 - If you choose a DHCP connection, make sure that the MAC address for the server has been configured in the DHCP server.
4. Click **OK** to apply the setting and wait for two to three minutes.
5. Use an IPv4 or IPv6 address to connect Lenovo XClarity Controller.

Important: The Lenovo XClarity Controller is set initially with a user name of USERID and password of PASSW0RD (with a zero, not the letter O). This default user setting has Supervisor access. It is required to change this user name and password during your initial configuration for enhanced security.

- If no monitor attached to the server, you can set the network connection through the Lenovo XClarity Controller interface. Connect an Ethernet cable from your laptop to Lenovo XClarity Controller connector, which is located at the rear of the server. For the location of the Lenovo XClarity Controller connector, see [“Rear view” on page 54](#).

Note: Make sure that you modify the IP settings on the laptop so that it is on the same network as the server default settings.

The default IPv4 address and the IPv6 Link Local Address (LLA) is provided on the Lenovo XClarity Controller Network Access label that is affixed to the Pull Out Information Tab.

- If you are using the Lenovo XClarity Administrator Mobile app from a mobile device, you can connect to the Lenovo XClarity Controller through the Lenovo XClarity Controller USB connector on the front of the server. For the location of the Lenovo XClarity Controller USB connector, see [“Front view” on page 33](#).

Note: The Lenovo XClarity Controller USB connector mode must be set to manage the Lenovo XClarity Controller (instead of normal USB mode). To switch from normal mode to Lenovo XClarity Controller management mode, hold the blue ID button on the front panel for at least 3 seconds until its LED flashes slowly (once every couple of seconds).

To connect using the Lenovo XClarity Administrator Mobile app:

1. Connect the USB cable of your mobile device to the Lenovo XClarity Administrator USB connector on the front panel.
2. On your mobile device, enable USB tethering.
3. On your mobile device, launch the Lenovo XClarity Administrator mobile app.
4. If automatic discovery is disabled, click **Discovery** on the USB Discovery page to connect to the Lenovo XClarity Controller.

For more information about using the Lenovo XClarity Administrator Mobile app, see:

http://sysmgt.lenovofiles.com/help/topic/com.lenovo.lxca.doc/lxca_usemobileapp.html

Update the firmware

Several options are available to update the firmware for the server.

You can use the tools listed here to update the most current firmware for your server and the devices that are installed in the server.

- Best practices related to updating firmware is available at the following site:

<http://lenovopress.com/LP0656>

- The latest firmware can be found at the following site:

<https://datacentersupport.lenovo.com/products/servers/thinksystem/sr665/7d2w/parts/downloads>

- You can subscribe to product notification to stay up to date on firmware updates:

<https://datacentersupport.lenovo.com/tw/en/solutions/ht509500>

UpdateXpress System Packs (UXSPs)

Lenovo typically releases firmware in bundles called UpdateXpress System Packs (UXSPs). To ensure that all of the firmware updates are compatible, you should update all firmware at the same time. If you are updating

firmware for both the Lenovo XClarity Controller and UEFI, update the firmware for Lenovo XClarity Controller first.

Update method terminology

- **In-band update.** The installation or update is performed using a tool or application within an operating system that is executing on the server's core CPU.
- **Out-of-band update.** The installation or update is performed by the Lenovo XClarity Controller collecting the update and then directing the update to the target subsystem or device. Out-of-band updates have no dependency on an operating system executing on the core CPU. However, most out-of-band operations do require the server to be in the S0 (Working) power state.
- **On-Target update.** The installation or update is initiated from an installed operating system executing on the target server itself.
- **Off-Target update.** The installation or update is initiated from a computing device interacting directly with the server's Lenovo XClarity Controller.
- **UpdateXpress System Packs (UXSPs).** UXSPs are bundled updates designed and tested to provide the interdependent level of functionality, performance, and compatibility. UXSPs are server machine-type specific and are built (with firmware and device driver updates) to support specific Windows Server, Red Hat Enterprise Linux (RHEL) and SUSE Linux Enterprise Server (SLES) operating system distributions. Machine-type-specific firmware-only UXSPs are also available.

Firmware updating tools

See the following table to determine the best Lenovo tool to use for installing and setting up the firmware:

Tool	Update Methods Supported	Core System Firmware Updates	I/O Devices Firmware Updates	Graphical user interface	Command line interface	Supports UXSPs
Lenovo XClarity Provisioning Manager (LXPM)	In-band ² On-Target	√		√		
Lenovo XClarity Controller (XCC)	Out-of-band Off-Target	√	Selected I/O devices	√		
Lenovo XClarity Essentials OneCLI (OneCLI)	In-band Out-of-band On-Target Off-Target	√	All I/O devices		√	√
Lenovo XClarity Essentials UpdateXpress (LXCE)	In-band Out-of-band On-Target Off-Target	√	All I/O devices	√		√

Tool	Update Methods Supported	Core System Firmware Updates	I/O Devices Firmware Updates	Graphical user interface	Command line interface	Supports UXSPs
Lenovo XClarity Essentials Bootable Media Creator (BoMC)	In-band Out-of-band Off-Target	✓	All I/O devices	✓ (BoMC application)	✓ (BoMC application)	✓
Lenovo XClarity Administrator (LXCA)	In-band ¹ Out-of-band ² Off-Target	✓	All I/O devices	✓		✓
Lenovo XClarity Integrator (LXCI) for VMware vCenter	Out-of-band Off-Target	✓	Selected I/O devices	✓		
Lenovo XClarity Integrator (LXCI) for Microsoft Windows Admin Center	In-band Out-of-band On-Target Off-Target	✓	All I/O devices	✓		✓
Lenovo XClarity Integrator (LXCI) for Microsoft System Center Configuration Manager	In-band On-Target	✓	All I/O devices	✓		✓
Notes: 1. For I/O firmware updates. 2. For BMC and UEFI firmware updates.						

- **Lenovo XClarity Provisioning Manager**

From Lenovo XClarity Provisioning Manager, you can update the Lenovo XClarity Controller firmware, the UEFI firmware, and the Lenovo XClarity Provisioning Manager software.

Note: By default, the Lenovo XClarity Provisioning Manager Graphical User Interface is displayed when you start the server and press the key specified in the on-screen instructions. If you have changed that default to be the text-based system setup, you can bring up the Graphical User Interface from the text-based system setup interface.

For additional information about using Lenovo XClarity Provisioning Manager to update firmware, see:

“Firmware Update” section in the LXPM documentation compatible with your server at https://sysmgt.lenovofiles.com/help/topic/lxpm_frontend/lxpm_product_page.html.

- **Lenovo XClarity Controller**

If you need to install a specific update, you can use the Lenovo XClarity Controller interface for a specific server.

Notes:

- To perform an in-band update through Windows or Linux, the operating system driver must be installed and the Ethernet-over-USB (sometimes called LAN over USB) interface must be enabled.

For additional information about configuring Ethernet over USB, see:

“Configuring Ethernet over USB” section in the XCC documentation version compatible with your server at https://sysmgt.lenovofiles.com/help/topic/lxcc_frontend/lxcc_overview.html

- If you update firmware through the Lenovo XClarity Controller, make sure that you have downloaded and installed the latest device drivers for the operating system that is running on the server.

For additional information about using Lenovo XClarity Controller to update firmware, see:

“Updating Server Firmware” section in the XCC documentation compatible with your server at https://sysmgt.lenovofiles.com/help/topic/lxcc_frontend/lxcc_overview.html

- **Lenovo XClarity Essentials OneCLI**

Lenovo XClarity Essentials OneCLI is a collection of command line applications that can be used to manage Lenovo servers. Its update application can be used to update firmware and device drivers for your servers. The update can be performed within the host operating system of the server (in-band) or remotely through the BMC of the server (out-of-band).

For additional information about using Lenovo XClarity Essentials OneCLI to update firmware, see:

http://sysmgt.lenovofiles.com/help/topic/toolstr_cli_lenovo/onecli_c_update.html

- **Lenovo XClarity Essentials UpdateXpress**

Lenovo XClarity Essentials UpdateXpress provides most of OneCLI update functions through a graphical user interface (GUI). It can be used to acquire and deploy UpdateXpress System Pack (UXSP) update packages and individual updates. UpdateXpress System Packs contain firmware and device driver updates for Microsoft Windows and for Linux.

You can obtain Lenovo XClarity Essentials UpdateXpress from the following location:

<https://datacentersupport.lenovo.com/solutions/Invo-xpress>

- **Lenovo XClarity Essentials Bootable Media Creator**

You can use Lenovo XClarity Essentials Bootable Media Creator to create bootable media that is suitable for firmware updates, VPD updates, inventory and FFDC collection, advanced system configuration, FoD Keys management, secure erase, RAID configuration, and diagnostics on supported servers.

You can obtain Lenovo XClarity Essentials BoMC from the following location:

<https://datacentersupport.lenovo.com/solutions/Invo-bomc>

- **Lenovo XClarity Administrator**

If you are managing multiple servers using the Lenovo XClarity Administrator, you can update firmware for all managed servers through that interface. Firmware management is simplified by assigning firmware-compliance policies to managed endpoints. When you create and assign a compliance policy to managed endpoints, Lenovo XClarity Administrator monitors changes to the inventory for those endpoints and flags any endpoints that are out of compliance.

For additional information about using Lenovo XClarity Administrator to update firmware, see:

http://sysmgt.lenovofiles.com/help/topic/com.lenovo.lxca.doc/update_fw.html

- **Lenovo XClarity Integrator offerings**

Lenovo XClarity Integrator offerings can integrate management features of Lenovo XClarity Administrator and your server with software used in a certain deployment infrastructure, such as VMware vCenter, Microsoft Admin Center, or Microsoft System Center.

For additional information about using Lenovo XClarity Integrator offerings to update firmware, see:

https://sysmgt.lenovofiles.com/help/topic/lxci/lxci_product_page.html

Configure the firmware

You can configure the management processor for the server through the BMC Web interface (Lenovo XClarity Controller) or through the command-line interface.

For information about configuring the server using Lenovo XClarity Controller, see:

“Configuring the Server” section in the XCC documentation compatible with your server at https://sysmgt.lenovofiles.com/help/topic/lxcc_frontend/lxcc_overview.html.

Configure the memory

Memory performance depends on several variables, such as memory mode, memory speed, memory ranks, memory population and processor.

More information about optimizing memory performance and configuring memory is available at the Lenovo Press Web site:

<https://lenovopress.com/servers/options/memory>

In addition, you can take advantage of a memory configurator, which is available at the following site:

http://1config.lenovo.com/#/memory_configuration

Note: Ensure that you observe the installation rules and sequence in “DIMM population rules” on page 24.

Configure the RAID arrays

Using a Redundant Array of Independent Disks (RAID) to store data remains one of the most common and cost-efficient methods to increase server's storage performance, availability, and capacity.

RAID increases performance by allowing multiple drives to process I/O requests simultaneously. RAID can also prevent data loss in case of a drive failure by reconstructing (or rebuilding) the missing data from the failed drive using the data from the remaining drives.

RAID array (also known as RAID drive group) is a group of multiple physical drives that uses a certain common method to distribute data across the drives. A virtual drive (also known as virtual disk or logical drive) is a partition in the drive group that is made up of contiguous data segments on the drives. Virtual drive is presented up to the host operating system as a physical disk that can be partitioned to create OS logical drives or volumes.

An introduction to RAID is available at the following Lenovo Press Web site:

<https://lenovopress.com/lp0578-lenovo-raid-introduction>

Detailed information about RAID management tools and resources is available at the following Lenovo Press Web site:

<https://lenovopress.com/lp0579-lenovo-raid-management-tools-and-resources>

Deploy the operating system

Several options are available to deploy an operating system on one or more servers.

Available operating systems

- Microsoft Windows Server
- VMware ESXi
- Red Hat Enterprise Linux
- SUSE Linux Enterprise Server

Complete list of available operating systems: <https://lenovopress.com/osig>.

Tool-based deployment

- **Multi-server context**

Available tools:

- Lenovo XClarity Administrator

http://sysmgt.lenovofiles.com/help/topic/com.lenovo.lxca.doc/compute_node_image_deployment.html

- Lenovo XClarity Essentials OneCLI

http://sysmgt.lenovofiles.com/help/topic/toolsctr_cli_lenovo/onecli_r_uxspi_proxy_tool.html

- Lenovo XClarity Integrator deployment pack for SCCM (for Windows operating system only)

https://sysmgt.lenovofiles.com/help/topic/com.lenovo.lxci_deploypack_sccm.doc/dpsccm_c_endtoend_deploy_scenario.html

- **Single-server context**

Available tools:

- Lenovo XClarity Provisioning Manager

“OS Installation” section in the LXPM documentation compatible with your server at https://sysmgt.lenovofiles.com/help/topic/lxpm_frontend/lxpm_product_page.html

- Lenovo XClarity Essentials OneCLI

http://sysmgt.lenovofiles.com/help/topic/toolsctr_cli_lenovo/onecli_r_uxspi_proxy_tool.html

- Lenovo XClarity Integrator deployment pack for SCCM (for Windows operating system only)

https://sysmgt.lenovofiles.com/help/topic/com.lenovo.lxci_deploypack_sccm.doc/dpsccm_c_endtoend_deploy_scenario.html

Manual deployment

If you cannot access the above tools, follow the instructions below, download the corresponding OS *Installation Guide*, and deploy the operating system manually by referring to the guide.

1. Go to <https://datacentersupport.lenovo.com/solutions/server-os>.
2. Select an operating system from the navigation pane and click **Resources**.
3. Locate the “OS Install Guides” area and click the installation instructions. Then, follow the instructions to complete the operation system deployment task.

Update the Universal Unique Identifier (UUID)

Optionally, you can update the Universal Unique Identifier (UUID).

There are two methods available to update the UUID:

- From Lenovo XClarity Provisioning Manager

To update the UUID from Lenovo XClarity Provisioning Manager:

1. Start the server and press the key according to the on-screen instructions. (For more information, see the “Startup” section in the LXPM documentation compatible with your server at https://sysmgt.lenovofiles.com/help/topic/lxpm_frontend/lxpm_product_page.html.) The Lenovo XClarity Provisioning Manager interface is displayed by default.
2. If the power-on Administrator password is required, enter the password.
3. From the System Summary page, click **Update VPD**.
4. Update the UUID.

- From Lenovo XClarity Essentials OneCLI

Lenovo XClarity Essentials OneCLI sets the UUID in the Lenovo XClarity Controller. Select one of the following methods to access the Lenovo XClarity Controller and set the UUID:

- Operate from the target system, such as LAN or keyboard console style (KCS) access
- Remote access to the target system (TCP/IP based)

To update the UUID from Lenovo XClarity Essentials OneCLI:

1. Download and install Lenovo XClarity Essentials OneCLI.

To download Lenovo XClarity Essentials OneCLI, go to the following site:

<https://datacentersupport.lenovo.com/solutions/HT116433>

2. Copy and unpack the OneCLI package, which also includes other required files, to the server. Make sure that you unpack the OneCLI and the required files to the same directory.
3. After you have OneCLI in place, use the following command syntax to set the UUID:

```
onecli config set SYSTEM_PROD_DATA.SysInfoUUID <uuid_value> [access_method]
```

Where:

<uuid_value>

Up to 16-byte hexadecimal value assigned by you.

[access_method]

The access method that you selected to use from the following methods:

- Online authenticated LAN access, type the command:

Example that does not use the user ID and password default values:

```
onecli config set SYSTEM_PROD_DATA.SysInfoUUID <uuid_value> --user <user_id>
--password <password>
```

Example that uses the user ID and password default values:

```
onecli config set SYSTEM_PROD_DATA.SysInfoUUID <uuid_value>
```

- Online KCS access (unauthenticated and user restricted):

You do not need to specify a value for *access_method* when you use this access method.

Example:

```
onecli config set SYSTEM_PROD_DATA.SysInfoUUID <uuid_value>
```

Note: The KCS access method uses the IPMI/KCS interface, which requires that the IPMI driver be installed.

- Remote LAN access, type the command:

Note: When using the remote LAN/WAN access method to access Lenovo XClarity Controller from a client, the *host* and the *xcc_external_ip* address are required parameters.

```
[--imm xcc_user_id:xcc_password@xcc_external_ip]
```

or

```
[--bmc xcc_user_id:xcc_password@xcc_external_ip]
```

Where:

xcc_external_ip

The BMC/IMM/XCC external IP address. There is no default value. This parameter is required.

xcc_user_id

The BMC/IMM/XCC account name (1 of 12 accounts). The default value is USERID.

xcc_password

The BMC/IMM/XCC account password (1 of 12 accounts). The default value is PASSWORD (with a zero 0 not an O).

Note: BMC, IMM, or XCC external IP address, account name, and password are all valid for this command.

Example that does use the user ID and password default values:

```
onecli config set SYSTEM_PROD_DATA.SysInfoUUID <uuid_value>
```

4. Restart the Lenovo XClarity Controller.
5. Restart the server.

Update the DMI/SMBIOS data

The Desktop Management Interface (DMI) must be updated when the system board is replaced. Use the Lenovo XClarity Provisioning Manager to update the DMI in the UEFI-based server.

1. Start the server and press F11 to display the Lenovo XClarity Provisioning Manager interface.
2. From the System Summary page, click **Update VPD**.
3. Update the asset tag information.

Back up the server configuration

After setting up the server or making changes to the configuration, it is a good practice to make a complete backup of the server configuration.

Make sure that you create backups for the following server components:

- **Management processor**

You can back up the management processor configuration through the Lenovo XClarity Controller interface. For details about backing up the management processor configuration, see:

“Backing up the BMC configuration” section in the XCC documentation compatible with your server at https://sysmgt.lenovofiles.com/help/topic/lxcc_frontend/lxcc_overview.html.

Alternatively, you can use the `save` command from Lenovo XClarity Essentials OneCLI to create a backup of all configuration settings. For more information about the `save` command, see:

http://sysmgt.lenovofiles.com/help/topic/toolctr_cli_lenovo/onecli_r_save_command.html

- **Operating system**

Use your backup methods to back up the operating system and user data for the server.

Chapter 6. Resolving installation issues

Use this information to resolve issues that you might have when setting up your system.

Use the information in this section to diagnose and resolve problems that you might encounter during the initial installation and setup of your server.

- [“Server does not power on” on page 251](#)
- [“The server immediately displays the POST Event Viewer when it is turned on” on page 251](#)
- [“Embedded hypervisor is not in the boot list” on page 251](#)
- [“Server cannot recognize a hard drive” on page 252](#)
- [“Displayed system memory is less than installed physical memory” on page 253](#)
- [“A Lenovo optional device that was just installed does not work.” on page 253](#)
- [“Voltage planar fault is displayed in the event log” on page 253](#)

Server does not power on

Complete the following steps until the problem is resolved:

1. Check the event log for any events related to the server not powering on.
2. Check for any LEDs that are flashing amber.
3. Check the power LED on the system board.
4. Check if AC power LED is lit on or the amber LED is lit on at the PSU rear side.
5. AC cycle the system.
6. Remove the CMOS battery for at least ten seconds, then, reinstall the CMOS battery.
7. Try to power on the system by IPMI command through XCC or by the power button.
8. Implement the minimum configuration (one processor, one DIMM and one PSU without any adapter and any drive installed).
9. Reseat all power supplies and make sure that AC LEDs on the PSU rear side are lit.
10. Replace each power supply and check the power button function after installing each one.
11. If the issue cannot be resolved by above actions, call service to review the issue symptom and see whether the system board replacement is necessary.

The server immediately displays the POST Event Viewer when it is turned on

Complete the following steps until the problem is solved.

1. Correct any errors that are indicated by the light path diagnostics LEDs.
2. Make sure that the server supports all the processors and that the processors match in speed and cache size.

You can view processor details from system setup.

To determine if the processor is supported for the server, see <https://serverproven.lenovo.com/>.

3. (Trained technician only) Make sure that processor 1 is seated correctly
4. (Trained technician only) Remove processor 2 and restart the server.
5. Replace the following components one at a time, in the order shown, restarting the server each time:
 - a. (Trained technician only) Processor
 - b. (Trained technician only) System board

Embedded hypervisor is not in the boot list

Complete the following steps until the problem is solved.

1. If the server has been installed, moved, or serviced recently, or if this is the first time the embedded hypervisor is being used, make sure that the device is connected properly and that there is no physical damage to the connectors.

2. See the documentation that comes with the optional embedded hypervisor flash device for setup and configuration information.
3. Check <https://serverproven.lenovo.com/> to validate that the embedded hypervisor device is supported for the server.
4. Make sure that the embedded hypervisor device is listed in the list of available boot options. From the management controller user interface, click **Server Configuration → Boot Options**.

For information about accessing the management controller user interface, see the “Opening and Using the XClarity Controller Web Interface” section in the XCC documentation version compatible with your server at https://sysmgt.lenovofiles.com/help/topic/lxccc_frontend/lxccc_overview.html.

5. Check <http://datacentersupport.lenovo.com> for any tech tips (service bulletins) related to the embedded hypervisor and the server.
6. Make sure that other software works on the server to ensure that it is working properly.

Server cannot recognize a hard drive

Complete the following steps until the problem is solved.

1. Observe the associated yellow hard disk drive status LED. If the LED is lit, it indicates a drive fault.
2. If the status LED is lit, remove the drive from the bay, wait 45 seconds, and reinsert the drive, making sure that the drive assembly connects to the hard disk drive backplane.
3. Observe the associated green hard disk drive activity LED and the yellow status LED and perform corresponding operations in different situations:
 - If the green activity LED is flashing and the yellow status LED is not lit, the drive is recognized by the controller and is working correctly. Run the diagnostics tests for the hard disk drives. When you start a server and press the key according to the on-screen instructions, the Lenovo XClarity Provisioning Manager interface is displayed by default. (For more information, see the “Startup” section in the LXPM documentation compatible with your server at https://sysmgt.lenovofiles.com/help/topic/lxpm_frontend/lxpm_product_page.html.) You can perform hard drive diagnostics from this interface. From the Diagnostic page, click **Run Diagnostic → HDD test/Disk Drive Test**.
 - If the green activity LED is flashing and the yellow status LED is flashing slowly, the drive is recognized by the controller and is rebuilding.
 - If neither LED is lit or flashing, check whether the hard disk drive backplane is correctly seated. For details, go to step 4.
 - If the green activity LED is flashing and the yellow status LED is lit, replace the drive. If the activity of the LEDs remains the same, go to step Hard disk drive problems. If the activity of the LEDs changes, return to step 1.
4. Make sure that the hard disk drive backplane is correctly seated. When it is correctly seated, the drive assemblies correctly connect to the backplane without bowing or causing movement of the backplane.
5. Reseat the backplane power cable and repeat steps 1 through 3.
6. Reseat the backplane signal cable and repeat steps 1 through 3.
7. Suspect the backplane signal cable or the backplane:
 - Replace the affected backplane signal cable.
 - Replace the affected backplane.
8. Run the diagnostics tests for the hard disk drives. When you start a server and press the key according to the on-screen instructions, the Lenovo XClarity Provisioning Manager interface is displayed by default. (For more information, see the “Startup” section in the LXPM documentation compatible with your server at https://sysmgt.lenovofiles.com/help/topic/lxpm_frontend/lxpm_product_page.html.) You can perform hard drive diagnostics from this interface. From the Diagnostic page, click **Run Diagnostic → HDD test/Disk Drive Test**.

Based on those tests:

- If the backplane passes the test but the drives are not recognized, replace the backplane signal cable and run the tests again.
- Replace the backplane.
- If the adapter fails the test, disconnect the backplane signal cable from the adapter and run the tests again.

- If the adapter fails the test, replace the adapter.

Displayed system memory is less than installed physical memory

Complete the following steps until the problem is resolved.

Note: Each time you install or remove a DIMM, you must disconnect the server from the power source; then, wait 10 seconds before restarting the server.

1. Make sure that:
 - Memory modules from different vendors are not in the same channel.
 - No error LEDs are lit on the operator information panel.
 - No DIMM error LEDs are lit on the system board.
 - Memory mirrored channel does not account for the discrepancy.
 - The memory modules are seated correctly.
 - You have installed the correct type of memory.
 - If you changed the memory, you updated the memory configuration in the Setup utility.
 - All banks of memory are enabled. The server might have automatically disabled a memory bank when it detected a problem, or a memory bank might have been manually disabled.
 - There is no memory mismatch when the server is at the minimum memory configuration.
2. Reseat the DIMMs and then restart the server.
3. Run the memory module diagnostics. When you start a server and press the key according to the on-screen instructions, the Lenovo XClarity Provisioning Manager interface is displayed by default. You can perform memory diagnostics from this interface. From the Diagnostic page, click **Run Diagnostic → Memory test**.
4. Check the POST error log:
 - If a DIMM was disabled by a systems-management interrupt (SMI), replace the DIMM.
 - If a DIMM was disabled by the user or by POST, reseat the DIMM; then, run the Setup utility and enable the DIMM.
5. Reseat the DIMM.
6. Restart the server.

A Lenovo optional device that was just installed does not work.

1. Make sure that:
 - The device is supported for the server (see <https://serverproven.lenovo.com/>).
 - You followed the installation instructions that came with the device and the device is installed correctly.
 - You have not loosened any other installed devices or cables.
 - You updated the configuration information in system setup. When you start a server and press the key according to the on-screen instructions to display the Setup Utility. Whenever memory or any other device is changed, you must update the configuration.
2. Reseat the device that you have just installed.
3. Replace the device that you have just installed.
4. Reseat the cable connection and check there is no physical damage to the cable.
5. If there is any cable damage, then replace the cable.

Voltage planar fault is displayed in the event log

Complete the following steps until the problem is solved.

1. Revert the system to the minimum configuration. See “[Technical specifications](#)” on page 7 for the minimally required number of processors and DIMMs.
2. Restart the system.
 - If the system restarts, add each of the removed items one at a time and restart the system each time until the error occurs. Replace the item for which the error occurs.
 - If the system does not restart, suspect the system board.

Appendix A. Getting help and technical assistance

If you need help, service, or technical assistance or just want more information about Lenovo products, you will find a wide variety of sources available from Lenovo to assist you.

On the World Wide Web, up-to-date information about Lenovo systems, optional devices, services, and support are available at:

<http://datacentersupport.lenovo.com>

Note: This section includes references to IBM Web sites and information about obtaining service. IBM is Lenovo's preferred service provider for ThinkSystem.

Tech Tips

Lenovo continually updates the support website with the latest tips and techniques that you can use to solve issues that your server might encounter. These Tech Tips (also called retain tips or service bulletins) provide procedures to work around issues or solve problems related to the operation of your server.

To find the Tech Tips available for your server:

1. Go to <http://datacentersupport.lenovo.com> and navigate to the support page for your server.
2. Click on **How To's** from the navigation pane.
3. Click **Article Type → Solution** from the drop-down menu.

Follow the on-screen instructions to choose the category for the problem that you are having.

Security advisories

Lenovo is committed to developing products and services that adhere to the highest security standards in order to protect our customers and their data. When potential vulnerabilities are reported, it is the responsibility of the Lenovo Product Security Incident Response Team (PSIRT) to investigate and provide information to our customers so they may put mitigation plans in place as we work toward providing solutions.

The list of current advisories is available at the following location:

https://datacentersupport.lenovo.com/product_security/home

Before you call

Before you call, there are several steps that you can take to try and solve the problem yourself. If you decide that you do need to call for assistance, gather the information that will be needed by the service technician to more quickly resolve your problem.

Attempt to resolve the problem yourself

You can solve many problems without outside assistance by following the troubleshooting procedures that Lenovo provides in the online help or in the Lenovo product documentation. The Lenovo product documentation also describes the diagnostic tests that you can perform. The documentation for most systems, operating systems, and programs contains troubleshooting procedures and explanations of error messages and error codes. If you suspect a software problem, see the documentation for the operating system or program.

You can find the product documentation for your ThinkSystem products at the following location:

<http://thinksystem.lenovofiles.com/help/index.jsp>

You can take these steps to try to solve the problem yourself:

- Check all cables to make sure that they are connected.
- Check the power switches to make sure that the system and any optional devices are turned on.
- Check for updated software, firmware, and operating-system device drivers for your Lenovo product. The Lenovo Warranty terms and conditions state that you, the owner of the Lenovo product, are responsible for maintaining and updating all software and firmware for the product (unless it is covered by an additional maintenance contract). Your service technician will request that you upgrade your software and firmware if the problem has a documented solution within a software upgrade.
- If you have installed new hardware or software in your environment, check <https://serverproven.lenovo.com/> to make sure that the hardware and software are supported by your product.
- Go to <http://datacentersupport.lenovo.com> and check for information to help you solve the problem.
 - Check the Lenovo forums at https://forums.lenovo.com/t5/Datacenter-Systems/ct-p/sv_eg to see if someone else has encountered a similar problem.

Gathering information needed to call Support

If you require warranty service for your Lenovo product, the service technicians will be able to assist you more efficiently if you prepare the appropriate information before you call. You can also go to <http://datacentersupport.lenovo.com/warrantylookup> for more information about your product warranty.

Gather the following information to provide to the service technician. This data will help the service technician quickly provide a solution to your problem and ensure that you receive the level of service for which you might have contracted.

- Hardware and Software Maintenance agreement contract numbers, if applicable
- Machine type number (Lenovo 4-digit machine identifier)
- Model number
- Serial number
- Current system UEFI and firmware levels
- Other pertinent information such as error messages and logs

As an alternative to calling Lenovo Support, you can go to <https://support.lenovo.com/servicerequest> to submit an Electronic Service Request. Submitting an Electronic Service Request will start the process of determining a solution to your problem by making the pertinent information available to the service technicians. The Lenovo service technicians can start working on your solution as soon as you have completed and submitted an Electronic Service Request.

Collecting service data

To clearly identify the root cause of a server issue or at the request of Lenovo Support, you might need collect service data that can be used for further analysis. Service data includes information such as event logs and hardware inventory.

Service data can be collected through the following tools:

- **Lenovo XClarity Provisioning Manager**

Use the Collect Service Data function of Lenovo XClarity Provisioning Manager to collect system service data. You can collect existing system log data or run a new diagnostic to collect new data.

- **Lenovo XClarity Controller**

You can use the Lenovo XClarity Controller web interface or the CLI to collect service data for the server. The file can be saved and sent to Lenovo Support.

- For more information about using the web interface to collect service data, see the “Downloading service data” section in the XCC documentation version compatible with your server at https://sysmgt.lenovofiles.com/help/topic/ixcc_frontend/ixcc_overview.html.

- For more information about using the CLI to collect service data, see the “ffdc command” section in the XCC documentation version compatible with your server at https://sysmgt.lenovofiles.com/help/topic/lxcc_frontend/lxcc_overview.html.

- **Lenovo XClarity Administrator**

Lenovo XClarity Administrator can be set up to collect and send diagnostic files automatically to Lenovo Support when certain serviceable events occur in Lenovo XClarity Administrator and the managed endpoints. You can choose to send diagnostic files to Lenovo Support using Call Home or to another service provider using SFTP. You can also manually collect diagnostic files, open a problem record, and send diagnostic files to the Lenovo Support Center.

You can find more information about setting up automatic problem notification within the Lenovo XClarity Administrator at http://sysmgt.lenovofiles.com/help/topic/com.lenovo.lxca.doc/admin_setupcallhome.html.

- **Lenovo XClarity Essentials OneCLI**

Lenovo XClarity Essentials OneCLI has inventory application to collect service data. It can run both in-band and out-of-band. When running in-band within the host operating system on the server, OneCLI can collect information about the operating system, such as the operating system event log, in addition to the hardware service data.

To obtain service data, you can run the `getinfor` command. For more information about running the `getinfor`, see http://sysmgt.lenovofiles.com/help/topic/toolctr_cli_lenovo/onecli_r_getinfor_command.html.

Contacting Support

You can contact Support to obtain help for your issue.

You can receive hardware service through a Lenovo Authorized Service Provider. To locate a service provider authorized by Lenovo to provide warranty service, go to <https://datacentersupport.lenovo.com/serviceprovider> and use filter searching for different countries. For Lenovo support telephone numbers, see <https://datacentersupport.lenovo.com/supportphonenumberlist> for your region support details.

Appendix B. Notices

Lenovo may not offer the products, services, or features discussed in this document in all countries. Consult your local Lenovo representative for information on the products and services currently available in your area.

Any reference to a Lenovo product, program, or service is not intended to state or imply that only that Lenovo product, program, or service may be used. Any functionally equivalent product, program, or service that does not infringe any Lenovo intellectual property right may be used instead. However, it is the user's responsibility to evaluate and verify the operation of any other product, program, or service.

Lenovo may have patents or pending patent applications covering subject matter described in this document. The furnishing of this document is not an offer and does not provide a license under any patents or patent applications. You can send inquiries in writing to the following:

*Lenovo (United States), Inc.
8001 Development Drive
Morrisville, NC 27560
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Important notes

Processor speed indicates the internal clock speed of the microprocessor; other factors also affect application performance.

CD or DVD drive speed is the variable read rate. Actual speeds vary and are often less than the possible maximum.

When referring to processor storage, real and virtual storage, or channel volume, KB stands for 1 024 bytes, MB stands for 1 048 576 bytes, and GB stands for 1 073 741 824 bytes.

When referring to hard disk drive capacity or communications volume, MB stands for 1 000 000 bytes, and GB stands for 1 000 000 000 bytes. Total user-accessible capacity can vary depending on operating environments.

Maximum internal hard disk drive capacities assume the replacement of any standard hard disk drives and population of all hard-disk-drive bays with the largest currently supported drives that are available from Lenovo.

Maximum memory might require replacement of the standard memory with an optional memory module.

Each solid-state memory cell has an intrinsic, finite number of write cycles that the cell can incur. Therefore, a solid-state device has a maximum number of write cycles that it can be subjected to, expressed as total bytes written (TBW). A device that has exceeded this limit might fail to respond to system-generated commands or might be incapable of being written to. Lenovo is not responsible for replacement of a device that has exceeded its maximum guaranteed number of program/erase cycles, as documented in the Official Published Specifications for the device.

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<http://thinksystem.lenovofiles.com/help/index.jsp>

Taiwan Region BSMI RoHS declaration

單元 Unit	限用物質及其化學符號 Restricted substances and its chemical symbols					
	鉛Lead (PB)	汞Mercury (Hg)	鎘Cadmium (Cd)	六價鉻 Hexavalent chromium (Cr ⁶⁺)	多溴聯苯 Polybrominated biphenyls (PBB)	多溴二苯醚 Polybrominated diphenyl ethers (PBDE)
機架	○	○	○	○	○	○
外部蓋板	○	○	○	○	○	○
機械組零件	—	○	○	○	○	○
空氣傳動設備	—	○	○	○	○	○
冷卻組零件	—	○	○	○	○	○
內存模組	—	○	○	○	○	○
處理器模組	—	○	○	○	○	○
電纜組零件	—	○	○	○	○	○
電源供應器	—	○	○	○	○	○
儲備設備	—	○	○	○	○	○
電路卡	—	○	○	○	○	○
光碟機	—	○	○	○	○	○
<p>備考1. “超出0.1 wt %” 及 “超出0.01 wt %” 係指限用物質之百分比含量超出百分比含量基準值。 Note1 : “exceeding 0.1 wt%” and “exceeding 0.01 wt%” indicate that the percentage content of the restricted substance exceeds the reference percentage value of presence condition.</p> <p>備考2. “○” 係指該項限用物質之百分比含量未超出百分比含量基準值。 Note2 : “○” indicates that the percentage content of the restricted substance does not exceed the percentage of reference value of presence.</p> <p>備考3. “—” 係指該項限用物質為排除項目。 Note3 : The “—” indicates that the restricted substance corresponds to the exemption.</p>						

Taiwan Region import and export contact information

Contacts are available for Taiwan Region import and export information.

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進口商電話: 0800-000-702

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