



ThinkSystem SR635 Maintenance Manual



Machine Types: 7Y98 and 7Y99

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, ensure 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>

First Edition (August 2019)

© Copyright Lenovo 2017, 2019.

LIMITED AND RESTRICTED RIGHTS NOTICE: If data or software is delivered pursuant to a General Services Administration (GSA) contract, use, reproduction, or disclosure is subject to restrictions set forth in Contract No. GS-35F-05925.

Contents

Safetyiii	Technical rules for PCIe NVMe adapter	82
Safety inspection checklist	iv	Top cover replacement	82
Chapter 1. Introduction	1	Remove the top cover	83
Specifications	3	Install the top cover	84
Firmware updates	6	Air baffle replacement	85
Tech Tips	8	Remove the air baffle	85
Security advisories	8	Install the air baffle	86
Power on the server	8	Rack latches replacement	87
Power off the server	8	Remove the rack latches	87
		Install the rack latches	89
Chapter 2. Server components	11	Security bezel replacement	91
Front view	11	Remove the security bezel	91
Operator information panel	13	Install the security bezel	92
Rear view	14	System fan replacement	94
Rear view LEDs	18	Remove a system fan	94
System board components	20	Install a system fan	95
Internal cable routing	21	Memory module replacement	97
Power cable routing	22	Remove a memory module	97
Server model with four 3.5-inch SAS/SATA drives	24	Memory module installation rules	99
Server model with eight 2.5-inch SAS/SATA drives	32	Install a memory module	101
Server model with six 2.5-inch SAS/SATA drives and four 2.5-inch NVMe drives	40	Hot-swap drive replacement	102
Server model with ten 2.5-inch SAS/SATA/NVMe drives	47	Remove a hot-swap drive	103
M.2 module cable routing	60	Install a hot-swap drive	104
Super capacitor cable routing	62	OCP 3.0 Ethernet adapter replacement	105
VGA/USB/Front panel connector	63	Remove the OCP 3.0 Ethernet adapter	105
System board LEDs	66	Install the OCP 3.0 Ethernet adapter	106
System board jumpers	68	Riser card replacement	107
Parts list	69	Remove a riser card	108
Power cords	73	Install a riser card	110
		Internal riser assembly replacement	111
Chapter 3. Hardware replacement procedures	75	Remove the internal riser assembly	111
Installation Guidelines	75	Install the internal riser assembly	112
System reliability guidelines	76	PCIe adapter replacement	113
Working inside the server with the power on	76	Remove a PCIe adapter	114
Handling static-sensitive devices	77	Install a PCIe adapter	117
Technical rules	77	GPU replacement	120
Technical rules for CPU and heat sink	77	Remove a GPU adapter	120
Technical rules for power supply	77	Install a GPU adapter	120
Technical rules for system fans	80	Backplane replacement	121
Technical rules for GPU adapters	80	Remove the backplane for four 3.5-inch hot-swap drives	121
Technical rules for drives	81	Install the backplane for four 3.5-inch hot-swap drives	122
Technical rules for HBA/RAID adapters	82	Remove the backplane for eight 2.5-inch hot-swap drives	123
		Install the backplane for eight 2.5-inch hot-swap drives	124

Remove the backplane for ten 2.5-inch hot-swap drives	125
Install the backplane for ten 2.5-inch hot-swap drives	126
Remove the rear backplane	127
Install the rear backplane	128
CMOS battery replacement	131
Remove the CMOS battery	131
Install the CMOS battery	133
TPM adapter replacement	134
Remove the TPM adapter	135
Install the TPM adapter	136
Rear hot-swap drive cage replacement	137
Remove the rear hot-swap drive cage	137
Install the rear hot-swap drive cage	138
Middle drive cage replacement	142
Remove the middle drive cage	142
Install the middle drive cage	145
M.2 adapter and M.2 drive replacement	149
Remove the M.2 adapter and M.2 drive	149
Adjust the retainer on the M.2 adapter	152
Install the M.2 adapter and M.2 drive	153
RAID super capacitor module replacement	157
Remove a super capacitor module on the M.2/riser support bracket	157
Install a super capacitor module on the M.2/riser support bracket	158
Remove the RAID super capacitor module on the chassis	159
Install the RAID super capacitor module on the chassis	160
Front I/O assembly replacement	162
Remove the front I/O assembly	163
Install the front I/O assembly	163
Hot-swap power supply replacement	164
Remove a hot-swap power supply	164
Install a hot-swap power supply	169
Heat sink and microprocessor replacement	175
Remove a heat sink	175
Remove a processor	176
Install a processor	177
Install a heat sink	179
Fan board replacement	180
Remove the fan board	180
Install the fan board	181
Power inverter board (PIB) board replacement	182
Remove the PIB board	182
Install the PIB board	183

System board replacement	184
Remove the system board	184
Install the system board	186
Update the Universal Unique Identifier (UUID)	188
Update the DMI/SMBIOS data	188
Enable TPM	188
Enable UEFI Secure Boot	189
Complete the parts replacement	189

Chapter 4. Problem determination291

Event logs	191
General problem determination procedures	193
Resolving suspected power problems	193
Resolving suspected Ethernet controller problems	194
Troubleshooting by symptom	194
Power on and power off problems	195
Memory problems	196
Hard disk drive problems	197
Monitor and video problems	199
Keyboard, mouse, or USB-device problems	201
Optional-device problems	201
Serial-device problems	202
Intermittent problems	203
Power problems	204
Network problems	204
Observable problems	205
Software problems	207

Appendix A. Getting help and technical assistance209

Before you call	209
Collecting service data	210
Contacting Support	210

Appendix B. Notices211

Trademarks	212
Important notes	212
Particulate contamination	212
Telecommunication regulatory statement	213
Electronic emission notices	213
Taiwan BSMI RoHS declaration	214
Taiwan import and export contact information	214

Index215

Safety

Before installing this product, read the Safety Information.

قبل تركيب هذا المنتج، يجب قراءة الملاحظات الأمنية

Antes de instalar este produto, leia as Informações de Segurança.

在安装本产品之前，请仔细阅读 Safety Information（安全信息）。

安裝本產品之前，請先閱讀「安全資訊」。

Prije instalacije ovog produkta obavezno pročitajte Sigurnosne Upute.

Před instalací tohoto produktu si přečtěte příručku bezpečnostních instrukcí.

Læs sikkerhedsforskrifterne, før du installerer dette produkt.

Lees voordat u dit product installeert eerst de veiligheidsvoorschriften.

Ennen kuin asennat tämän tuotteen, lue turvaohjeet kohdasta Safety Information.

Avant d'installer ce produit, lisez les consignes de sécurité.

Vor der Installation dieses Produkts die Sicherheitshinweise lesen.

Πριν εγκαταστήσετε το προϊόν αυτό, διαβάστε τις πληροφορίες ασφάλειας (safety information).

לפני שתתקינו מוצר זה, קראו את הוראות הבטיחות.

A termék telepítése előtt olvassa el a Biztonsági előírásokat!

Prima di installare questo prodotto, leggere le Informazioni sulla Sicurezza.

製品の設置の前に、安全情報をお読みください。

본 제품을 설치하기 전에 안전 정보를 읽으십시오.

Пред да се инсталира овој продукт, прочитајте информацијата за безбедност.



Les sikkerhetsinformasjonen (Safety Information) før du installerer dette produktet.

Przed zainstalowaniem tego produktu, należy zapoznać się z książką "Informacje dotyczące bezpieczeństwa" (Safety Information).

Antes de instalar este produto, leia as Informações sobre Segurança.

Перед установкой продукта прочтите инструкции по технике безопасности.

Pred inštaláciou tohto zariadenia si pečítajte Bezpečnostné predpisy.

Pred namestitvijo tega proizvoda preberite Varnostne informacije.

Antes de instalar este producto, lea la información de seguridad.

Läs säkerhetsinformationen innan du installerar den här produkten.

ཐོན་ཇུས་འདི་བདེ་སྤྱོད་མ་བྱས་གོང་། སྐྱར་གྱི་ཡིད་གཟབ་
བྱ་འདྲ་མིན་ཡིད་པའི་འོད་ཟེར་བལྟ་དགོས།

Bu ürünü kurmadan önce güvenlik bilgilerini okuyun.

مەزكۇر مەھسۇلاتنى ئورنىتىشتىن بۇرۇن بىخەتەرلىك ئۆزۈرلىرىنى ئوقۇپ چىقىڭ.

Youq mwngz yungh canjbinj neix gaxgonq, itdingh aeu doeg aen
canjbinj soengq cungj vahgangj ancien siusik.

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.

CAUTION:

This equipment must be installed by trained service personnel, as defined by the NEC and IEC 60950-1, Second Edition, the standard for Safety of Information Technology Equipment. Lenovo assumes you are qualified in the servicing of equipment and trained in recognizing hazards in products with hazardous energy levels.

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. In the Customize a Model pane:
 - 1) Click **Select Options/Parts for a Model**.
 - 2) Enter the machine type and model for your server.
- c. Click the Power tab 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.

Chapter 1. Introduction

The ThinkSystem SR635 server is a 1U rack server designed for performance and expansion for various IT workloads. With the modular design, the server is flexible to be customized for maximum storage capacity or high storage density with selectable input/output options and tiered system management.

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.

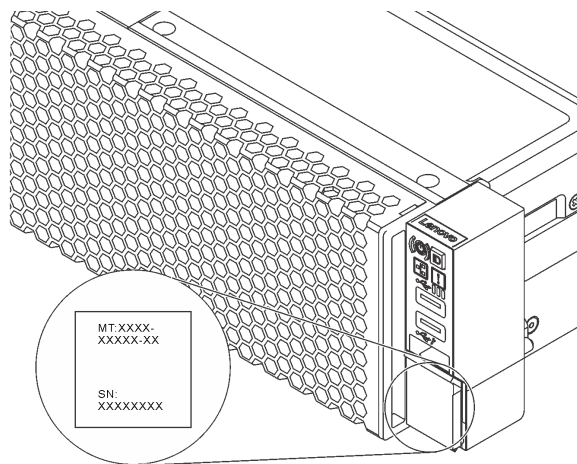


Figure 1. Location of the ID label

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 illustration shows the QR code: <https://support.lenovo.com/p/servers/sr635>



Figure 2. QR code

Specifications

The following information is a summary of the features and specifications of the server. Depending on the model, some features might not be available, or some specifications might not apply.

Table 1. Server specifications

Specification	Description
Dimension	<ul style="list-style-type: none"> • 1U • Height: 43.0 mm (1.3 inches) • Width: <ul style="list-style-type: none"> – With rack latches: 482.0 mm (19.0 inches) – Without rack latches: 434.4 mm (17.1 inches) • Depth: 778.3 mm (30.6 inches) <p>Note: The depth is measured with rack latches and power supply installed, but without security bezel installed.</p>
Package weight	Up to 19.2 kg (42.3 lb)
Processor	<ul style="list-style-type: none"> • One AMD®EPYC™ 7002-Generation processor • Designed for Land Grid Array (LGA) 4094 (SP3) socket • Scalable up to 64 cores • Thermal Design Power (TDP): up to 225 wattss <p>For a list of supported processors, see: http://www.lenovo.com/us/en/serverproven/</p>
Heat sink	<ul style="list-style-type: none"> • Standard heat sink • High-performance heat sink
Memory	<ul style="list-style-type: none"> • Slots: 16 memory module slots • Minimum memory: 8 GB • Maximum memory: 1 TB • Supported memory module type: <ul style="list-style-type: none"> – TruDDR4 2933, single-rank/dual-rank, 8 GB/16 GB/32 GB/64 GB RDIMM – TruDDR4 3200, dual-rank, 16 GB/32 GB/64 GB RDIMM <p>Notes:</p> <ul style="list-style-type: none"> • The operating speed and total memory capacity depend on the processor model and UEFI settings. <p>For a list of supported memory, see the Lenovo ServerProven Web site: https://static.lenovo.com/us/en/serverproven/index.shtml.</p>
Internal drives	<ul style="list-style-type: none"> • Up to two M.2 drives • Up to four 3.5-inch hot-swap SAS/SATA drives • Up to twelve 2.5-inch hot-swap SAS/SATA drives • Up to sixteen NVMe drives
PCIe slots	Depending on the model, your server supports up to three PCIe slots in the rear. For detailed information, see “Rear view” on page 14.

Table 1. Server specifications (continued)

Specification	Description
Graphics processing unit (GPU)	<ul style="list-style-type: none"> • Maximum: up to three GPUs • Type: NVIDIA Tesla T4
Input/Output (I/O) features	<ul style="list-style-type: none"> • Front panel: <ul style="list-style-type: none"> – One VGA connector (optional) – Two USB 3.1 connectors • Rear panel: <ul style="list-style-type: none"> – One VGA connector – Two USB 3.1 connectors – Ethernet connectors on OCP 3.0 Ethernet adapter (optional) – One RJ45 BMC management network connector – One serial port
HBA/RAID adapters (depending on the model)	<p>Support for JBOD mode :</p> <ul style="list-style-type: none"> • 430-8i SAS/SATA 12G HBA adapter • 430-16i SAS/SATA 12G HBA adapter • 430-8e SAS/SATA 12G HBA adapter • 430-16e SAS/SATA 12G HBA adapter <p>Support for JBOD mode and RAID levels 0, 1, 5, 10, and 50:</p> <ul style="list-style-type: none"> • 530-8i PCIe 12G RAID adapter • 730-8i 1G Cache PCIe 12G RAID adapter • 730-8i 2G Flash PCIe 12G RAID adapter <p>Support for JBOD mode and RAID levels 0, 1, 5, 10 ,50 , 6 and 60:</p> <ul style="list-style-type: none"> • 930-8i 2G Flash PCIe 12G RAID adapter • 930-16i 4G Flash PCIe 12G RAID adapter • 930-8e 4G Flash PCIe 12G RAID adapter • 930-16e 4G Flash PCIe 12G RAID adapter <p>For technical rules for storage controller adapters, see “Technical rules for HBA/RAID adapters” on page 82.</p>
System fans	Seven dual-rotor hot-swap fans (including one redundant fan rotor)
Power supplies	<p>One or two hot-swap power supplies for redundancy support:</p> <ul style="list-style-type: none"> • 550-watts ac 80 PLUS Platinum • 750-watts ac 80 PLUS Platinum • 750-watts ac 80 PLUS Titanium • 1100-watts ac 80 PLUS Platinum
Minimal configuration for debugging	<ul style="list-style-type: none"> • One processor in processor socket 1 • One memory module in slot 1 • One power supply • One HDD drive or one M.2 drive (if OS is needed for debugging) • Six system fans (depending on the configuration)

Table 1. Server specifications (continued)

Specification	Description																				
Acoustical noise emissions	<ul style="list-style-type: none"> • Sound power levels, idle <ul style="list-style-type: none"> – 5.1 bels, minimum – 5.8 bels, typical – 6.2 bels, maximum • Sound power levels, operating <ul style="list-style-type: none"> – 5.1 bels, minimum – 5.8 bels, typical – 6.2 bels, maximum <p>Notes:</p> <ul style="list-style-type: none"> • These sound power levels are measured in controlled acoustical environments according to procedures specified by ISO 7779 and are reported in accordance with ISO 9296. • The declared acoustic noise levels are based on specified configurations, which may change slightly depending on configuration/conditions. 																				
Electrical input	<p><i>Table 2. Electrical input for power supplies</i></p> <table border="1"> <thead> <tr> <th>Power supply</th> <th>100–127 V ac (50–60 Hz)</th> <th>200–240 V ac (50–60 Hz)</th> <th>240 V dc*</th> </tr> </thead> <tbody> <tr> <td>550-watts 80 PLUS Platinum</td> <td>Yes</td> <td>Yes</td> <td>Yes</td> </tr> <tr> <td>750-watts 80 PLUS Platinum</td> <td>Yes</td> <td>Yes</td> <td>Yes</td> </tr> <tr> <td>750-watts 80 PLUS Titanium</td> <td>No</td> <td>Yes</td> <td>Yes</td> </tr> <tr> <td>1100-watts 80 PLUS Platinum</td> <td>Yes</td> <td>Yes</td> <td>Yes</td> </tr> </tbody> </table> <p>CAUTION: 240 V dc input (input range: 180-300 V dc) is supported in Chinese Mainland ONLY. Power supply with 240 V dc input cannot support hot plugging power cord function. Before removing the power supply with dc input, please turn off server or disconnect dc power sources at the breaker panel or by turning off the power source. Then, remove the power cord.</p>	Power supply	100–127 V ac (50–60 Hz)	200–240 V ac (50–60 Hz)	240 V dc*	550-watts 80 PLUS Platinum	Yes	Yes	Yes	750-watts 80 PLUS Platinum	Yes	Yes	Yes	750-watts 80 PLUS Titanium	No	Yes	Yes	1100-watts 80 PLUS Platinum	Yes	Yes	Yes
Power supply	100–127 V ac (50–60 Hz)	200–240 V ac (50–60 Hz)	240 V dc*																		
550-watts 80 PLUS Platinum	Yes	Yes	Yes																		
750-watts 80 PLUS Platinum	Yes	Yes	Yes																		
750-watts 80 PLUS Titanium	No	Yes	Yes																		
1100-watts 80 PLUS Platinum	Yes	Yes	Yes																		
Environment	<p>The server is supported in the following environment:</p> <ul style="list-style-type: none"> • Air temperature: <ul style="list-style-type: none"> – Operating: <ul style="list-style-type: none"> – ASHRAE class A2: 10–35°C (50–95°F); when the altitude exceeds 900 m (2953 ft), the maximum ambient temperature value decreases by 1°C (1.8°F) with every 300 m (984 ft) of altitude increase. – ASHRAE class A3: 5–40°C (41–104°F); when the altitude exceeds 900 m (2953 ft), the maximum ambient temperature value decreases by 1°C (1.8°F) with every 175 m (574 ft) of altitude increase. – ASHRAE class A4: 5–45°C (41–113°F); when the altitude exceeds 900 m (2953 ft), the maximum ambient temperature value decreases by 1°C (1.8°F) with every 125 m (410 ft) of altitude increase. 																				

Table 1. Server specifications (continued)

Specification	Description
	<ul style="list-style-type: none"> - Server off: 5–45°C (41–113°F) - Shipping or storage: -40–60°C (-40–140°F) • Maximum altitude: 3050 m (10 000 ft) • Relative humidity (non-condensing): <ul style="list-style-type: none"> - Operating: <ul style="list-style-type: none"> - ASHRAE Class A2: 8%–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) - Shipment or storage: 8%–90% • Particulate contamination <p>Attention: Airborne particulates and reactive gases acting alone or in combination with other environmental factors such as humidity or temperature might pose a risk to the server.</p> <p>Your server complies with ASHRAE class A2 specifications. The server performance might be impacted when the operating temperature is outside the ASHRAE A2 specifications. Server model with the following configurations complies with ASHRAE class A3 and class A4 specifications:</p> <ul style="list-style-type: none"> • The processor TDP is 120/155 watts. • There is no NVMe drive, rear drive cage, M.2 drive, GPU adapter, OCP 3.0 Ethernet adapter or PCIe NVMe adapter installed. <p>Note: Server model with 2 port/4 port 1G OCP 3.0 Ethernet adapter installed can comply with ASHRAE class A3 and class A4 specifications</p>

Firmware updates

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.

Note: 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 BMC and UEFI, update the firmware for BMC first.

Best practice related to updating firmware is available at the following location:

<http://lenovopress.com/LP0656>

Important 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 BMC 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 not require the server to be in the S0 (Working) power state.

- **On-Target update.** The installation or update is initiated from an Operating System executing on the server's operating system.
- **Off-Target update.** The installation or update is initiated from a computing device interacting directly with the server's BMC.
- **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.

See the following table to determine the best Lenovo tool to use for installing and setting up the firmware:

Note: The server UEFI settings for option ROM must be set to **UEFI** to update the firmware using Lenovo XClarity Essentials. For more information, see the following Tech Tip:

<https://datacentersupport.lenovo.com/us/en/solutions/ht506118>

Tool	In-band update	Out-of-band update	On-target update	Off-target update	Graphical user interface	Command-line interface	Supports UXSPs
Lenovo XClarity Provisioning Manager Lite Limited to core system firmware only.	✓			✓	✓		
ThinkSystem System Manager Supports core system firmware and most advanced I/O option firmware updates		✓		✓	✓	✓	
Lenovo XClarity Essentials Bootable Media Creator Supports core system firmware and I/O firmware updates. You can update the Microsoft Windows operating system, but device drivers are not included on the bootable image	✓				✓	✓	✓

The latest firmware can be found at the following site:

<http://datacentersupport.lenovo.com/products/servers/thinksystem/sr635/7y98/downloads>

- **Lenovo XClarity Provisioning Manager Lite**

From Lenovo XClarity Provisioning Manager Lite, you can update the BMC firmware, the UEFI firmware, and the Lenovo XClarity Provisioning Manager Lite software.

Note: By default, the Lenovo XClarity Provisioning Manager Lite Graphical User Interface is displayed when you press F11. If your server starts with the text-based system setup, you can bring up the Graphical User Interface from the text-based system setup interface.

- **ThinkSystem System Manager**

From ThinkSystem System Manager, you can update the system firmware, the backplane firmware, and the power supply firmware.

If you need to install a specific update, you can use ThinkSystem System Manager for a specific server.

Specific details about updating firmware using ThinkSystem System Manager are available at:

https://thinksystem.lenovofiles.com/help/topic/7Y98/bmc_user_guide.pdf

- **Lenovo XClarity Essentials Bootable Media Creator**

You can use Lenovo XClarity Essentials Bootable Media Creator to create bootable media that is suitable for applying firmware updates.

You can obtain Lenovo XClarity Essentials BoMC from the following location:

<https://datacentersupport.lenovo.com/solutions/Invo-bomc>

Tech Tips

Lenovo continually updates the support Web site with the latest tips and techniques that you can use to solve issues that you might have with your server. These Tech Tips (also called retain tips or service bulletins) provide procedures to work around issues 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 **How-tos & Solutions**.

Expand **Symptom** and choose a category for the type of 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

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 restart automatically after a power interruption.
- The server can respond to remote power-on requests sent to the BMC.

For information about powering off the server, see “Power off the server” on page 8.

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 ThinkSystem System Manager 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.

When in a standby state, the server can respond to remote power-on requests sent to the BMC. For information about powering on the server, see https://thinksystem.lenovofiles.com/help/topic/7Y98/bmc_user_guide.pdf.

Chapter 2. Server components

Use the information in this section to learn about each of the components associated with your server.

Front view

The front view of the server varies by model. Depending on the model, your server might look slightly different from the illustrations in this topic.

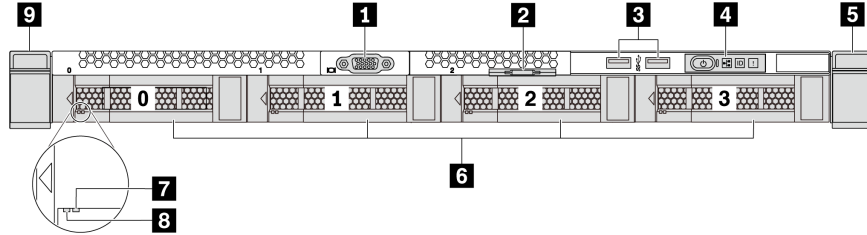


Figure 3. Front view of server model with four 3.5-inch drive bays

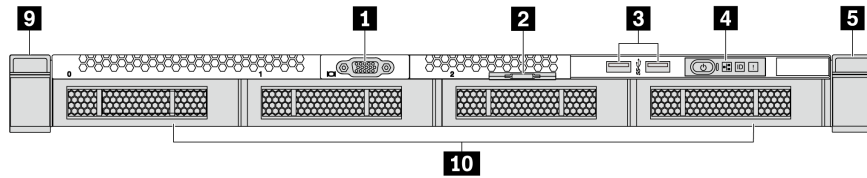


Figure 4. Front view of server model without a backplane (for four 3.5-inch drive bays)

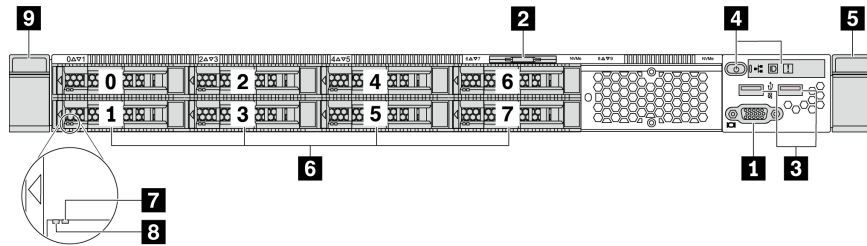


Figure 5. Front view of server model with eight 2.5-inch drive bays

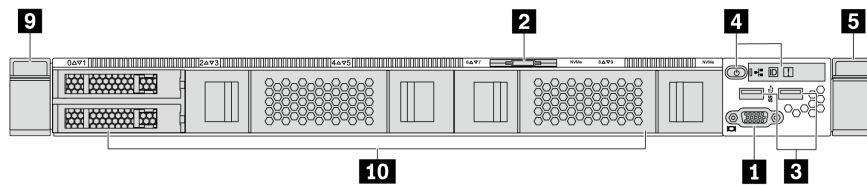


Figure 6. Front view of server model without a backplane (for ten 2.5-inch drive bays)

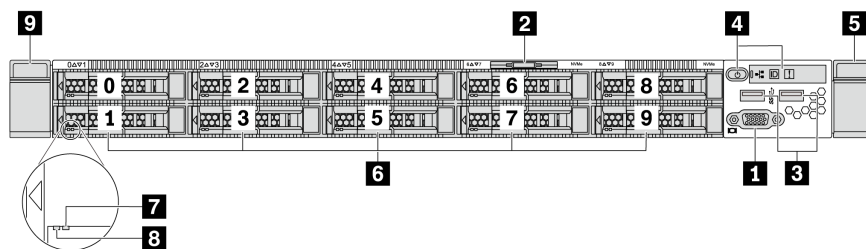


Figure 7. Front view of server model with ten 2.5-inch drive bays

Table 3. Components on the front of the server

1 VGA connector (optional)	2 Pull-out information tab
3 USB 3.1 connectors	4 Operator information panel
5 Rack latch (right)	6 Hot-swap drive bays
7 Drive status LED (yellow)	8 Drive activity LED (green)
9 Rack latch (left)	10 Drive bay filler

1 VGA connector

Used to attach a high-performance monitor, a direct-drive monitor, or other devices that use a VGA connector.

2 Pull-out information tab

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

3 USB 3.1 connector

Attach a USB-compatible device, such as a USB keyboard, USB mouse, or USB storage device.

4 Operator information panel

For information about the controls and status LEDs on the operator information panel, see “Operator information panel” on page 13.

5 **9** 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.

6 Hot-swap drive bays(drive fillers are installed for no-backplane configuration)

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. The vacant drive bays must be occupied by drive fillers.

7 Drive status LED

8 Drive activity LED

Each hot-swap drive has two LEDs.

Drive LED	Status	Description
7 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.
8 Drive activity LED (left)	Solid green	The drive is powered but not active.
	Blinking green	The drive is active.

Operator information panel

The operator information panel of the server provides controls and LEDs.

The following illustration shows the operator information panel of the server.

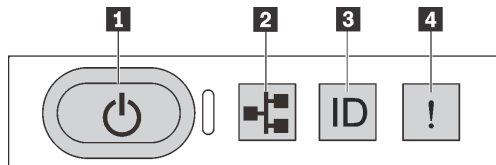


Figure 8. Operator information panel

Table 4. Components on the operator information panel

1 Power button with power status LED	2 Network activity LED (for OCP 3.0 Ethernet adapter)
3 System ID button with system ID LED	4 System error LED

1 Power button with power status LED

You can press the power button to power on the server when you finish setting up the server. You also can hold the power button for several seconds to power off the server if you cannot shut down the server from the operating system. The power status LED helps you to 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).
Off	None	There is no ac power applied to the server.

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

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.

3 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. You can also use the ThinkSystem System Manager or a remote management program to change the state of the system ID LEDs to assist in visually locating the server among other servers.

4 System error LED

The system error LED helps you to determine if there are any system errors.

Status	Color	Description	Action
On	Yellow	An error has been detected on the server. Causes might include but not limited to the following errors: <ul style="list-style-type: none"> • Processor error • Memory module error • Storage failure • PCIe adapter failure • Power supply error • Fan failure • Mainboard failure 	Check the event log to determine the exact cause of the error.
Off	None	The server is off or the server is on and is working correctly.	None.

Rear view

The rear of the server provides access to several connectors and components, including the power supplies, PCIe adapters, hot-swap drive bays, serial port, and Ethernet connectors.

Refer to the following rear view for different server models:

- “Rear view of server model with three PCIe slots” on page 14
- “Rear view of server model with two PCIe slots” on page 15
- “Rear view of server model with two hot-swap drive bays and one PCIe slot” on page 16
- “Rear view of server model with one PCIe slot” on page 17
- “Rear view of server model with no PCIe slot” on page 17

Rear view of server model with three PCIe slots

The following illustration shows the rear view of server model with three PCIe slots. Depending on the model, your server might look slightly different from the illustration below.

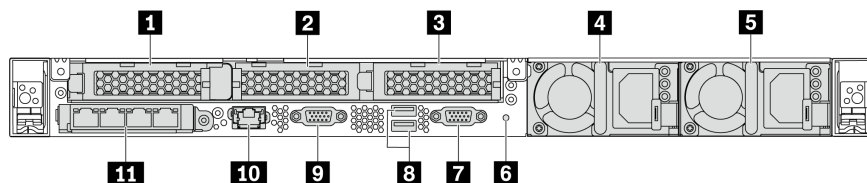


Figure 9. Rear view of server model with three PCIe slots

Table 5. Components on the rear of the server

1 PCIe slot 1 on riser 1 assembly	2 PCIe slot 2 on riser 2 assembly
3 PCIe slot 3 on riser 2 assembly	4 Power supply 1
5 Power supply 2 (optional)	6 NMI button
7 Serial port	8 USB 3.1 connectors (2)
9 VGA connector	10 RJ45 BMC management network connector
11 Ethernet connectors on OCP 3.0 Ethernet adapter (optional, two or four connectors may be available)	

1 PCIe slot 1 on riser 1 assembly

Your server supports the following riser card for riser 1 assembly:

Slot 1: PCIe x16, low-profile

2 3 PCIe slots on riser 2 assembly

Your server supports the following riser card configurations for riser 2 assembly:

Type 1:

- Slot 2: PCIe x16 (x16, x8, x4, x1), low-profile
- Slot 3: PCIe x16 (x16, x8, x4, x1), low-profile

Type 2:

- Slot 2: no riser card installed
- Slot 3: PCIe x16 (x16, x8, x4, x1), low-profile

Rear view of server model with two PCIe slots

The following illustration shows the rear view of the server model with two PCIe slots. Depending on the model, your server might look slightly different from the illustration below.

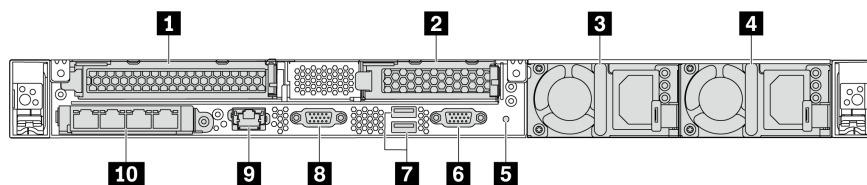


Figure 10. Rear view of server model with two PCIe slots

Table 6. Components on the rear of the server

1 PCIe slot 1 on riser 1 assembly	2 PCIe slot 3 on riser 2 assembly
3 Power supply 1	4 Power supply 2 (optional)
5 NMI button	6 Serial port
7 USB 3.1 connectors (2)	8 VGA connector
9 BMC management network connector	10 Ethernet connectors on OCP 3.0 Ethernet adapter (optional, two or four connectors may be available)

1 PCIe slot 1 on riser 1 assembly

Your server supports the following riser card for riser 1 assembly:

Slot 1: PCIe x16 (x16, x8, x4, x1), full-height, full-length

2 PCIe slot 3 on riser 2 assembly

Your server supports the following riser card for riser 2 assembly:

Slot 3: PCIe x16 (x16, x8, x4, x1), low-profile

Rear view of server model with two hot-swap drive bays and one PCIe slot

The following illustration shows the rear view of the server model with two hot-swap drive bays and one PCIe slot. Depending on the model, your server might look slightly different from the illustration below.

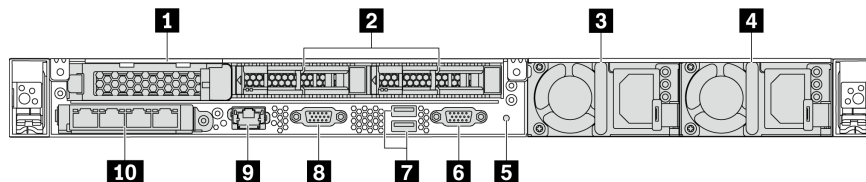


Figure 11. Rear view of server model with two hot-swap drive bays and one PCIe slot

Table 7. Components on the rear of the server

1 PCIe slot 1	2 Rear 2.5-inch drive bays
3 Power supply 1	4 Power supply 2 (optional)
5 NMI button	6 Serial port
7 USB 3.1 connectors (2)	8 VGA connector
9 BMC management network connector	10 Ethernet connectors on OCP 3.0 Ethernet adapter (optional, two or four connectors may be available)

1 PCIe slot 1

Slot 1: PCIe x16 (x16, x8, x4, x1), low-profile

2 Rear 2.5-inch drive bays

Used to install two 2.5-inch hot-swap drives on the rear of the server.

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. The vacant drive bays must be occupied by drive bay fillers or drive fillers.

Rear view of server model with one PCIe slot

The following illustration shows the rear view of the server model with one PCIe slot. Depending on the model, your server might look slightly different from the illustration below.

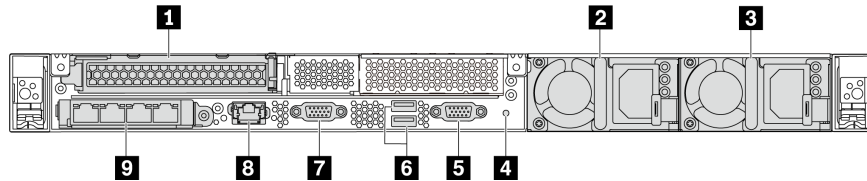


Figure 12. Rear view of server model with one PCIe slot

Table 8. Components on the rear of the server

1 PCIe slot 1 on riser 1 assembly	2 Power supply 1
3 Power supply 2 (optional)	4 NMI button
5 Serial port	6 USB 3.1 connectors (2)
7 VGA connector	8 BMC management Ethernet connector
9 Ethernet connectors on OCP 3.0 Ethernet adapter (optional, two or four connectors may be available)	

1 PCIe slot 1

Slot 1: PCIe x16 (x16, x8, x4, x1), full-height/full-length

Rear view of server model with no PCIe slot

The following illustration shows the rear view of the server model with no PCIe slot. Depending on the model, your server might look slightly different from the illustration below.

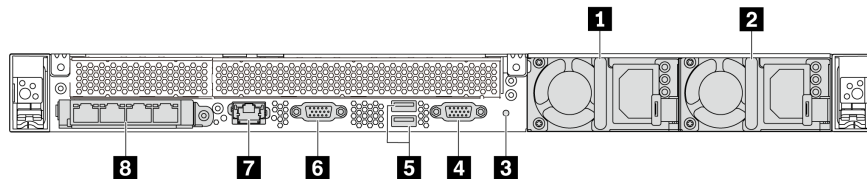


Figure 13. Rear view of server model with no PCIe slot

Table 9. Components on the rear of the server

1 Power supply 1	2 Power supply 2 (optional)
3 NMI button	4 Serial port
5 USB 3.1 connectors (2)	6 VGA connector
7 BMC management network connector	8 Ethernet connectors on OCP 3.0 Ethernet adapter (optional, two or four connectors may be available)

The following are common components on the rear view of different models:

- **Power supply 1**
- **Power supply 2 (optional)**

The hot-swap redundant power supplies help 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 18.

- **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.

- **Serial port**

Used to connect to the host system serial interface.

- **USB 3.1 connectors (2)**

Used to attach a device that requires a USB 2.0 or 3.1 connection, such as a USB keyboard, USB mouse, or USB storage device.

- **VGA connector**

Used to attach a high-performance monitor, a direct-drive monitor, or other devices that use a VGA connector.

- **BMC management network connector**

Used to attach an Ethernet cable to manage the baseboard management controller (BMC).

- **Ethernet connectors on OCP 3.0 Ethernet adapter (optional)**

The OCP 3.0 Ethernet adapter provides two or four extra Ethernet connectors for network connections.

One of the Ethernet connectors 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.

Rear view LEDs

The rear of the server provides system ID LED, system error LED, Ethernet LEDs, and power supply LEDs.

The following illustration shows the LEDs on the rear view of server model with two PCIe slots. The LEDs on the rear view of other server models are the same.

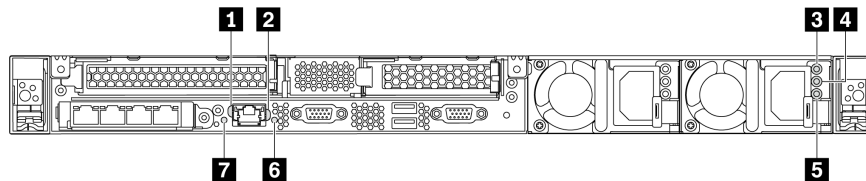


Figure 14. Rear view LEDs

Table 10. LEDs on the rear view of the server

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

1 Ethernet link LED
2 Ethernet activity LED

The BMC network connector has two status LEDs.

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

3 4 5 Power supply LEDs

Each hot-swap power supply has three status LEDs.

LED	Description
3 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.
4 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 the 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 the entire load. When the power load increases, the standby power supply will switch to active state to provide sufficient power to the system. <p>To disable zero-output mode, start the Setup utility, go to Advanced → Power → Zero Output and select Disable. If you disable the zero-out mode, both power supplies will be in the active state.</p> <ul style="list-style-type: none"> Off: The server is powered off, or the power supply is not working properly. If the server is powered on but the LED is off, replace the power supply.
5 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.

6 System ID LED

The blue system ID LED helps you to 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. You can also use the ThinkSystem System Manager or a remote management program to change the state of the system ID LEDs to assist in visually locating the server among other servers.

7 System error LED

The system error LED helps you to determine if there are any system errors. For details, see “System error LED” on page 14.

System board components

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

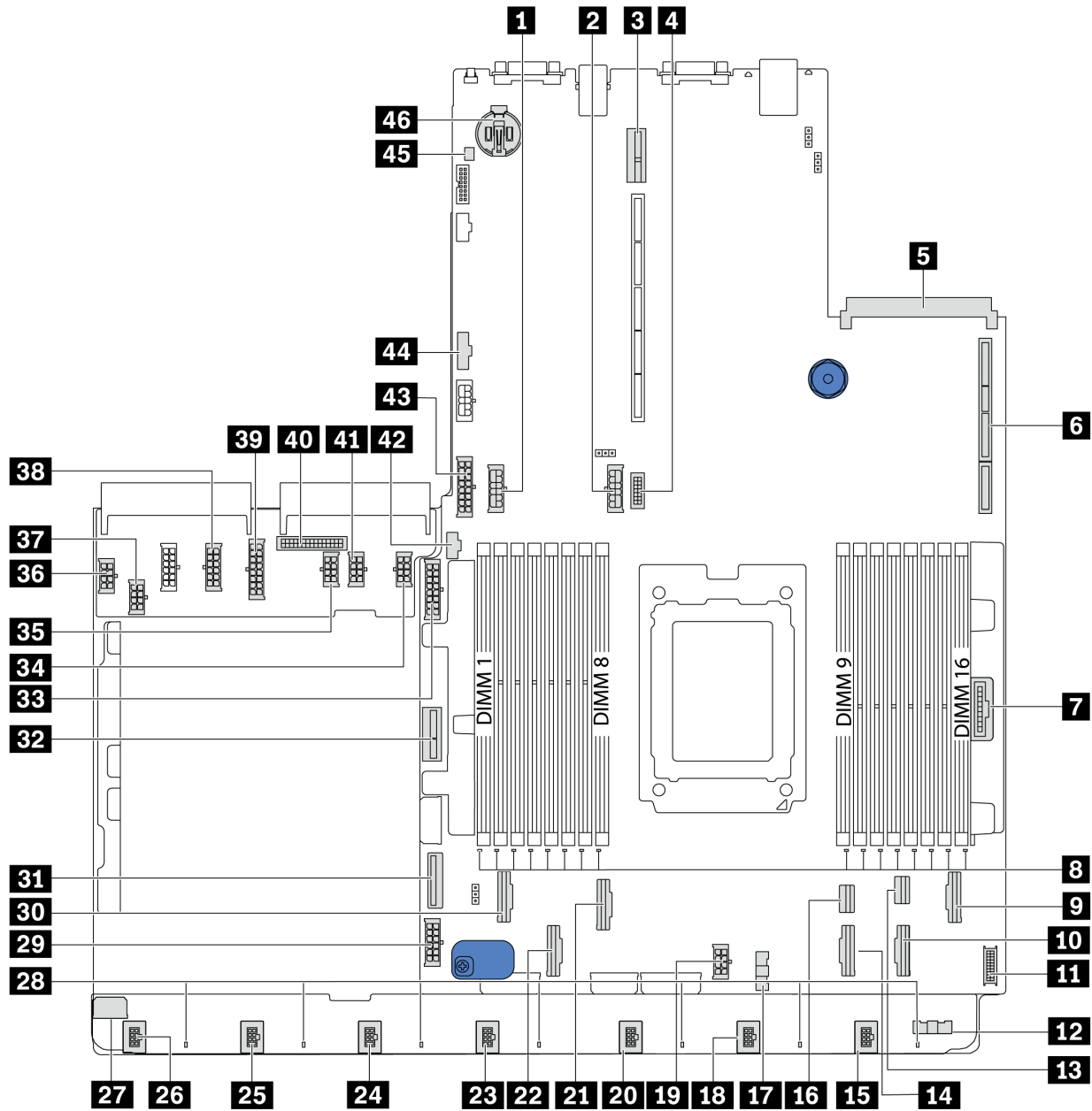


Figure 15. System board components

1 Middle backplane power connector	2 Rear backplane power connector
3 Riser 2 slot	4 Front VGA connector
5 OCP 3.0 Ethernet adapter connector	6 Riser 1 slot
7 Front panel connector	8 DIMM 1-16 error LEDs

9 PCIe connector 6	10 PCIe connector 5
11 Front USB connector	12 Fan board sideband connector (connect to 17)
13 PCIe connector 8	14 PCIe connector 4
15 Fan 7 connector	16 PCIe connector 7
17 Fan board sideband connector (connect to 12)	18 Fan 6 connector
19 CPU power connector (connect to 37)	20 Fan 5 connector
21 PCIe connector 3	22 PCIe connector 2
23 Fan 4 connector	24 Fan 3 connector
25 Fan 2 connector	26 Fan 1 connector
27 Fan board power connector (connect to 36)	28 Fan 1-7 error LEDs
29 System power connector 2 (connect to 38)	30 PCIe connector 1
31 PCIe connector 9	32 Internal riser power connector
33 Front backplane power connector	34 GPU power connector 1 (reserved)
35 GPU power connector 3 (reserved)	36 Fan board power connector (connect to 27)
37 CPU power connector (connect to 19)	38 System power connector 2 (connect to 29)
39 System power connector 1 (connect to 43)	40 PIB sideband connector (connect to 44)
41 GPU power connector 2 (Reserved)	42 M.2 sideband connector
43 System power connector 1 (Connect to 39)	44 PIB sideband connector (connect to 40)
45 Intrusion switch connector	46 3V battery (Cr2032)

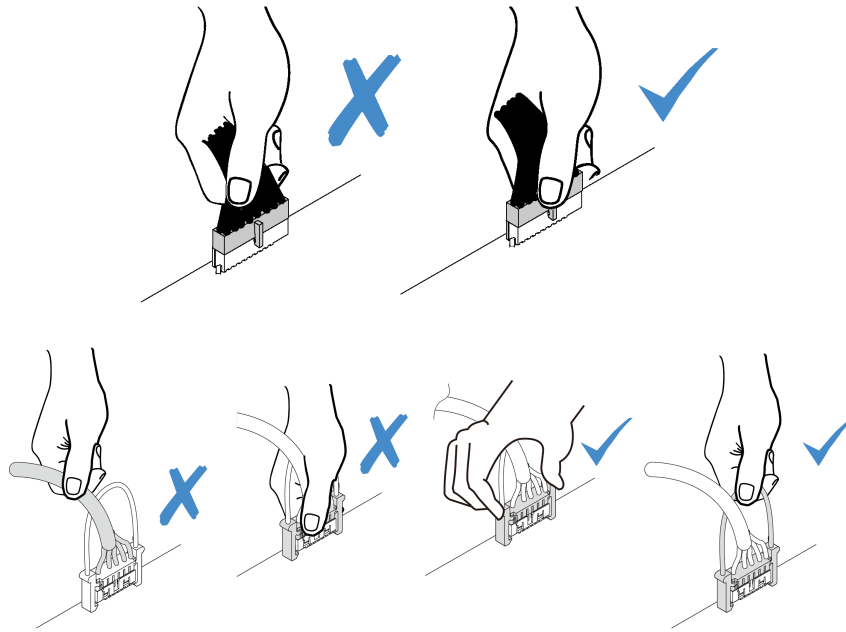
Internal cable routing

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

To connect cables, observe the following guidelines:

- Power 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 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.



Power cable routing

Use the section to understand the power cable routing for CPU, backplanes, PIB board, fan board, internal drive assembly and rear drive cage.

Power cable routing

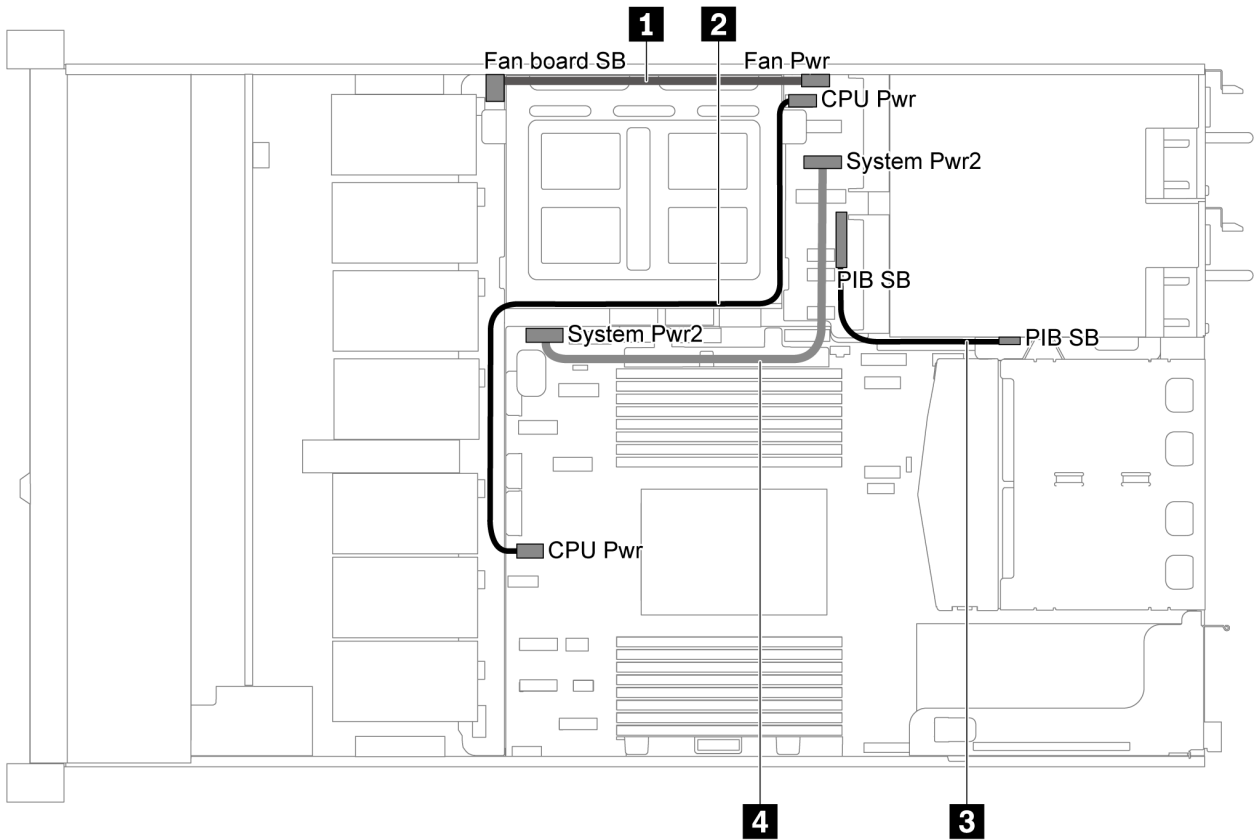


Figure 16. Power cable routing-1

Cable	From	To
1	Fan board power connector on the fan board	Fan board power connector on the PIB board
2	CPU power connector on the PIB board	CPU power connector on the system board
3	PIB sideband connector on the PIB board	PIB sideband connector on the system board
4	System power connector 2 on the PIB board	System power connector 2 on the system board

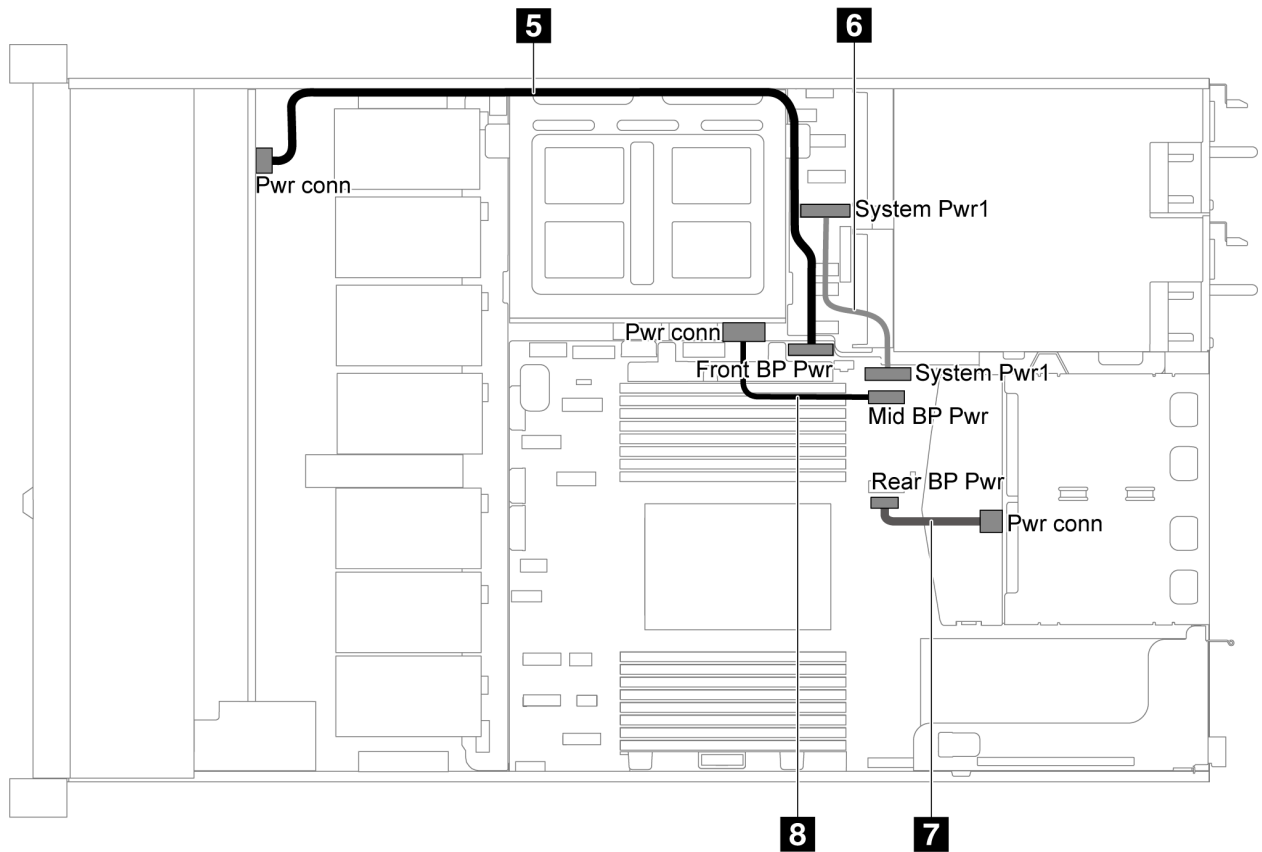


Figure 17. Power cable routing-2

Cable	From	To
5	Front backplane power connector on the front backplane	Front backplane power connector on the system board
6	System power connector 1 on the PIB board	System power connector 1 on the system board
7	Rear backplane power connector on the rear backplane	Rear backplane power connector on the system board
8	Middle backplane power connector on the middle backplane	Middle backplane power connector on the system board

Server model with four 3.5-inch SAS/SATA drives

Use this section to understand the connectors on the backplane and internal cable routing for server model with four 3.5-inch SAS/SATA drives.

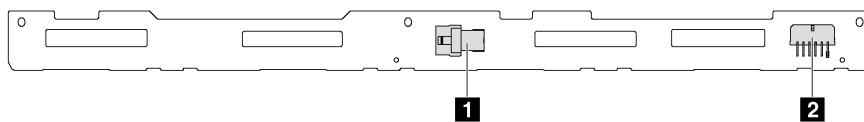


Figure 18. Connectors on the backplane for four 3.5-inch SAS/SATA drives

1 SAS connector

2 Power connector

For power cable connection, see “Power cable routing” on page 22.

Refer to the following cable routing for different configurations:

- “Four 3.5-inch SATA drives” on page 25
- “Four 3.5-inch SAS/SATA drives and one 8i RAID adapter” on page 26
- “Four 3.5-inch SATA drives and rear SAS/SATA drive assembly” on page 27
- “Four 3.5-inch SAS/SATA drives, rear SAS/SATA drive assembly and one 8i RAID adapter” on page 28
- “Four 3.5-inch SATA drives and rear NVMe drive assembly” on page 29
- “Four 3.5-inch SAS/SATA drives, rear NVMe drive assembly and one 8i RAID adapter” on page 30
- “Four 3.5-inch SATA drives and middle drive cage” on page 31
- “Four 3.5-inch SAS/SATA drives, middle drive cage and one 8i RAID adapter” on page 32

Four 3.5-inch SATA drives

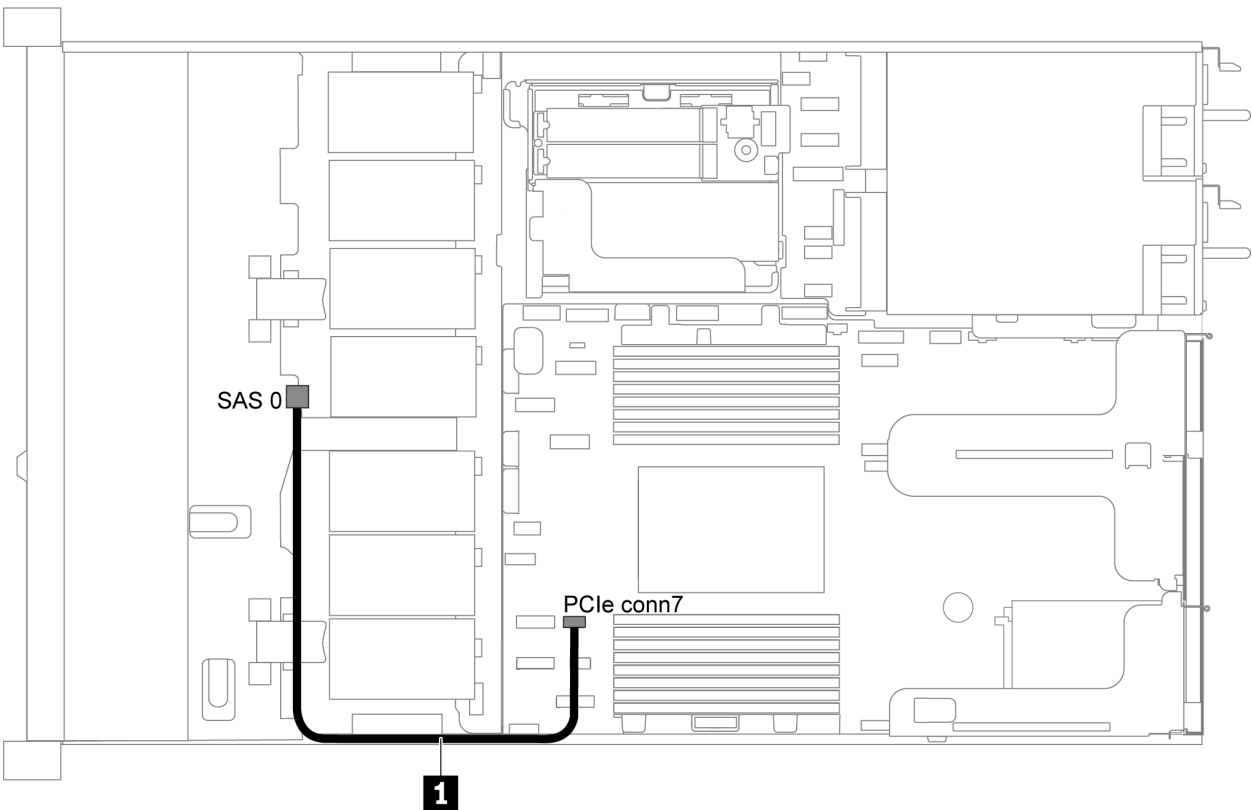


Figure 19. Cable routing for server model with four 3.5-inch SATA drives

Note: When the SAS/SATA backplanes are connected to PCIe connectors on the system board, only SATA drives are supported. No SAS drives are supported.

Cable	From	To
1 SAS signal cable for front backplane	SAS connector on the front backplane	PCIe connector 7 on the system board

Four 3.5-inch SAS/SATA drives and one 8i RAID adapter

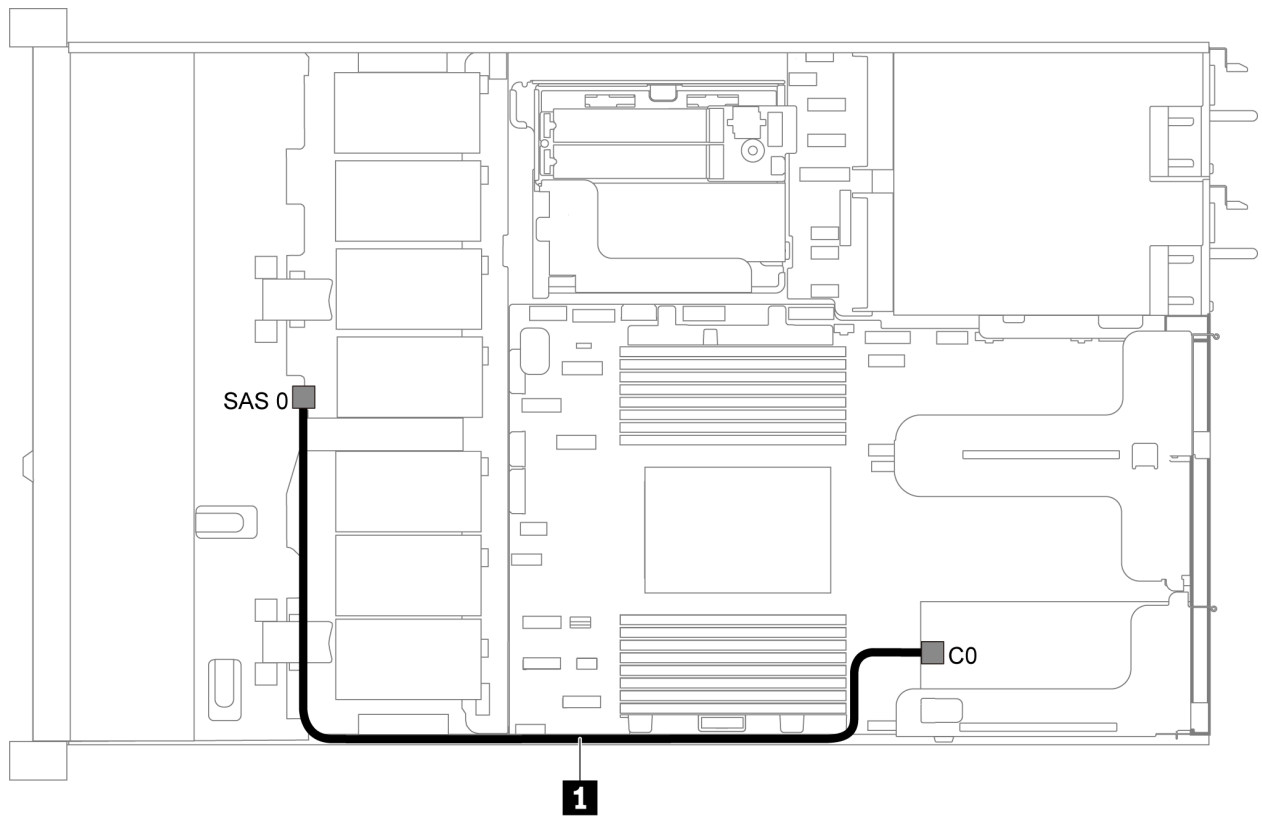


Figure 20. Cable routing for server model with four 3.5-inch SAS/SATA drives and one 8i RAID adapter

Note: RAID adapter can be installed in PCIe slot 1 or internal riser assembly.

Cable	From	To
1 SAS signal cable for front backplane	SAS connector on the front backplane	C0 connector on the RAID adapter

Four 3.5-inch SATA drives and rear SAS/SATA drive assembly

Notes:

- When the SAS/SATA backplanes are connected to PCIe connectors on the system board, only SATA drives are supported. No SAS drives are supported.
- The cable routing illustration is based on the scenario that the rear hot-swap drive cage is installed. Depending on the model, the rear hot-swap drive cage might not be available on your server.

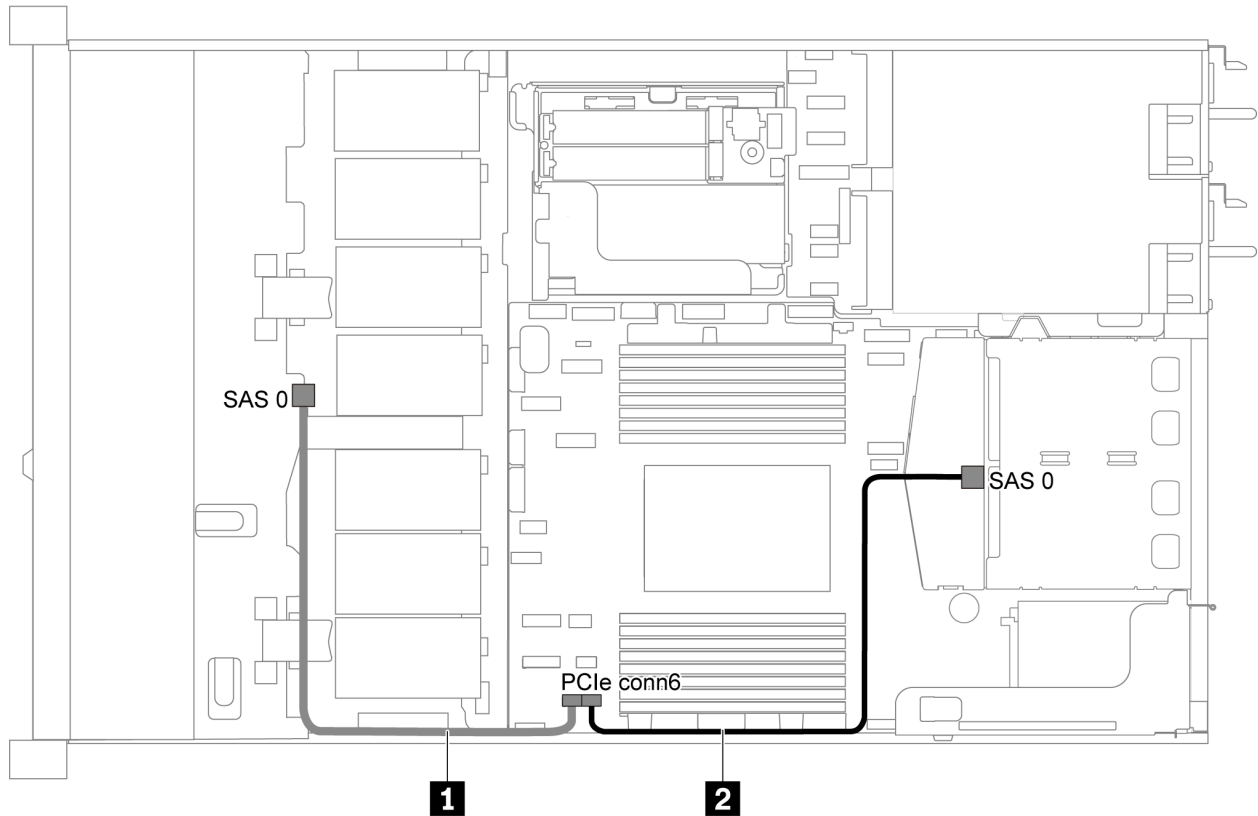


Figure 21. Cable routing for server model with four 3.5-inch SATA drives and rear SAS/SATA drive assembly

Cable	From	To
1 SAS signal cable for front backplane	SAS connector on the front backplane	PCIe connector 6 on the system board
2 SAS signal cable for rear backplane	SAS connector on the rear backplane	PCIe connector 6 on the system board

Four 3.5-inch SAS/SATA drives, rear SAS/SATA drive assembly and one 8i RAID adapter

Note: The cable routing illustration is based on the scenario that the rear hot-swap drive cage is installed. Depending on the model, the rear hot-swap drive cage might not be available on your server.

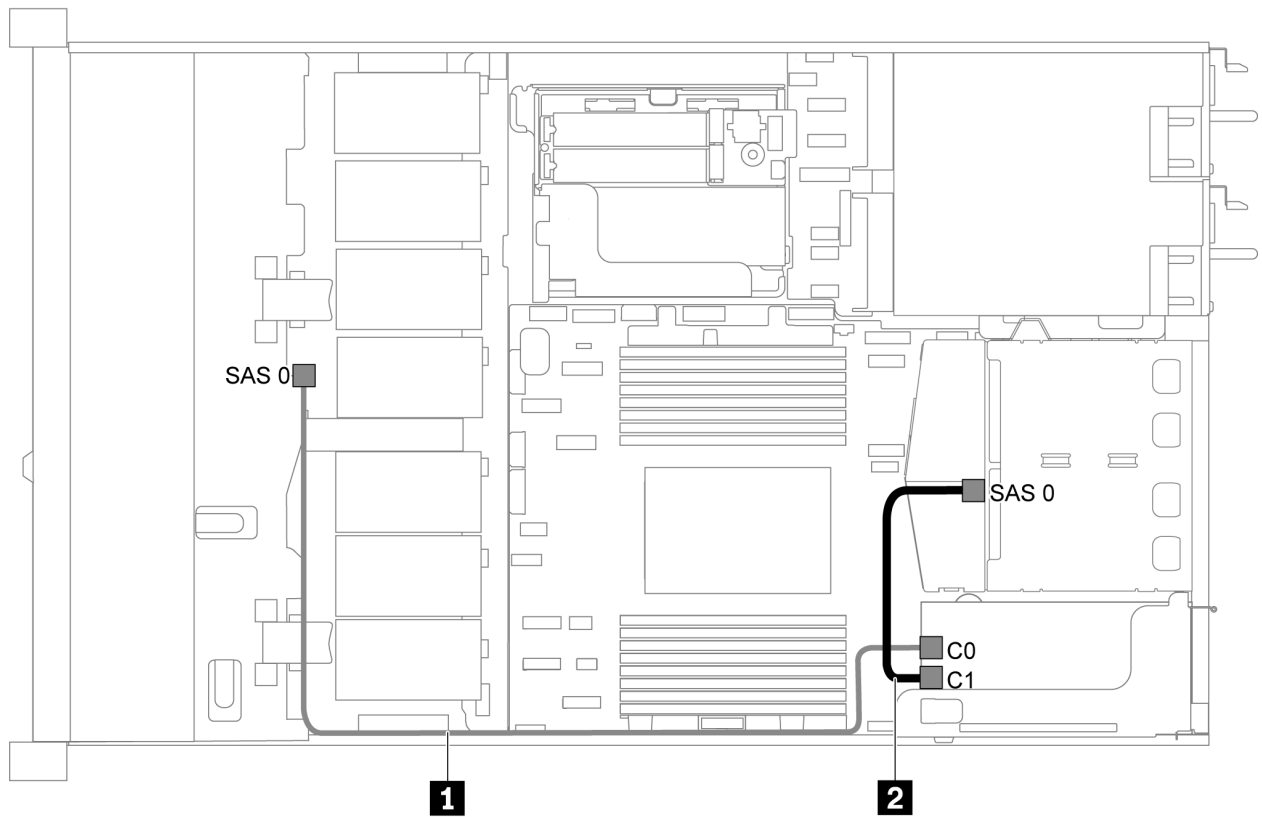


Figure 22. Cable routing for server model with four 3.5-inch SAS/SATA drives, rear SAS/SATA drive assembly and one 8i RAID adapter

Note: RAID adapter can be installed in PCIe slot 1 or internal riser assembly.

Cable	From	To
1 SAS signal cable for front backplane	SAS connector on the front backplane	C0 connector on the RAID adapter
2 SAS signal cable for rear backplane	SAS connector on the rear backplane	C1 connector on the RAID adapter

Four 3.5-inch SATA drives and rear NVMe drive assembly

Notes:

- When the SAS/SATA backplanes are connected to PCIe connectors on the system board, only SATA drives are supported. No SAS drives are supported.
- The cable routing illustration is based on the scenario that the rear hot-swap drive cage is installed. Depending on the model, the rear hot-swap drive cage might not be available on your server.

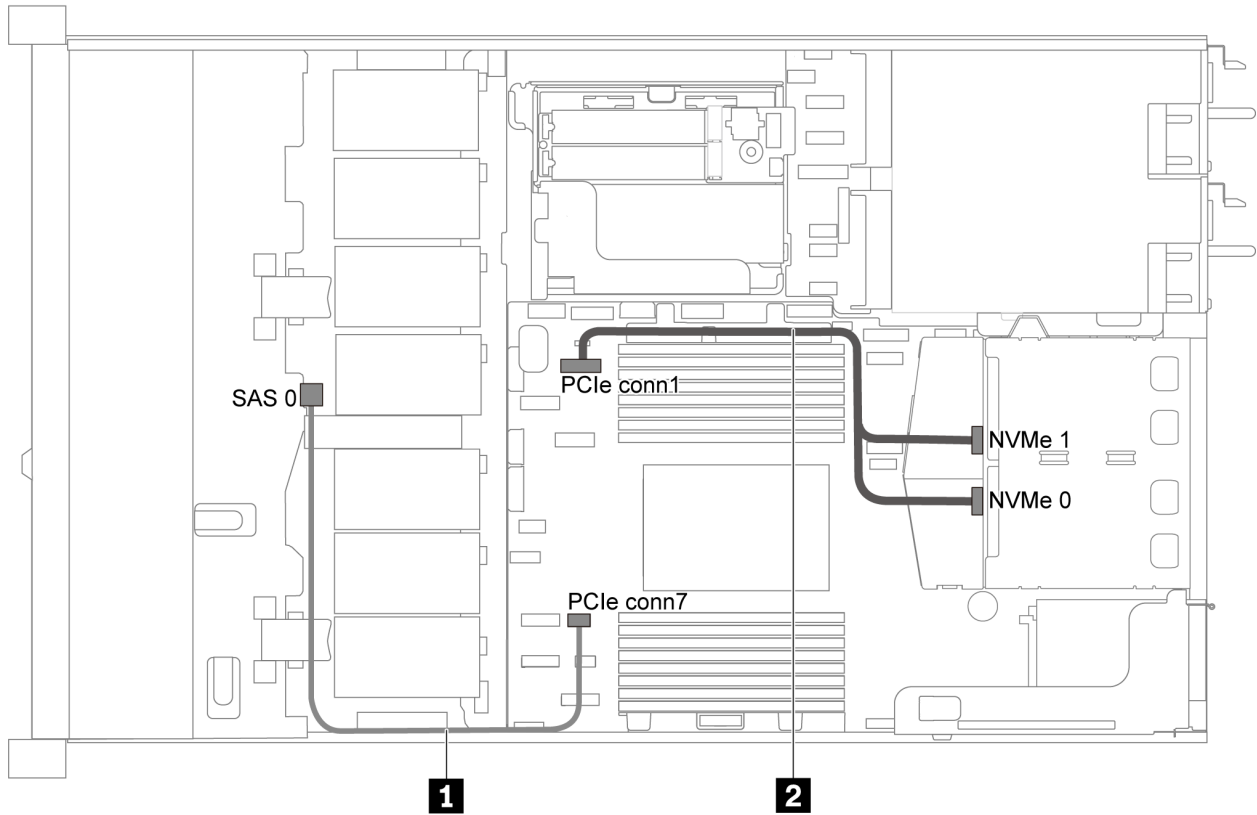


Figure 23. Cable routing for server model with four 3.5-inch SATA drives and rear NVMe drive assembly

Cable	From	To
1 SAS signal cable for front backplane	SAS connector on the front backplane	PCIe connector 7 on the system board
2 NVMe signal cable for rear backplane	NVMe connectors on the rear backplane	PCIe connector 1 on the system board

Four 3.5-inch SAS/SATA drives, rear NVMe drive assembly and one 8i RAID adapter

Note: The cable routing illustration is based on the scenario that the rear hot-swap drive cage is installed. Depending on the model, the rear hot-swap drive cage might not be available on your server.

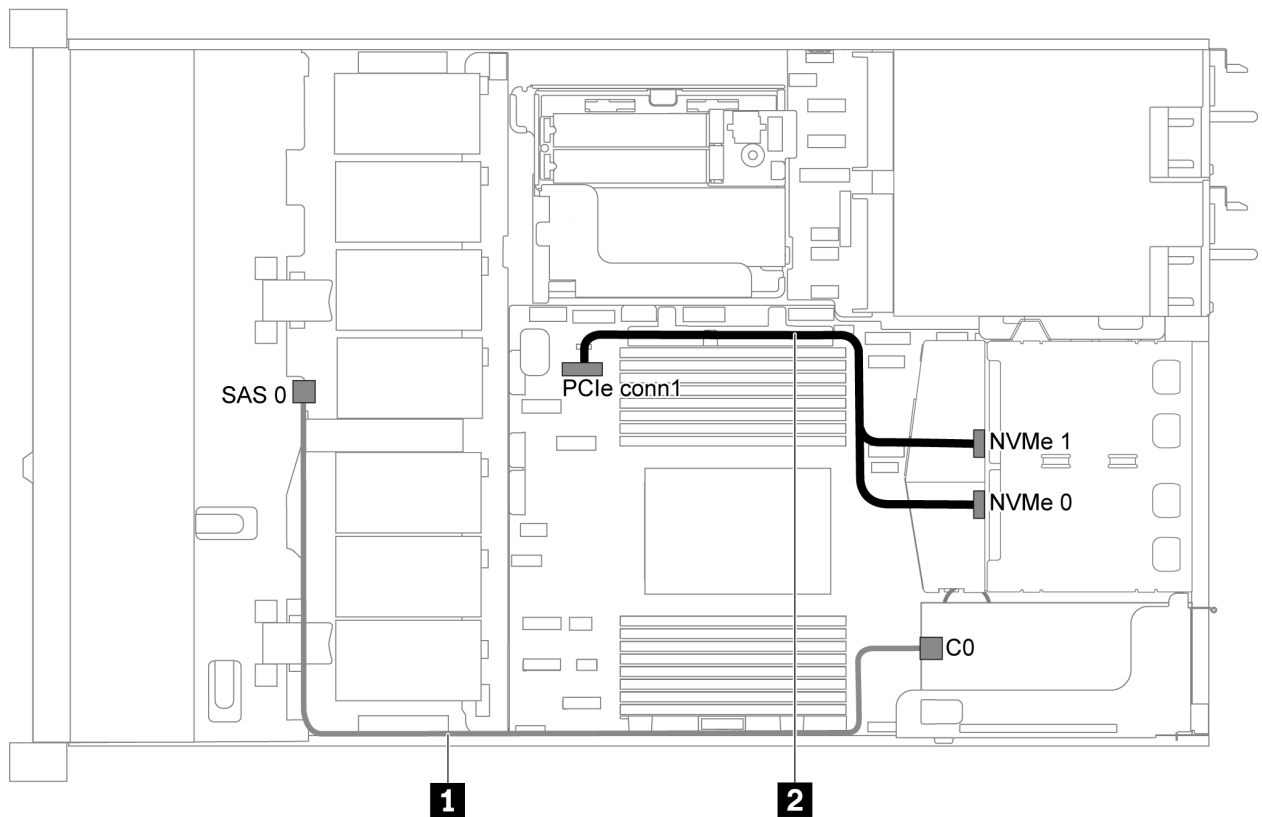


Figure 24. Cable routing for server model with four 3.5-inch SAS/SATA drives, rear NVMe drive assembly and one 8i RAID adapter

Note: RAID adapter can be installed in PCIe slot 1 or internal riser assembly.

Cable	From	To
1 SAS signal cable for front backplane	SAS connector on the front backplane	C0 connector on the RAID adapter
2 NVMe signal cable for rear backplane	NVMe connectors on the rear backplane	PCIe connector 1 on the system board

Four 3.5-inch SATA drives and middle drive cage

Note: When the SAS/SATA backplanes are connected to PCIe connectors on the system board, only SATA drives are supported. No SAS drives are supported.

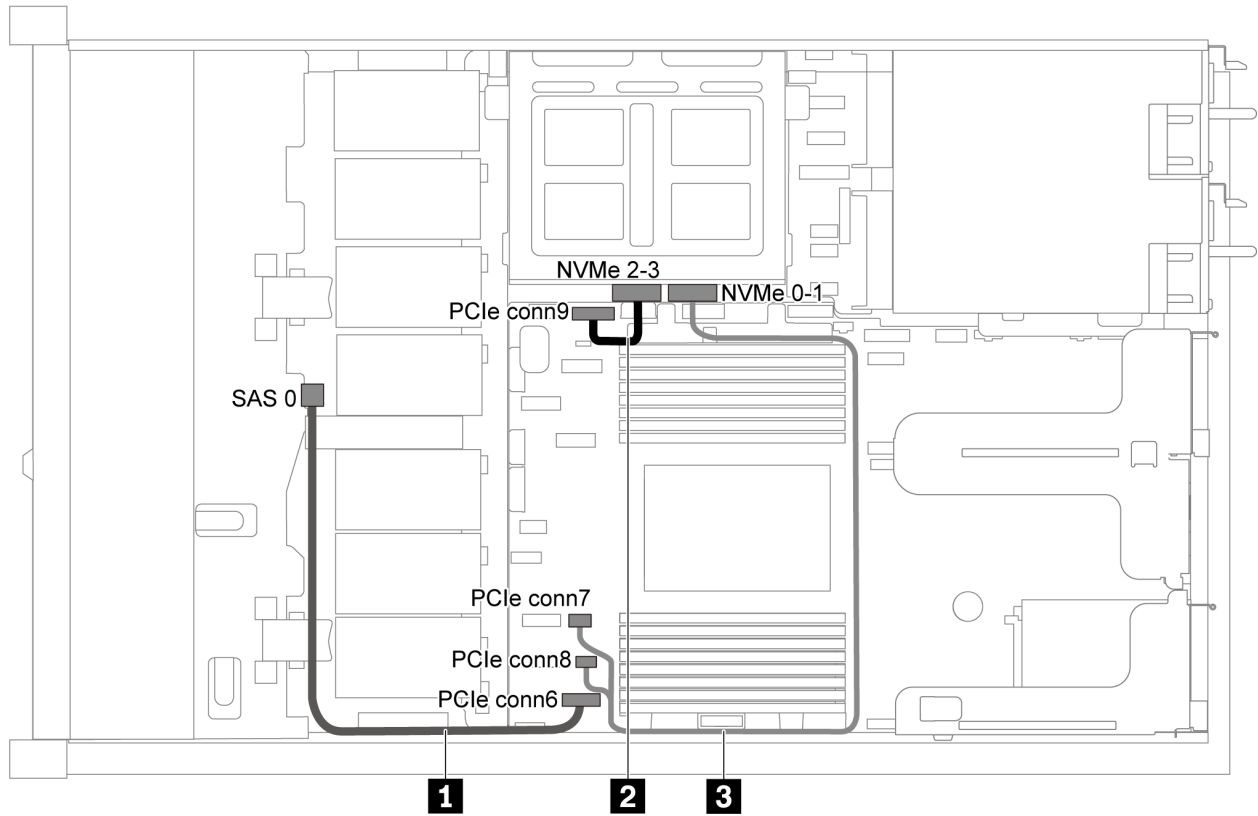


Figure 25. Cable routing for server model with four 3.5-inch SATA drives and middle drive cage

Cable	From	To
1 SAS signal cable for front backplane	SAS connector on the front backplane	PCIe connector 6 on the system board
2 NVMe signal cable for internal backplane	NVMe 2-3 connector on the internal backplane	PCIe connector 9 on the system board
3 NVMe signal cable for internal backplane	NVMe 0-1 connector on the internal backplane	PCIe connector 7 and PCIe connector 8 on the system board

Four 3.5-inch SAS/SATA drives, middle drive cage and one 8i RAID adapter

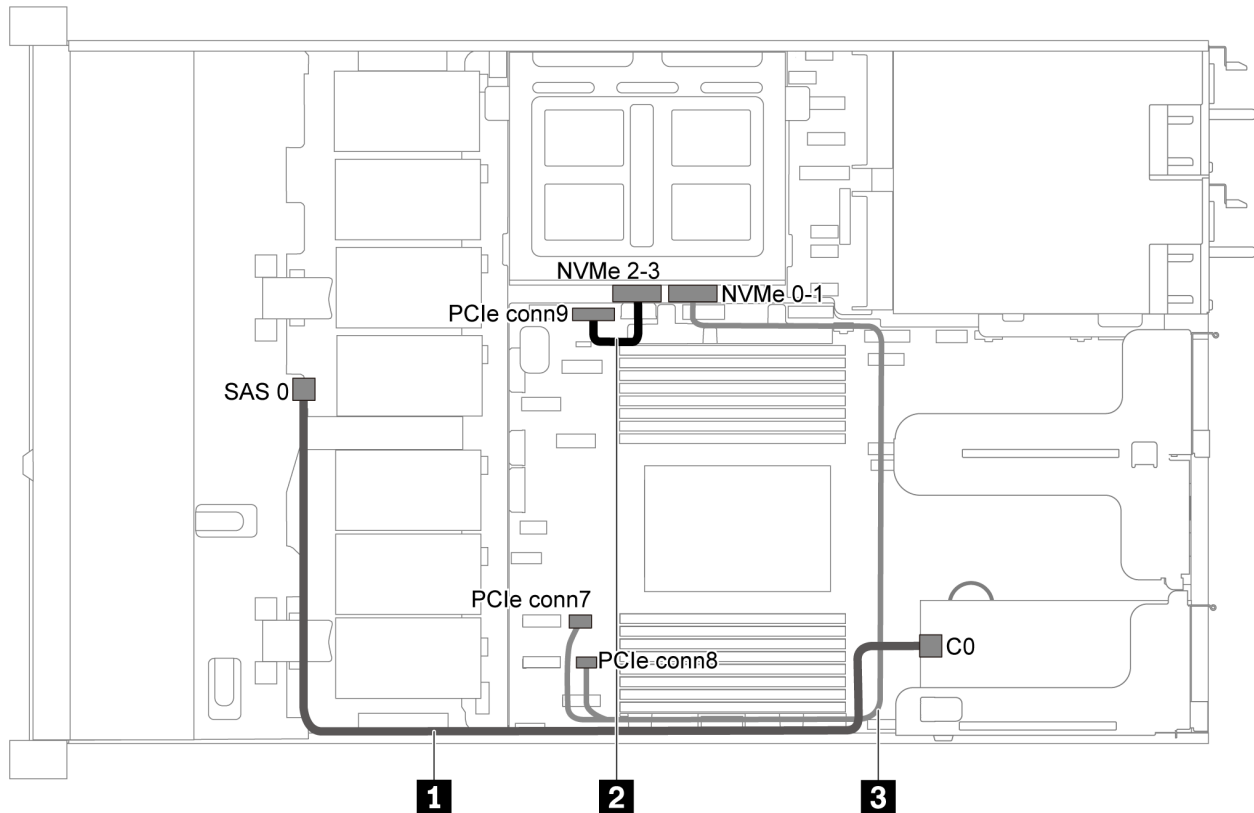


Figure 26. Cable routing for server model with four 3.5-inch SAS/SATA drives, middle drive cage and one 8i RAID adapter

Cable	From	To
1 SAS signal cable for front backplane	SAS connector on the front backplane	C0 connector on the RAID adapter
2 NVMe signal cable for internal backplane	NVMe 2-3 connector on the internal backplane	PCIe connector 9 on the system board
3 NVMe signal cable for internal backplane	NVMe 0-1 connector on the internal backplane	PCIe connector 7 and PCIe connector 8 on the system board

Server model with eight 2.5-inch SAS/SATA drives

Use this section to understand the connectors on the backplane and internal cable routing for server model with eight 2.5-inch SAS/SATA drives.

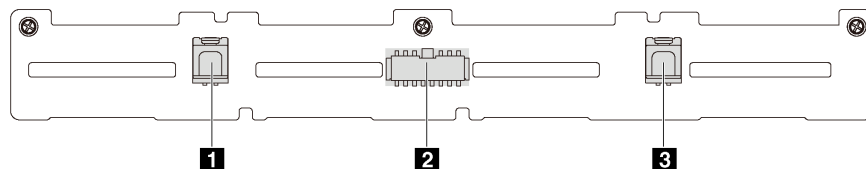


Figure 27. Connectors on the backplane for eight 2.5-inch SAS/SATA drives

1 SAS 1 connector

2 Power connector

3 SAS 0 connector

Refer to the following cable routing for different configurations:

- “Eight 2.5-inch SATA drives” on page 33
- “Eight 2.5-inch SAS/SATA drives and one 8i RAID adapter” on page 34
- “Eight 2.5-inch SATA drives and rear SAS/SATA drive assembly” on page 35
- “Eight 2.5-inch SAS/SATA drives, rear SAS/SATA drive assembly and two 8i RAID adapters” on page 36
- “Eight 2.5-inch SAS/SATA drives, rear SAS/SATA drive assembly and one 16i RAID adapter” on page 37
- “Eight 2.5-inch SATA drives and rear NVMe drive assembly” on page 38
- “Eight 2.5-inch SAS/SATA drives, rear NVMe drive assembly and one 8i RAID adapter” on page 39

For power cable connection, see “Power cable routing” on page 22.

Eight 2.5-inch SATA drives

Note: When the SAS/SATA backplanes are connected to PCIe connectors on the system board, only SATA drives are supported. No SAS drives are supported.

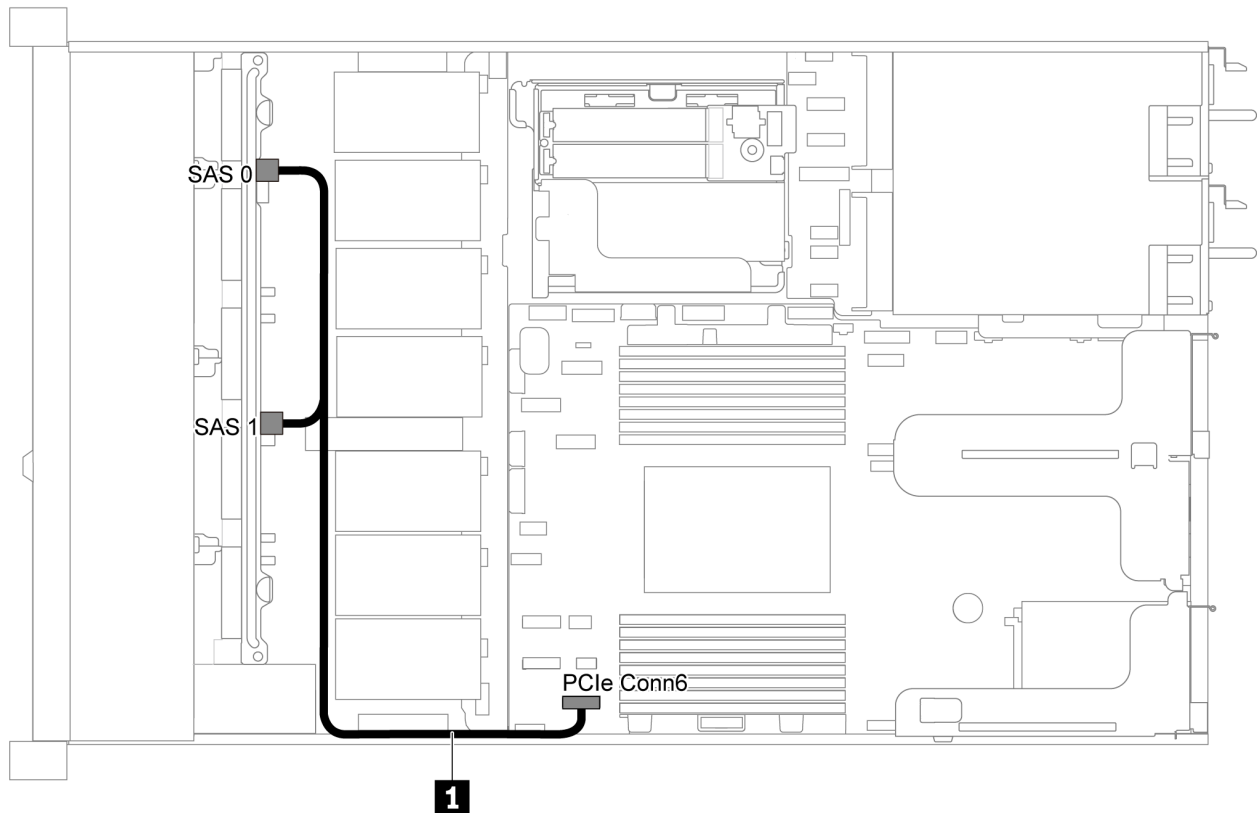


Figure 28. Cable routing for server model with eight 2.5-inch SATA drives

Cable	From	To
1 SAS signal cable for front backplane	SAS 0 and SAS 1 connectors on the front backplane	PCIe connector 6 on the system board

Eight 2.5-inch SAS/SATA drives and one 8i RAID adapter

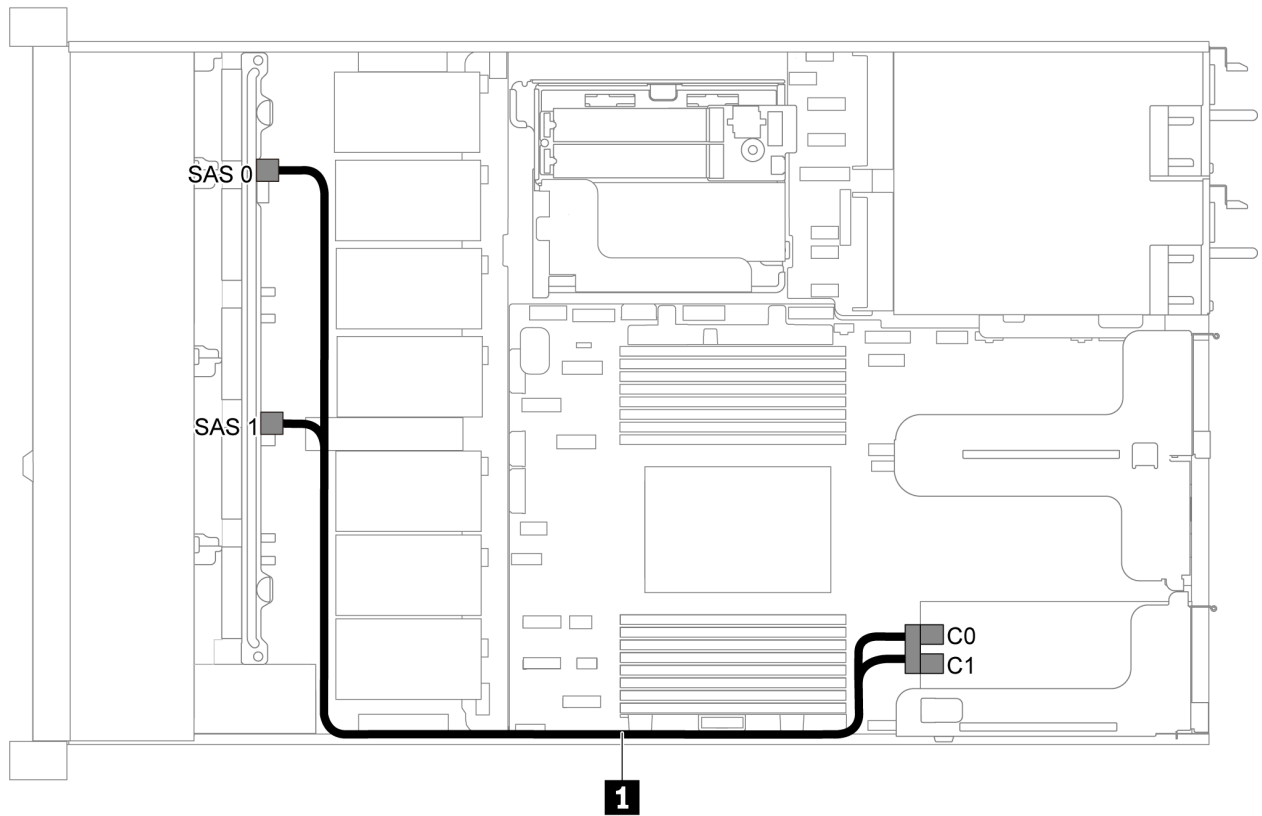


Figure 29. Cable routing for server model with eight 2.5-inch SAS/SATA drives and one 8i RAID adapter

Note: RAID adapter can be installed in PCIe slot 1 or internal riser assembly.

Cable	From	To
1 SAS signal cable for front backplane	SAS 0 and SAS 1 connectors on the front backplane	C0 and C1 connectors on the RAID adapter

Eight 2.5-inch SATA drives and rear SAS/SATA drive assembly

Notes:

- When the SAS/SATA backplanes are connected to PCIe connectors on the system board, only SATA drives are supported. No SAS drives are supported.
- The cable routing illustration is based on the scenario that the rear hot-swap drive cage is installed. Depending on the model, the rear hot-swap drive cage might not be available on your server.

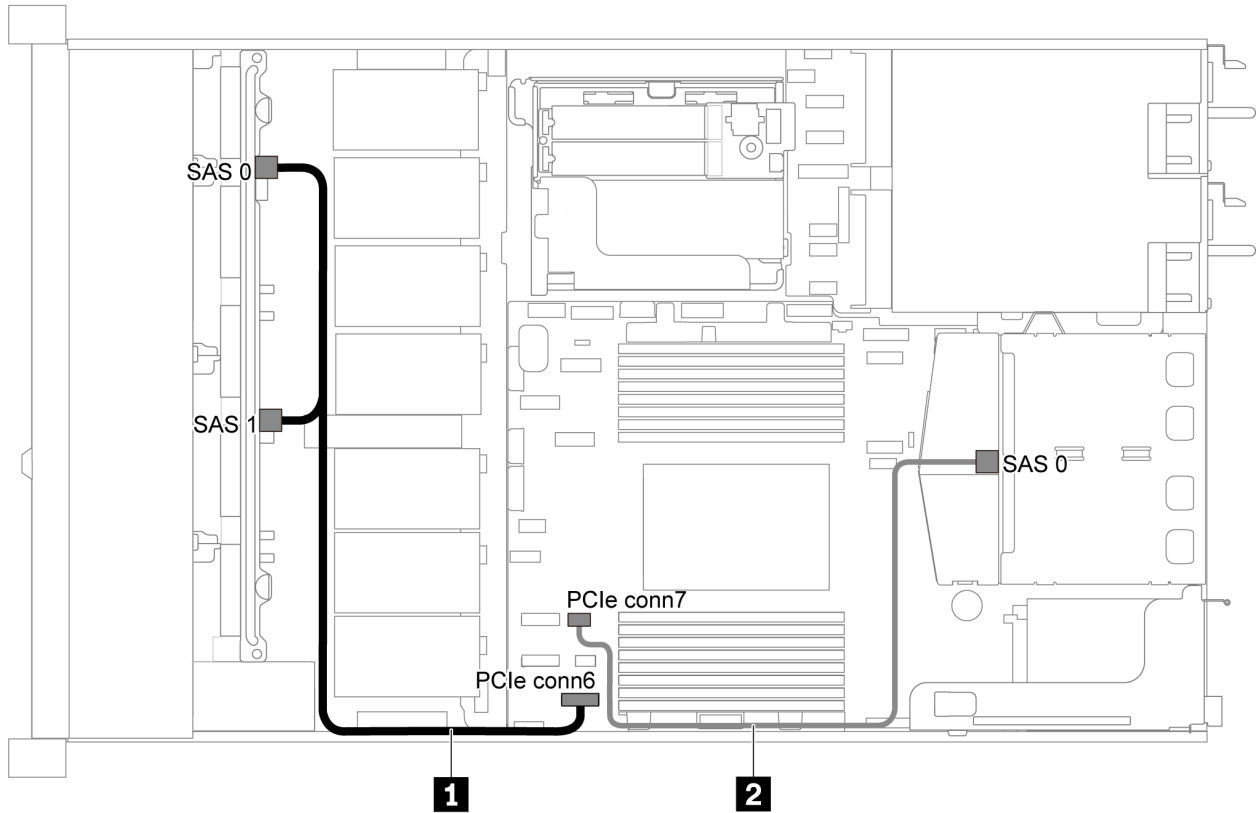


Figure 30. Cable routing for server model with eight 2.5-inch SATA drives and rear SAS/SATA drive assembly

Cable	From	To
1 SAS signal cable for front backplane	SAS 0 and SAS 1 connectors on the front backplane	PCIe connector 6 on the system board
2 SAS signal cable for rear backplane	SAS connector on the rear backplane	PCIe connector 7 on the system board

Eight 2.5-inch SAS/SATA drives, rear SAS/SATA drive assembly and two 8i RAID adapters

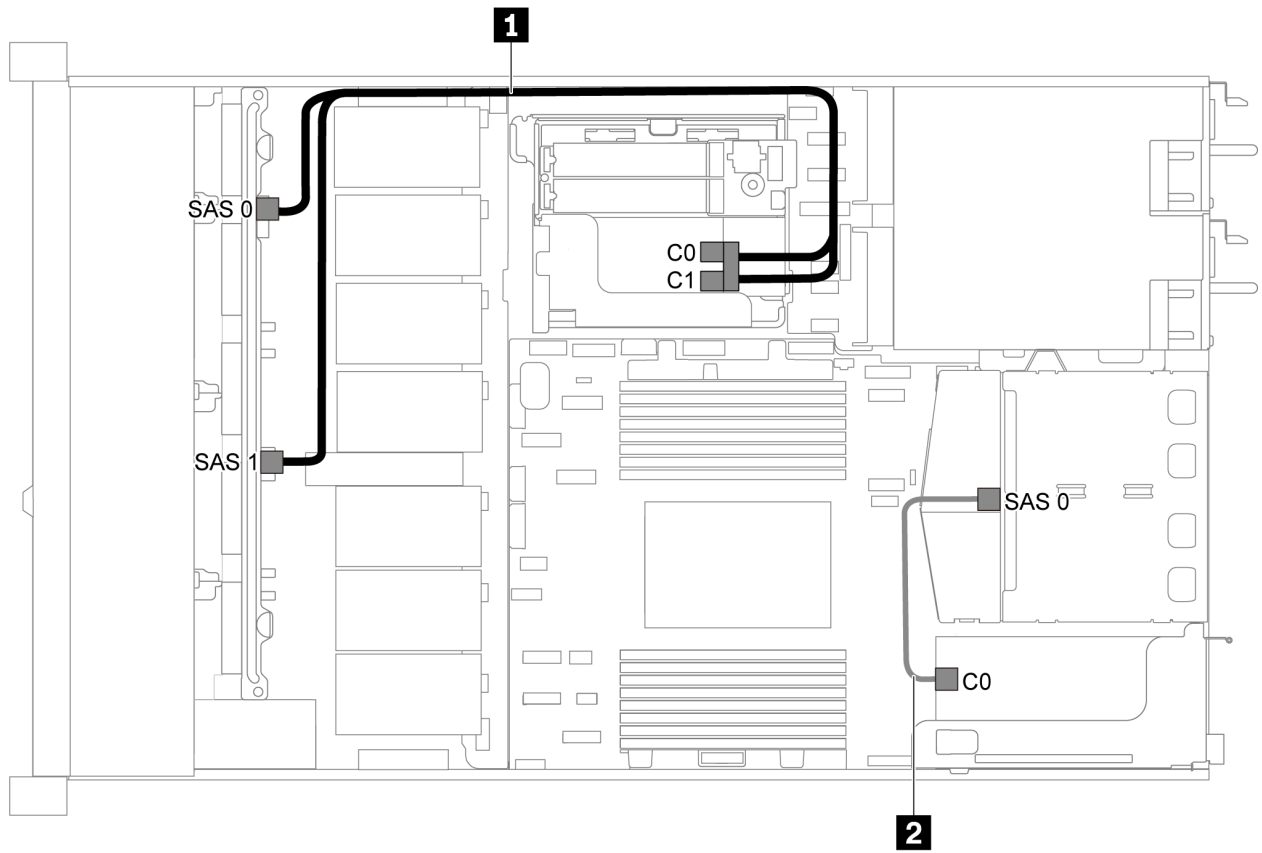


Figure 31. Cable routing for server model with eight 2.5-inch SAS/SATA drives, rear SAS/SATA drive assembly and two 8i RAID adapters

Cable	From	To
1 SAS signal cable for front backplane	SAS 0 and SAS 1 connectors on the front backplane	C0 and C1 connectors on the RAID adapter
2 SAS signal cable for rear backplane	SAS connector on the rear backplane	C0 connectors on the RAID adapter

Eight 2.5-inch SAS/SATA drives, rear SAS/SATA drive assembly and one 16i RAID adapter

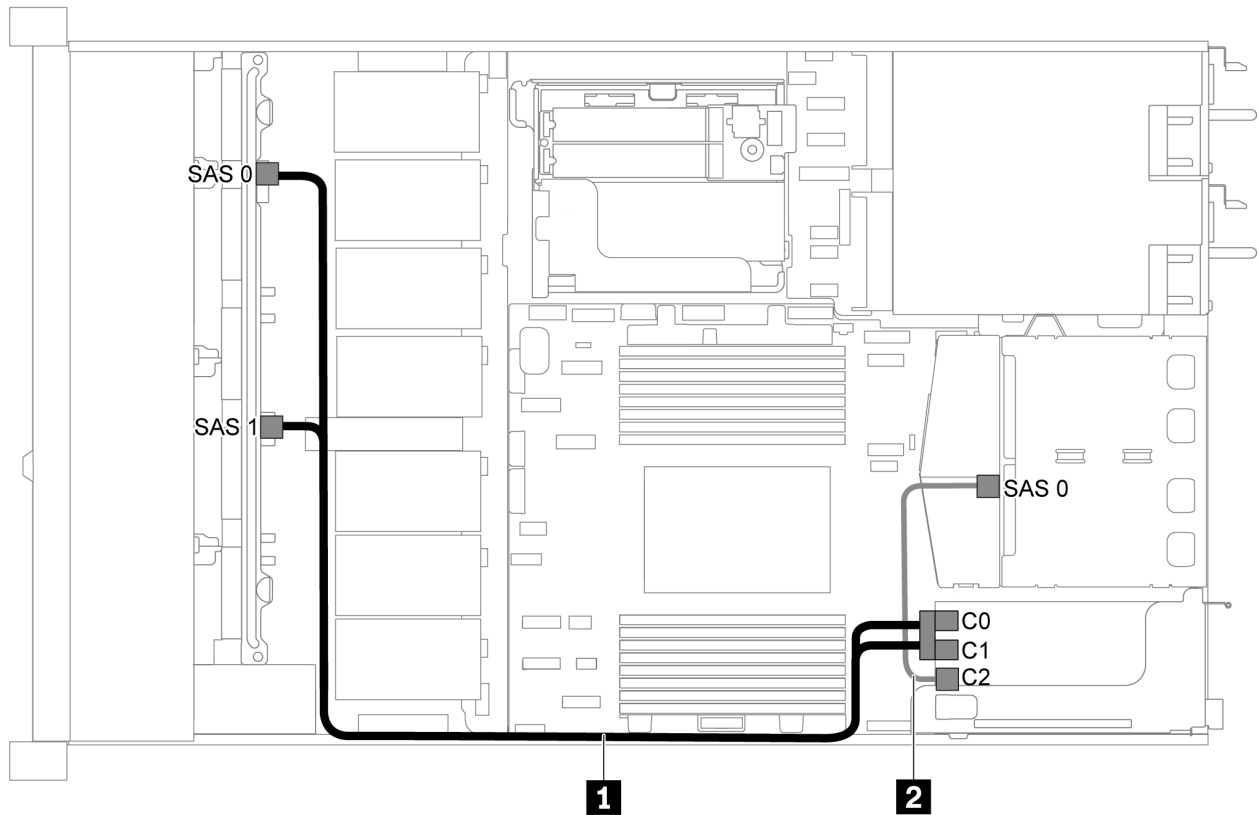


Figure 32. Cable routing for server model with eight 2.5-inch SAS/SATA drives, rear SAS/SATA drive assembly and one 16i RAID adapter

Note: RAID adapter can be installed in PCIe slot 1 or internal riser assembly.

Cable	From	To
1 SAS signal cable for front backplane	SAS 0 and SAS 1 connectors on the front backplane	C0 and C1 connectors on the RAID adapter
2 SAS signal cable for rear backplane	SAS connector on the rear backplane	C2 connectors on the RAID adapter

Eight 2.5-inch SATA drives and rear NVMe drive assembly

Notes:

- When the SAS/SATA backplanes are connected to PCIe connectors on the system board, only SATA drives are supported. No SAS drives are supported.
- The cable routing illustration is based on the scenario that the rear hot-swap drive cage is installed. Depending on the model, the rear hot-swap drive cage might not be available on your server.

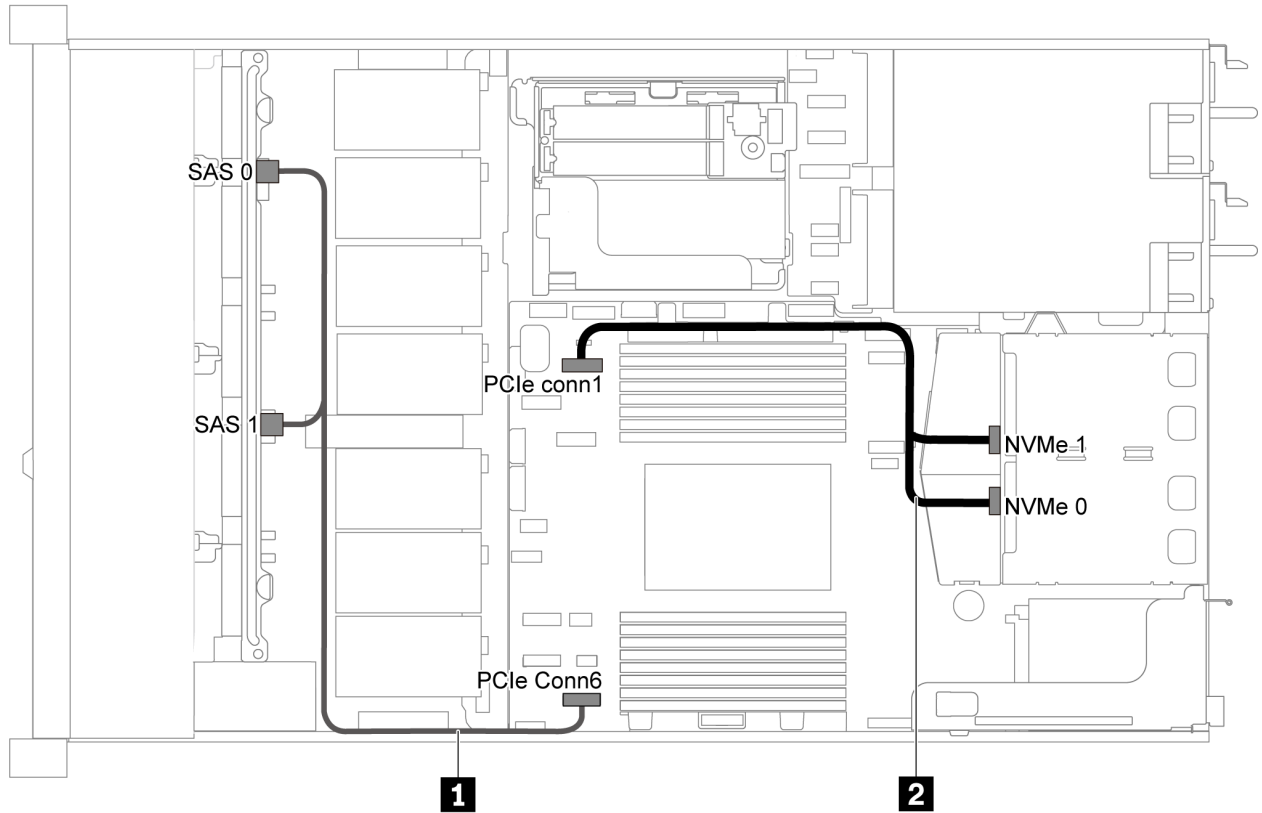


Figure 33. Cable routing for server model with eight 2.5-inch SATA drives and rear NVMe drive assembly

Cable	From	To
1 SAS signal cable for front backplane	SAS 0 and SAS 1 connectors on the front backplane	PCIe connector 6 on the system board
2 NVMe signal cable for rear backplane	NVMe connectors on the rear backplane	PCIe connector 1 on the system board

Eight 2.5-inch SAS/SATA drives, rear NVMe drive assembly and one 8i RAID adapter

Note: The cable routing illustration is based on the scenario that the rear hot-swap drive cage is installed. Depending on the model, the rear hot-swap drive cage might not be available on your server.

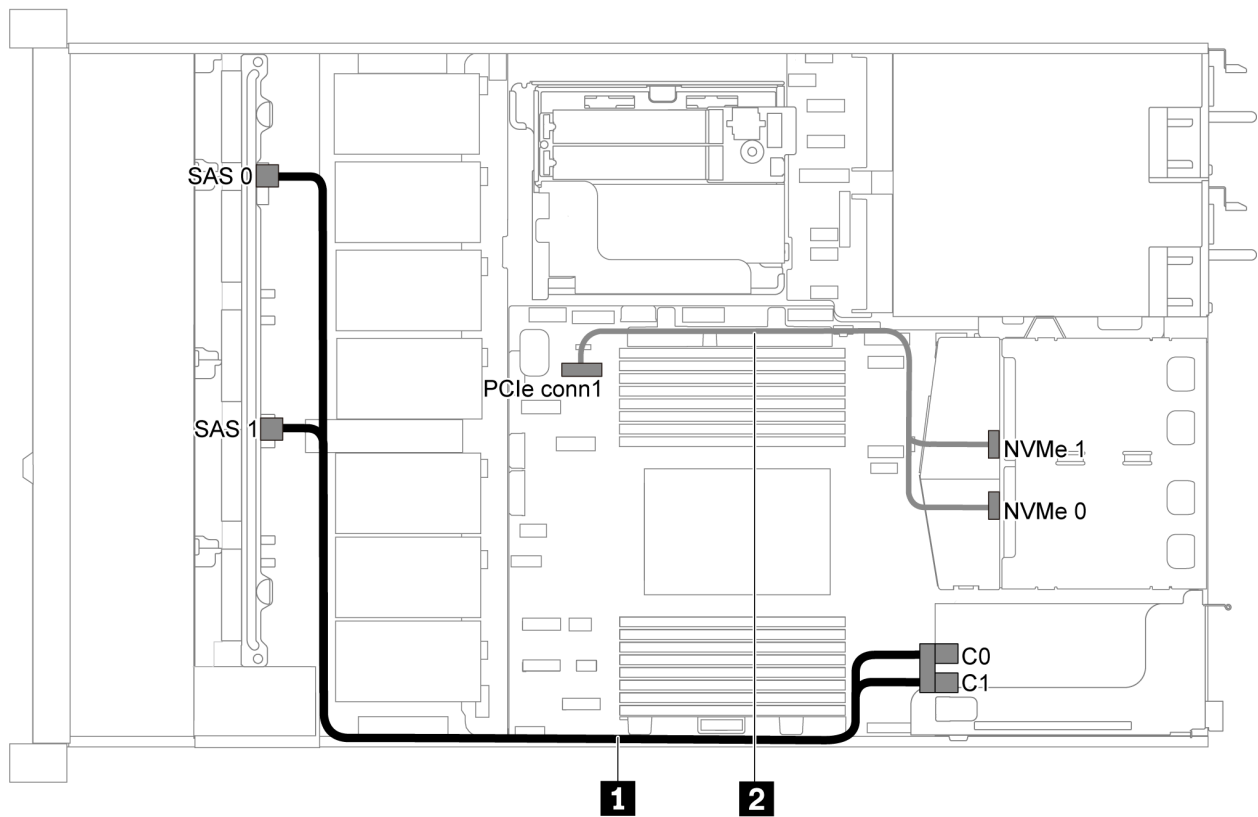


Figure 34. Cable routing for server model with eight 2.5-inch SAS/SATA drives, rear NVMe drive assembly and one 8i RAID adapter

Note: RAID adapter can be installed in PCIe slot 1 or internal riser assembly.

Cable	From	To
1 SAS signal cable for front backplane	SAS 0 and SAS 1 connectors on the front backplane	C0 and C1 connectors on the RAID adapter
2 NVMe signal cable for rear backplane	NVMe connectors on the rear backplane	PCIe connector 1 on the system board

Server model with six 2.5-inch SAS/SATA drives and four 2.5-inch NVMe drives

Use this section to understand the connectors on the backplane and the internal cable routing for server model with six 2.5-inch SAS/SATA drives and four 2.5-inch NVMe drives.

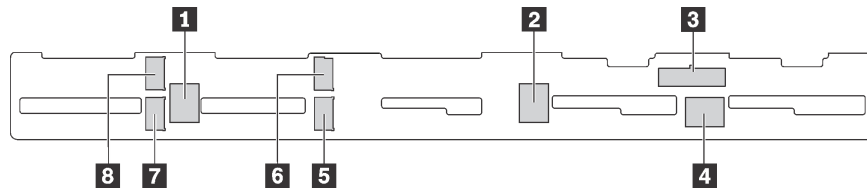


Figure 35. Connectors on the backplane for six 2.5-inch SAS/SATA drives and four 2.5-inch NVMe drives

- | | | | |
|---------------------------|---------------------------|---------------------------|---------------------------|
| 1 SAS 2 connector | 2 SAS 1 connector | 3 Power connector | 4 SAS 0 connector |
| 5 NVMe 1 connector | 6 NVMe 0 connector | 7 NVMe 3 connector | 8 NVMe 2 connector |

Notes:

- NVMe drives are only supported in drive bays 6–9.

For power cable connection, see “Power cable routing” on page 22.

Refer to the following cable routing for different configurations:

Note: When the SAS/SATA backplanes are connected to PCIe connectors on the system board, only SATA drives are supported. No SAS drives are supported.

- “Six 2.5-inch SATA drives and four 2.5-inch NVMe drives” on page 41
- “Six 2.5-inch SAS/SATA drives, four 2.5-inch NVMe drives and one 16i RAID adapter” on page 42
- “Six 2.5-inch SATA drives, four 2.5-inch NVMe drives and rear SAS/SATA drive assembly” on page 43
- “Six 2.5-inch SAS/SATA drives, four 2.5-inch NVMe drives, rear SAS/SATA drive assembly and one 16i RAID adapter” on page 44
- “Six 2.5-inch SATA drives, four 2.5-inch NVMe drives and rear NVMe drive assembly” on page 45
- “Six 2.5-inch SAS/SATA drives, four 2.5-inch NVMe drives, rear NVMe drive assembly and one 16i RAID adapter” on page 46

Six 2.5-inch SATA drives and four 2.5-inch NVMe drives

Note: When the SAS/SATA backplanes are connected to PCIe connectors on the system board, only SATA drives are supported. No SAS drives are supported.

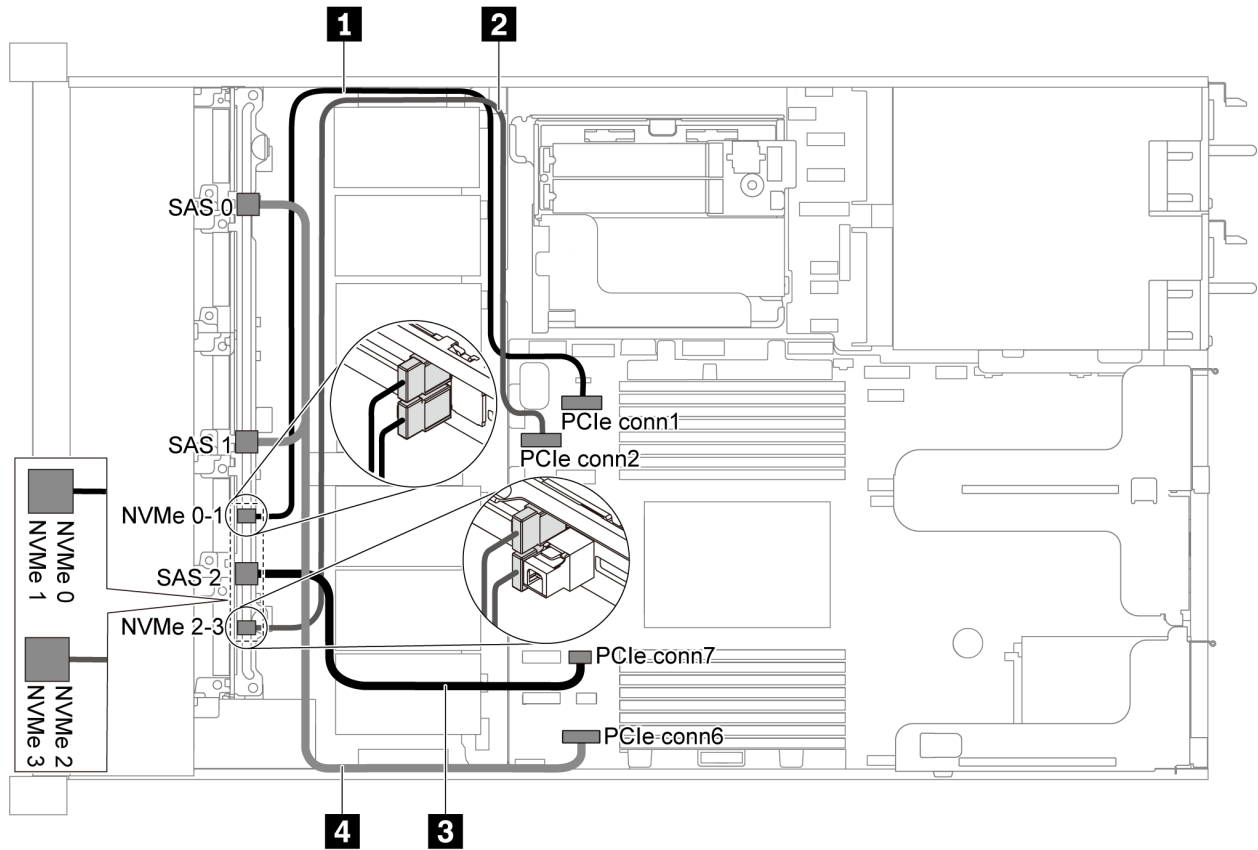


Figure 36. Cable routing for server model with six 2.5-inch SATA drives and four 2.5-inch NVMe drives

Cable	From	To
1 NVMe signal cable for front backplane	NVMe 0 and NVMe 1 connectors on the front backplane	PCIe connector 1 on the system board
2 NVMe signal cable for front backplane	NVMe 2 and NVMe 3 connectors on the front backplane	PCIe connector 2 on the system board
3 SAS signal cable for front backplane	SAS 2 connector on the front backplane	PCIe connector 7 on the system board
4 SAS signal cable for front backplane	SAS 0 and SAS 1 connectors on the front backplane	PCIe connector 6 on the system board

Six 2.5-inch SAS/SATA drives, four 2.5-inch NVMe drives and one 16i RAID adapter

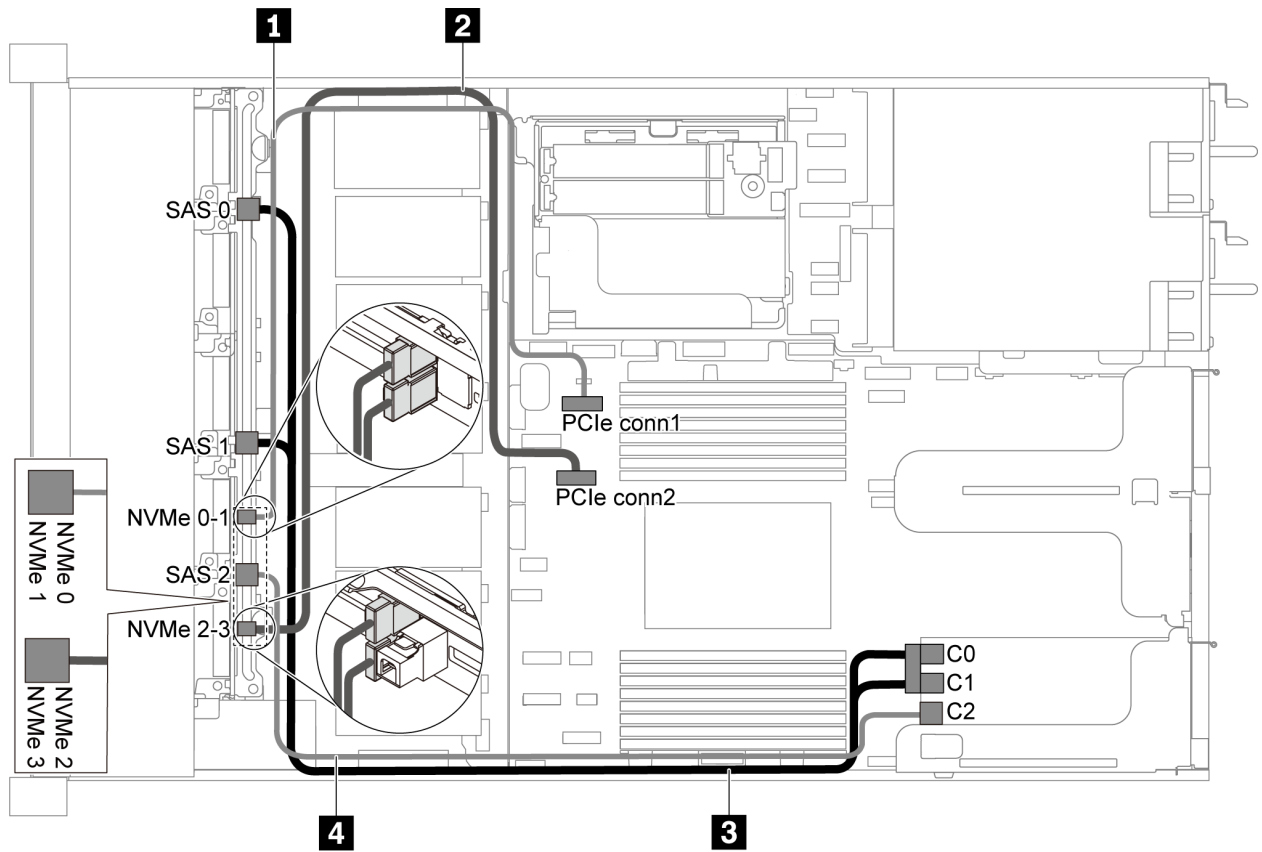


Figure 37. Cable routing for server model with six 2.5-inch SAS/SATA drives, four 2.5-inch NVMe drives and one 16i RAID adapter

Note: RAID adapter can be installed in PCIe slot 1 or internal riser assembly.

Cable	From	To
1 NVMe signal cable for front backplane	NVMe 0 and NVMe 1 connectors on the front backplane	PCIe connector 1 on the system board
2 NVMe signal cable for front backplane	NVMe 2 and NVMe 3 connectors on the front backplane	PCIe connector 2 on the system board
3 SAS signal cable for front backplane	SAS 0 and SAS 1 connectors on the front backplane	C0 and C1 connectors on the RAID adapter
4 SAS signal cable for front backplane	SAS 2 connector on the front backplane	C2 connector on the RAID adapter

Six 2.5-inch SATA drives, four 2.5-inch NVMe drives and rear SAS/SATA drive assembly

Notes:

- When the SAS/SATA backplanes are connected to PCIe connectors on the system board, only SATA drives are supported. No SAS drives are supported.
- The cable routing illustration is based on the scenario that the rear hot-swap drive cage is installed. Depending on the model, the rear hot-swap drive cage might not be available on your server.

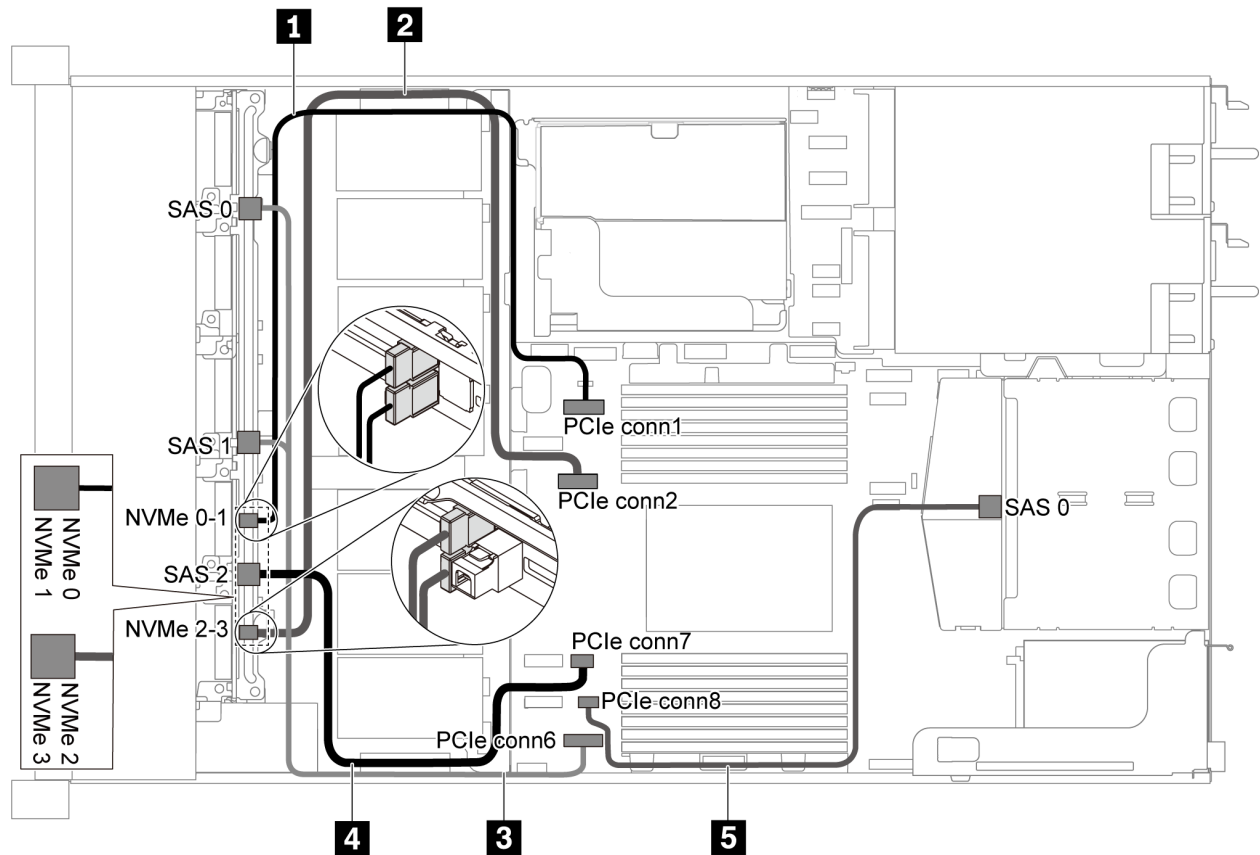


Figure 38. Cable routing for server model with six 2.5-inch SATA drives, four 2.5-inch NVMe drives and rear SAS/SATA drive assembly

Note: M.2 drive is not supported for this configuration.

Cable	From	To
1 NVMe signal cable for front backplane	NVMe 0 and NVMe 1 connectors on the front backplane	PCIe connector 1 on the system board
2 NVMe signal cable for front backplane	NVMe 2 and NVMe 3 connectors on the front backplane	PCIe connector 2 on the system board
3 SAS signal cable for front backplane	SAS 0 and SAS1 connectors on the front backplane	PCIe connector 6 on the system board
4 SAS signal cable for front backplane	SAS 2 connector on the front backplane	PCIe connector 7 on the system board
5 SAS signal cable for rear backplane	SAS connector on the rear backplane	PCIe connector 8 on the system board

Six 2.5-inch SAS/SATA drives, four 2.5-inch NVMe drives, rear SAS/SATA drive assembly and one 16i RAID adapter

Note: The cable routing illustration is based on the scenario that the rear hot-swap drive cage is installed. Depending on the model, the rear hot-swap drive cage might not be available on your server.

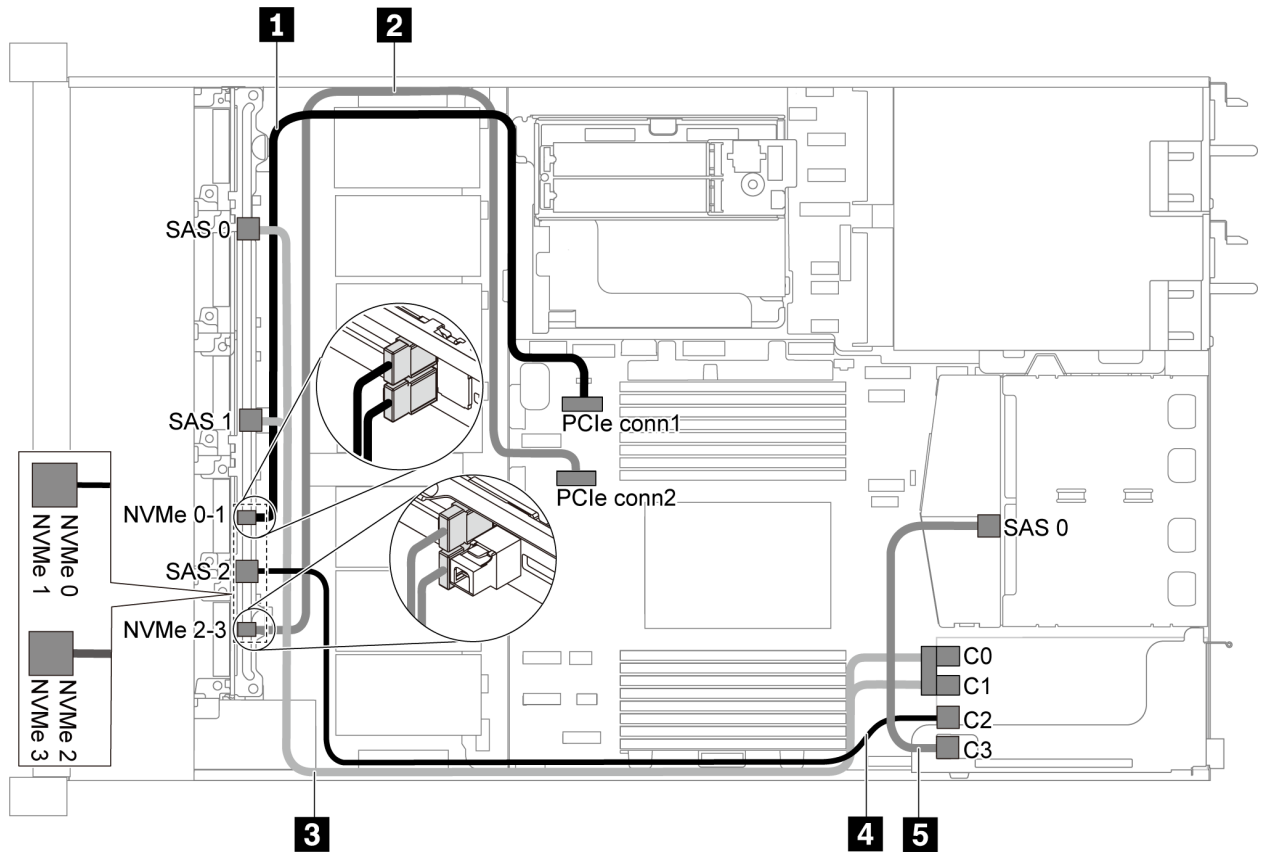


Figure 39. Cable routing for server model with six 2.5-inch SAS/SATA drives, four 2.5-inch NVMe drives, rear SAS/SATA drive assembly and one 16i RAID adapter

Note: RAID adapter can be installed in PCIe slot 1 or internal riser assembly.

Cable	From	To
1 NVMe signal cable for front backplane	NVMe 0 and NVMe 1 connectors on the front backplane	PCIe connector 1 on the system board
2 NVMe signal cable for front backplane	NVMe 2 and NVMe 3 connectors on the front backplane	PCIe connector 2 on the system board
3 SAS signal cable for front backplane	SAS 0 and SAS 1 connectors on the front backplane	C0 and C1 connectors on the RAID adapter
4 SAS signal cable for front backplane	SAS 2 connector on the front backplane	C2 connector on the RAID adapter
5 SAS signal cable for rear backplane	SAS connector on the rear backplane	C3 connector on the RAID adapter

Six 2.5-inch SATA drives, four 2.5-inch NVMe drives and rear NVMe drive assembly

Notes:

- When the SAS/SATA backplanes are connected to PCIe connectors on the system board, only SATA drives are supported. No SAS drives are supported.
- The cable routing illustration is based on the scenario that the rear hot-swap drive cage is installed. Depending on the model, the rear hot-swap drive cage might not be available on your server.

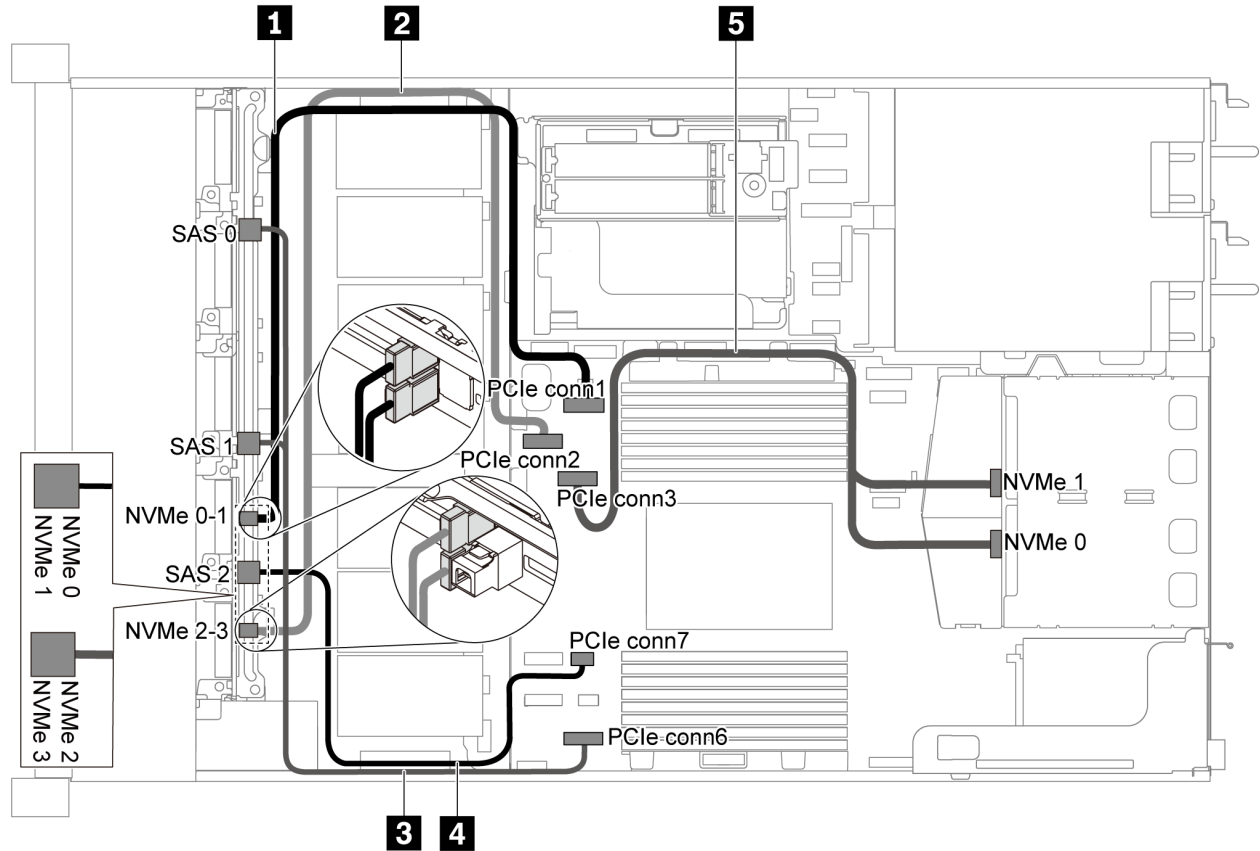


Figure 40. Cable routing for server model with six 2.5-inch SATA drives, four 2.5-inch NVMe drives and rear NVMe drive assembly

Cable	From	To
1 NVMe signal cable for front backplane	NVMe 0 and NVMe 1 connectors on the front backplane	PCIe connector 1 on the system board
2 NVMe signal cable for front backplane	NVMe 2 and NVMe 3 connectors on the front backplane	PCIe connector 2 on the system board
3 SAS signal cable for front backplane	SAS 0 and SAS1 connectors on the front backplane	PCIe connector 6 on the system board
4 SAS signal cable for front backplane	SAS 2 connector on the front backplane	PCIe connector 7 on the system board
5 NVMe signal cable for rear backplane	NVMe connectors on the rear backplane	PCIe connector 3 on the system board

Six 2.5-inch SAS/SATA drives, four 2.5-inch NVMe drives, rear NVMe drive assembly and one 16i RAID adapter

Note: The cable routing illustration is based on the scenario that the rear hot-swap drive cage is installed. Depending on the model, the rear hot-swap drive cage might not be available on your server.

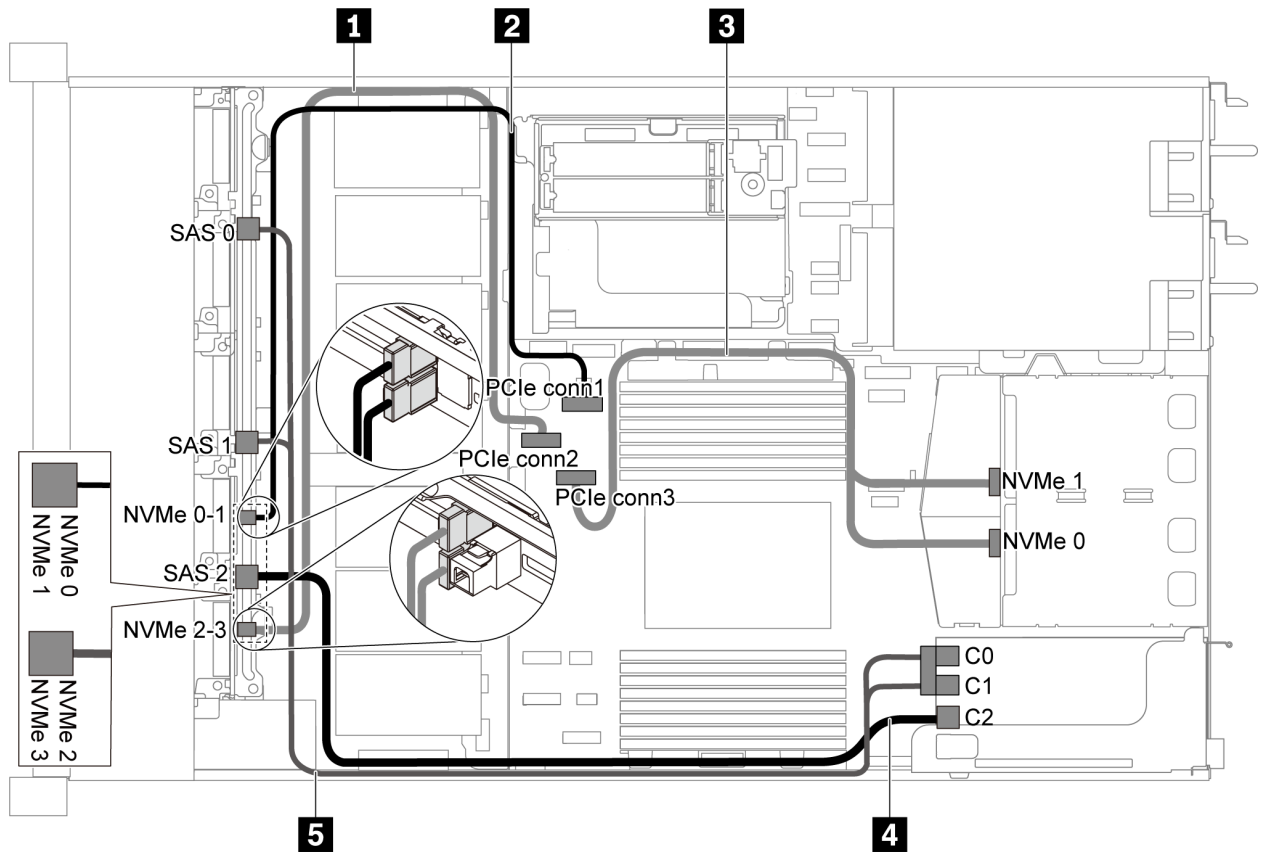


Figure 41. Cable routing for server model with six 2.5-inch SAS/SATA drives, four 2.5-inch NVMe drives, rear NVMe drive assembly and one 16i RAID adapter

Note: RAID adapter can be installed in PCIe slot 1 or internal riser assembly.

Cable	From	To
1 NVMe signal cable for front backplane	NVMe 2 and NVMe 3 connectors on the front backplane	PCIe connector 2 on the system board
2 NVMe signal cable for front backplane	NVMe 0 and NVMe 1 connectors on the front backplane	PCIe connector 1 on the system board
3 NVMe signal cable for rear backplane	NVMe connectors on the rear backplane	PCIe connector 3 on the system board
4 SAS signal cable for front backplane	SAS 2 connector on the front backplane	C2 connector on the RAID adapter
5 SAS signal cable for front backplane	SAS 0 and SAS 1 connectors on the front backplane	C0 and C1 connectors on the RAID adapter

Server model with ten 2.5-inch SAS/SATA/NVMe drives

Use this section to understand the connectors on the backplane and the internal cable routing for server model with ten 2.5-inch SAS/SATA/NVMe drives.

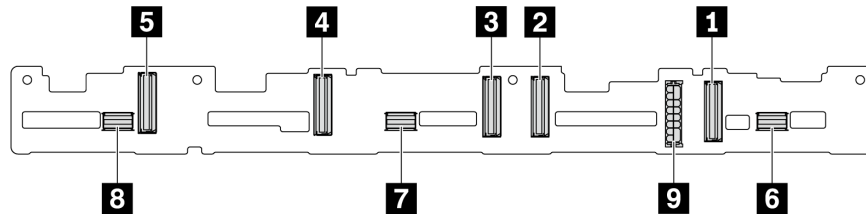


Figure 42. Connectors on the backplane for ten 2.5-inch SAS/SATA/NVMe drives

- | | | | |
|-----------------------------|-----------------------------|-----------------------------|-----------------------------|
| 1 NVMe 0–1 connector | 2 NVMe 2–3 connector | 3 NVMe 4–5 connector | 4 NVMe 6–7 connector |
| 5 NVMe 8–9 connector | 6 SAS/SATA 0–3 | 7 SAS/SATA 4–7 | 8 SAS/SATA 8–9 |
| 9 Power connector | | | |

For power cable connection, see “Power cable routing” on page 22.

Refer to the following cable routing for different configurations:

Note: When the SAS/SATA/NVMe backplanes are connected to PCIe connectors on the system board, only SATA/NVMe drives are supported. No SAS drives are supported.

- “Ten 2.5-inch SATA drives and ten 2.5-inch NVMe drives” on page 47
- “Ten 2.5-inch SAS/SATA drives, ten 2.5-inch NVMe drives and one 16i RAID adapter” on page 49
- “Ten 2.5-inch SATA drives, ten 2.5-inch NVMe drives and rear SAS/SATA drive assembly” on page 50
- “Ten 2.5-inch SAS/SATA drives, ten 2.5-inch NVMe drives, rear SAS/SATA drive assembly and one 16i RAID adapter” on page 51
- “Ten 2.5-inch SAS/SATA drives, ten 2.5-inch NVMe drives, rear NVMe drive assembly and one 16i RAID adapter” on page 52
- “Ten 2.5-inch SAS/SATA drives, ten 2.5-inch NVMe drives, rear SAS/SATA drive assembly, middle NVMe drive assembly and one 16i RAID adapter” on page 53
- “Ten 2.5-inch NVMe drives, rear NVMe drive assembly and middle NVMe drive assembly” on page 55
- “Ten 2.5-inch SAS/SATA drives, ten 2.5-inch NVMe drives, rear NVMe drive assembly, middle NVMe drive assembly and one 16i RAID adapter” on page 57
- “Ten 2.5-inch SAS/SATA drives, ten 2.5-inch NVMe drives, middle NVMe drive assembly and one 16i RAID adapter” on page 58

Ten 2.5-inch SATA drives and ten 2.5-inch NVMe drives

Note: When the SAS/SATA backplanes are connected to PCIe connectors on the system board, only SATA drives are supported. No SAS drives are supported.

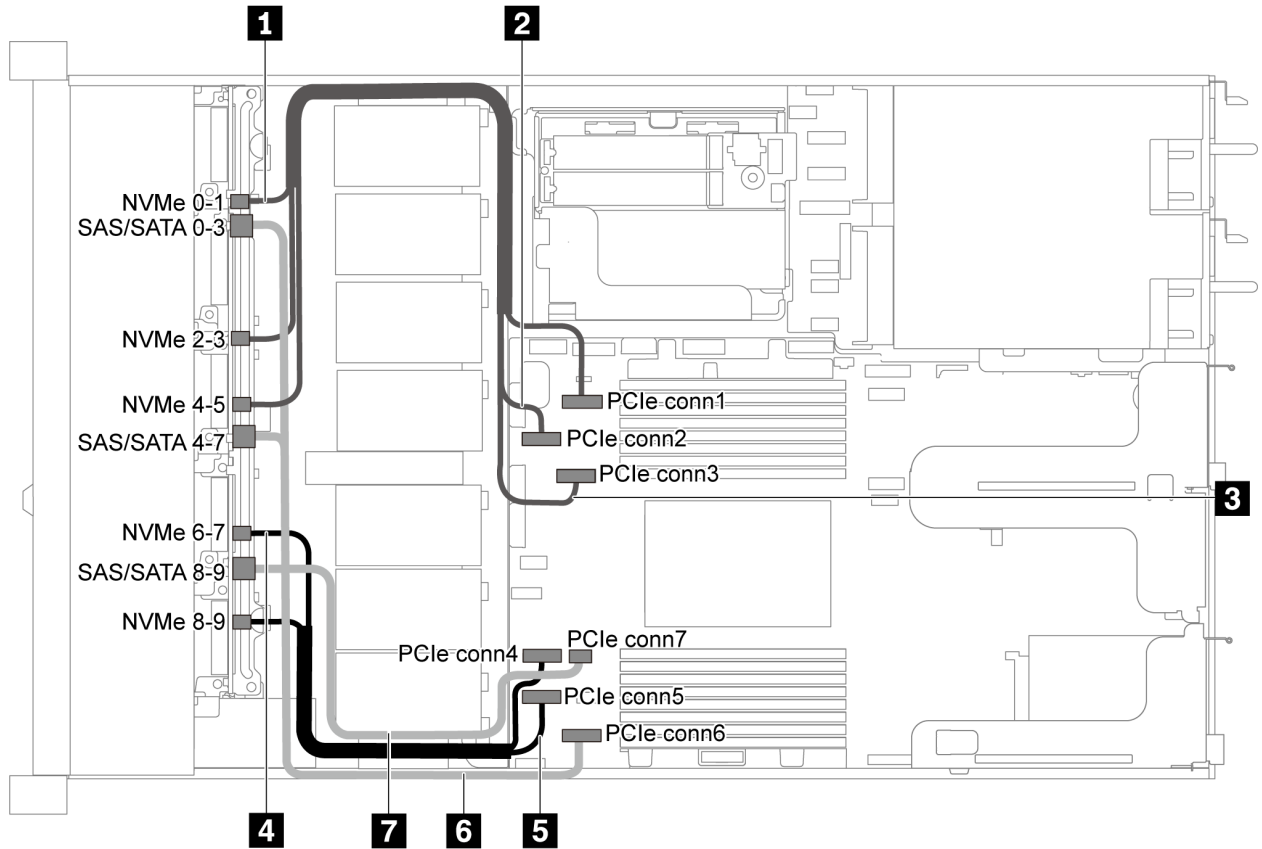


Figure 43. Cable routing for server model with ten 2.5-inch SATA drives and ten 2.5-inch NVMe drives

Cable	From	To
1 NVMe signal cable for front backplane	NVMe 0–1 connector on the front backplane	PCIe connector 1 on the system board
2 NVMe signal cable for front backplane	NVMe 2–3 connector on the front backplane	PCIe connector 2 on the system board
3 NVMe signal cable for front backplane	NVMe 4–5 connector on the front backplane	PCIe connector 3 on the system board
4 NVMe signal cable for front backplane	NVMe 6–7 connector on the front backplane	PCIe connector 4 on the system board
5 NVMe signal cable for front backplane	NVMe 8–9 connector on the front backplane	PCIe connector 5 on the system board
6 SAS signal cable for front backplane	SAS/SATA 0–3 and 4–7 connectors on the front backplane	PCIe connector 6 on the system board
7 SAS signal cable for front backplane	SAS/SATA 8–9 connector on the front backplane	PCIe connector 7 on the system board

Ten 2.5-inch SAS/SATA drives, ten 2.5-inch NVMe drives and one 16i RAID adapter

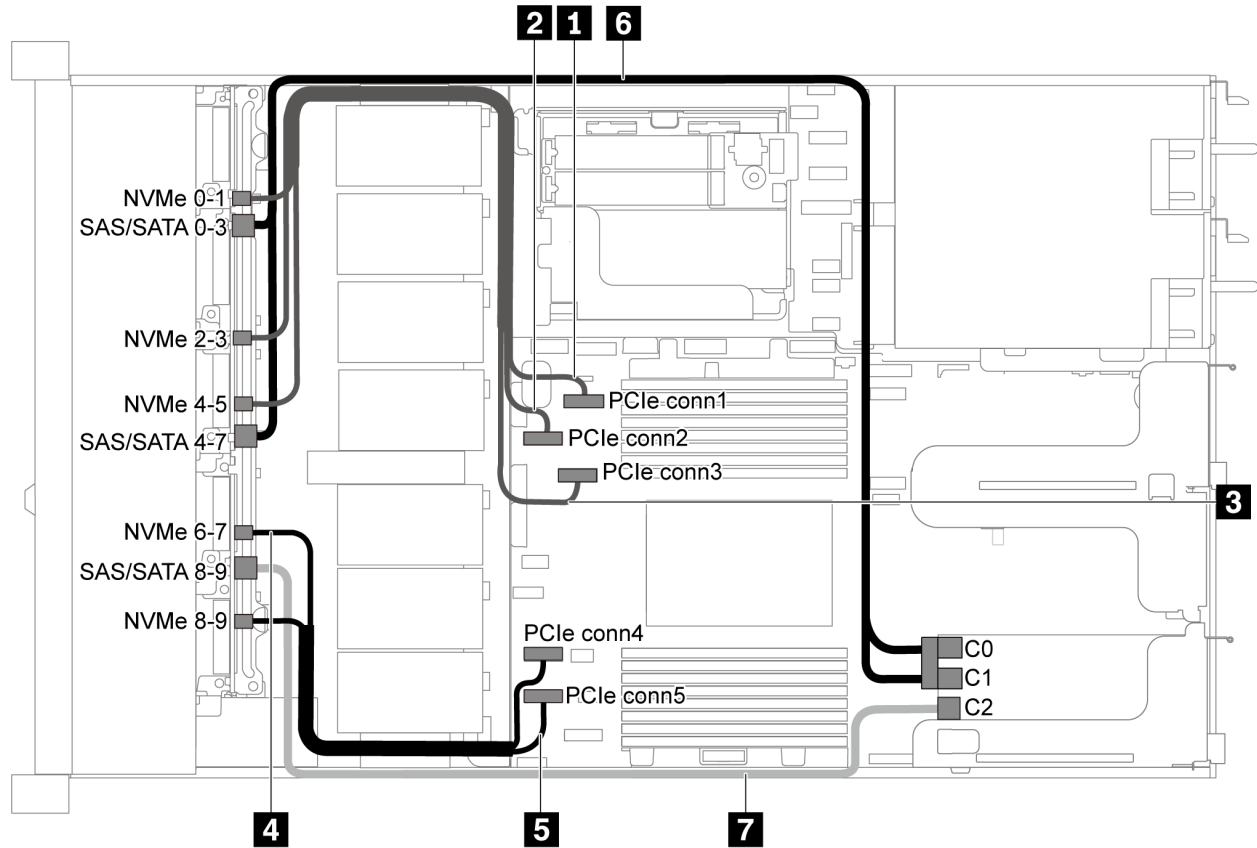


Figure 44. Cable routing for server model with ten 2.5-inch SAS/SATA drives, ten 2.5-inch NVMe drives and one 16i RAID adapter

Note: RAID adapter can be installed in PCIe slot 1 or internal riser assembly.

Cable	From	To
1 NVMe signal cable for front backplane	NVMe 0–1 connector on the front backplane	PCIe connector 1 on the system board
2 NVMe signal cable for front backplane	NVMe 2–3 connector on the front backplane	PCIe connector 2 on the system board
3 NVMe signal cable for front backplane	NVMe 4–5 connector on the front backplane	PCIe connector 3 on the system board
4 NVMe signal cable for front backplane	NVMe 6–7 connector on the front backplane	PCIe connector 4 on the system board
5 NVMe signal cable for front backplane	NVMe 8–9 connector on the front backplane	PCIe connector 5 on the system board
6 SAS signal cable for front backplane	SAS/SATA 0–3 and SAS/SATA 4–7 connectors on the front backplane	C0 and C1 connectors on RAID adapter in PCIe slot 1
7 SAS signal cable for front backplane	SAS/SATA 8–9 connector on the front backplane	C2 connector on RAID adapter in PCIe slot 1

Ten 2.5-inch SATA drives, ten 2.5-inch NVMe drives and rear SAS/SATA drive assembly

Notes:

- When the SAS/SATA backplanes are connected to PCIe connectors on the system board, only SATA drives are supported. No SAS drives are supported.
- The cable routing illustration is based on the scenario that the rear hot-swap drive cage is installed. Depending on the model, the rear hot-swap drive cage might not be available for your server.

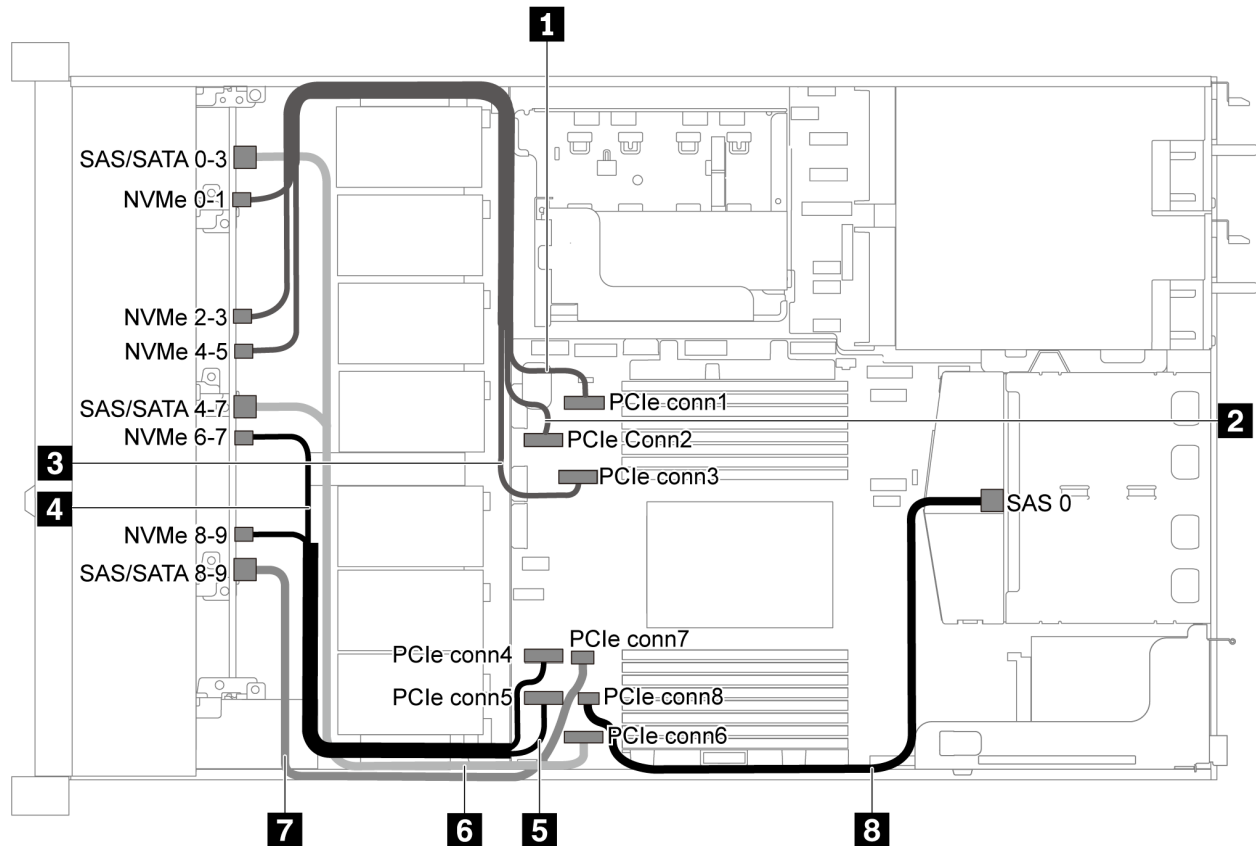


Figure 45. Cable routing for server model with ten 2.5-inch SATA drives, ten 2.5-inch NVMe drives and rear SAS/SATA drive assembly

Note: M.2 drive is not supported for this configuration.

Cable	From	To
1 NVMe signal cable for front backplane	NVMe 0–1 connector on the front backplane	PCIe connector 1 on the system board
2 NVMe signal cable for front backplane	NVMe 2–3 connector on the front backplane	PCIe connector 2 on the system board
3 NVMe signal cable for front backplane	NVMe 4–5 connector on the front backplane	PCIe connector 3 on the system board
4 NVMe signal cable for front backplane	NVMe 6–7 connector on the front backplane	PCIe connector 4 on the system board
5 NVMe signal cable for front backplane	NVMe 8–9 connector on the front backplane	PCIe connector 5 on the system board

Cable	From	To
6 SAS signal cable for front backplane	SAS/SATA 0–3 and 4–7 connectors on the front backplane	PCIe connector 6 on the system board
7 SAS signal cable for front backplane	SAS/SATA 8–9 connector on the front backplane	PCIe connector 7 on the system board
8 SAS signal cable for rear backplane	SAS connector on the rear backplane	PCIe connector 8 on the system board

Ten 2.5-inch SAS/SATA drives, ten 2.5-inch NVMe drives, rear SAS/SATA drive assembly and one 16i RAID adapter

Note: The cable routing illustration is based on the scenario that the rear hot-swap drive cage is installed. Depending on the model, the rear hot-swap drive cage might not be available on your server.

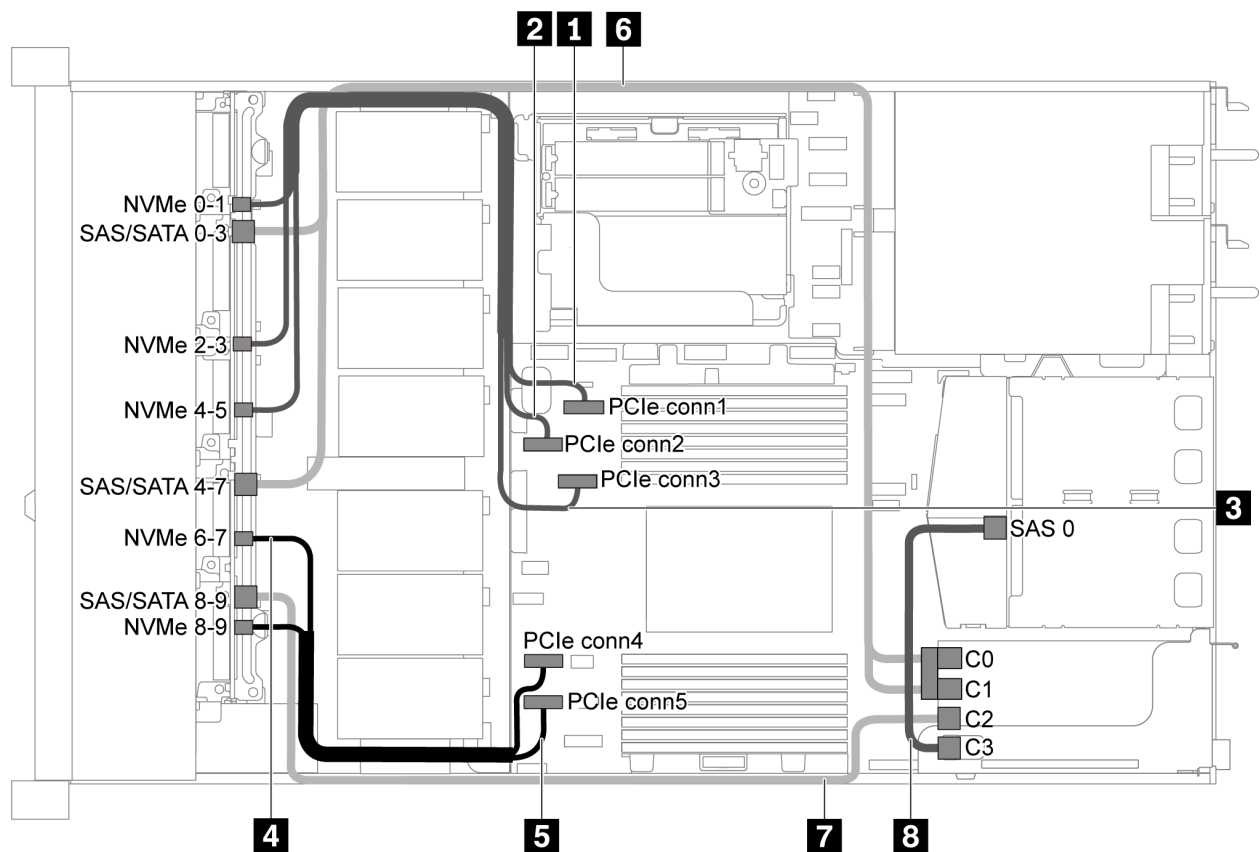


Figure 46. Cable routing for server model with ten 2.5-inch SAS/SATA drives, ten 2.5-inch NVMe drives, rear SAS/SATA drive assembly and one 16i RAID adapter

Note: RAID adapter can be installed in PCIe slot 1 or internal riser assembly.

Cable	From	To
1 NVMe signal cable for front backplane	NVMe 0–1 connector on the front backplane	PCIe connector 1 on the system board
2 NVMe signal cable for front backplane	NVMe 2–3 connector on the front backplane	PCIe connector 2 on the system board

Cable	From	To
3 NVMe signal cable for front backplane	NVMe 4-5 connector on the front backplane	PCIe connector 3 on the system board
4 NVMe signal cable for front backplane	NVMe 6-7 connector on the front backplane	PCIe connector 4 on the system board
5 NVMe signal cable for front backplane	NVMe 8-9 connector on the front backplane	PCIe connector 5 on the system board
6 SAS signal cable for front backplane	SAS/SATA 0-3 and SAS/SATA 4-7 connectors on the front backplane	C0 and C1 connectors on RAID adapter in PCIe slot 1
7 SAS signal cable for front backplane	SAS/SATA 8-9 connector on the front backplane	C2 connector on RAID adapter in PCIe slot 1
8 SAS signal cable for rear backplane	SAS connector on the rear backplane	C3 connector on RAID adapter in PCIe slot 1

Ten 2.5-inch SAS/SATA drives, ten 2.5-inch NVMe drives, rear NVMe drive assembly and one 16i RAID adapter

Note: The cable routing illustration is based on the scenario that the rear hot-swap drive cage is installed. Depending on the model, the rear hot-swap drive cage might not be available on your server.

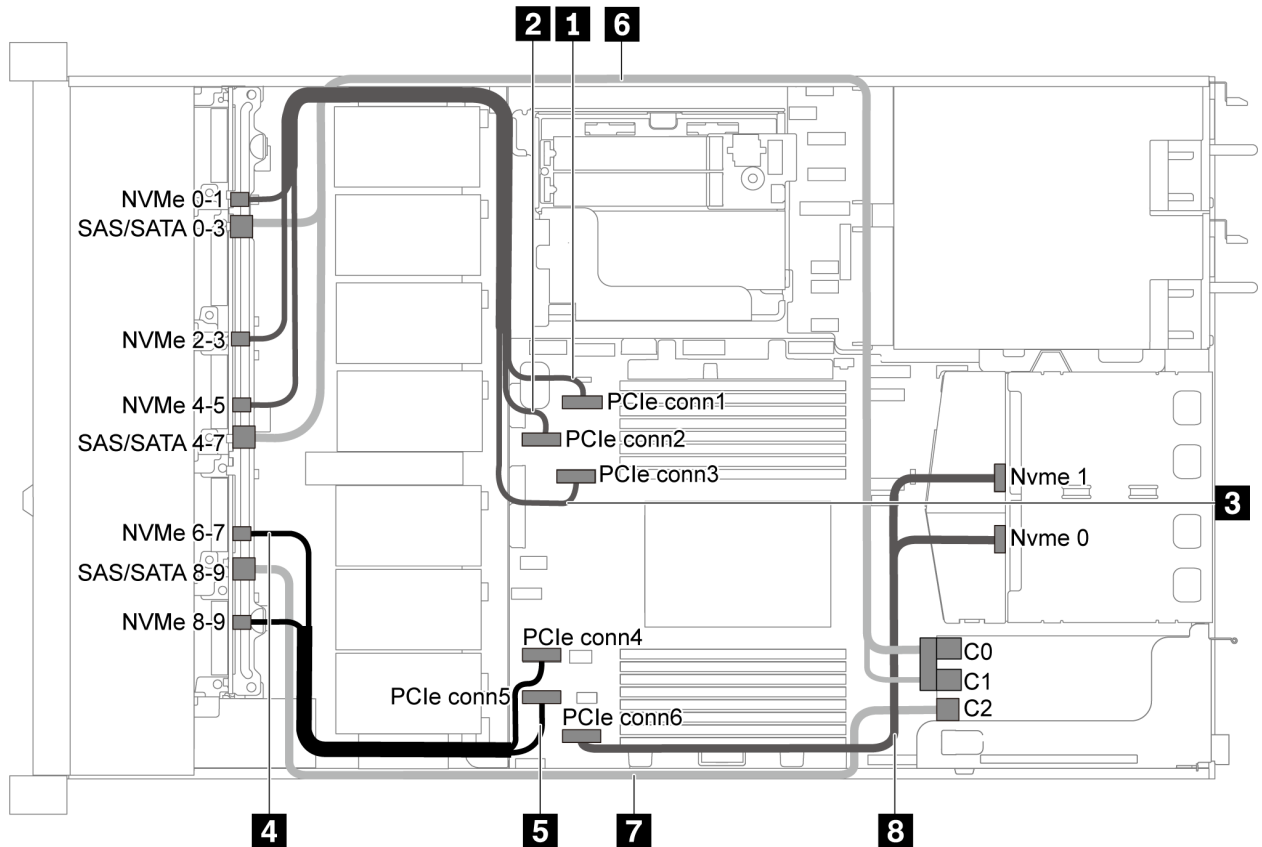


Figure 47. Cable routing for server model with ten 2.5-inch SAS/SATA drives, ten 2.5-inch NVMe drives, rear NVMe drive assembly and one 16i RAID adapter

Note: RAID adapter can be installed in PCIe slot 1 or internal riser assembly.

Cable	From	To
1 NVMe signal cable for front backplane	NVMe 0–1 connector on the front backplane	PCIe connector 1 on the system board
2 NVMe signal cable for front backplane	NVMe 2–3 connector on the front backplane	PCIe connector 2 on the system board
3 NVMe signal cable for front backplane	NVMe 4–5 connector on the front backplane	PCIe connector 3 on the system board
4 NVMe signal cable for front backplane	NVMe 6–7 connector on the front backplane	PCIe connector 4 on the system board
5 NVMe signal cable for front backplane	NVMe 8–9 connector on the front backplane	PCIe connector 5 on the system board
6 SAS signal cable for front backplane	SAS/SATA 0–3 and SAS/SATA 4–7 connectors on the front backplane	C0 and C1 connectors on RAID adapter in PCIe slot 1
7 SAS signal cable for front backplane	SAS/SATA 8–9 connector on the front backplane	C2 connector on RAID adapter in PCIe slot 1
8 NVMe signal cable for rear backplane	NVMe connectors on the rear backplane	PCIe connector 6 on the system board

Ten 2.5-inch SAS/SATA drives, ten 2.5-inch NVMe drives, rear SAS/SATA drive assembly, middle NVMe drive assembly and one 16i RAID adapter

Notes:

- The cable routing illustration is based on the scenario that the rear hot-swap drive cage and middle NVMe drive assembly are installed. Depending on the model, the rear hot-swap drive cage and middle NVMe drive assembly might not be available on your server.
- The following two illustrations are for the same one configuration.

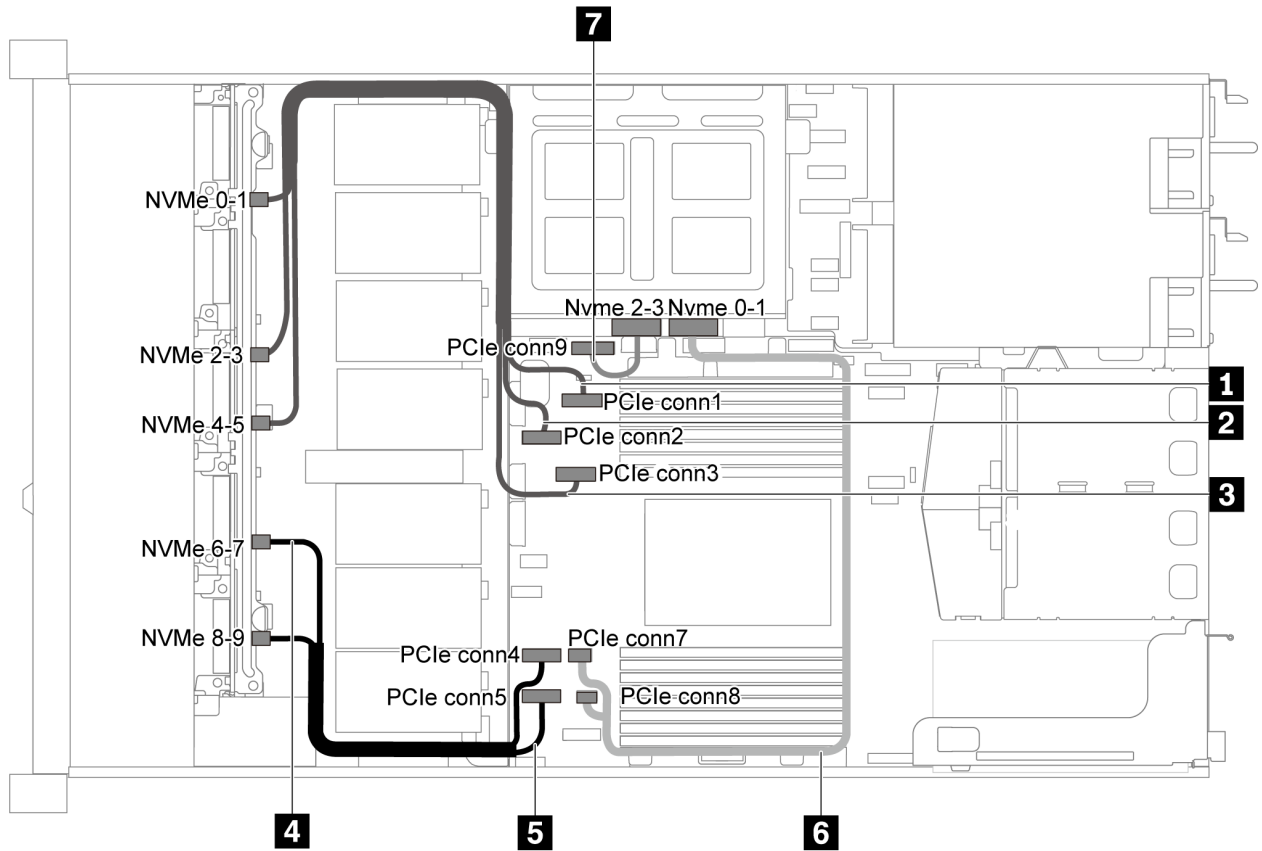


Figure 48. Cable routing for server model with ten 2.5-inch SAS/SATA drives, ten 2.5-inch NVMe drives, rear SAS/SATA drive assembly, middle NVMe drive assembly and one 16i RAID adapter-1

Cable	From	To
1 NVMe signal cable for front backplane	NVMe 0-1 connector on the front backplane	PCIe connector 1 on the system board
2 NVMe signal cable for front backplane	NVMe 2-3 connector on the front backplane	PCIe connector 2 on the system board
3 NVMe signal cable for front backplane	NVMe 4-5 connector on the front backplane	PCIe connector 3 on the system board
4 NVMe signal cable for front backplane	NVMe 6-7 connector on the front backplane	PCIe connector 4 on the system board
5 NVMe signal cable for front backplane	NVMe 8-9 connector on the front backplane	PCIe connector 5 on the system board
6 NVMe signal cable for middle backplane	NVMe 0-1 connector on the middle backplane	PCIe connector 7 and PCIe connector 8 on the system board
7 NVMe signal cable for middle backplane	NVMe 2-3 connector on the middle backplane	PCIe connector 9 on the system board

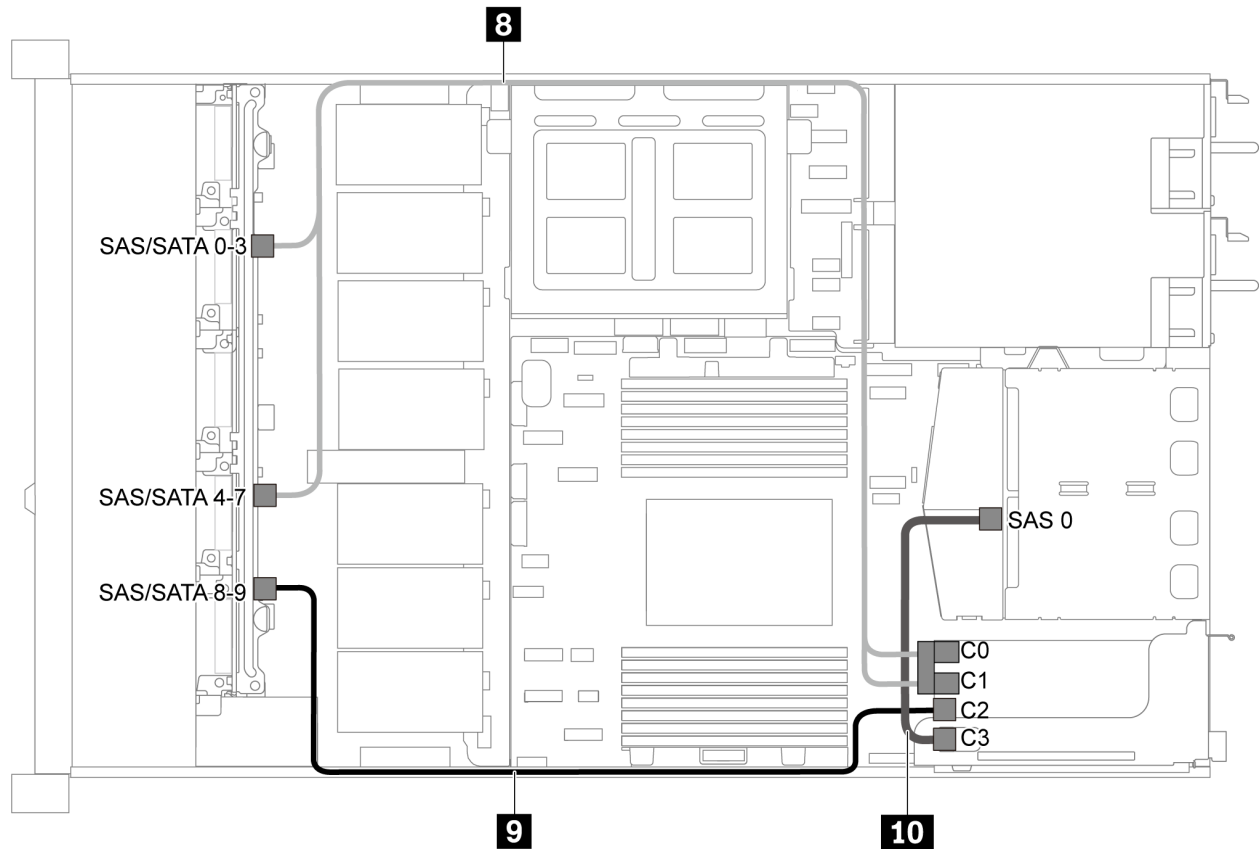


Figure 49. Cable routing for server model with ten 2.5-inch SAS/SATA drives, ten 2.5-inch NVMe drives, rear SAS/SATA drive assembly, middle NVMe drive assembly and one 16i RAID adapter-2

Cable	From	To
8 SAS signal cable for front backplane	SAS/SATA 0–3 and SAS/SATA 4–7 connectors on the front backplane	C0 and C1 connectors on RAID adapter in PCIe slot 1
9 SAS signal cable for front backplane	SAS/SATA 8–9 connector on the front backplane	C2 connector on RAID adapter in PCIe slot 1
10 SAS signal cable for rear backplane	SAS 0 connector on the middle backplane	C3 connector on RAID adapter in PCIe slot 1

Ten 2.5-inch NVMe drives, rear NVMe drive assembly and middle NVMe drive assembly

Note: The cable routing illustration is based on the scenario that the rear hot-swap drive cage and middle NVMe drive assembly are installed. Depending on the model, the rear hot-swap drive cage and middle NVMe drive assembly might not be available on your server.

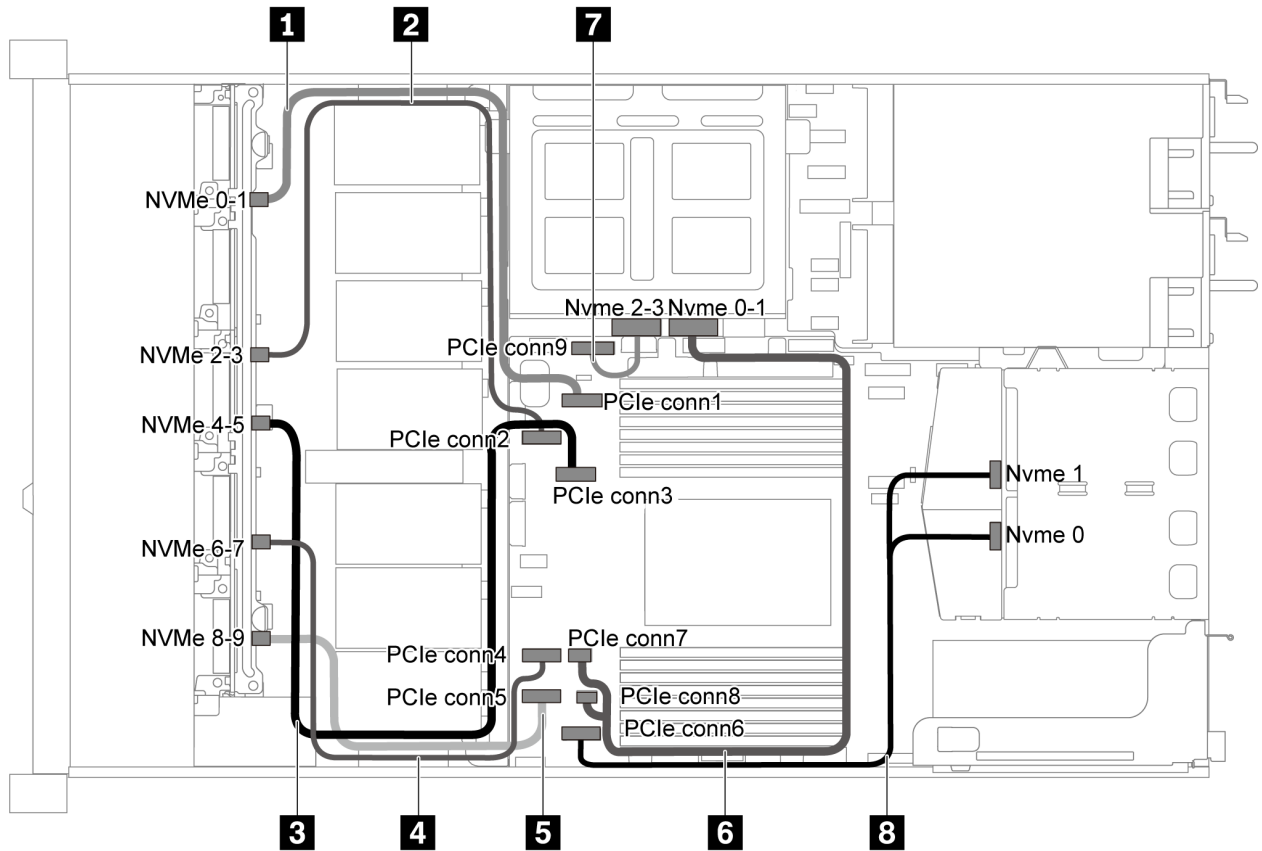


Figure 50. Cable routing for server model with ten 2.5-inch NVMe drives, rear NVMe drive assembly and middle NVMe drive assembly

Cable	From	To
1 NVMe signal cable for front backplane	NVMe 0–1 connector on the front backplane	PCIe connector 1 on the system board
2 NVMe signal cable for front backplane	NVMe 2–3 connector on the front backplane	PCIe connector 2 on the system board
3 NVMe signal cable for front backplane	NVMe 4–5 connector on the front backplane	PCIe connector 3 on the system board
4 NVMe signal cable for front backplane	NVMe 6–7 connector on the front backplane	PCIe connector 4 on the system board
5 NVMe signal cable for front backplane	NVMe 8–9 connector on the front backplane	PCIe connector 5 on the system board
6 NVMe signal cable for middle backplane	NVMe 0–1 connector on the middle backplane	PCIe connector 7 and PCIe connector 8 on the system board
7 NVMe signal cable for middle backplane	NVMe 2–3 connector on the middle backplane	PCIe connector 9 on the system board
8 NVMe signal cable for rear backplane	NVMe 0–1 connector on the rear backplane	PCIe connector 6 on the system board

Ten 2.5-inch SAS/SATA drives, ten 2.5-inch NVMe drives, rear NVMe drive assembly, middle NVMe drive assembly and one 16i RAID adapter

Notes:

- The cable routing illustration is based on the scenario that the rear hot-swap drive cage and middle NVMe drive assembly are installed. Depending on the model, the rear hot-swap drive cage and middle NVMe drive assembly might not be available on your server.
- The following two illustrations are for the same one configuration.

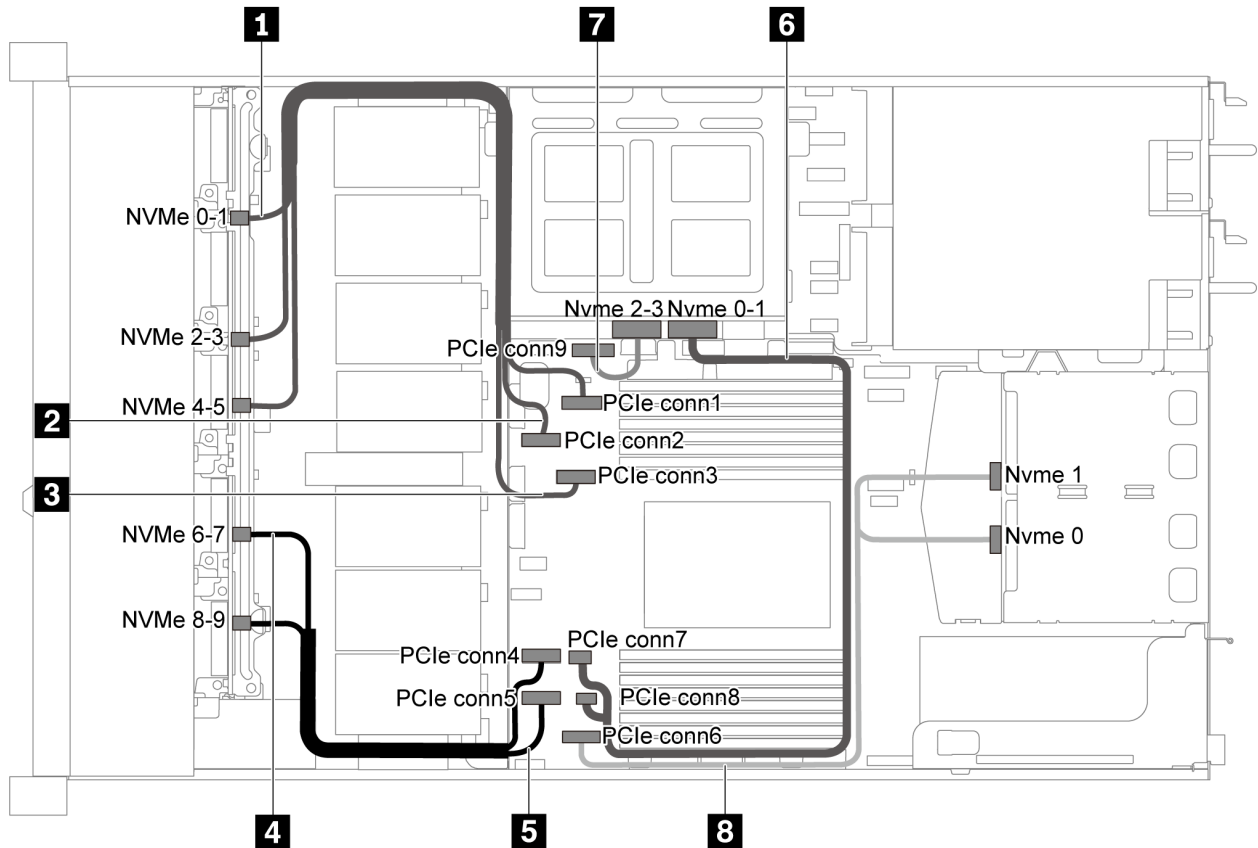


Figure 51. Cable routing for server model with ten 2.5-inch SAS/SATA drives, ten 2.5-inch NVMe drives, rear NVMe drive assembly, middle NVMe drive assembly and one 16i RAID adapter-1

Cable	From	To
1 NVMe signal cable for front backplane	NVMe 0–1 connector on the front backplane	PCIe connector 1 on the system board
2 NVMe signal cable for front backplane	NVMe 2–3 connector on the front backplane	PCIe connector 2 on the system board
3 NVMe signal cable for front backplane	NVMe 4–5 connector on the front backplane	PCIe connector 3 on the system board
4 NVMe signal cable for front backplane	NVMe 6–7 connector on the front backplane	PCIe connector 4 on the system board
5 NVMe signal cable for front backplane	NVMe 8–9 connector on the front backplane	PCIe connector 5 on the system board

Cable	From	To
6 NVMe signal cable for middle backplane	NVMe 0–1 connector on the middle backplane	PCIe connector 7 and PCIe connector 8 on the system board
7 NVMe signal cable for middle backplane	NVMe 2–3 connector on the middle backplane	PCIe connector 9 on the system board
8 NVMe signal cable for rear backplane	NVMe 0–1 connector on the rear backplane	PCIe connector 6 on the system board

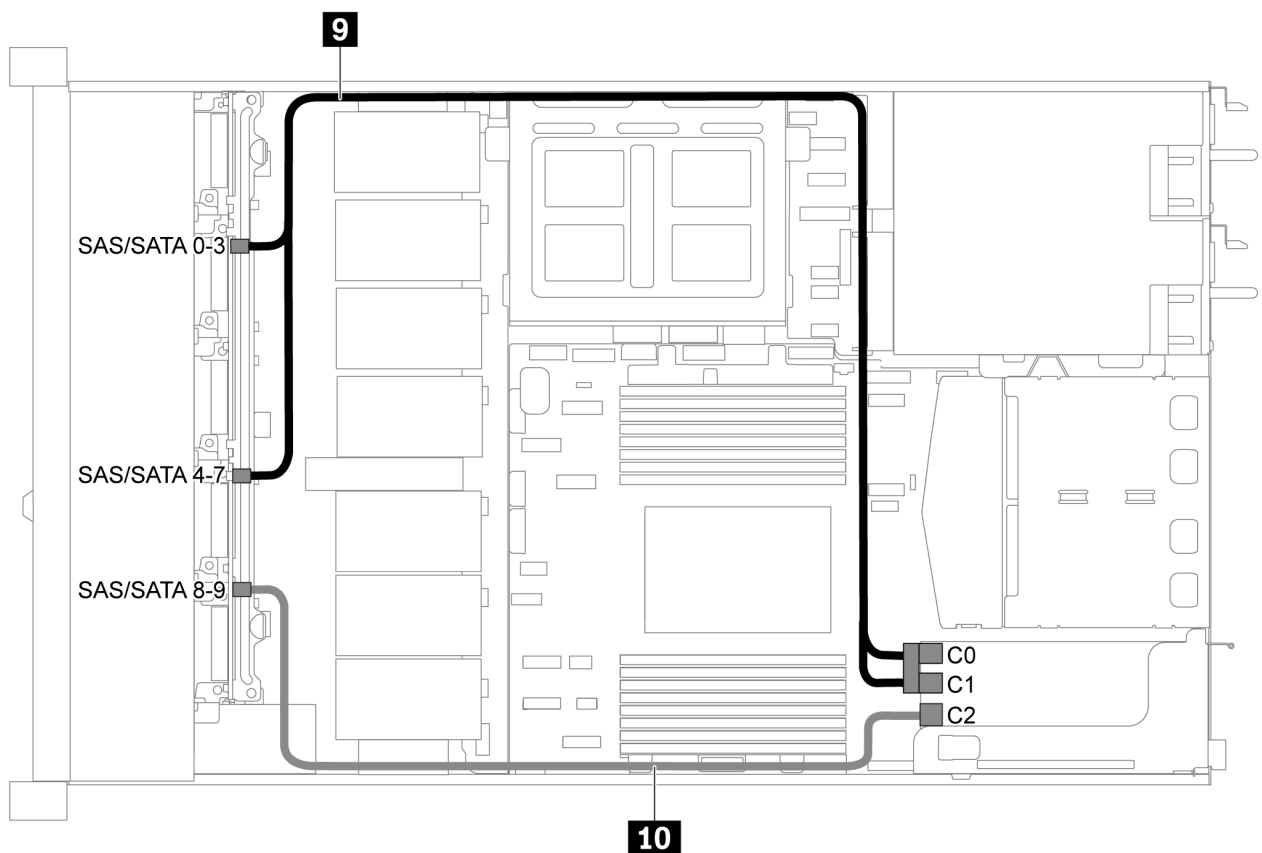


Figure 52. Cable routing for server model with ten 2.5-inch SAS/SATA drives, ten 2.5-inch NVMe drives, rear SAS/SATA drive assembly, middle NVMe drive assembly and one 16i RAID adapter-2

Cable	From	To
9 SAS signal cable for front backplane	SAS/SATA 0–3 and SAS/SATA 4–7 connectors on the front backplane	C0 and C1 connectors on RAID adapter in PCIe slot 1
10 SAS signal cable for front backplane	SAS/SATA 8–9 connector on the front backplane	C2 connector on RAID adapter in PCIe slot 1

Ten 2.5-inch SAS/SATA drives, ten 2.5-inch NVMe drives, middle NVMe drive assembly and one 16i RAID adapter

Notes:

- The cable routing illustration is based on the scenario that the middle NVMe drive assembly is installed. Depending on the model, the middle NVMe drive assembly might not be available on your server.
- The following two illustrations are for the same one configuration.

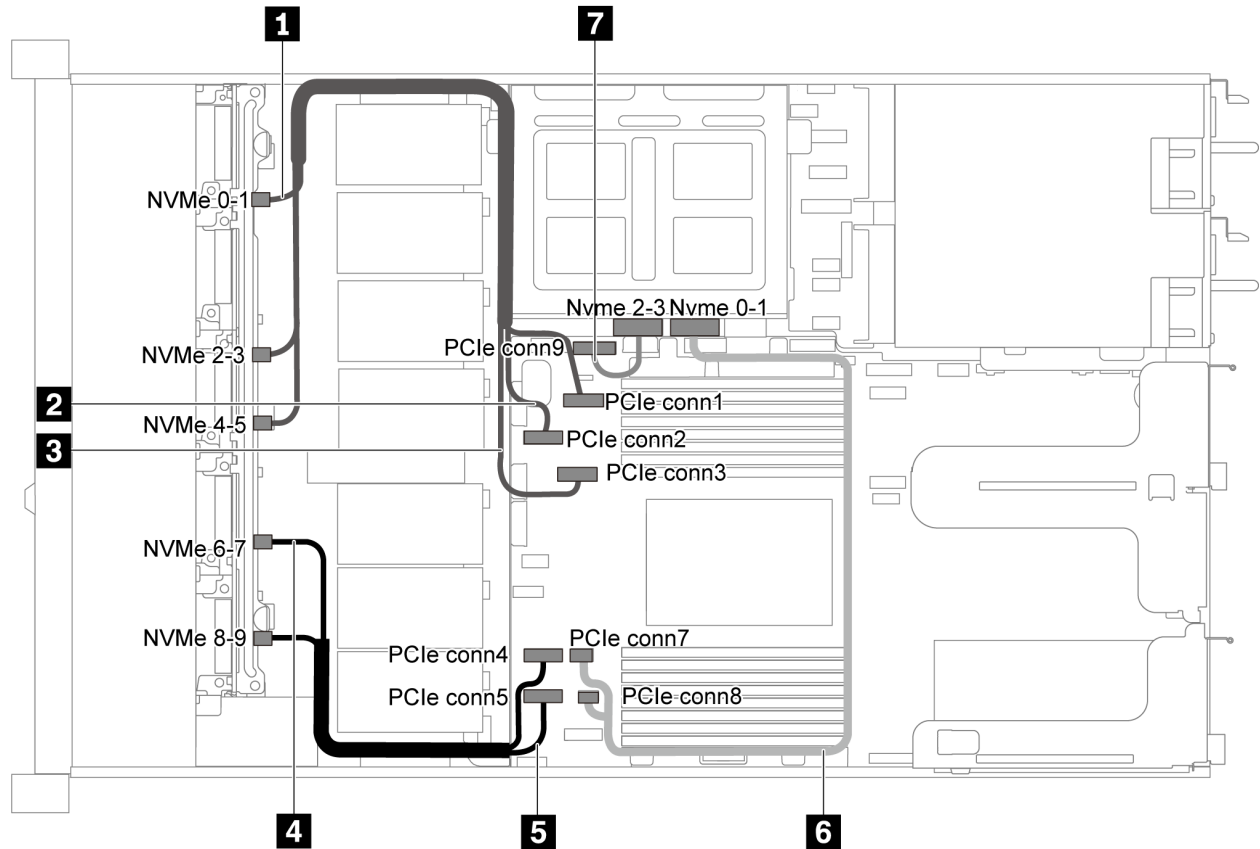


Figure 53. Cable routing for server model with ten 2.5-inch SAS/SATA drives, ten 2.5-inch NVMe drives, middle NVMe drive assembly and one 16i RAID adapter-1

Cable	From	To
1 NVMe signal cable for front backplane	NVMe 0–1 connector on the front backplane	PCIe connector 1 on the system board
2 NVMe signal cable for front backplane	NVMe 2–3 connector on the front backplane	PCIe connector 2 on the system board
3 NVMe signal cable for front backplane	NVMe 4–5 connector on the front backplane	PCIe connector 3 on the system board
4 NVMe signal cable for front backplane	NVMe 6–7 connector on the front backplane	PCIe connector 4 on the system board
5 NVMe signal cable for front backplane	NVMe 8–9 connector on the front backplane	PCIe connector 5 on the system board
6 NVMe signal cable for middle backplane	NVMe 0–1 connector on the rear backplane	PCIe connector 7 on the system board
7 NVMe signal cable for middle backplane	NVMe 2–3 connector on the middle backplane	PCIe connector 9 on the system board

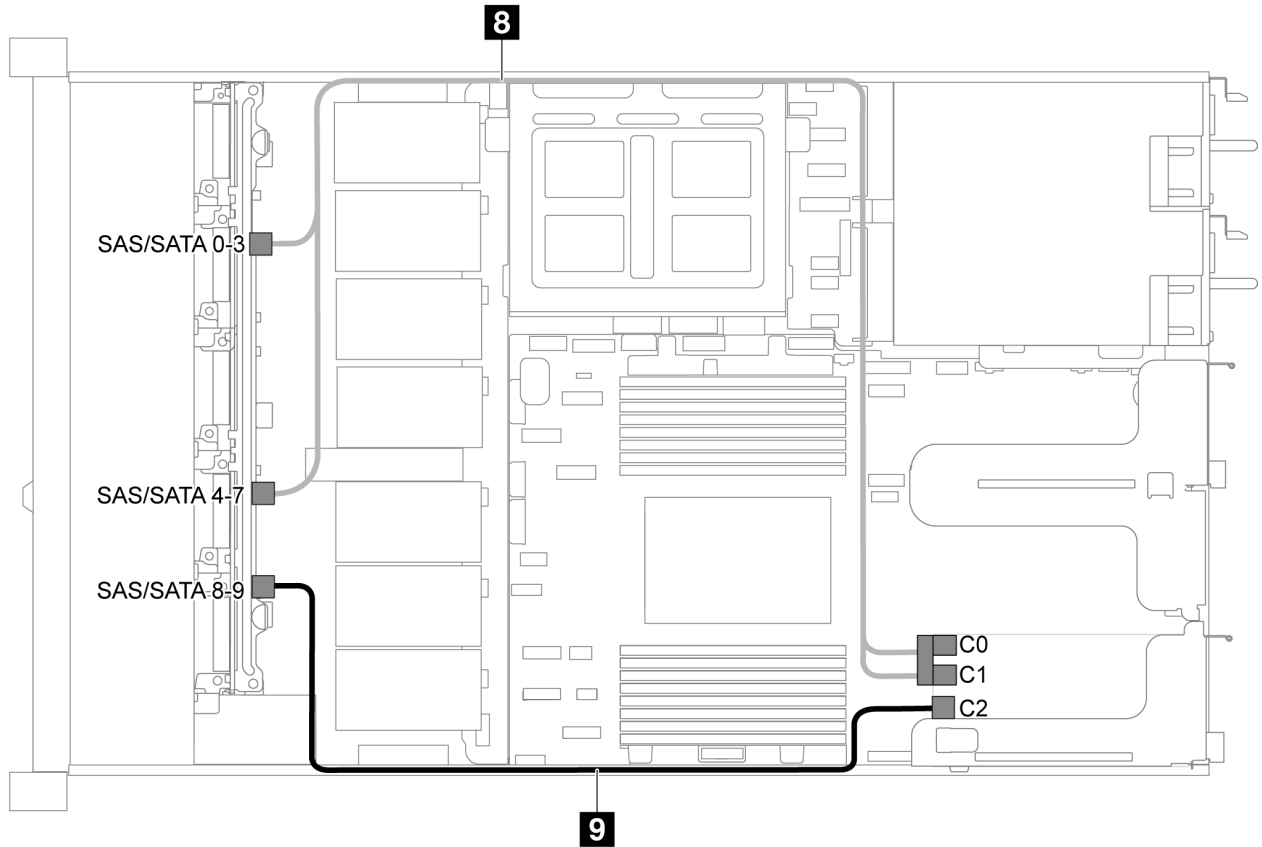


Figure 54. Cable routing for server model with ten 2.5-inch SAS/SATA drives, ten 2.5-inch NVMe drives, middle NVMe drive assembly and one 16i RAID adapter-2

Cable	From	To
8 SAS signal cable for front backplane	SAS/SATA 0-3 and SAS/SATA 4-7 connectors on the front backplane	C0 and C1 connectors on RAID adapter in PCIe slot 1
9 SAS signal cable for front backplane	SAS/SATA 8-9 connector on the front backplane	C2 connector on RAID adapter in PCIe slot 1

M.2 module cable routing

Use the section to understand the cable routing for the M.2 module.

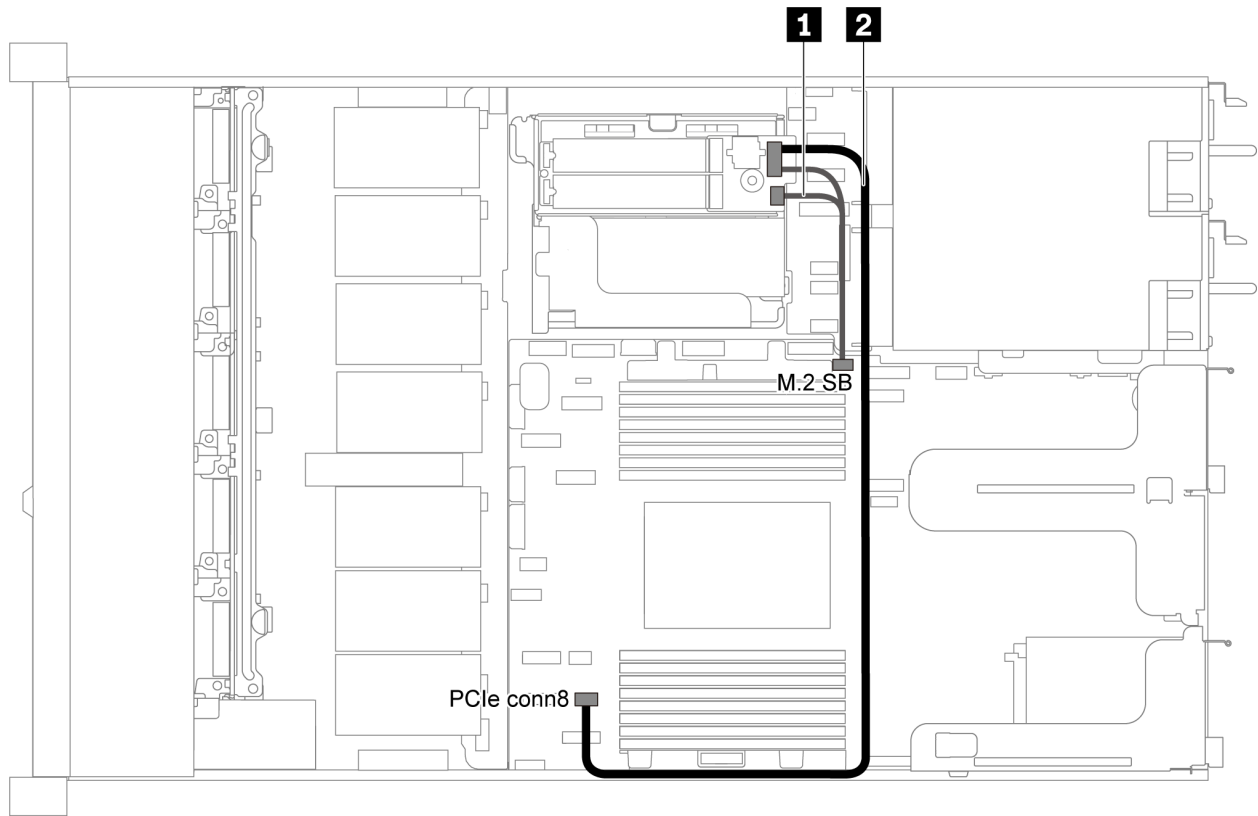


Figure 55. Cable routing for server model with M.2 module

Cable	From	To
1	M.2 sideband connectors on the M.2 module	M.2 sideband connector on the system board
2	Power connector on the M.2 module	PCIe connector 8 on the system board

Super capacitor cable routing

Use the section to understand the cable routing for the super capacitor.

Cable routing for server model with two super capacitors

Note: For server model with 3.5-inch drive bays, it supports up to two RAID super capacitor modules.

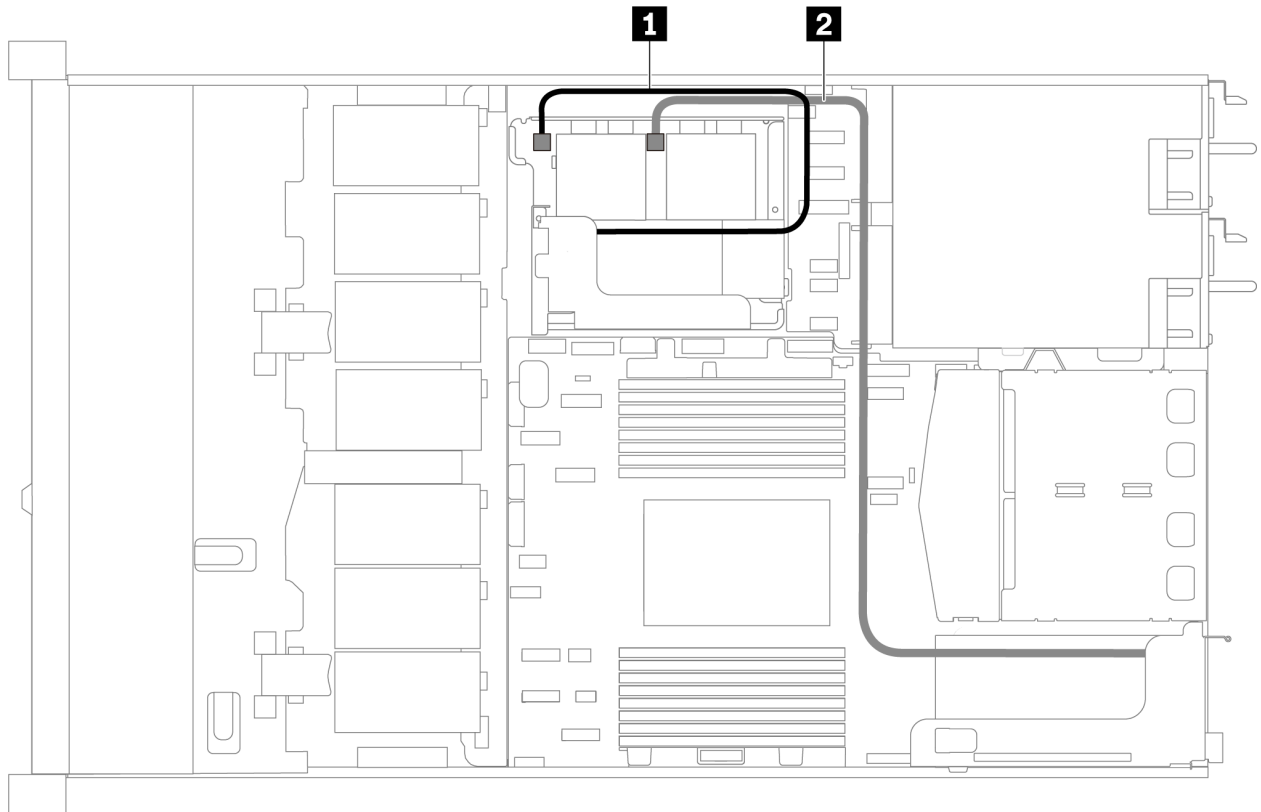


Figure 56. Cable routing for server model with two super capacitors

From	To
1 Super capacitor connector	Super capacitor connector on the RAID adapter installed in the internal riser kit
2 Super capacitor connector	Super capacitor connector on the RAID adapter installed in the PCIe slot 1

Cable routing for server model with three super capacitors

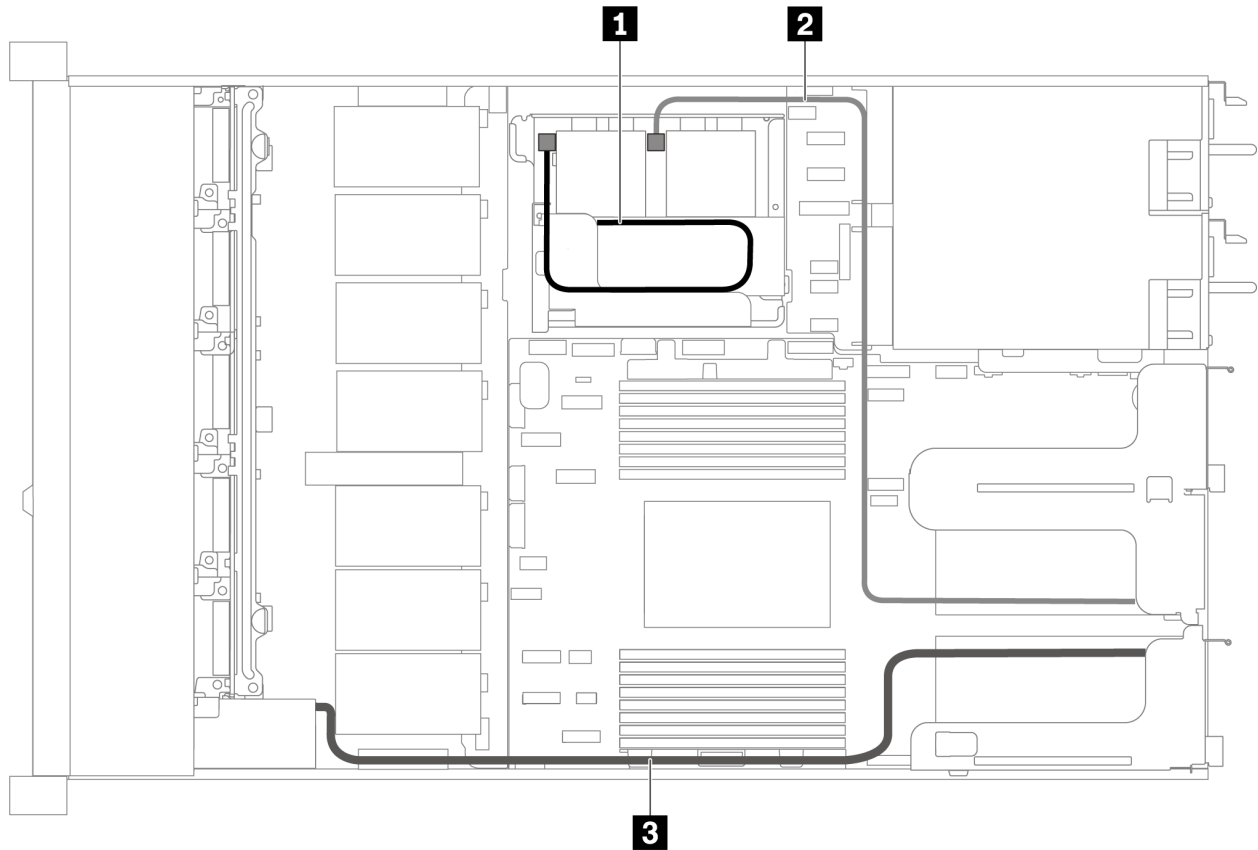


Figure 57. Cable routing for server model with three super capacitors

From	To
1 Super capacitor connector	Super capacitor connector on the RAID adapter installed in the internal riser kit
2 Super capacitor connector	Super capacitor connector on the RAID adapter installed in the PCIe slot 2
3 Super capacitor connector	Super capacitor connector on the RAID adapter installed in the PCIe slot 1

VGA/USB/Front panel connector

Use the section to understand the cable routing for the VGA/USB/Front panel connector on the left rack latch.

Note: The VGA connector is available on some models.

The following is the cable routing for server model with four 3.5-inch drive bays.

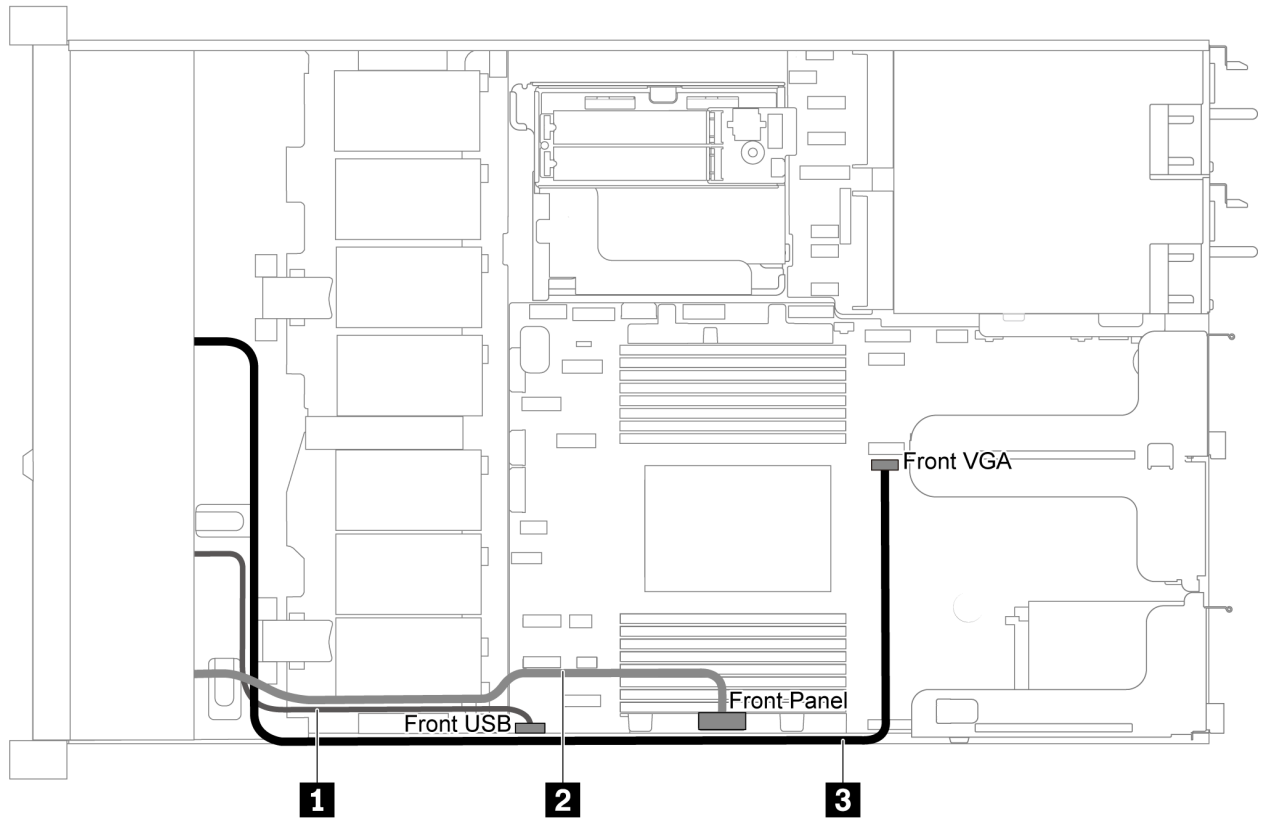


Figure 58. VGA/USB/Front panel connector cable routing for server model with four 3.5-inch drive bays

Cable	To
1 USB cable from the front of server	Front USB connector on the system board
2 Front panel cable from the front of server	Front Panel connector on the system board
3 VGA cable from the front of server	Front VGA connector on the system board

The following is the cable routing for server model with eight/ten 2.5-inch drive bays.

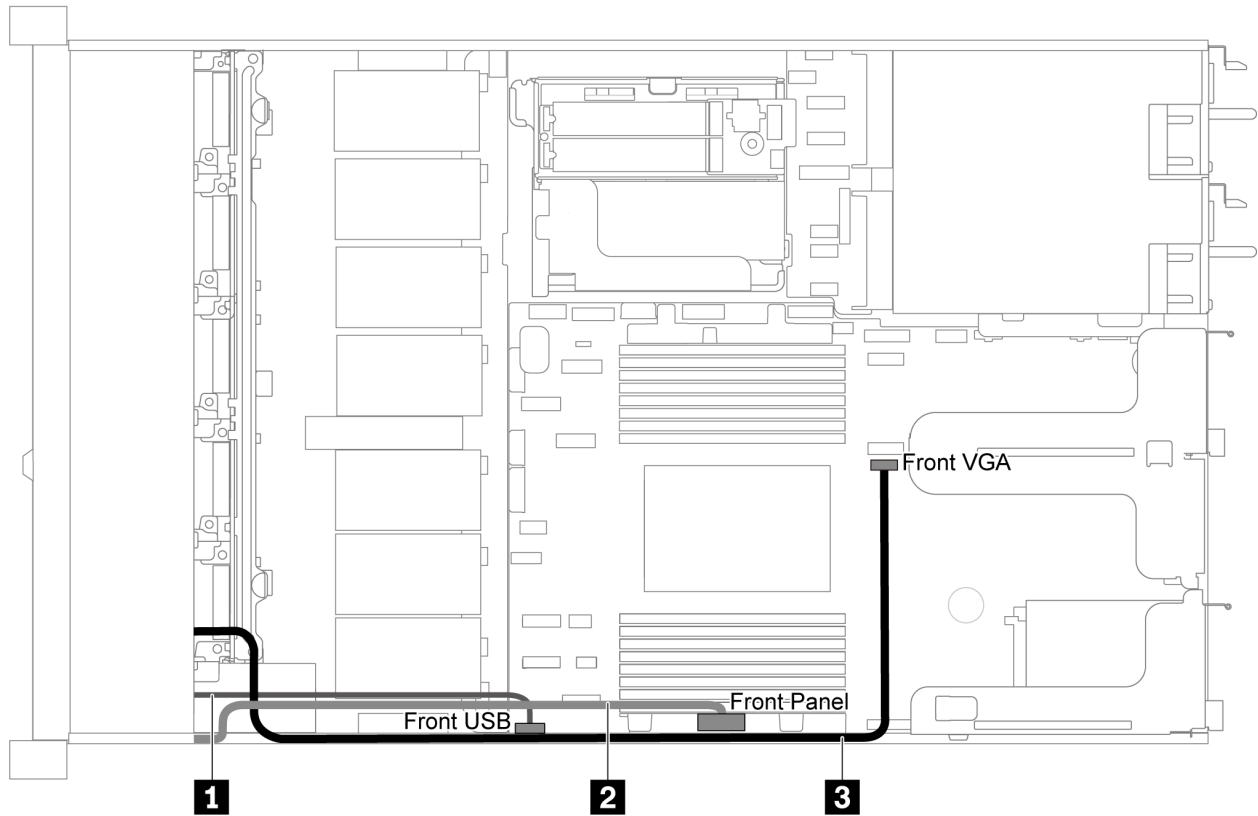


Figure 59. VGA/USB/Front panel connector cable routing for server model with eight/ten 2.5-inch drive bays

Cable	To
1 USB cable from the front of server	Front USB connector on the system board
2 Front panel cable from the front of server	Front Panel connector on the system board
3 VGA cable from the front of server	Front VGA connector on the system board

System board LEDs

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

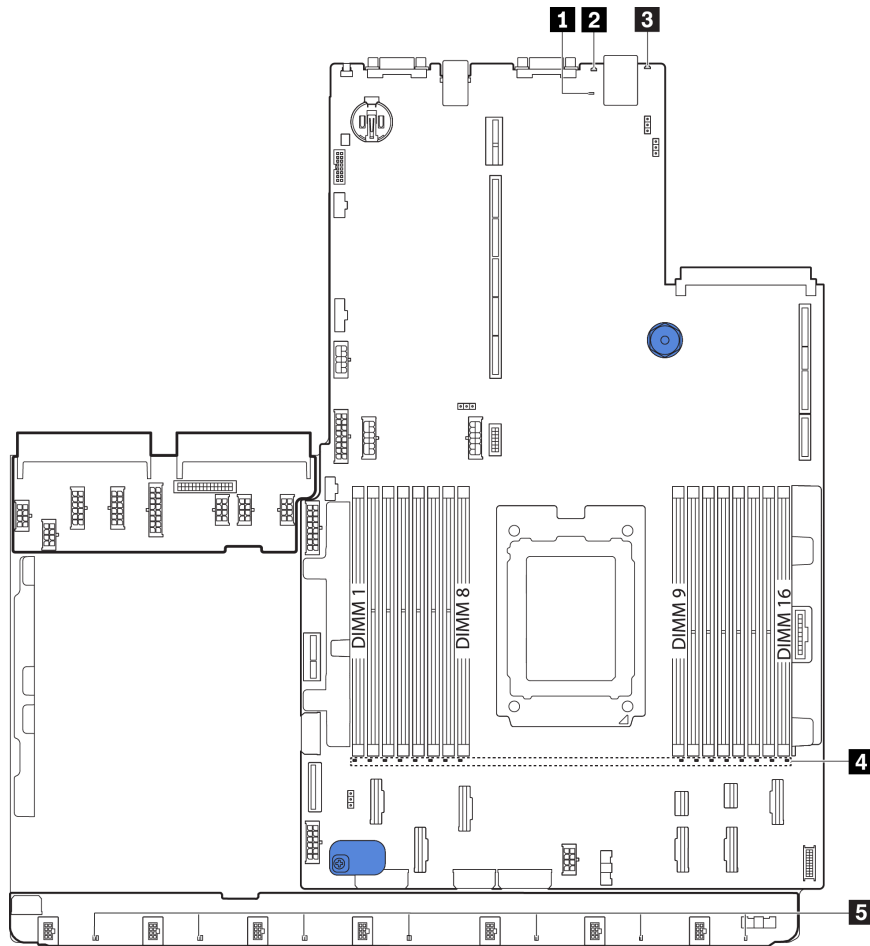


Figure 60. System board LEDs

Table 11. LEDs on the system board

Callout	Callout
1 BMC heart beat LED	2 System ID LED
3 System error LED	4 DIMM error LEDs (16)
5 Fan error LEDs (7)	

1 BMC heart beat LED

The BMC heart beat LED helps you identify the BMC status.

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

2 System ID LED

The blue system ID LED helps you to 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 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 “Operator information panel” on page 13.

4 DIMM error LEDs

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

5 Fan error LEDs

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

System board jumpers

The following illustration shows the location of the jumpers on the system board of your server.

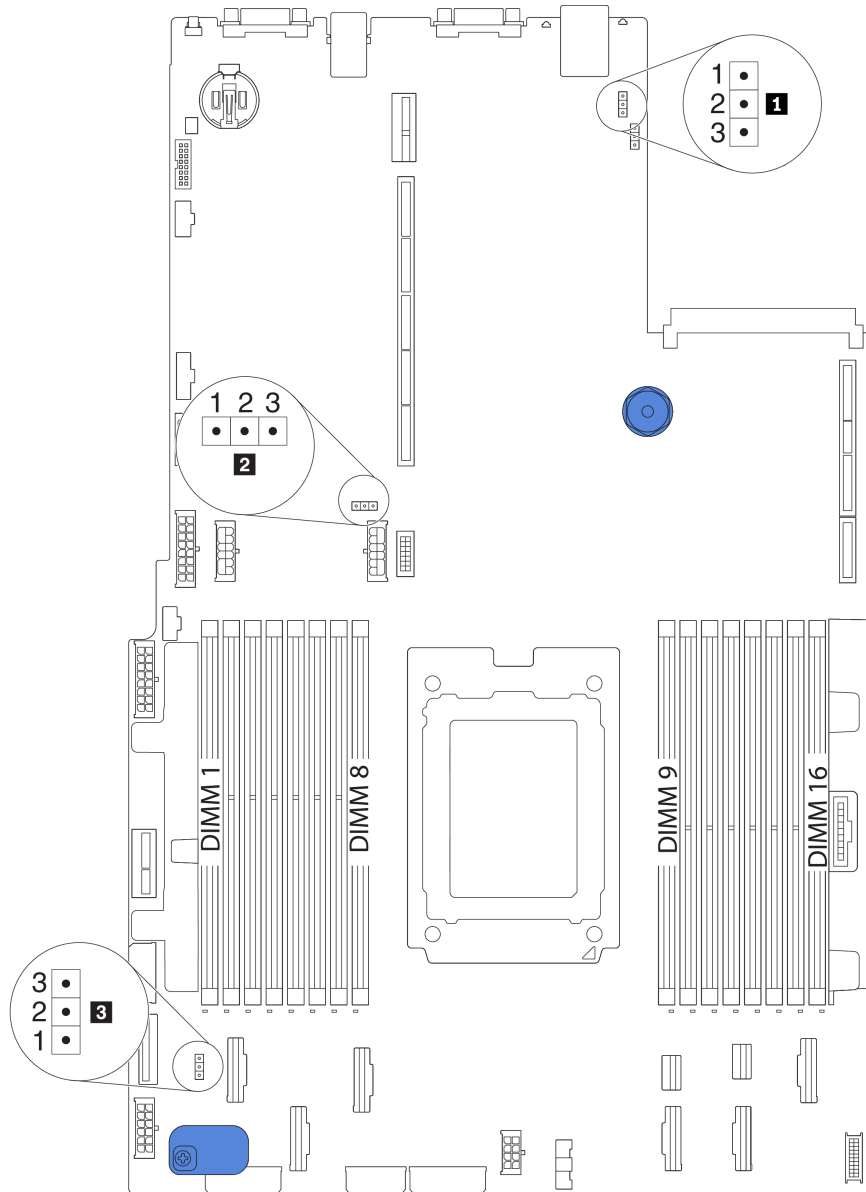


Figure 61. System board jumpers

Table 12. Jumper description

Jumper name	Jumper number	Jumper setting
1 TPM physical presence jumper	J10	<ul style="list-style-type: none"> Pins 1 and 2: The jumper is in default setting. Pins 2 and 3: TPM physical presence is asserted.
2 Clear CMOS jumper	J3	<ul style="list-style-type: none"> Pins 1 and 2: The jumper is in default setting. Pins 2 and 3: Clear CMOS settings.
3 Clear password jumper	J6	<ul style="list-style-type: none"> Pins 1 and 2: The jumper is in default setting. Pins 2 and 3: Clear the power-on password.

Important:

- Before you move any jumpers, turn off the server; then, disconnect all power cords and external cables. Do not open your server or attempt any repair before reading and understanding the following information:
 - http://thinksystem.lenovofiles.com/help/topic/safety_documentation/pdf_files.html
 - “Handling static-sensitive devices” on page 77
 - Any system-board switch or jumper block that is not shown in the illustrations in this document are reserved.
-

Parts list

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

For more information about ordering the parts shown in Figure 62 “Server components” on page 70:

<http://datacentersupport.lenovo.com/us/en/products/servers/thinksystem/sr635/7y98/parts>

Note: Depending on the model, your server might look slightly different from the illustration.

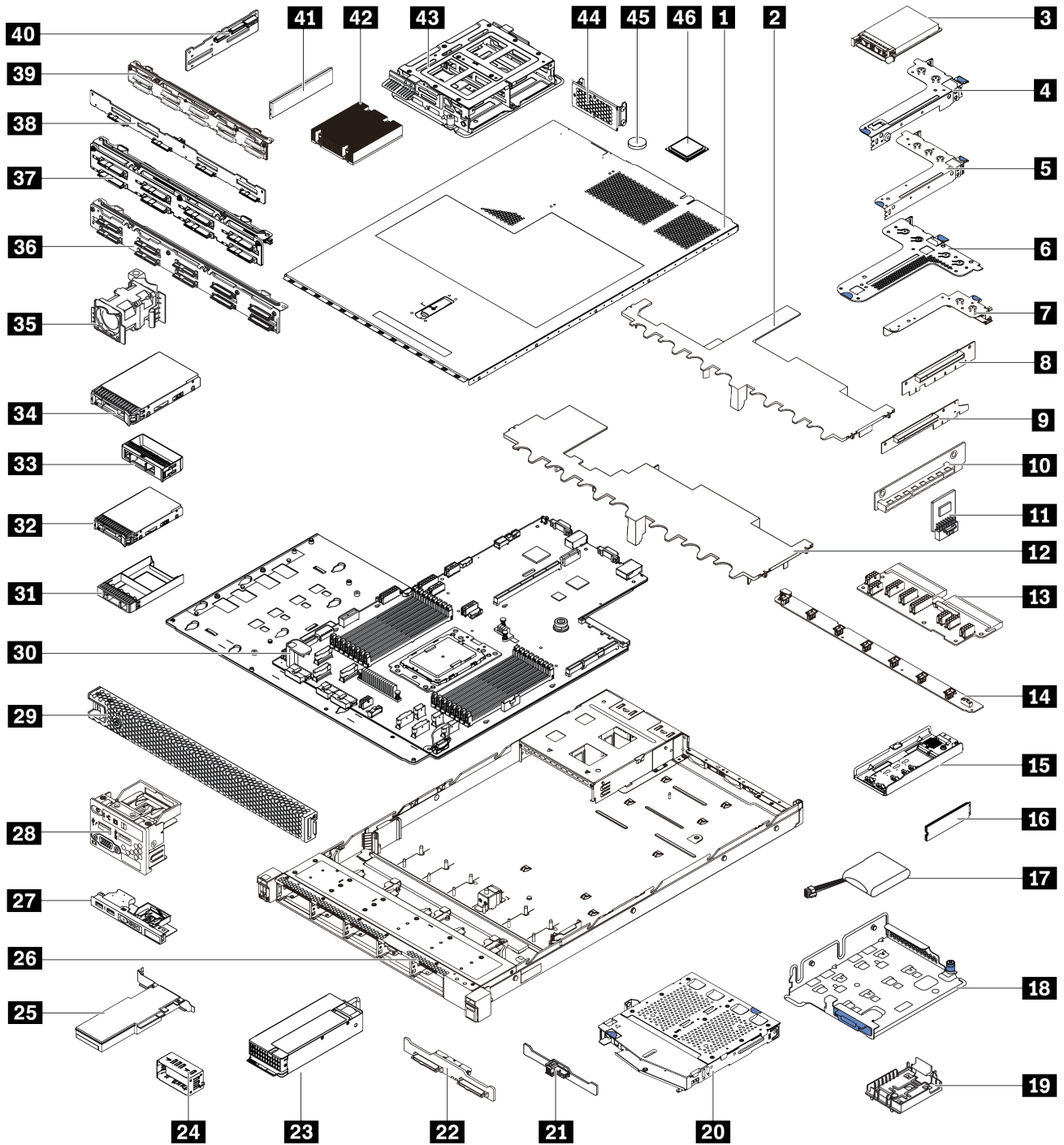


Figure 62. Server components

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

- **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.
- **Tier 2 customer replaceable unit:** 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.
- **Field replaceable unit (FRU):** FRUs must be installed only by trained service technicians.

- **Consumable and Structural parts:** Purchase and replacement of consumable and structural parts is your responsibility. If Lenovo acquires or installs a structural component at your request, you will be charged for the service.

Table 13. Parts listing

Index	Description	Tier 1 CRU	Tier 2 CRU	FRU	Consumable and Structural parts
For more information about ordering the parts shown in Figure 62 “Server components” on page 70: http://datacentersupport.lenovo.com/us/en/products/servers/thinksystem/sr635/7y98/parts					
1	Top cover	√			
2	Air baffle for middle drive cage				√
3	OCP 3.0 Ethernet adapter	√			
4	Riser bracket (low profile)	√			
5	Riser bracket (full-height, full-length)	√			
6	Riser bracket (low profile + low profile)	√			
7	Internal riser bracket (low profile)	√			
8 9 10	Riser card	√			
11	TPM adapter			√	
12	Standard air baffle				√
13	PIB board			√	
14	Fan board			√	
15	M.2 adapter module	√			
16	M.2 drive	√			
17	RAID super capacitor	√			
18	M.2/riser support bracket	√			
19	RAID super capacitor holder	√			
20	Rear hot-swap drive cage	√			
21	Rear SAS/SATA backplane	√			
22	Rear NVMe backplane	√			
23	Power supply	√			
24	Power supply filler	√			
25	PCIe adapter	√			
26	Chassis			√	
27	Front I/O assembly, server models with four 3.5-inch drive bays	√			
28	Front I/O assembly, server models with eight or ten 2.5-inch drive bays	√			

Table 13. Parts listing (continued)

Index	Description	Tier 1 CRU	Tier 2 CRU	FRU	Consumable and Structural parts
29	Security bezel	√			
30	System board			√	
31	Filler, 2.5-inch drive				√
32	Storage drive, 2.5-inch, hot-swap	√			
33	Filler, 3.5-inch drive				√
34	Storage drive, 3.5-inch, hot-swap	√			
35	System fan	√			
36	Backplane, ten 2.5-inch hot-swap drives	√			
37	Backplane, eight 2.5-inch hot-swap drives	√			
38	Backplane, four 3.5-inch hot-swap drives	√			
39	Backplane, ten 2.5-inch AnyBay hot-swap drives	√			
40	Middle backplane, four 2.5-inch hot-swap drives	√			
41	Memory module	√			
42	Heat sink			√	
43	Internal drive cage, four 2.5-inch hot-swap drives				√
44	Rear wall bracket				√
45	CMOS battery	√			
46	Processor			√	

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. Hardware replacement procedures

This section provides installation and removal procedures for all serviceable system components. Each component replacement procedure references any tasks that need to be performed to gain access to the component being replaced.

For more information about ordering parts, go to:

<http://datacentersupport.lenovo.com/us/en/products/servers/thinksystem/sr635/7y98/parts>

Note: If you replace a part, such as an adapter, that contains firmware, you might also need to update the firmware for that part. For more information about updating firmware, see “Firmware updates” on page 6.

Installation Guidelines

Before installing components in your server, read the installation guidelines.

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 that you work safely.
 - A complete list of safety information for all products is available at:
http://thinksystem.lenovofiles.com/help/topic/safety_documentation/pdf_files.html
 - The following guidelines are available as well: “Handling static-sensitive devices” on page 77 and “Working inside the server with the power on” on page 76.
- Make sure the components that you are installing are supported.
- Make sure the components you are installing are supported by the server. For a list of supported optional components for the server, see <http://www.lenovo.com/us/en/serverproven/>.
- 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 SR635 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 that the latest level of code is supported for the cluster solution 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.
- 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.

System reliability guidelines

Review the system reliability guidelines to ensure proper system cooling and reliability.

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 since 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.
- Processor socket must contain either a socket cover or a processor with heat sink.

Working inside the server with the power on

You might need to keep the power on with the server cover removed to look at system information about the display panel or to replace hot-swap components. Review these guidelines before doing so.

Attention: The server might stop and loss of data 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 long 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

Review these guidelines before you handle static-sensitive devices to reduce the possibility of damage from electrostatic discharge.

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.

Technical rules

Refer to the below technical rules and limitations when you install the related server components.

Technical rules for CPU and heat sink

The following are installation rules to install the CPU:

- If the CPU TDP is 120W or 155W, select 1U standard heat sink.
- If the CPU TDP is 180W, 200W, or 225W, select 1U high-performance heat sink.

Technical rules for power supply

The following table lists the technical rules between processor TDP and GPU adapters for different configurations with different types of power supply.

- For 750-watt power supply:

Configuration	Maximum GPU	Processor TDP
4 x 3.5-inch front drive bays	2	120/155/180/200 watts
	3	120 watts
8 x 2.5-inch front drive bays	2	120/155/180/200 watts
8 x 2.5-inch front drive bays (6 drives + 2 vacant drive bays)	3	120 watts
6 x 2.5-inch front drive bays + 4 x 2.5-inch AnyBay front drive bays	1	120/155/180/200 watts
	2	120 watts
6 x 2.5-inch front drive bays + 4 x 2.5-inch AnyBay front drive bays (vacant)	3	120 watts
10 x 2.5-inch AnyBay front drive bays	1	120 watts
10 x 2.5-inch AnyBay front drive bays (6 drives + 4 vacant drive bays)	2	120 watts
4 x 3.5-inch chassis without front drives	2	120/155/180/200 watts
	3	120 watts
10 x 2.5-inch chassis without front drives	1	120 watts

- For 1100-watt power supply:

Configuration	Maximum GPU	Processor TDP
4 x 3.5-inch front drive bays	2	120/155/180/200 watts
	3	120 watts
8 x 2.5-inch front drive bays	2	120/155/180/200 watts
8 x 2.5-inch front drive bays (6 drives + 2 vacant drive bays)	3	120 watts
6 x 2.5-inch front drive bays + 4 x 2.5-inch AnyBay front drive bays	2	120/155/180/200 watts
6 x 2.5-inch front drive bays + 4 x 2.5-inch AnyBay front drive bays (vacant)	3	120 watts
10 x 2.5-inch AnyBay front drive bays	2	120/155/180/200 watts
10 x 2.5-inch AnyBay front drive bays (6 drives + 4 vacant drive bays)	3	120 watts
4 x 3.5-inch chassis without front drives	2	120/155/180/200 watts
	3	120 watts
10 x 2.5-inch chassis without front drives	2	120/155/180/200 watts

The following table is the technical rules for processor TDP and the supported configurations with different types of power supply.

- For 550 watts power supply:

Only server model with 4 x 3.5-inch front drive bays is supported. The processor TDP is 120/155 watts.

- For 750-watt power supply:

Supported configuration	Processor TDP
4 x 3.5-inch front drive bays	120/155/180/200/225 watts
4 x 3.5-inch front drive bays + middle NVMe drives	120/155/180/200/225 watts
4 x 3.5-inch front drive bays + rear SAS/SATA/NVMe drives	120/155 watts
8 x 2.5-inch front drive bays	120/155/180/200/225 watts
8 x 2.5-inch front drive bays + rear SAS/SATA/NVMe drives	120/155 watts
6 x 2.5-inch front drive bays + 4 x 2.5-inch AnyBay front drive bays	120/155/180/200 watts
6 x 2.5-inch front drive bays + 4 x 2.5-inch AnyBay front drive bays + rear SAS/SATA/NVMe drives	120/155 watts
10 x 2.5-inch AnyBay front drive bays	120/155 watts
10 x 2.5-inch AnyBay front drive bays + rear SAS/SATA/NVMe drives	120 watts
4 x 3.5-inch chassis without front drives and without GPU installed	120/155/180/200/225 watts
10 x 2.5-inch chassis without front drives and without GPU installed	120/155 watts

- For 1100-watt power supply:

Supported configuration	Processor TDP
4 x 3.5-inch front drive bays	120/155/180/200/225 watts
4 x 3.5-inch front drive bays + middle NVMe drives	120/155/180/200/225 watts
4 x 3.5-inch front drive bays + rear SAS/SATA/NVMe drives	120/155 watts
8 x 2.5-inch front drive bays	120/155/180/200 watts
8 x 2.5-inch front drive bays + rear SAS/SATA/NVMe drives	120/155 watts
6 x 2.5-inch front drive bays + 4 x 2.5-inch AnyBay front drive bays	120/155/180/200/225 watts
6 x 2.5-inch front drive bays + 4 x 2.5-inch AnyBay front drive bays + rear SAS/SATA/NVMe drives	120/155 watts
10 x 2.5-inch AnyBay front drive bays	120/155/180/200/225 watts
10 x 2.5-inch AnyBay front drive bays + rear SAS/SATA/NVMe drives	120/155 watts
10 x 2.5-inch AnyBay front drive bays + rear SAS/SATA/NVMe drives + middle NVMe drives	120/155 watts
10 x 2.5-inch AnyBay front drive bays + middle NVMe drives	120/155/180/200/225 watts

Supported configuration	Processor TDP
10 x 2.5-inch chassis without front drives and without GPU installed	120/155/180/200/225 watts
4 x 3.5-inch chassis without front drives and without GPU installed	120/155/180/200/225 watts

Technical rules for system fans

Note: 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.

Follow the following rules for system fan selection:

- Standard fans are selected when no GPU adapter, rear drive cage, or middle drive cage installed and the processor TDP is 120 watts or 155 watts.
- Performance fans are selected when GPU adapter, rear drive cage, or middle drive cage installed, or the processor TDP is 180 watts, 200 watts or 225 watts.
- Fan 1 is optional if there is no M.2 drive, internal PCIe adapter, middle drive cage, rear drive cage or GPU adapter installed. However, if there is no fan 1 installed, you must keep the location for fan 1 occupied by a fan filler to ensure proper airflow.

Technical rules for GPU adapters

The following are installation rules to install the GPU:

- PCIe slot priority to install the GPU: PCIe slot 1, PCIe slot 3, PCIe slot 2
- High-performance fan must be selected.
- Internal drive assembly and rear drive cage are not supported.
- PCIe SSD adapter is not supported.
- The TDP for supported CPU is up to 200 watts.
- A maximum of six hot-swap drives can be installed. The installation order for the drive bay is 0-5.
- The following table is the technical rules between GPU adapters and processor TDP for different configurations.

Supported configuration for drives in front backplane	Maximum GPU adapters	Processor TDP	Supported ambient temperature
<ul style="list-style-type: none"> – 4 x 3.5-inch SAS/SATA – 8 x 2.5-inch SAS/SATA – 6 x 2.5-inch SAS/SATA + 4 x 2.5-inch AnyBay – 10 x 2.5-inch AnyBay 	2	120 watts	up to 35°C
<ul style="list-style-type: none"> – 4 x 3.5-inch SAS/SATA – 8 x 2.5-inch SAS/SATA – 6 x 2.5-inch SAS/SATA + 4 x 2.5-inch AnyBay – 10 x 2.5-inch AnyBay 	2	120/155/180/200 watts	up to 30°C
<ul style="list-style-type: none"> – 4 x 3.5-inch SAS/SATA – 6 x 2.5-inch SAS/SATA + 2 vacant drive bays – 6 x 2.5-inch AnyBay + 4 vacant drive bays 	3	120 watts	up to 30°C

Technical rules for drives

The following notes describe the type of drives that your server supports and other information that you must consider when you install a drive.

- Depending on your server models, your server supports the following types of drives:
 - SAS/SATA HDD
 - SAS/SATA SSD
 - NVMe SSD

For a list of supported drives, see:

<http://www.lenovo.com/us/en/serverproven/>

- The drive bays are numbered to indicate the installation order (starting from number “0”). Follow the installation order when you install a drive. See “Front view” on page 11.
- You can mix drives of different types and different capacities in one system, but not in one RAID array. The following priorities are recommended:
 - Drive type priority: NVMe SSD, SAS SSD, SATA SSD, SAS HDD, SATA HDD
 - Drive capacity priority: the lowest capacity first
- The drives in a single RAID array must be the same type, same size, and same capacity.
- If you select 12 or 14 TB 3.5-inch SAS/SATA drives, only standard fan is supported.
- For middle drive cage:
 - Only 7mm NVMe drives are supported.
 - High-performance fan should be selected, and the supported ambient temperature is up to 30°C.
- For rear drive cage:
 - 7mm NVMe drives and SAS/SATA drives are supported.
 - High-performance fan should be selected, and the supported ambient temperature is up to 30°C.

- Supported processor TDP is 120/155 watts.

Technical rules for HBA/RAID adapters

The following are installation rules to install HBA/RAID adapters:

- If you plan to use the RAID 530-8i adapter in the server, it must have firmware 50.3.0-1032 or later applied before it can be used in the server. If the adapter you plan to use has older firmware, it must first be upgraded by installing it in a supported server and upgrading the firmware there. For more information, see <https://datacentersupport.lenovo.com/us/zh/solutions/ht509177>.
- If a 730-8i 2G, 930-8i, 930-16i, 930-8e or 930-16e RAID adapter is installed, a super capacitor must be installed.
- 730-8i 2G RAID adapter cannot be mixed with other types of HBA/RAID adapters.
- 730-8i 1G RAID adapter cannot be mixed with 530-8i, 730-8i 2G, or 930-8i RAID adapter.
- When a 730-8i 1G or 530-8i RAID adapter installed, no super capacitor is supported.
- HBA adapter cannot be mixed with RAID adapter. However, for the configuration of eight 2.5 SAS/SATA drives in front bays and two 2.5 SAS/SATA drives in rear bays, you can select 530-8i RAID adapter for front drives and 430-8i for rear drives.
- For PCIe SSD adapter:
 - Only high-performance fan can be installed.
 - The TDP for supported processor is 120/155 watts.

Technical rules for PCIe NVMe adapter

The following notes describe the type of PCIe adapters that your server supports and other information that you must consider when you install a PCIe adapter.

- For PCIe NVMe adapter:
 - Three PCIe NVMe adapters can be supported and installed in PCIe slot 1, 2, and 3.
 - High-performance fan should be selected, and the supported ambient temperature is up to 35°C.
 - Supported processor TDP is 120/155 watts.

Top cover replacement

Use this information to remove and install the top cover.

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

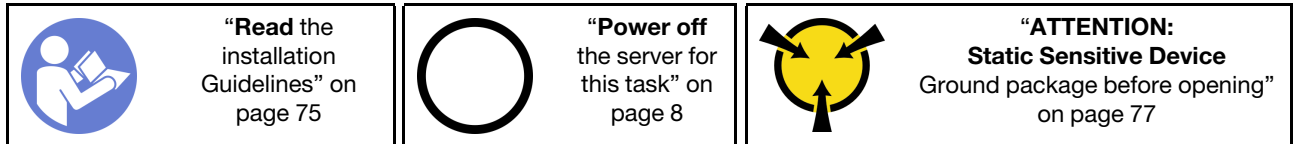


CAUTION:

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

Remove the top cover

Use this information to remove the top cover.



Note: You can remove or install a hot-swap fan without powering off the server, which helps you avoid significant interruption to the operation of the system.

To remove the top cover, complete the following steps:

Watch the procedure. A video of the removal process is available:

- Youtube: <https://www.youtube.com/playlist?list=PLYV5R7hVcs-DTDY1ImpIPpJV0zo7dKq14>
- Youku: http://list.youku.com/albumlist/show/id_52222446.html

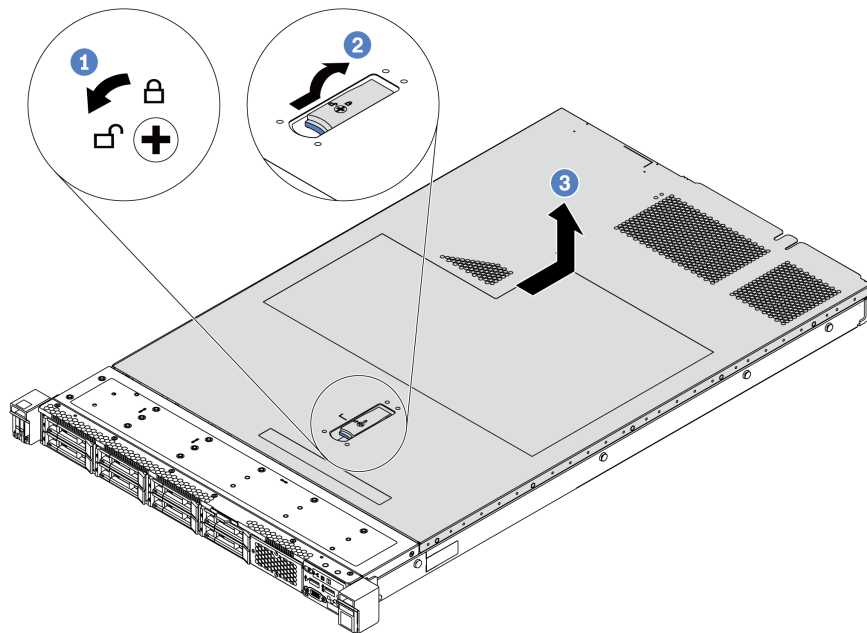


Figure 63. Top cover removal

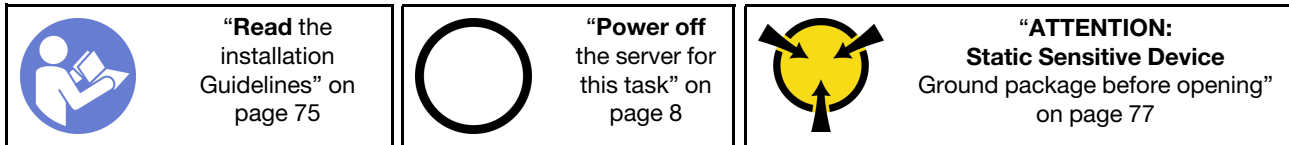
- Step 1. Use a screwdriver to turn the cover lock to the unlocked position as shown.
- Step 2. Press the release button on the cover latch and then fully open the cover latch.
- Step 3. Slide the top cover to the rear of the server until it is disengaged from the chassis. Then, lift the top cover off the chassis and place it on a flat clean surface.

Attention:

- Handle the top cover carefully. Dropping the top cover with the cover latch open might damage the cover latch.
- For proper cooling and airflow, install the top cover before you power on the server.

Install the top cover

Use this information to install the top cover.



Before installing the top cover:

1. 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.
2. Ensure that all internal cables are correctly connected and routed. See “Internal cable routing” on page 21.
3. If you are installing a new top cover, attach the service label to the new top cover first if necessary.

Note: A new top cover comes without a service label attached. If you need a service label, order it together with the new top cover. The service label is free of charge.

To install the top cover, complete the following steps:

Watch the procedure. A video of the installation process is available:

- Youtube: <https://www.youtube.com/playlist?list=PLYV5R7hVcs-DTDY1ImpIPpJVOzo7dKq14>
- Youku: http://list.youku.com/albumlist/show/id_52222446.html

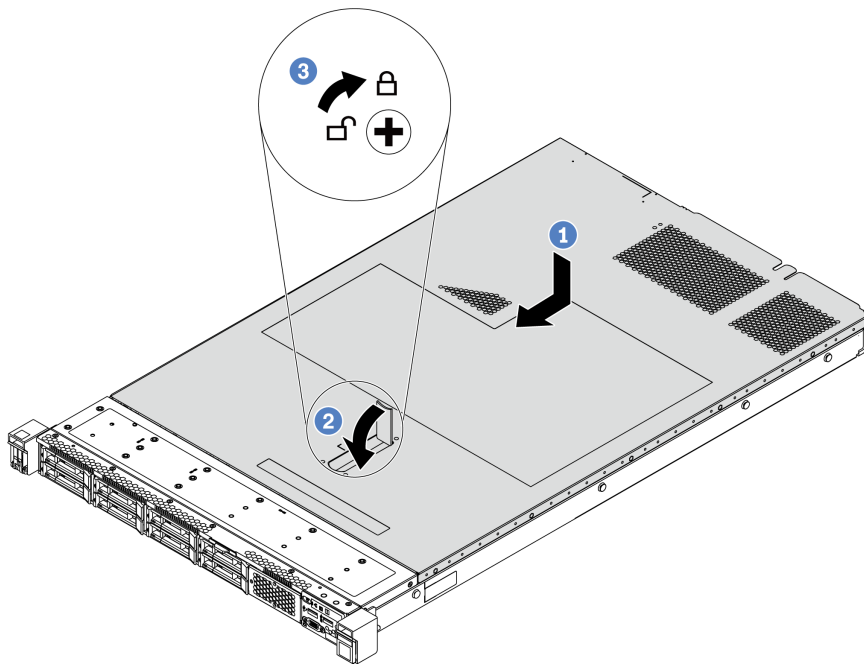


Figure 64. Top cover installation

Step 1. 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 with 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.

Step 2. Pivot the cover latch until the top cover snaps into position. Ensure that the cover latch is completely closed.

Step 3. Use a screwdriver to turn the cover lock to the locked position.

After installing the top cover, complete the parts replacement. See “Complete the parts replacement” on page 189.

Air baffle replacement

Use this information to remove and install the air baffle.

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



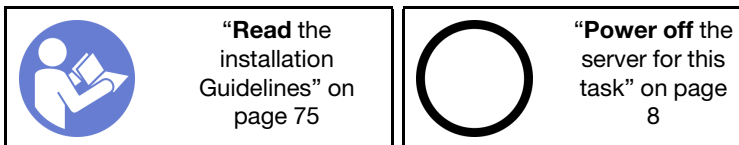
CAUTION:

Hazardous moving fan blades nearby.

Note: Air baffle is not available for some server models.

Remove the air baffle

Use this information to remove the air baffle.



Note: Depending on the model, your server might not have an air baffle installed.

Before removing the air baffle:

1. Remove the top cover. See “Remove the top cover” on page 83.

2. If there is a RAID super capacitor module installed on the bottom of the air baffle, disconnect the RAID super capacitor module cable first.

To remove the air baffle, complete the following step:

Watch the procedure. A video of the removal process is available:

- Youtube: <https://www.youtube.com/playlist?list=PLYV5R7hVcs-DTDY1ImpIPpJV0zo7dKq14>
- Youku: http://list.youku.com/albumlist/show/id_52222446.html

Note: The air baffle you want to remove might be different from the following illustrations, but the removal method is the same.

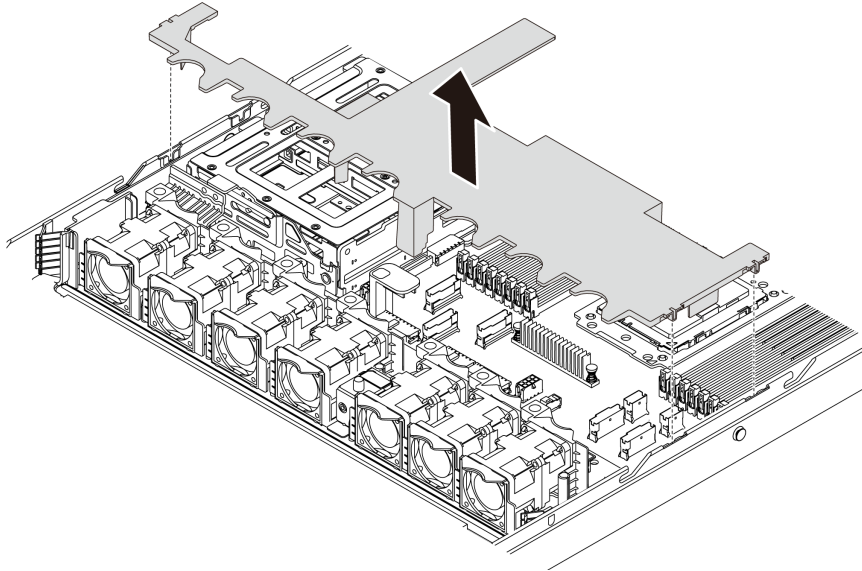


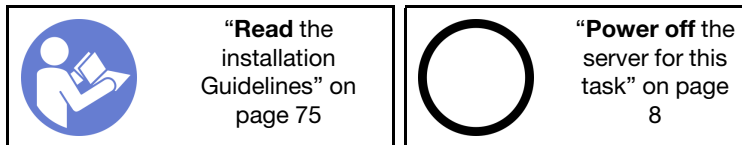
Figure 65. Air baffle removal

Step 1. Grasp the air baffle and carefully lift it out of the server.

Attention: For proper cooling and airflow, install the air baffle before you power on the server. Operating the server with the air baffle removed might damage server components.

Install the air baffle

Use this information to install the air baffle.



To install the air baffle, complete the following steps:

Watch the procedure. A video of the installation process is available:

- Youtube: <https://www.youtube.com/playlist?list=PLYV5R7hVcs-DTDY1ImpIPpJV0zo7dKq14>
- Youku: http://list.youku.com/albumlist/show/id_52222446.html

Note: The air baffle you want to install might be different from the following illustrations, but the installation method is the same.

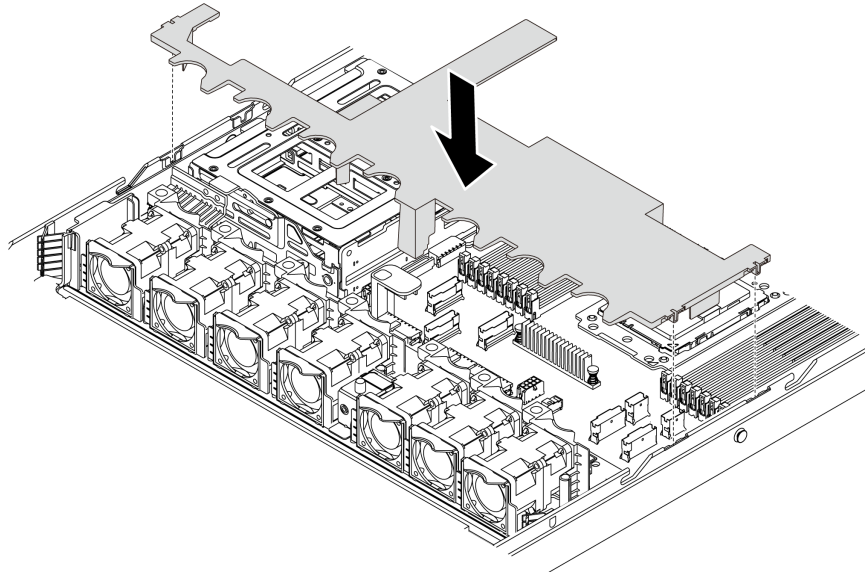


Figure 66. Air baffle installation

- Step 1. Align the tabs on both sides of the air baffle with the corresponding slots on both sides of the chassis.
- Step 2. Lower the air baffle into the chassis and press the air baffle down until it is securely seated.

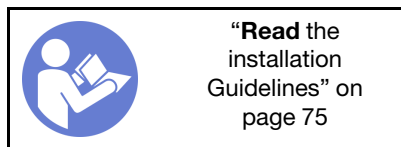
After installing the air baffle, complete the parts replacement. See “Complete the parts replacement” on page 189.

Rack latches replacement

Use this information to remove and install the rack latches.

Remove the rack latches

Use this information to remove the rack latches.



Before removing the rack latches:

1. If the server is installed with the security bezel, remove it first. See “Remove the security bezel” on page 91.
2. Use a flat-blade screwdriver to remove the ID label plate on the right rack latch and place it in a safe place.

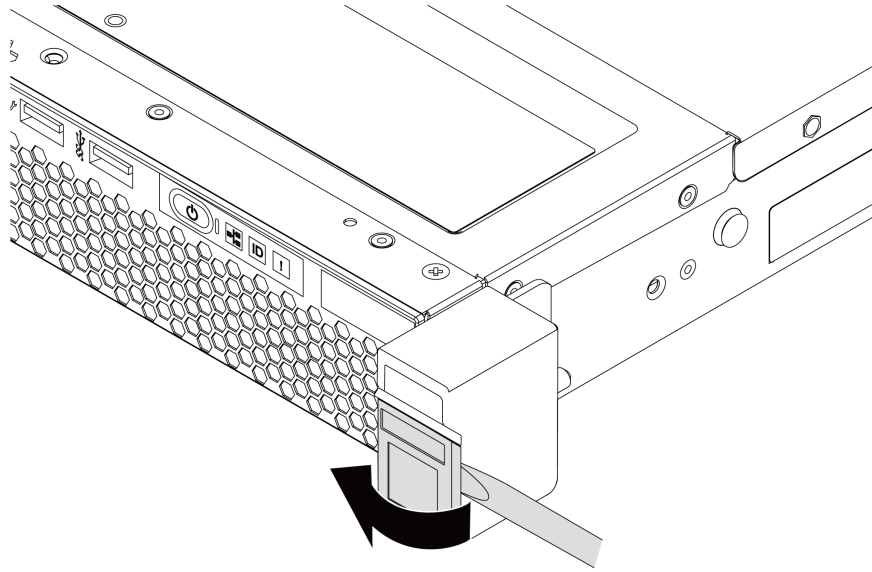


Figure 67. ID label plate removal

To remove the rack latches, complete the following steps:

Watch the procedure. A video of the removal process is available:

- Youtube: <https://www.youtube.com/playlist?list=PLYV5R7hVcs-DTDY1ImpIPpJVOzo7dKq14>
- Youku: http://list.youku.com/albumlist/show/id_52222446.html

Step 1. On each side of the server, remove the two screws that secure the rack latch.

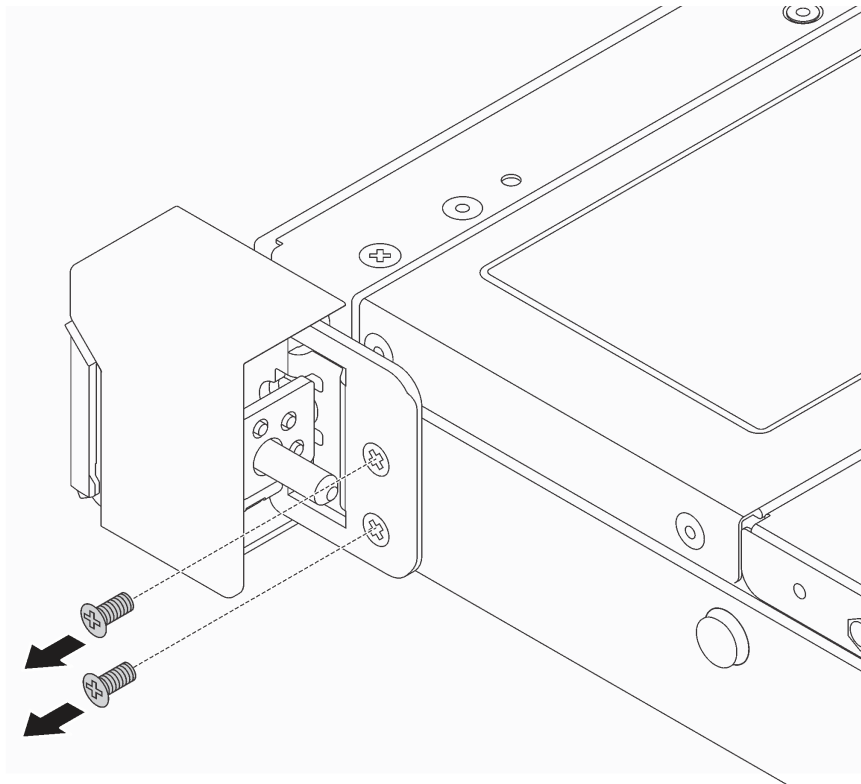


Figure 68. Rack latch screws removal

Step 2. On each side of the server, remove the rack latch from the chassis as shown.

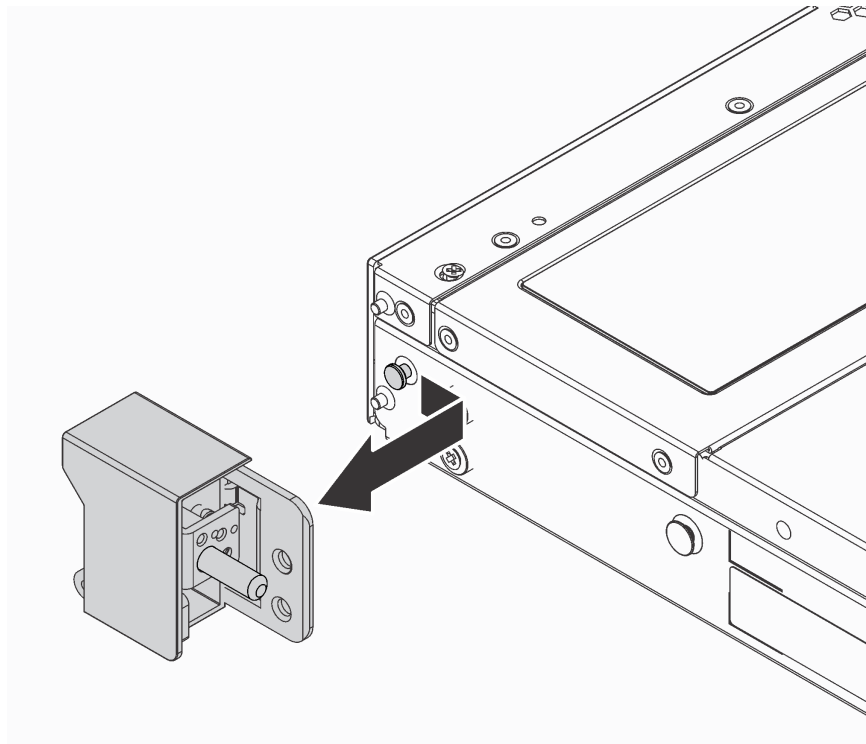
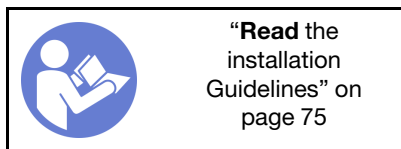


Figure 69. Rack latch removal

If you are instructed to return the old rack latches, follow all packaging instructions and use any packaging materials that are provided.

Install the rack latches

Use this information to install the rack latches.



To install the rack latches, complete the following steps:

Watch the procedure. A video of the installation process is available:

- Youtube: <https://www.youtube.com/playlist?list=PLYV5R7hVcs-DTDY1ImpIPpJV0zo7dKq14>
- Youku: http://list.youku.com/albumlist/show/id_52222446.html

Step 1. On each side of the server, align the rack latch with the pin on the chassis. Then, press the rack latch onto the chassis and slightly slide it forward as shown.

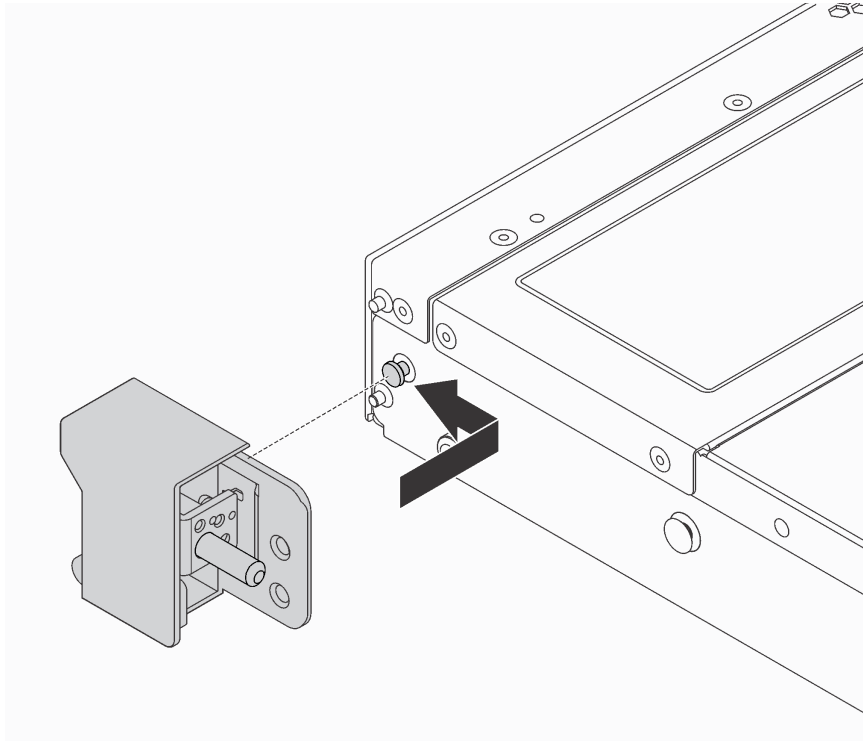


Figure 70. Rack latch installation

Step 2. Install the two screws to secure the rack latch on each side of the server.

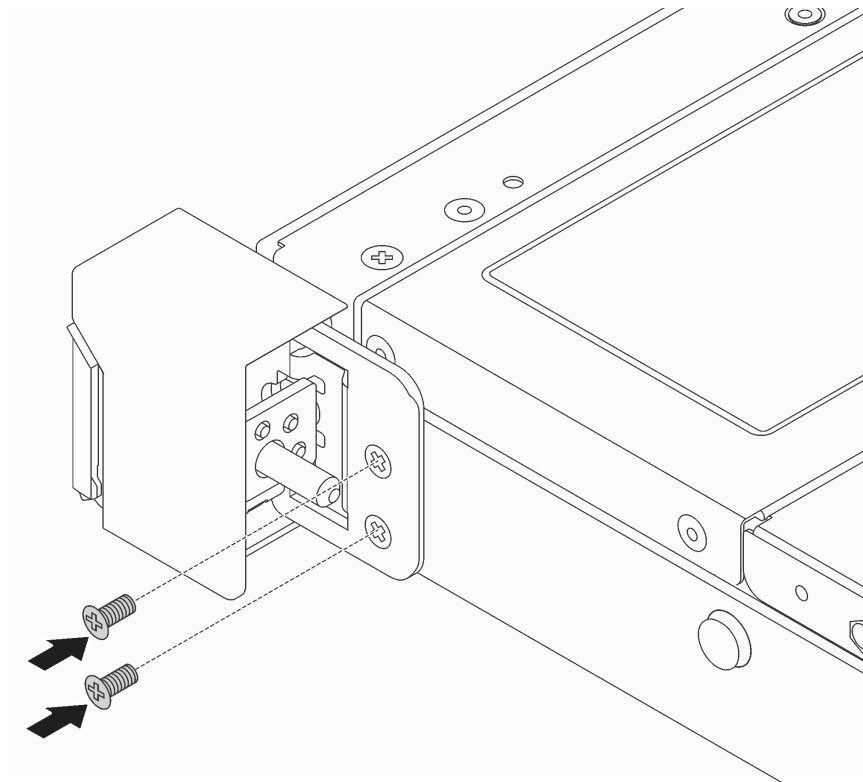


Figure 71. Rack latch screws installation

After installing the rack latches:

1. Install the ID label plate to the right rack latch as shown.

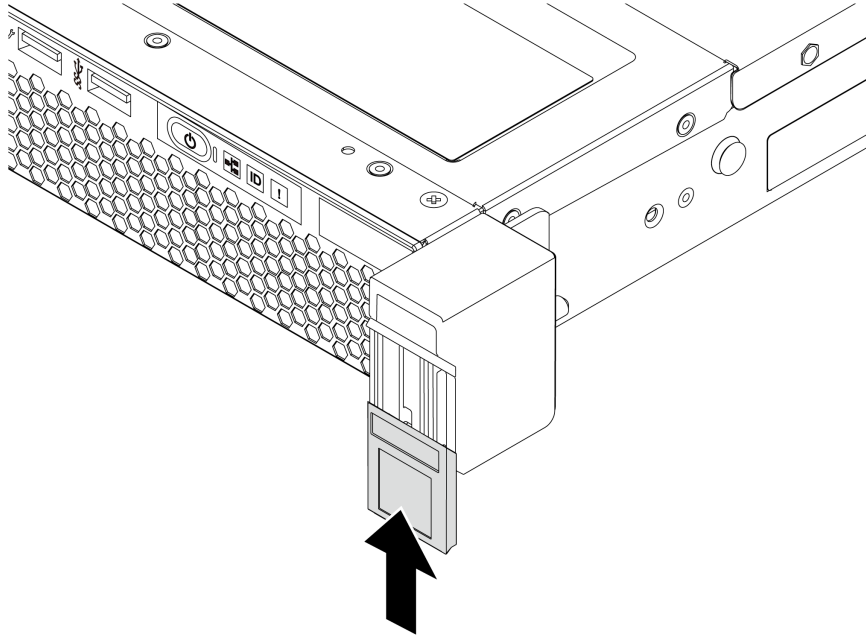


Figure 72. ID label plate installation

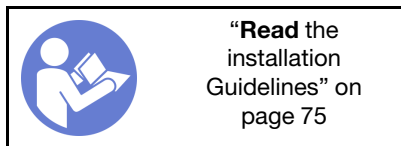
2. Complete the parts replacement. See “Complete the parts replacement” on page 189.

Security bezel replacement

Use this information to remove and install the security bezel.

Remove the security bezel

Use this information to remove the security bezel.



To remove the security bezel, complete the following steps:

Watch the procedure. A video of the removal process is available:

- Youtube: <https://www.youtube.com/playlist?list=PLYV5R7hVcs-DTDY1ImpIPpJV0zo7dKq14>
- Youku: http://list.youku.com/albumlist/show/id_52222446.html

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

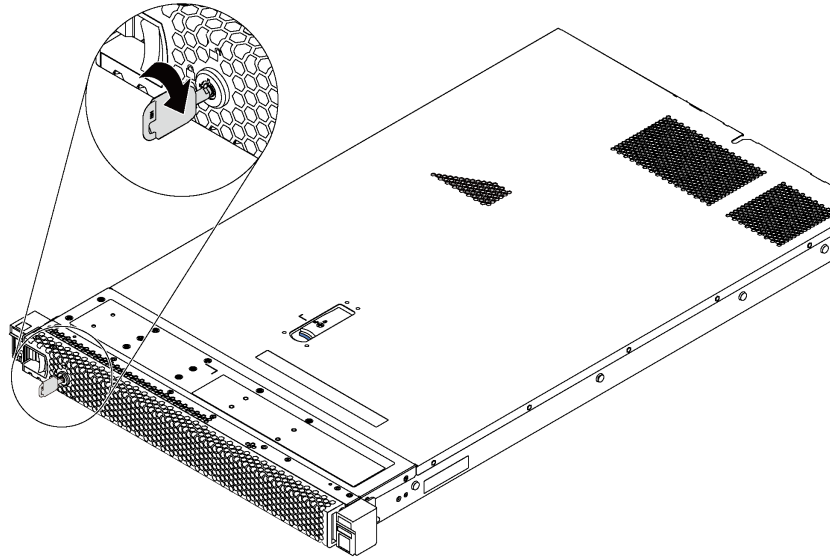


Figure 73. Security bezel unlock

Step 2. Press the blue release latch and pivot the security bezel outward to remove it from the chassis.

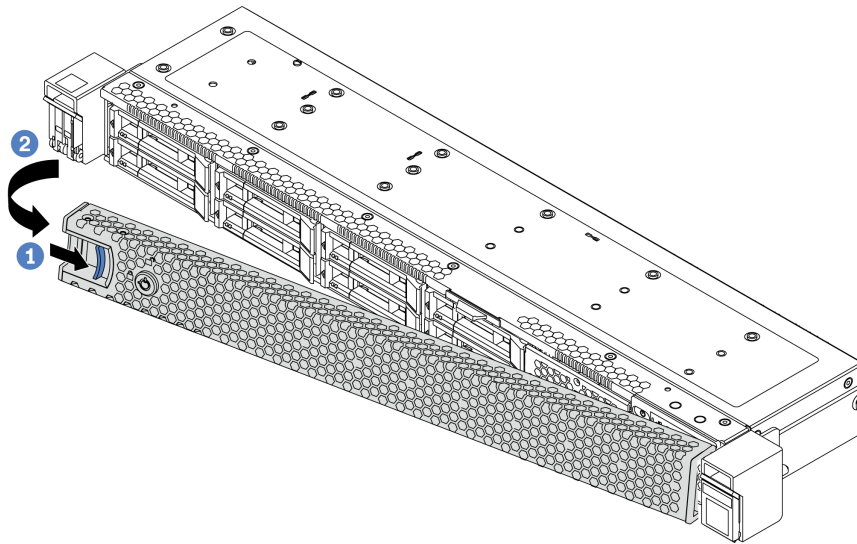
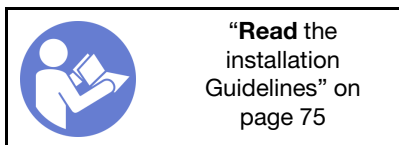


Figure 74. Security bezel removal

Attention: Before you ship the rack with the server installed, reinstall and lock the security bezel into place.

Install the security bezel

Use this information to install the security bezel.



Before installing the security bezel, if you have removed the rack latches, reinstall them. See “Install the rack latches” on page 89.

To install the security bezel, complete the following steps:

Attention: Before you ship the rack with the server installed, reinstall and lock the security bezel into place.

Watch the procedure. A video of the installation process is available:

- Youtube: <https://www.youtube.com/playlist?list=PLYV5R7hVcs-DTDY1ImpIPpJV0zo7dKq14>
- Youku: http://list.youku.com/albumlist/show/id_52222446.html

Step 1. If the key is held inside the security bezel, remove it out of the security bezel.

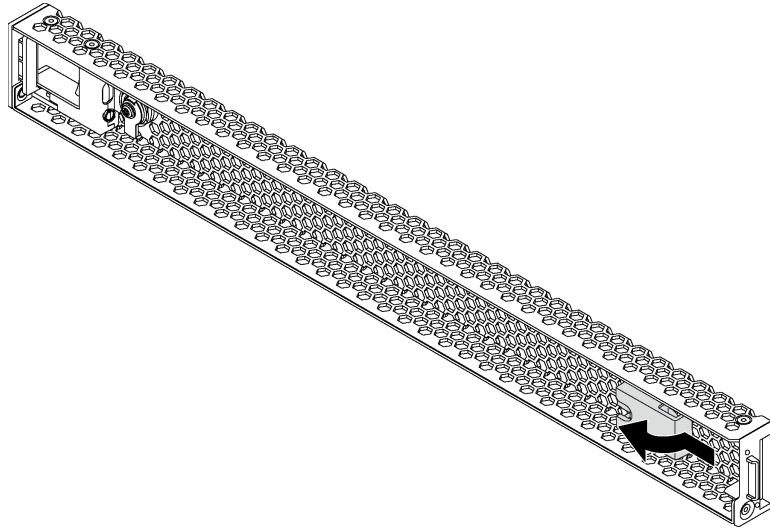


Figure 75. Key removal

Step 2. Insert the tab on the security bezel into the slot on the right side of the chassis. Then, press and hold the blue release latch and pivot the security bezel inward until it clicks into place.

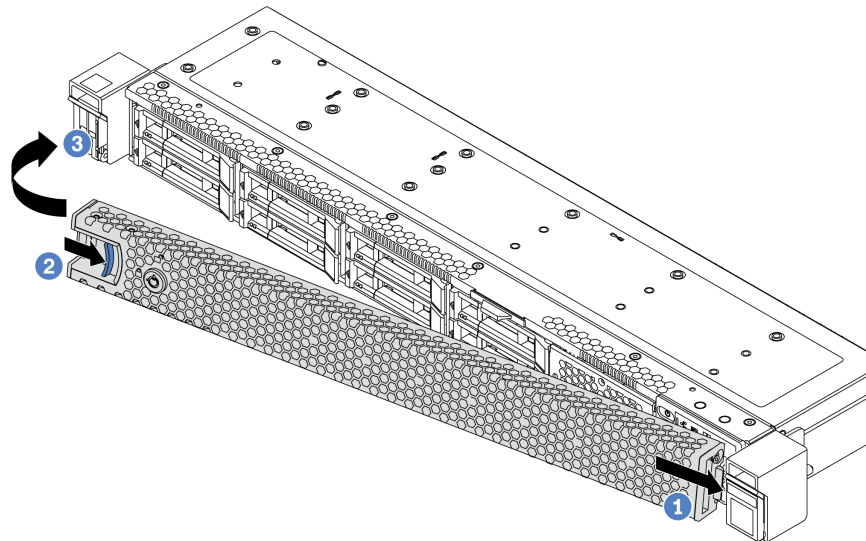


Figure 76. Security bezel installation

Step 3. Use the key to lock the security bezel.

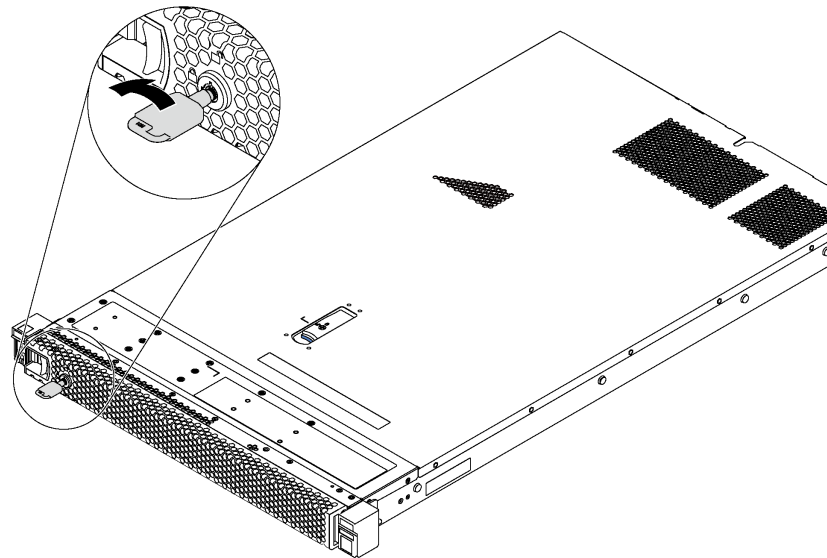


Figure 77. Security bezel lockup

System fan replacement

Use this information to remove and install a system fan.

Remove a system fan

Use this information to remove a system fan. You can remove a hot-swap fan without powering off the server, which helps you avoid significant interruption to the operation of the system.



“Read the installation Guidelines” on page 75



“ATTENTION: Static Sensitive Device Ground package before opening” on page 77

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.

Before removing a system fan, remove the top cover. See “Remove the top cover” on page 83.

To remove a system fan, complete the following step:

Watch the procedure. A video of the removal process is available:

- Youtube: <https://www.youtube.com/playlist?list=PLYV5R7hVcs-DTDY1ImpIPpJV0zo7dKq14>
- Youku: http://list.youku.com/albumlist/show/id_52222446.html

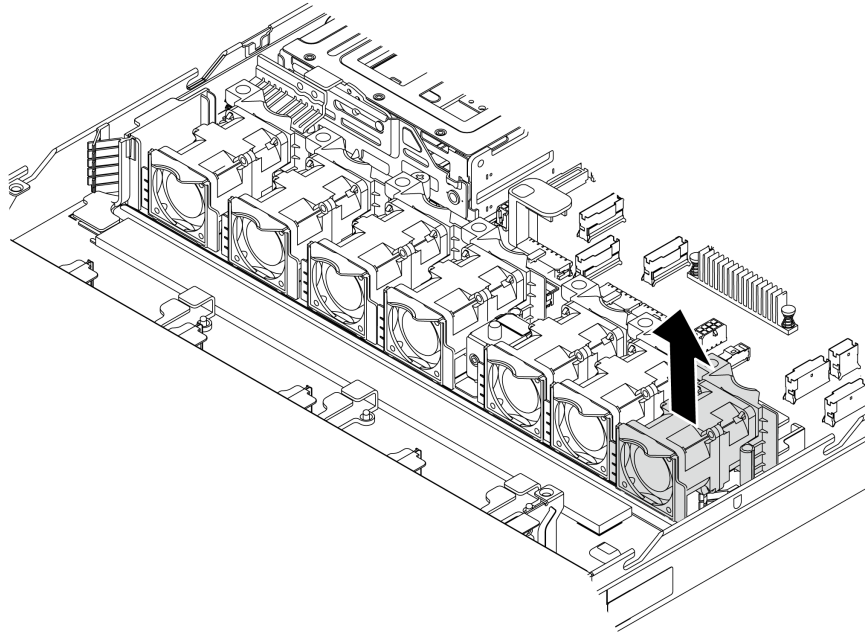


Figure 78. System fan removal



Step 1. Grasp the fan tabs on both ends of the system fan and carefully lift the system fan out of the server.

After removing the system fan:

- Install a new system fan. See “Install a system fan” on page 95.
- If you are instructed to return the old system fan, follow all packaging instructions and use any packaging materials that are provided.

Install a system fan

Use this information to install a system fan. You can install a hot-swap fan without powering off the server, which helps you avoid significant interruption to the operation of the system.

 <p>“Read the installation Guidelines” on page 75</p>	 <p>“ATTENTION: Static Sensitive Device Ground package before opening” on page 77</p>
--	--

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.

Before installing a system fan, 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.

See “Technical rules for system fans” on page 80 before you install system fans.

To install a system fan, complete the following steps:

Watch the procedure. A video of the installation process is available:

- Youtube: <https://www.youtube.com/playlist?list=PLYV5R7hVcs-DTDY1ImpIPpJV0zo7dKq14>
- Youku: http://list.youku.com/albumlist/show/id_52222446.html

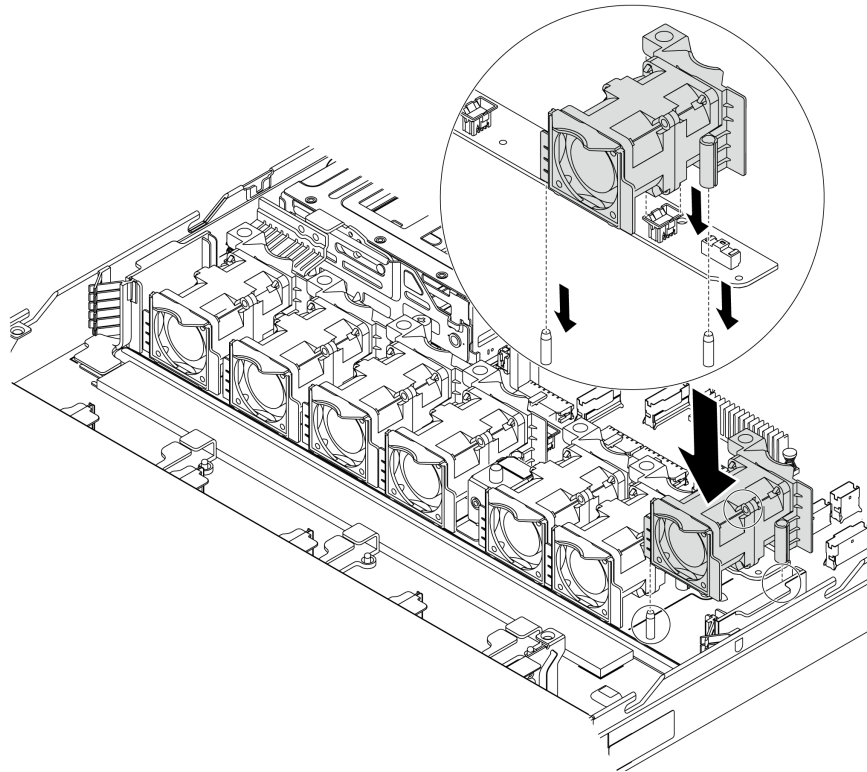


Figure 79. System fan installation

- Step 1. Align the two holes in the system fan with the two pins on the chassis.
- Step 2. Press the system fan down until it is seated correctly in the slot. Ensure that the fan connector is installed correctly to the connector on the system board.


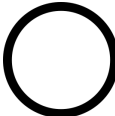

After installing the system fan, complete the parts replacement. See “Complete the parts replacement” on page 189.

Memory module replacement

Use this information to remove and install a memory module.

Remove a memory module

Use this information to remove a memory module.

 <p>“Read the installation Guidelines” on page 75</p>	 <p>“Power off the server for this task” on page 8</p>	 <p>“ATTENTION: Static Sensitive Device Ground package before opening” on page 77</p>
--	---	---

Attention:

- 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 77.

- 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 touch. 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.

Before removing a memory module:

1. Remove the top cover. See “Remove the top cover” on page 83.
2. If your server comes with an air baffle, remove it first. See “Remove the air baffle” on page 85.

Watch the procedure. A video of the removal process is available:

- Youtube: <https://www.youtube.com/playlist?list=PLYV5R7hVcs-DTDY1ImpIPpJVOzo7dKq14>
- Youku: http://list.youku.com/albumlist/show/id_52222446.html

To remove a memory module, complete the following steps:

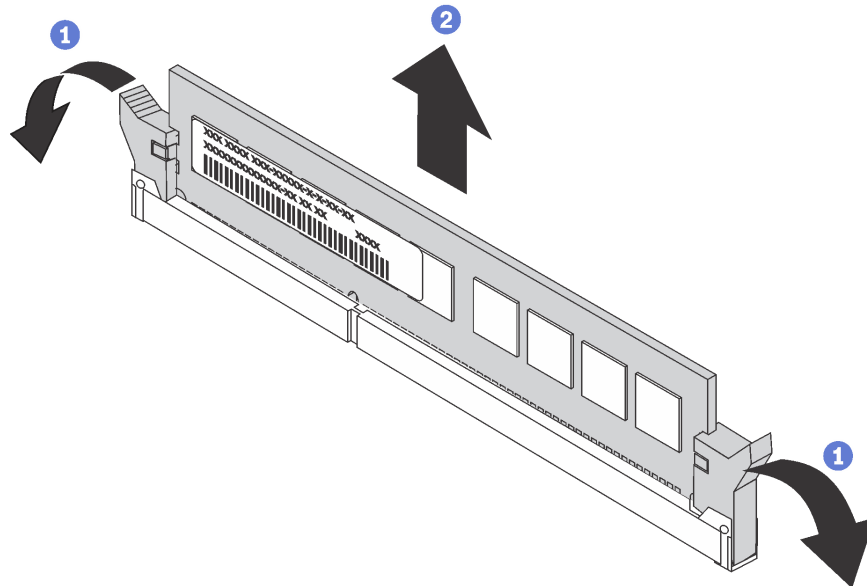


Figure 80. Memory module removal

Step 1. Open the retaining clips on each end of the memory module slot.

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

Step 2. Grasp the memory module at both ends and carefully lift it out of the slot.

After removing a memory module:

1. Install a memory module filler or a new memory module to cover the slot. See “Install a memory module” on page 101.
2. If you are instructed to return the old memory module, follow all packaging instructions and use any packaging materials that are provided.

Memory module installation rules

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

Your server has 16 memory slots and supports:

- Minimum: 8 GB
- Maximum: 1 TB
- Type (depending on the model):
 - TruDDR4 2933, single-rank or dual-rank, 8 GB/16 GB/32 GB/64 GB RDIMM
 - TruDDR4 3200, dual-rank, 16 GB/32 GB/64 GB RDIMM

For a list of supported memory options, see: <http://www.lenovo.com/us/en/serverproven/>

Follow the below rules when you install or replace a memory module:

- Memory modules in each channel must be the same type.
- Memory modules from different vendors are supported, but not in the same channel.
- Memory modules with different capacities (only two different capacities) are supported. Install the memory module that has the higher capacity first.
- Memory modules with different ranks are supported. Install the memory module with the highest rank first.
- Do not mix x4 and x8 DIMMs in the same channel.
- DIMMs of 3200 MHz and 2933 MHz are supported:
 - 2933 MHz DIMMs: operate at 2933 MHz for both 1 DIMM per channel and 2 DIMMs per channel
 - 3200 MHz DIMMs: operate at 3200 MHz when 1 DIMM per channel, but operate at 2933 MHz when 2 DIMMs per channel
 - Mixing of 2933 MHz and 3200 MHz DIMMs are supported in different channels, operating at 2933 MHz, but not supported in the same channel.

Note: Operating speed depends on the processor model. If the processor only supports a memory bus speed of 2666 MHz, all the installed DIMMs operate at 2666 MHz.

- Install a memory module filler if there is no memory module installed in the slot.

The following illustration helps you to locate the memory slots on the system board.

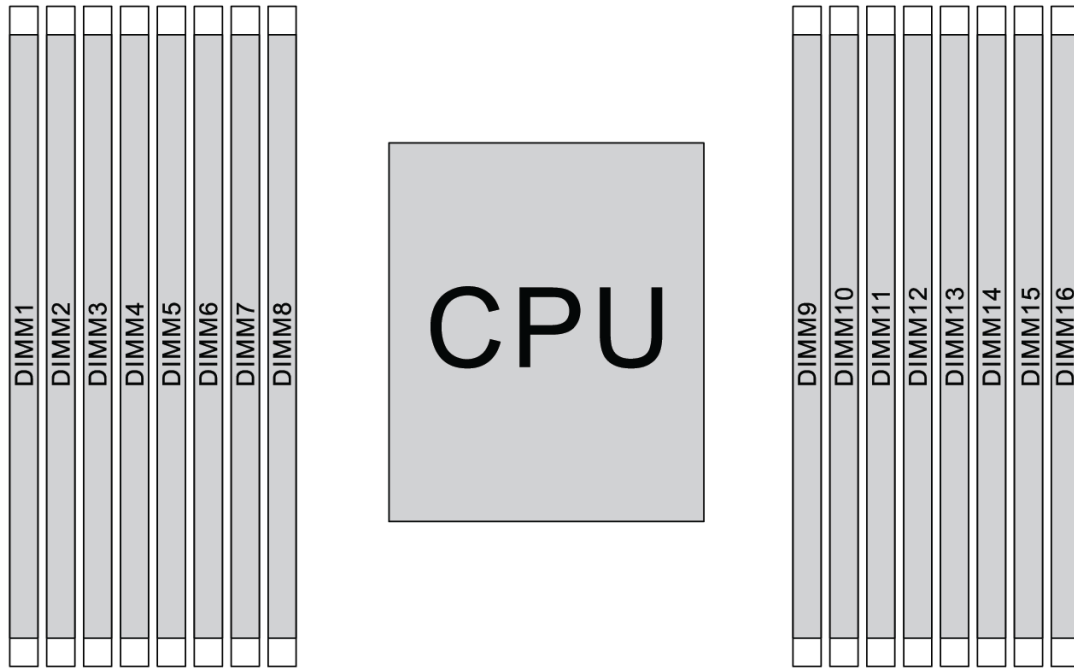


Figure 81. DIMM locations

The following table shows the relationship between the processors, memory controllers, memory channels, slots, and DIMM numbers. The system has eight channels, and supports up to two DIMMs per channel. DIMMs must be populated from farthest slot (slot 1) to closest slot (slot 0) to the processor on a per-channel basis when a data bus daisy chain topology is used. DIMMs may be populated in either slot on a per-channel basis when a data bus balanced tee route topology is used.

Table 14. DIMM installation order




Unified Memory Controller (UMC)	UMC2		UMC3		UMC1		UMC0		UMC6		UMC7		UMC5		UMC4	
Channel (CH)	D		C		B		A		E		F		G		H	
CH slot	1	0	1	0	1	0	1	0	0	1	0	1	0	1	0	1
DIMM number	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
1 DIMM			3													
2 DIMMs	1		3													
3 DIMMs	1		3											14		
4 DIMMs	1		3											14		16
5 DIMMs	1		3				7							14		16
6 DIMMs	1		3		5		7							14		16
7 DIMMs	1		3		5		7			10				14		16

Table 14. DIMM installation order (continued)

8 DIMMs	1		3		5		7			10		12		14		16
9 DIMMs	1		3	4	5		7			10		12		14		16
10 DIMMs	1	2	3	4	5		7			10		12		14		16
11 DIMMs	1	2	3	4	5		7			10		12	13	14		16
12 DIMMs	1	2	3	4	5		7			10		12	13	14	15	16
13 DIMMs	1	2	3	4	5		7	8		10		12	13	14	15	16
14 DIMMs	1	2	3	4	5	6	7	8		10		12	13	14	15	16
15 DIMMs	1	2	3	4	5	6	7	8	9	10		12	13	14	15	16
16 DIMMs	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16

Install a memory module

Use this information to install a memory module.

	<p>“Read the installation Guidelines” on page 75</p>		<p>“Power off the server for this task” on page 8</p>		<p>“ATTENTION: Static Sensitive Device Ground package before opening” on page 77</p>
---	---	---	--	--	---

Attention:

- 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 77:
 - 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.

Before installing a memory module:

1. Touch the static-protective package that contains the new memory module to any unpainted surface on the outside of the server. Then, take the new memory module out of the package and place it on a static-protective surface.
2. Locate the required memory module slot on the system board. See “Memory module installation rules” on page 99. Ensure that you observe the installation rules and sequence.

To install a memory module, complete the following steps:

Watch the procedure. A video of the installation process is available:

- Youtube: <https://www.youtube.com/playlist?list=PLYV5R7hVcs-DTDY1ImpIPpJVOzo7dKq14>
- Youku: http://list.youku.com/albumlist/show/id_52222446.html

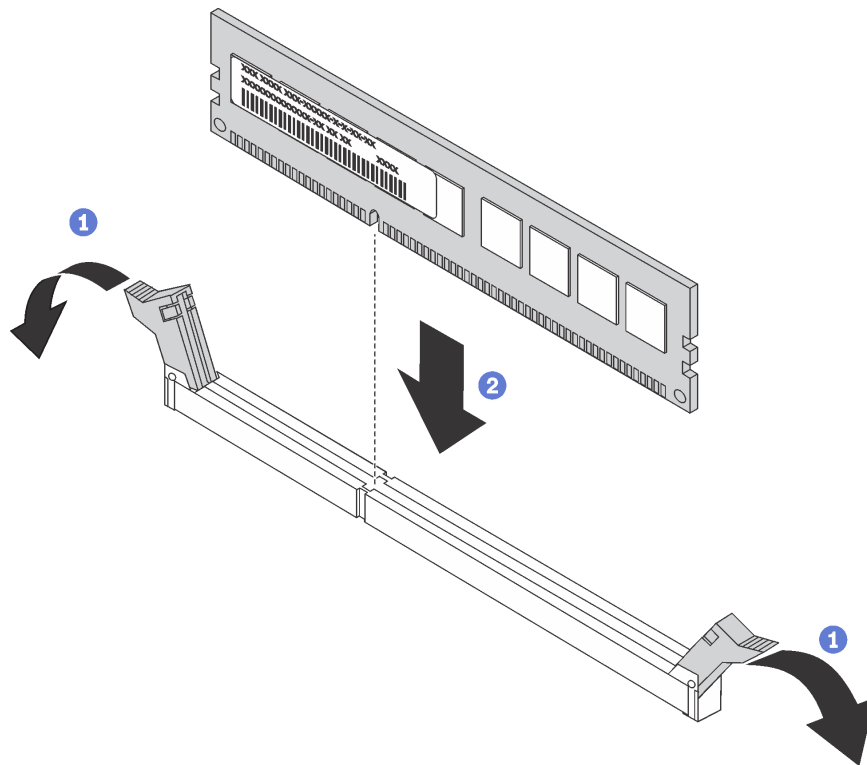


Figure 82. Memory module installation

Step 1. Open the retaining clips 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.

Step 2. Align the memory module with the slot, and 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. Open the retaining clips, remove the memory module, and then reinsert it.

After installing the memory module, complete the parts replacement. See “Complete the parts replacement” on page 189.

Hot-swap drive replacement

Use this information to remove and install a hot-swap drive. You can remove or install a hot-swap drive without turning off the server, which helps you avoid significant interruption to the operation of the system.

Notes:

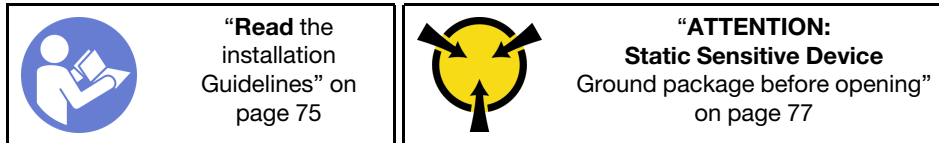
- The term “hot-swap drive” refers to all the supported types of hot-swap hard disk drives, hot-swap solid-state drives, and hot-swap NVMe drives.
- Use any documentation that comes with the drive and follow those instructions in addition to the instructions in this topic. Ensure that you have all the cables and other equipment that are specified in the documentation that comes with the drive.
- The electromagnetic interference (EMI) integrity and cooling of the server are protected by having all drive bays covered or occupied. The vacant bays are either covered by an EMI-protective panel or occupied by

drive fillers. When installing a drive, save the removed drive filler in case that you later remove the drive and need the drive filler to cover the place.

- To avoid damage to the drive connectors, ensure that the top cover is in place and fully closed whenever you install or remove a drive.

Remove a hot-swap drive

Use this information to remove a hot-swap drive.



Before removing a hot-swap drive:

1. Ensure that you have backed up data on your drive, especially if it is part of a RAID array.
 - Before you make changes to drives, RAID adapters, drive backplanes, or drive cables, back up all important data that is stored on the drives.
 - Before you remove any component of a RAID array, back up all RAID configuration information.
2. If one or more NVMe drives are to be removed, it is recommended to disable them first in Safely Remove Hardware and Eject Media (Windows) or filesystem (Linux). See the indications above the drive bays to determine the type of the drive to remove. If the drive bay numbers come with the term "NVMe", it indicates the installed drives are NVMe drives.
3. If the security bezel is installed, remove it first. See "Remove the security bezel" on page 91.

Attention: To ensure that there is adequate system cooling, do not operate the server for more than two minutes without either a drive or a drive filler installed in each bay.

To remove a hot-swap drive, complete the following steps:

Watch the procedure. A video of the removal process is available:

- Youtube: <https://www.youtube.com/playlist?list=PLYV5R7hVcs-DTDY1ImpIPpJV0zo7dKq14>
- Youku: http://list.youku.com/albumlist/show/id_52222446.html

Step 1. Slide the release latch to the left to open the drive tray handle.

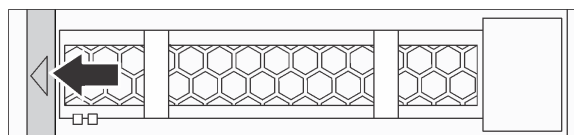


Figure 83. Opening the drive tray handle

Step 2. Grasp the handle and slide the drive out of the drive bay.

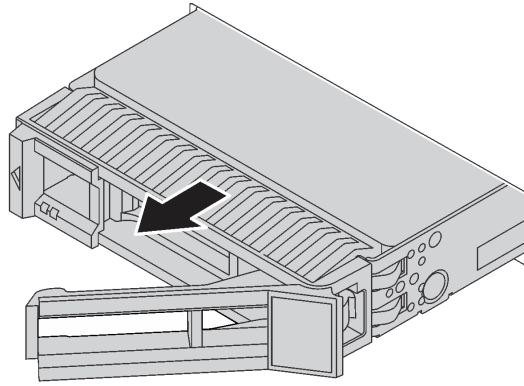




Figure 84. Hot-swap drive removal

After removing a hot-swap drive:

1. Install the drive filler or a new drive to cover the drive bay. See “Install a hot-swap drive” on page 104.
2. If you are instructed to return the old hot-swap drive, follow all packaging instructions and use any packaging materials that are provided.

Install a hot-swap drive

Use this information to install a hot-swap drive.

 <p>“Read the installation Guidelines” on page 75</p>	 <p>“ATTENTION: Static Sensitive Device” Ground package before opening” on page 77</p>
---	--

Before installing a hot-swap drive:

1. Remove the drive filler from the drive bay. Keep the drive filler in a safe place.

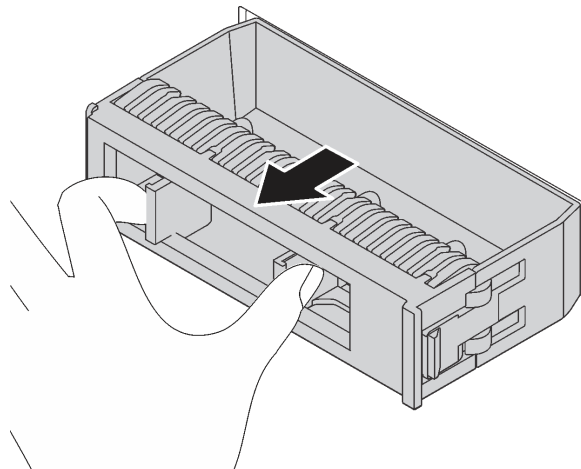


Figure 85. Drive filler removal

2. Touch the static-protective package that contains the new drive to any unpainted surface on the outside of the server. Then, take the new drive out of the package and place it on a static-protective surface.
3. See “Technical rules for drives” on page 81 before you install the hot-swap drive.

To install a hot-swap drive, complete the following steps:

Watch the procedure. A video of the installation process is available:

- Youtube: <https://www.youtube.com/playlist?list=PLYV5R7hVcs-DTDY1ImpIPpJV0zo7dKq14>
- Youku: http://list.youku.com/albumlist/show/id_52222446.html

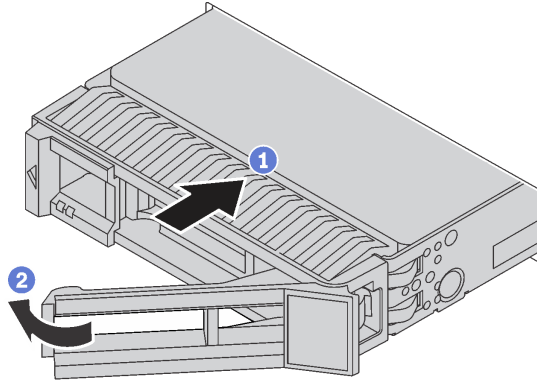


Figure 86. Hot-swap drive installation

- Step 1. Ensure that the drive tray handle is in the open position. Slide the drive into the drive bay until it snaps into position.
- Step 2. Close the drive tray handle to lock the drive in place.
- Step 3. 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 4. Continue to install additional hot-swap drives if necessary.

After installing all hot-swap drives:

1. Reinstall the security bezel. See “Install the security bezel” on page 92.
2. Use the Lenovo XClarity Provisioning Manager Lite to configure the RAID if necessary. For more information, see:
https://sysmgt.lenovofiles.com/help/topic/ixpml_v2/Introduction.html


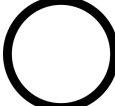

OCP 3.0 Ethernet adapter replacement

Use this information to remove and install the OCP 3.0 Ethernet adapter.

Note: The OCP 3.0 Ethernet adapter is available only on some models.

Remove the OCP 3.0 Ethernet adapter

Use this information to remove the OCP 3.0 Ethernet adapter.

	“Read the installation Guidelines” on page 75		“Power off the server for this task” on page 8		“ATTENTION: Static Sensitive Device Ground package before opening” on page 77
---	--	---	---	--	--

Before removing the OCP 3.0 Ethernet adapter, 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.

To remove the OCP 3.0 Ethernet adapter, complete the following steps:

Watch the procedure. A video of the removal process is available:

- Youtube: <https://www.youtube.com/playlist?list=PLYV5R7hVcs-DTDY1ImpIPpJV0zo7dKq14>
- Youku: http://list.youku.com/albumlist/show/id_52222446.html

Step 1. Loosen the thumbscrew that secures the adapter. Pull out the OCP 3.0 Ethernet adapter as shown.

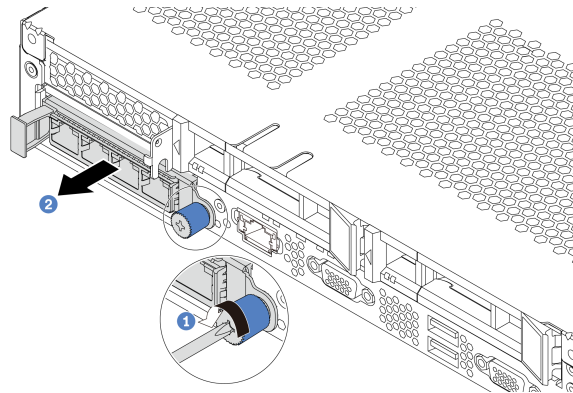

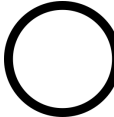



Figure 87. OCP 3.0 Ethernet adapter removal

Install the OCP 3.0 Ethernet adapter

Use this information to install the OCP 3.0 Ethernet adapter.

	“Read the installation Guidelines” on page 75		“Power off the server for this task” on page 8		“ATTENTION: Static Sensitive Device Ground package before opening” on page 77
---	--	---	---	--	--

Note: 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.

Before installing the OCP 3.0 Ethernet adapter, 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.

To install the OCP 3.0 Ethernet adapter, complete the following steps:

Watch the procedure. A video of the installation process is available:

- Youtube: <https://www.youtube.com/playlist?list=PLYV5R7hVcs-DTDY1ImpIPpJV0zo7dKq14>
- Youku: http://list.youku.com/albumlist/show/id_52222446.html

Step 1. Attach the OCP 3.0 Ethernet adapter label that comes with this option on the rear of the server.

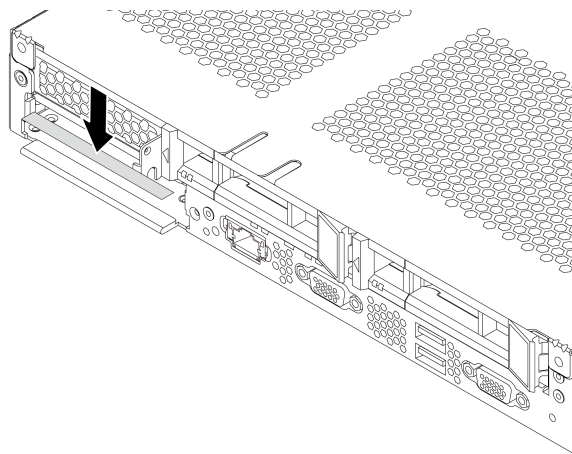


Figure 88. OCP 3.0 Ethernet adapter label installation

- Step 2. Push the OCP 3.0 Ethernet adapter as shown to insert it into the connector on the system board. Tighten the thumbscrew to secure the adapter.

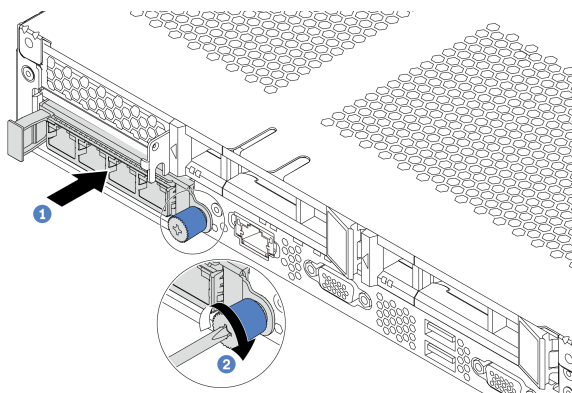


Figure 89. OCP 3.0 Ethernet adapter installation

After installing the OCP 3.0 Ethernet adapter, complete the parts replacement. See “Complete the parts replacement” on page 189.

Riser card replacement

Use this information to remove and install a riser card.

For servers with riser assembly, it comes with one of the following riser assembly configurations:

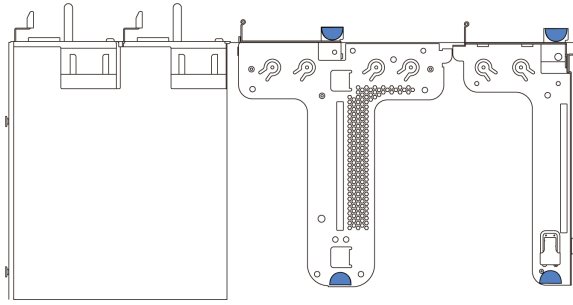


Figure 90. Configuration 1

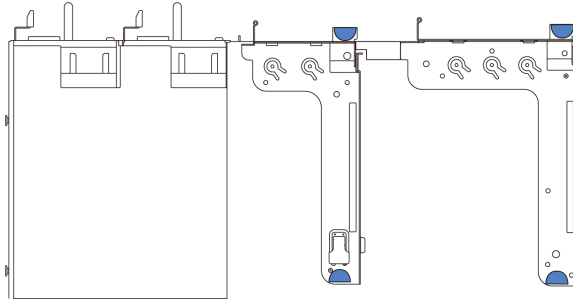


Figure 91. Configuration 2

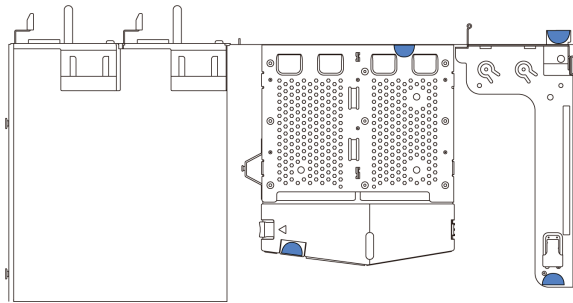


Figure 92. Configuration 3

There are three types of riser assembly configurations. The removing and installation procedure of the riser card is similar for all types of riser assembly. The following procedures are based on the riser assembly in configuration 1.

Remove a riser card

Use this information to remove a riser card.

	<p>“Read the installation Guidelines” on page 75</p>		<p>“ATTENTION: Static Sensitive Device Ground package before opening” on page 77</p>
--	--	--	--

Before removing a riser card, remove the top cover. See “Remove the top cover” on page 83.

To remove a riser card, complete the following steps:

Note: The riser assembly you want to remove might be different from the following illustrations, but the removal method is the same.

Watch the procedure. A video of the removal process is available:

- Youtube: <https://www.youtube.com/playlist?list=PLYV5R7hVcs-DTDY1ImpIPpJV0zo7dKq14>
- Youku: http://list.youku.com/albumlist/show/id_52222446.html

Step 1. If there is any PCIe adapter installed on the riser card, record the cable connections first. Then, disconnect all cables from the PCIe adapter and completely remove the riser assembly out of the chassis.

Step 2. Grasp the riser assembly by its edges and carefully lift it out of the chassis.

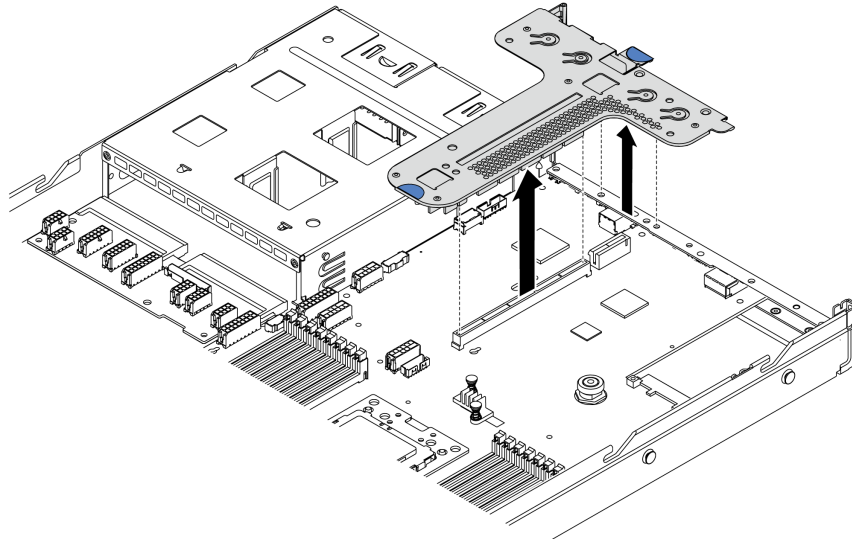


Figure 93. Riser assembly removal

Step 3. Remove the PCIe adapters that are installed on the riser card. See “Remove a PCIe adapter” on page 114.

Step 4. Remove the two screws that secure the riser card to the bracket. Then, remove the riser card.

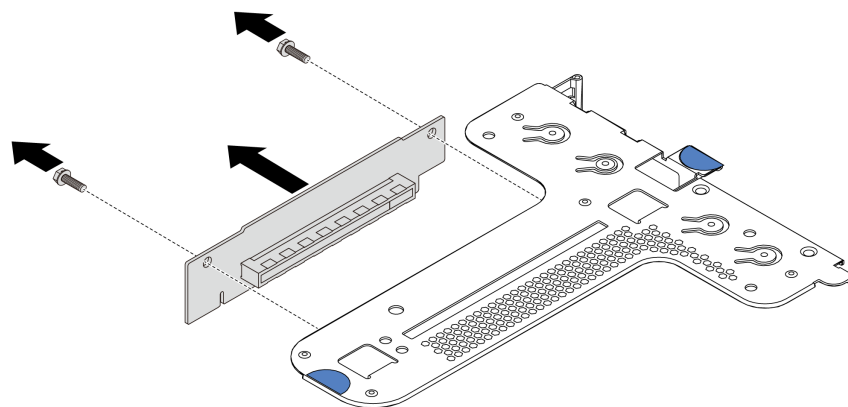

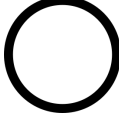



Figure 94. Riser card removal

If you are instructed to return the old riser card, follow all packaging instructions and use any packaging materials that are provided.

Install a riser card

Use this information to install a riser card.

 <p>“Read the installation Guidelines” on page 75</p>	 <p>“Power off the server for this task” on page 8</p>	 <p>“ATTENTION: Static Sensitive Device Ground package before opening” on page 77</p>
--	---	---

Before installing a riser card, 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.

To install a riser card, complete the following steps:

Note: The riser assembly you want to install might be different from the illustrations below, but the installation method is the same. For different types of supported riser card, see “Rear view” on page 14.

Watch the procedure. A video of the installation process is available:

- Youtube: <https://www.youtube.com/playlist?list=PLYV5R7hVcs-DTDY1ImpIPpJVOzo7dKq14>
- Youku: http://list.youku.com/albumlist/show/id_52222446.html

Step 1. Align the screw holes in the new riser card with the corresponding ones in the bracket and install the two screws to secure the riser card to the bracket.

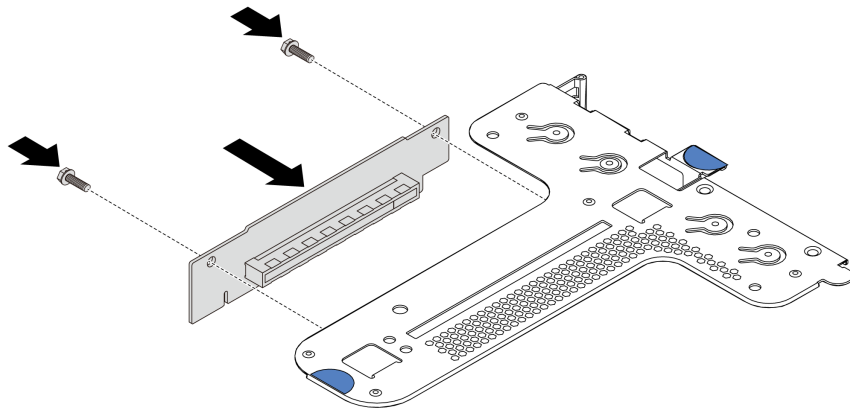


Figure 95. Riser card installation

Step 2. Reinstall the PCIe adapters on the new riser card. See “Install a PCIe adapter” on page 117.

Step 3. Refer to your note to reconnect any cables to the PCIe adapters on the new riser card.

Step 4. Position the riser assembly on the chassis. Align the two pins on the bracket with the two holes in the chassis and align the riser card with the riser slot on the system board. Then, carefully press the riser assembly straight down into the slot until it is fully seated.

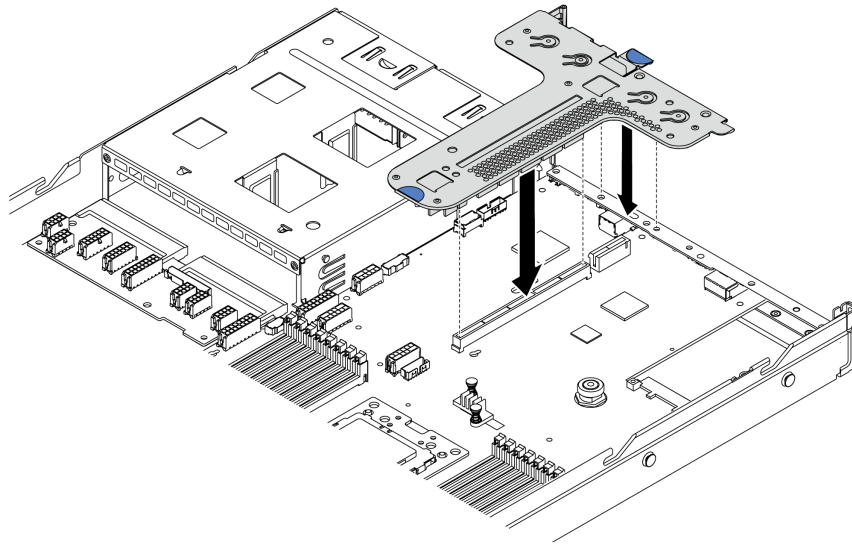


Figure 96. Riser assembly installation

According to the configuration, you may also need to install the rear wall bracket between the two riser assemblies.

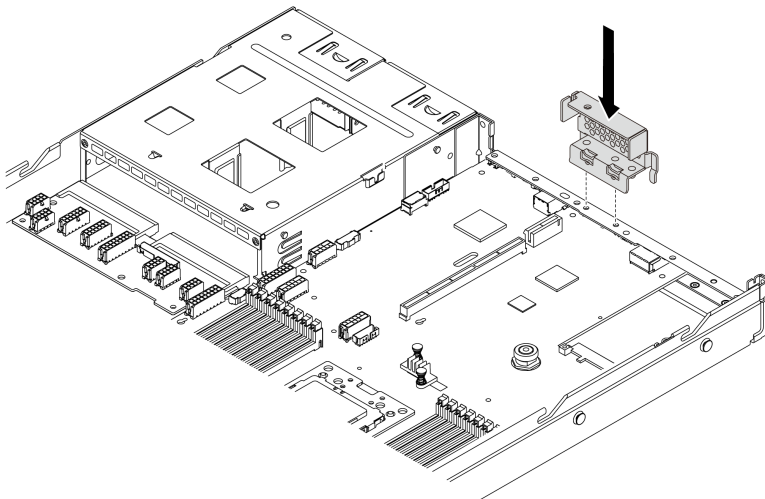


Figure 97. Rear wall bracket installation

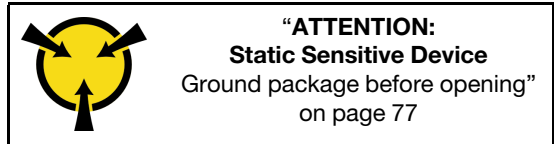
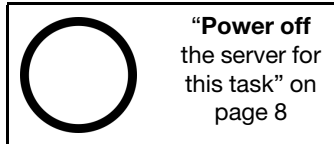
After installing the riser card, complete the parts replacement. See “Complete the parts replacement” on page 189.

Internal riser assembly replacement

Use this information to remove and install the internal riser assembly.

Remove the internal riser assembly

Use this information to remove the internal riser assembly.



Before removing the internal riser assembly:

1. Remove the top cover. See “Remove the top cover” on page 83.
2. Disconnect the cables from the internal riser assembly.

To remove the internal riser assembly:

Watch the procedure. A video of the removal process is available:

- Youtube: <https://www.youtube.com/playlist?list=PLYV5R7hVcs-DTDY1ImpIPpJVOzo7dKq14>
- Youku: http://list.youku.com/albumlist/show/id_52222446.html

Step 1. Loosen the captive screw, and then directly lift it up from the chassis.

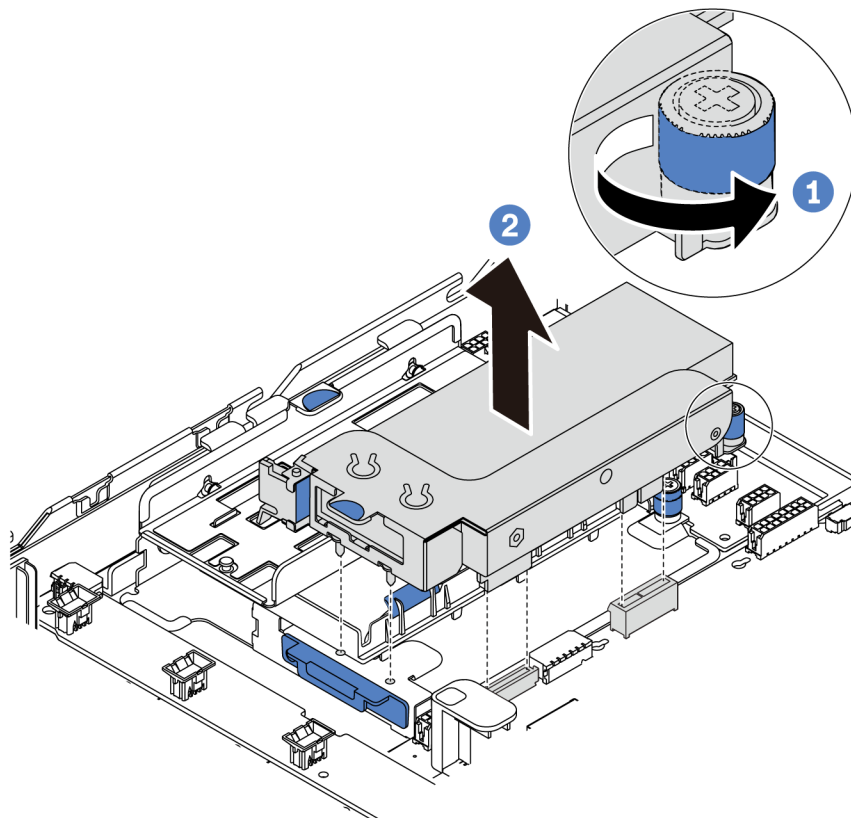
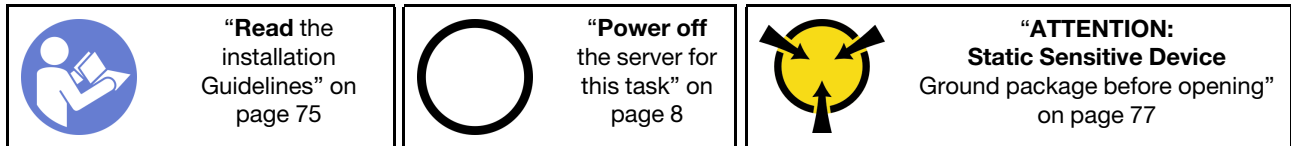


Figure 98. Internal riser assembly removal

Complete the parts replacement. See “Complete the parts replacement” on page 189.

Install the internal riser assembly

Use this information to install the internal riser assembly.



To install the internal riser assembly, complete the following steps:

Watch the procedure. A video of the installation process is available:

- Youtube: <https://www.youtube.com/playlist?list=PLYV5R7hVcs-DTDY1ImpIPpJV0zo7dKq14>
- Youku: http://list.youku.com/albumlist/show/id_52222446.html

- Step 1. Install the internal riser assembly and install the super capacitor on the internal riser assembly. See “Install a super capacitor module on the M.2/riser support bracket” on page 158.
- Step 2. Align the pins and connectors of the internal riser assembly with the holes and connectors on the chassis, and then secure the assembly in place.

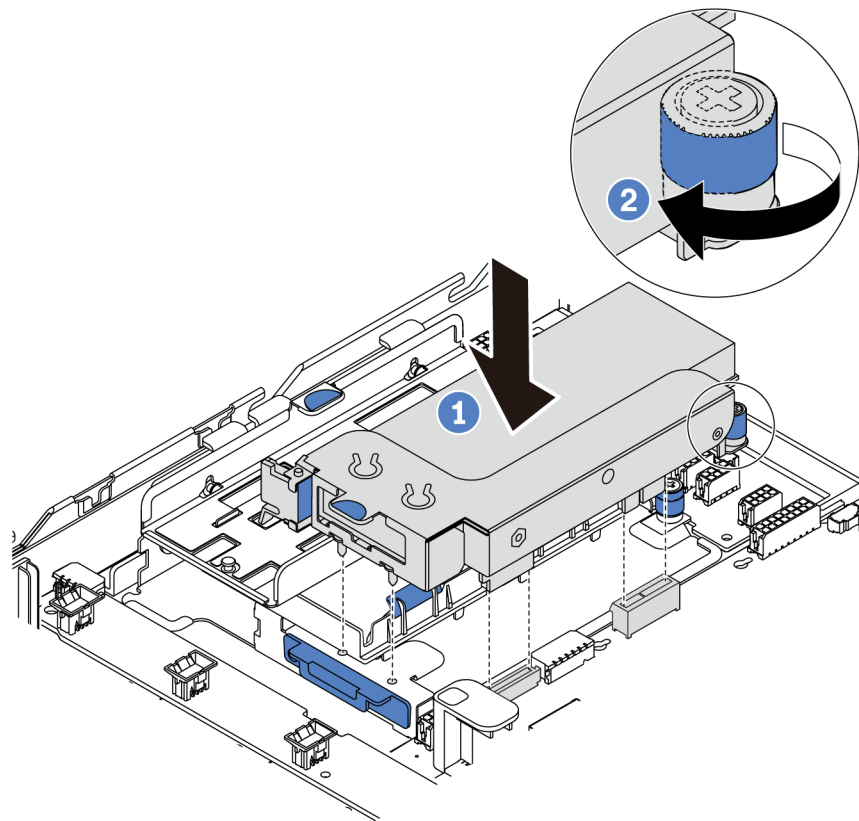


Figure 99. Internal riser assembly installation

- Step 3. Tighten the captive screw to further secure the assembly.

After installing the internal riser assembly, complete the parts replacement. See “Complete the parts replacement” on page 189.

PCIe adapter replacement

Use this information to remove and install a PCIe adapter.




The PCIe adapter can be an Ethernet adapter, a host bus adapter (HBA), a PCIe RAID adapter, a PCIe interposer adapter, a PCIe solid-state drive, a PCIe GPU, and any other supported PCIe adapters.

Notes:

- Depending on the specific type, the PCIe adapter might look different from the illustrations in this topic.
- Use any documentation that comes with the PCIe adapter and follow those instructions in addition to the instructions in this topic.

Remove a PCIe adapter

Use this information to remove a PCIe adapter.

 <p>“Read the installation Guidelines” on page 75</p>	 <p>“Power off the server for this task” on page 8</p>	 <p>“ATTENTION: Static Sensitive Device Ground package before opening” on page 77</p>
---	--	--

Before removing a PCIe adapter:

1. Remove the top cover. See “Remove the top cover” on page 83.
2. Remove the riser assembly. See “Remove a riser card” on page 108.

To remove a PCIe adapter, complete the following steps:

Watch the procedure. A video of the removal process is available:

- Youtube: <https://www.youtube.com/playlist?list=PLYV5R7hVcs-DTDY1ImpIPpJVOzo7dKq14>
- Youku: http://list.youku.com/albumlist/show/id_52222446.html

Step 1. (This step is for riser 2 assembly and internal riser assembly.) Pivot the latch on the riser bracket to the open position.

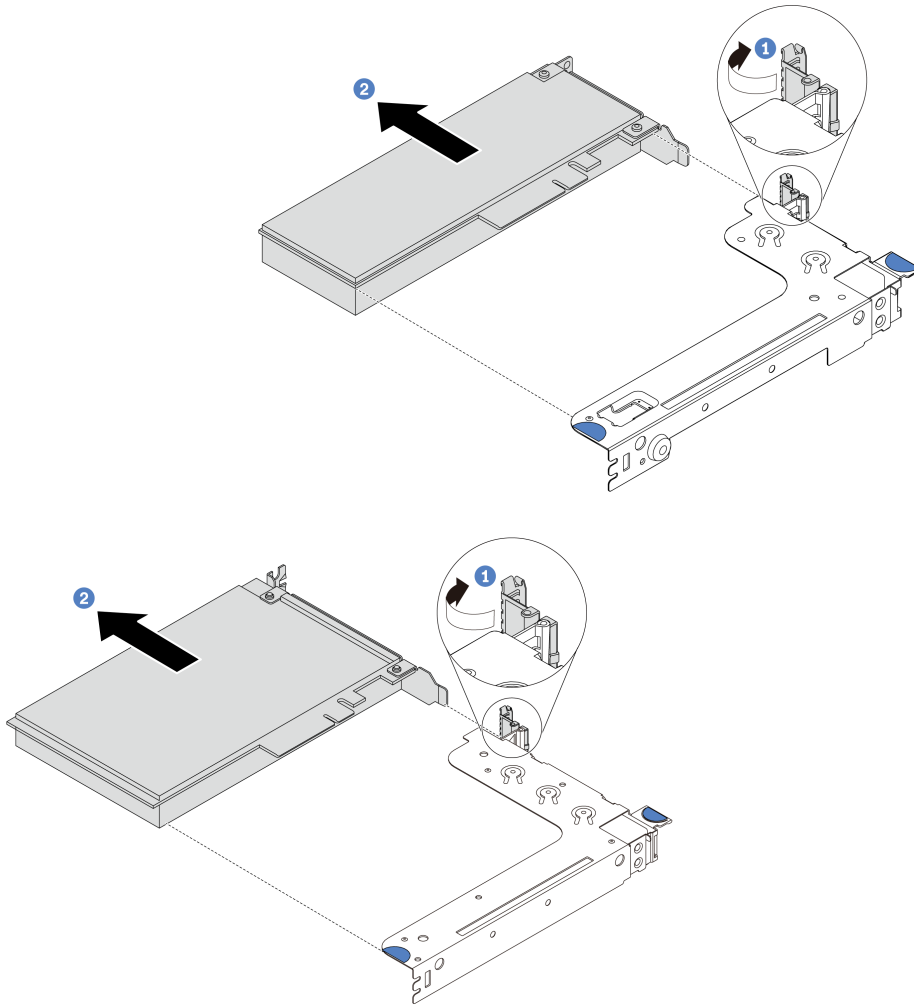


Figure 100. Riser 1 assembly (LP/FHFL) removal

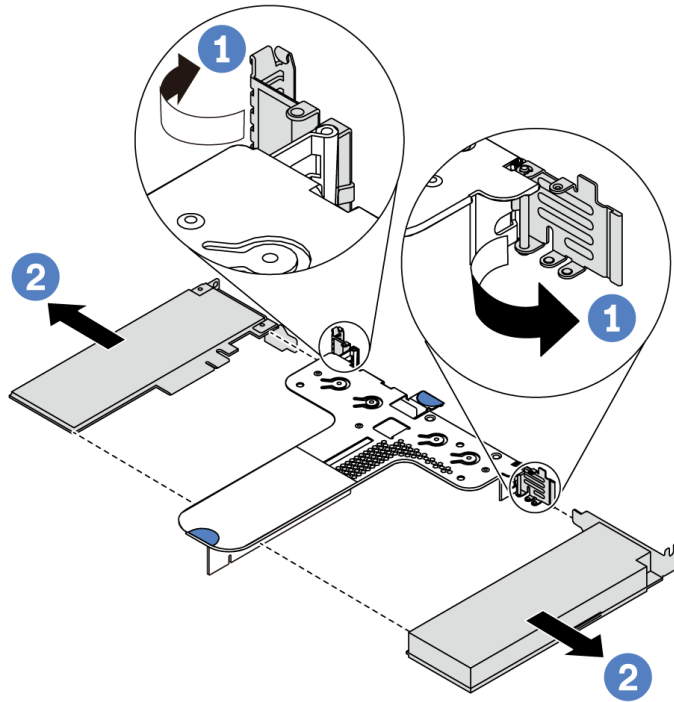


Figure 101. Riser 2 assembly (LP+LP) removal

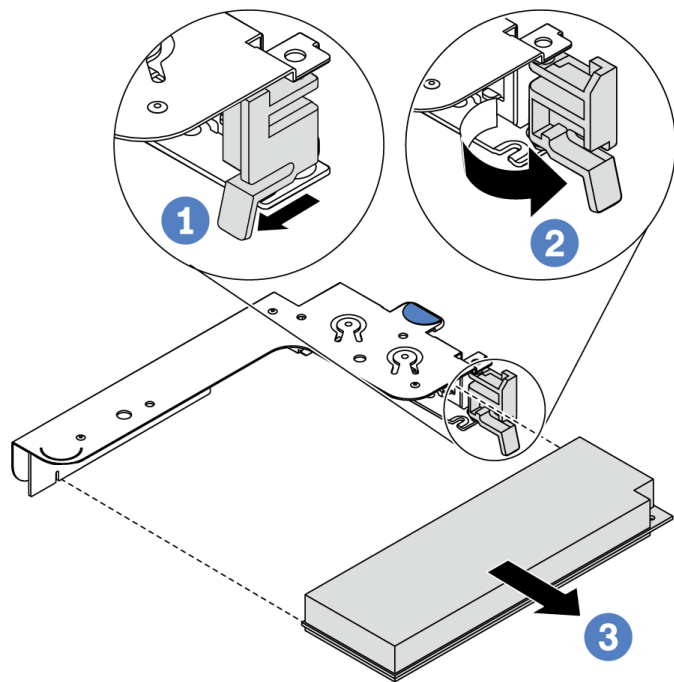


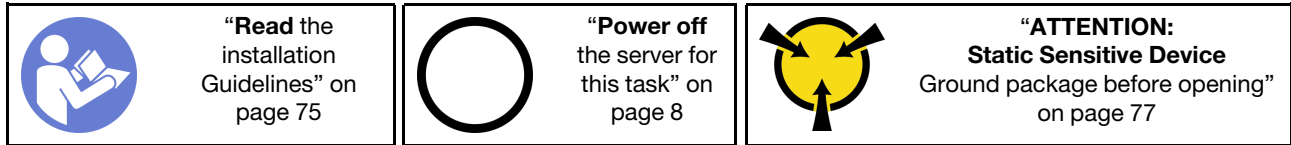
Figure 102. Internal riser assembly (LP) removal

Step 2. Grasp the PCIe adapter by its edges and carefully pull it out of the PCIe adapter slot on the riser card.

If you are instructed to return the old PCIe adapter, follow all packaging instructions and use any packaging materials that are provided.

Install a PCIe adapter

Use this information to install a PCIe adapter.



Before installing a PCIe adapter:

1. Touch the static-protective package that contains the new PCIe adapter to any unpainted surface on the outside of the server. Then, take the new PCIe adapter out of the package and place it on a static-protective surface.
2. Locate the correct PCIe slot for the PCIe adapter. For information about the PCIe slots and supported PCIe adapters, see “Rear view” on page 14.
3. See “Technical rules for HBA/RAID adapters” on page 82 and “Technical rules for PCIe NVMe adapter” on page 82 before you install the PCIe adapter.

To install a PCIe adapter, complete the following steps:

Watch the procedure. A video of the installation process is available:

- Youtube: <https://www.youtube.com/playlist?list=PLYV5R7hVcs-DTDY1ImpIPpJV0zo7dKq14>
- Youku: http://list.youku.com/albumlist/show/id_52222446.html

Note: The internal riser card supports only a RAID/HBA 8i adapter, not supporting a RAID/HBA 16i or 24i adapter.

- Step 1. Align the PCIe adapter with the PCIe slot on the riser card. Then, carefully press the PCIe adapter straight into the slot until it is securely seated and its bracket also is secured.

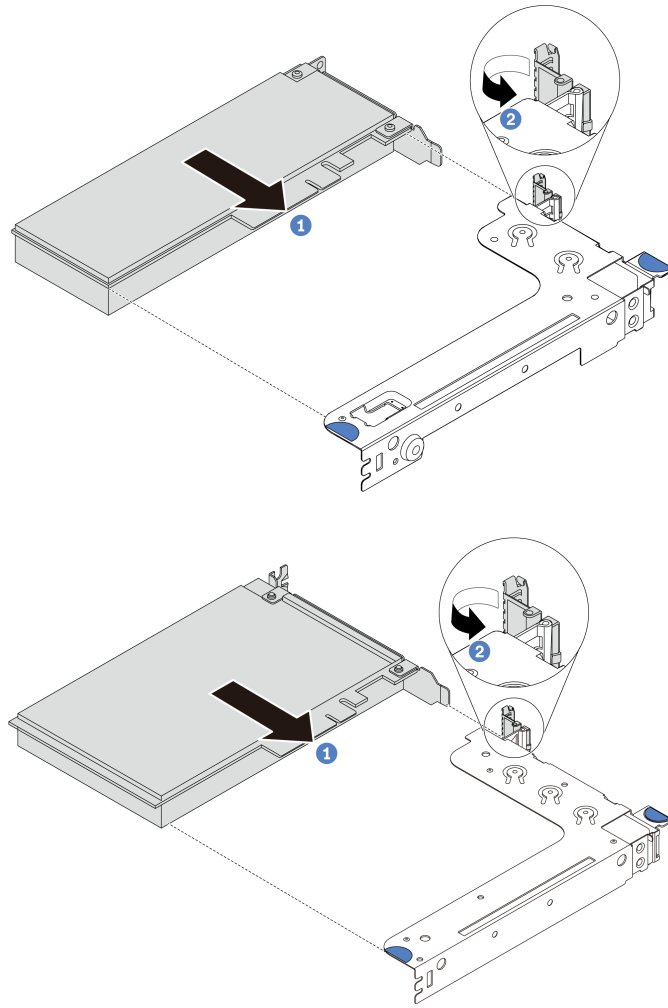


Figure 103. Riser 1 assembly (LP/FHFL) installation

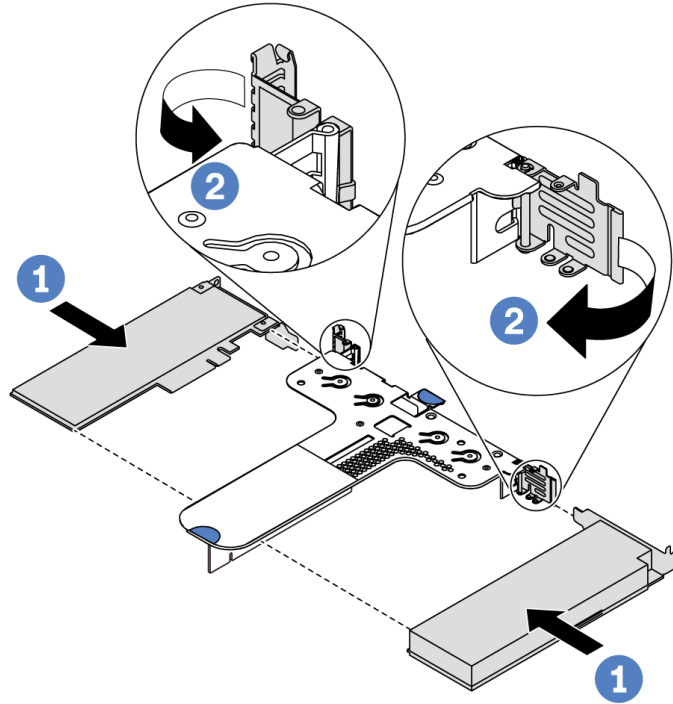


Figure 104. Riser 2 assembly (LP+LP) installation

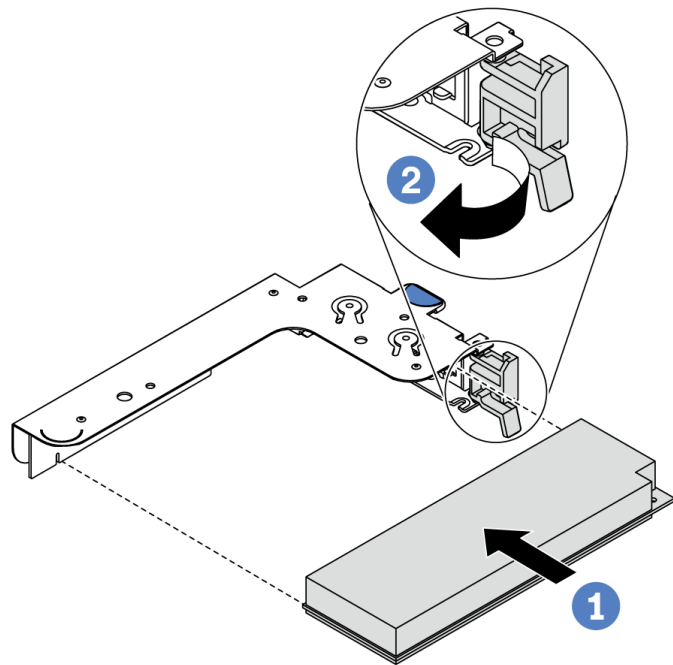


Figure 105. Internal riser assembly (LP) installation

Step 2. (Skip this step for riser 2 assembly.) Pivot the latch on the riser bracket to the closed position.

After installing the PCIe adapter:

1. Reinstall the riser assembly. See “Install a riser card” on page 110.


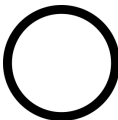

2. Complete the parts replacement. See “Complete the parts replacement” on page 189.

GPU replacement

Use this information to remove and install a GPU adapter.

Remove a GPU adapter

Use this information to remove a GPU adapter.

 <p>“Read the installation Guidelines” on page 75</p>	 <p>“Power off the server for this task” on page 8</p>	 <p>“ATTENTION: Static Sensitive Device Ground package before opening” on page 77</p>
--	---	---

Notes:

- 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.

Before removing a GPU adapter:

1. Remove the top cover. See “Remove the top cover” on page 83.
2. Remove the riser bracket that has the GPU adapter installed. For instructions on how to remove the riser bracket, see “Remove a riser card” on page 108.

To remove a GPU adapter, complete the following steps:

Watch the procedure. A video of the removal process is available:

- Youtube: <https://www.youtube.com/playlist?list=PLYV5R7hVcs-DTDY1ImpIPpJV0zo7dKq14>
- Youku: http://list.youku.com/albumlist/show/id_52222446.html


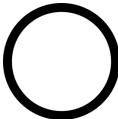

Step 1. Disconnect the power cable from the GPU adapter.

Step 2. Remove the GPU adapter from the riser bracket. See “Remove a PCIe adapter” on page 114.

If you are instructed to return the old GPU adapter, follow all packaging instructions and use any packaging materials that are provided.

Install a GPU adapter

Use this information to install a GPU adapter.

 <p>“Read the installation Guidelines” on page 75</p>	 <p>“Power off the server for this task” on page 8</p>	 <p>“ATTENTION: Static Sensitive Device Ground package before opening” on page 77</p>
--	---	---

Notes:

- Only certain types of GPU adapters are supported, refer to “Specifications” on page 3 for detailed information.
- GPU adapters are supported on some server models with requirements, refer to “Technical rules for GPU adapters” on page 80.

To install a GPU adapter, complete the following steps:

Watch the procedure. A video of the installation process is available:

- Youtube: <https://www.youtube.com/playlist?list=PLYV5R7hVcs-DTDY1ImpIPpJV0zo7dKq14>
- Youku: http://list.youku.com/albumlist/show/id_52222446.html

Step 1. Locate the appropriate PCIe slot for the GPU adapter.

Step 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. See “Install a PCIe adapter” on page 117.

Step 3. Reinstall the riser assembly. See “Install a riser card” on page 110.

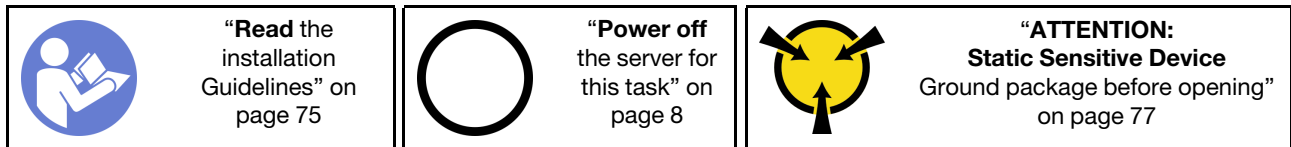
After installing the GPU adapter, complete the parts replacement. See “Complete the parts replacement” on page 189.

Backplane replacement

Use this information to remove and install the backplane.

Remove the backplane for four 3.5-inch hot-swap drives

Use this information to remove the backplane for four 3.5-inch hot-swap drives.



Before removing the backplane:

1. Remove the top cover. See “Remove the top cover” on page 83.
2. Remove all the installed drives and drive fillers from the drive bays. See “Remove a hot-swap drive” on page 103 and “Install a hot-swap drive” on page 104.

To remove the backplane, complete the following steps:

Watch the procedure. A video of the removal process is available:

- Youtube: <https://www.youtube.com/playlist?list=PLYV5R7hVcs-DTDY1ImpIPpJV0zo7dKq14>
- Youku: http://list.youku.com/albumlist/show/id_52222446.html

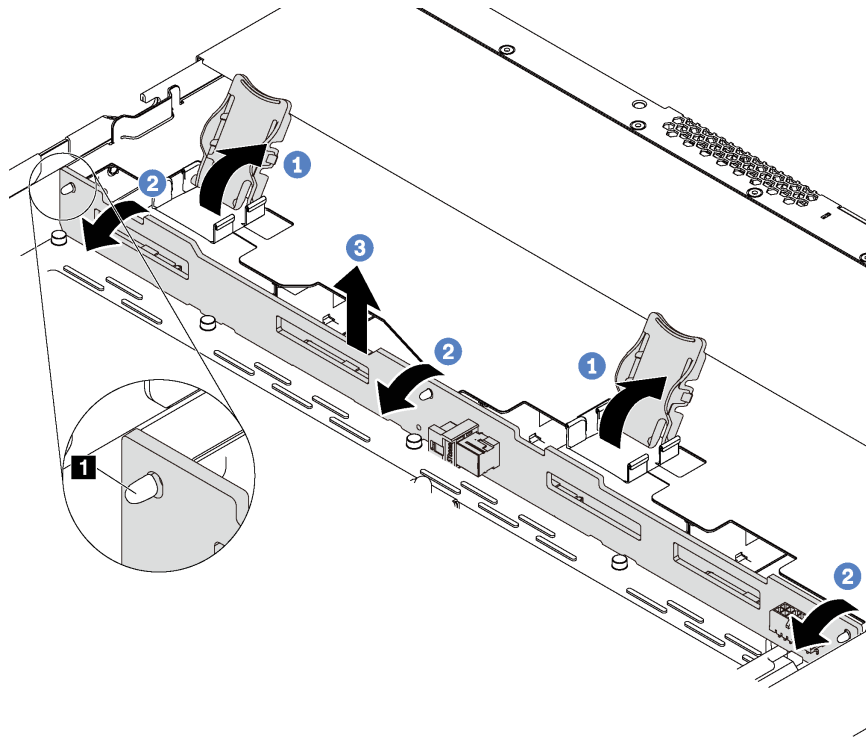



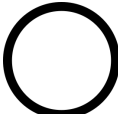

Figure 106. Removal of backplane for four 3.5-inch hot-swap drives

- Step 1. Open the release latches that secure the backplane.
- Step 2. Pivot the backplane backward slightly to release it from the three pins **1** on the chassis.
- Step 3. Carefully remove the backplane out of the chassis under the front I/O assembly cables.
- Step 4. Disconnect the cables from the backplane.

If you are instructed to return the old backplane, follow all packaging instructions and use any packaging materials that are provided.

Install the backplane for four 3.5-inch hot-swap drives

Use this information to install the backplane for four 3.5-inch hot-swap drives.

 <p>“Read the installation Guidelines” on page 75</p>	 <p>“Power off the server for this task” on page 8</p>	 <p>“ATTENTION: Static Sensitive Device Ground package before opening” on page 77</p>
---	--	--

Before installing the backplane:

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.
2. Connect the cables to the backplane. See “Server model with four 3.5-inch SAS/SATA drives” on page 24.

To install the backplane, complete the following steps:

Watch the procedure. A video of the installation process is available:

- Youtube: <https://www.youtube.com/playlist?list=PLYV5R7hVcs-DTDY1ImpIPpJV0zo7dKq14>
- Youku: http://list.youku.com/albumlist/show/id_52222446.html

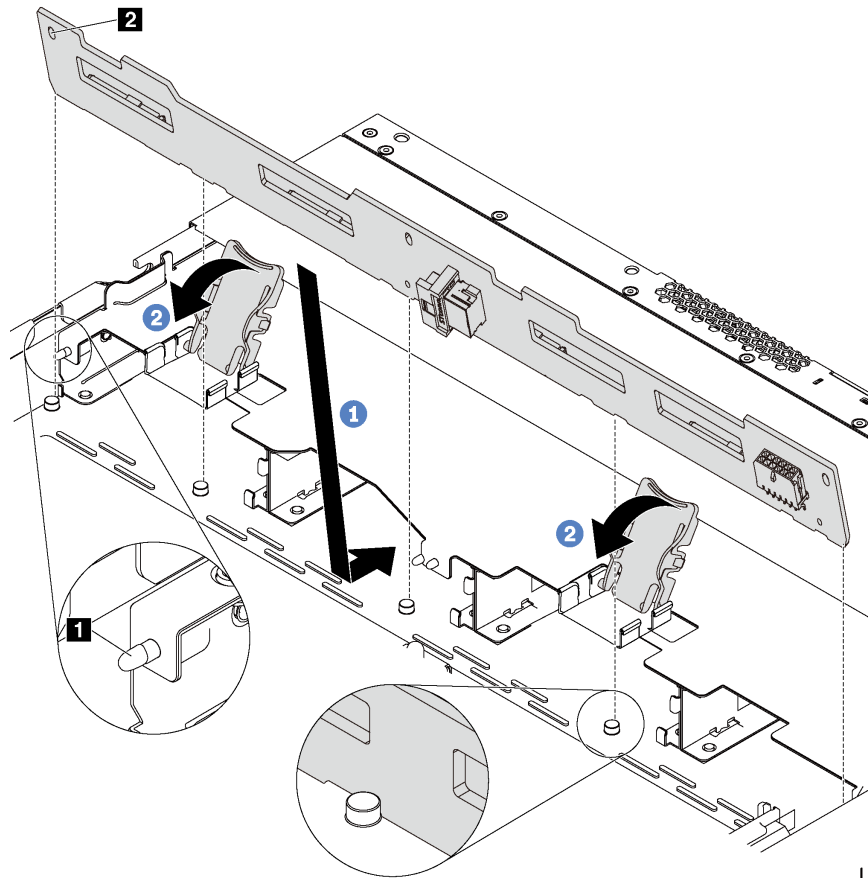


Figure 107. Installation of backplane for four 3.5-inch hot-swap drives




- Step 1. Put the backplane under the front I/O assembly cables, align it with the chassis, and lower it into the chassis. Put the backplane into place with it leaning backward slightly so that the three pins **1** on the chassis pass through the three holes **2** in the backplane.
- Step 2. Close the release latches to secure the backplane in place.

After installing the backplane:

1. Reinstall all the drives and drive fillers into the drive bays. See “Install a hot-swap drive” on page 104.
2. Complete the parts replacement. See “Complete the parts replacement” on page 189.

Remove the backplane for eight 2.5-inch hot-swap drives

Use this information to remove the backplane for eight 2.5-inch hot-swap drives.

 <p>“Read the installation Guidelines” on page 75</p>	 <p>“Power off the server for this task” on page 8</p>	 <p>“ATTENTION: Static Sensitive Device Ground package before opening” on page 77</p>
--	---	---

Before removing the backplane:

1. Remove the top cover. See “Remove the top cover” on page 83.
2. Remove all the installed drives and drive fillers from the drive bays. See “Remove a hot-swap drive” on page 103 and “Install a hot-swap drive” on page 104.

To remove the backplane, complete the following step:

Watch the procedure. A video of the removal process is available:

- Youtube: <https://www.youtube.com/playlist?list=PLYV5R7hVcs-DTDY1ImpIPpJV0zo7dKq14>
- Youku: http://list.youku.com/albumlist/show/id_52222446.html

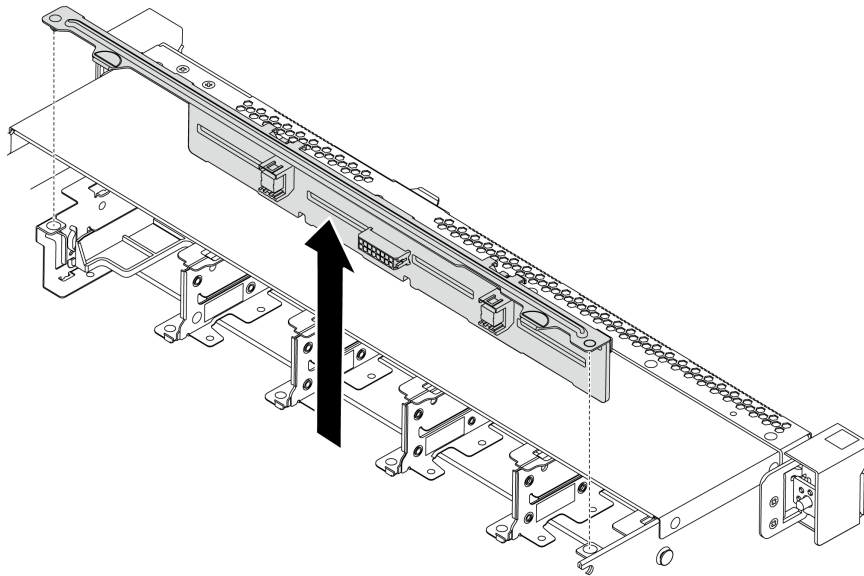



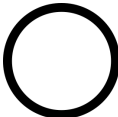

Figure 108. Removal of backplane for eight 2.5-inch hot-swap drives

- Step 1. Grasp the backplane and carefully lift it out of the chassis.
- Step 2. Disconnect the cables from the backplane.

If you are instructed to return the old backplane, follow all packaging instructions and use any packaging materials that are provided.

Install the backplane for eight 2.5-inch hot-swap drives

Use this information to install the backplane for eight 2.5-inch hot-swap drives.

 <p>“Read the installation Guidelines” on page 75</p>	 <p>“Power off the server for this task” on page 8</p>	 <p>“ATTENTION: Static Sensitive Device Ground package before opening” on page 77</p>
--	---	--

Before installing the backplane:

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.
2. Connect the cables to the backplane. See “Server model with eight 2.5-inch SAS/SATA drives” on page 32.

To install the backplane, complete the following steps:

Watch the procedure. A video of the installation process is available:

- Youtube: <https://www.youtube.com/playlist?list=PLYV5R7hVcs-DTDY1ImpIPpJV0zo7dKq14>
- Youku: http://list.youku.com/albumlist/show/id_52222446.html

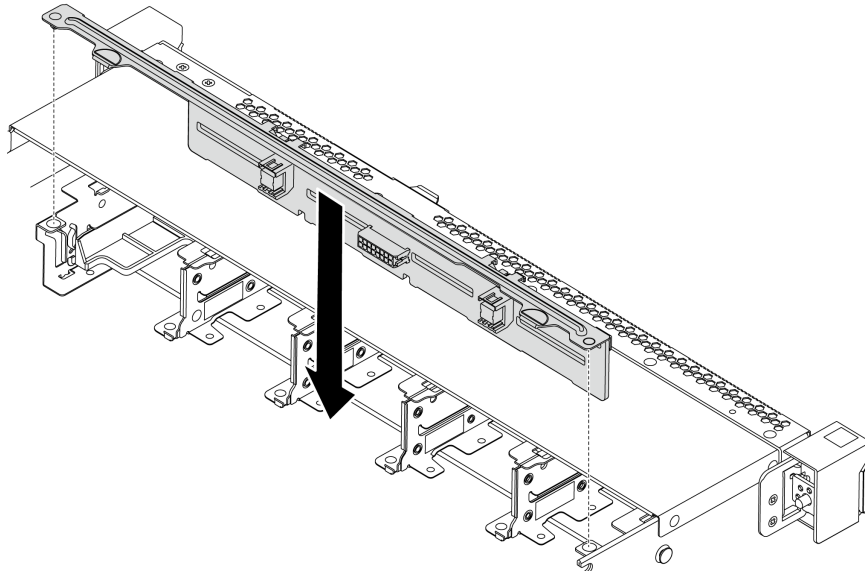


Figure 109. Installation of backplane for eight 2.5-inch hot-swap drives


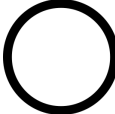

- Step 1. Align the two pins on the backplane with the corresponding holes in the chassis.
- Step 2. Lower the backplane into the chassis. Ensure that the pins pass through the holes and the backplane is fully seated in place.

After installing the backplane:

1. Reinstall all the drives and drive fillers into the drive bays. See “Install a hot-swap drive” on page 104.
2. Complete the parts replacement. See “Complete the parts replacement” on page 189.

Remove the backplane for ten 2.5-inch hot-swap drives

Use this information to remove the backplane for ten 2.5-inch hot-swap drives.

	“Read the installation Guidelines” on page 75		“Power off the server for this task” on page 8		“ATTENTION: Static Sensitive Device Ground package before opening” on page 77
---	--	---	---	--	--

Before removing the backplane:

1. Remove the top cover. See “Remove the top cover” on page 83.
2. Remove all the installed drives and drive fillers from the drive bays. See “Remove a hot-swap drive” on page 103 and “Install a hot-swap drive” on page 104.

To remove the backplane, complete the following step:

Watch the procedure. A video of the removal process is available:

- Youtube: <https://www.youtube.com/playlist?list=PLYV5R7hVcs-DTDY1ImpIPpJV0zo7dKq14>

- Youku: http://list.youku.com/albumlist/show/id_52222446.html

Note: There are two types of backplane for ten 2.5-inch hot-swap drives. The backplane you want to install might be different from the following illustration, but the installation method is the same.

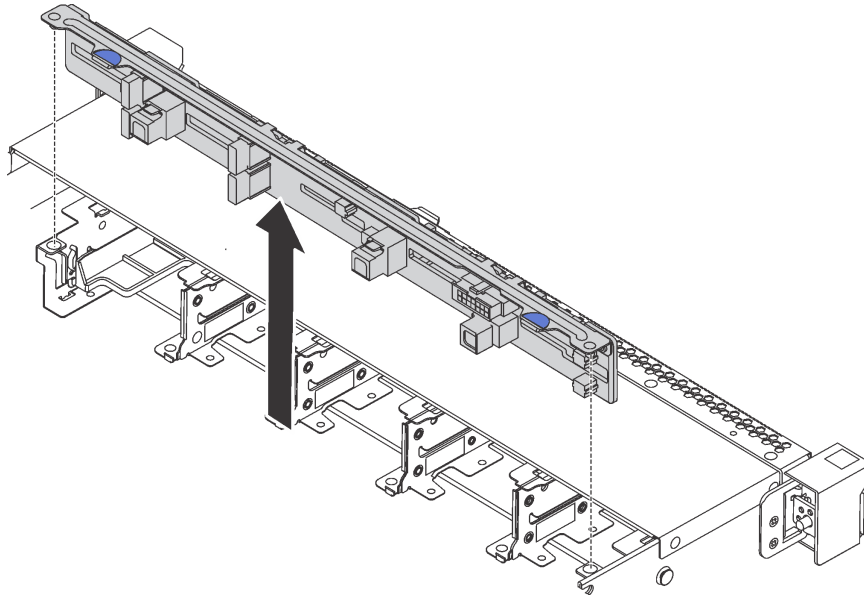



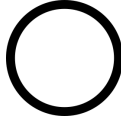

Figure 110. Removal of backplane for ten 2.5-inch hot-swap drives

- Step 1. Grasp the backplane and carefully lift it out of the chassis.
- Step 2. Disconnect the cables from the backplane.

If you are instructed to return the old backplane, follow all packaging instructions and use any packaging materials that are provided.

Install the backplane for ten 2.5-inch hot-swap drives

Use this information to install the backplane for ten 2.5-inch hot-swap drives.

 <p>“Read the installation Guidelines” on page 75</p>	 <p>“Power off the server for this task” on page 8</p>	 <p>“ATTENTION: Static Sensitive Device Ground package before opening” on page 77</p>
--	---	--

Before installing the backplane:

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.
2. Connect the cables to the backplane. See “Server model with six 2.5-inch SAS/SATA drives and four 2.5-inch NVMe drives” on page 40 or “Server model with ten 2.5-inch SAS/SATA/NVMe drives” on page 47.

To install the backplane, complete the following steps:

Watch the procedure. A video of the installation process is available:

- Youtube: <https://www.youtube.com/playlist?list=PLYV5R7hVcs-DTDY1ImpIPpJVOzo7dKq14>

- Youku: http://list.youku.com/albumlist/show/id_52222446.html

Note: There are two types of backplane for ten 2.5-inch hot-swap drives. The backplane you want to install might be different from the following illustration, but the installation method is the same.

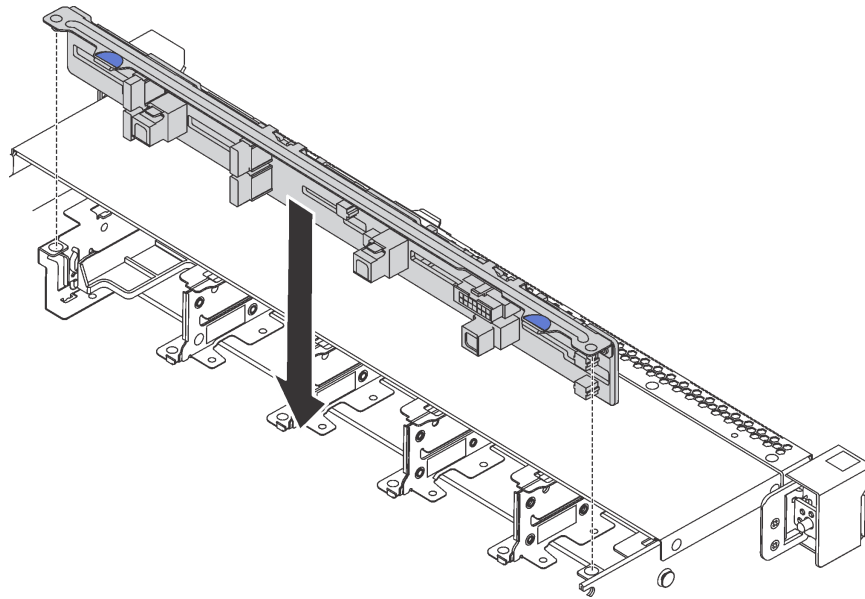


Figure 111. Installation of backplane for ten 2.5-inch hot-swap drives




- Step 1. Align the two pins on the backplane with the corresponding holes in the chassis as shown.
- Step 2. Lower the backplane into the chassis. Ensure that the pins pass through the holes and the backplane is fully seated in place.

After installing the backplane:

1. Reinstall all the drives and drive fillers into the drive bays. See “Install a hot-swap drive” on page 104.
2. Complete the parts replacement. See “Complete the parts replacement” on page 189.

Remove the rear backplane

Use this information to remove the rear backplane.

 <p>“Read the installation Guidelines” on page 75</p>	 <p>“Power off the server for this task” on page 8</p>	 <p>“ATTENTION: Static Sensitive Device Ground package before opening” on page 77</p>
--	---	--

Before removing the rear backplane:

1. Remove the top cover. See “Remove the top cover” on page 83.
2. Remove the drives or drive fillers installed in the rear hot-swap drive cage. See “Remove a hot-swap drive” on page 103 and “Install a hot-swap drive” on page 104.

To remove the rear backplane, complete the following steps:

- Step 1. Gently press and hold the tab on the rear hot-swap drive cage as shown and remove the air baffle from the rear hot-swap drive cage.

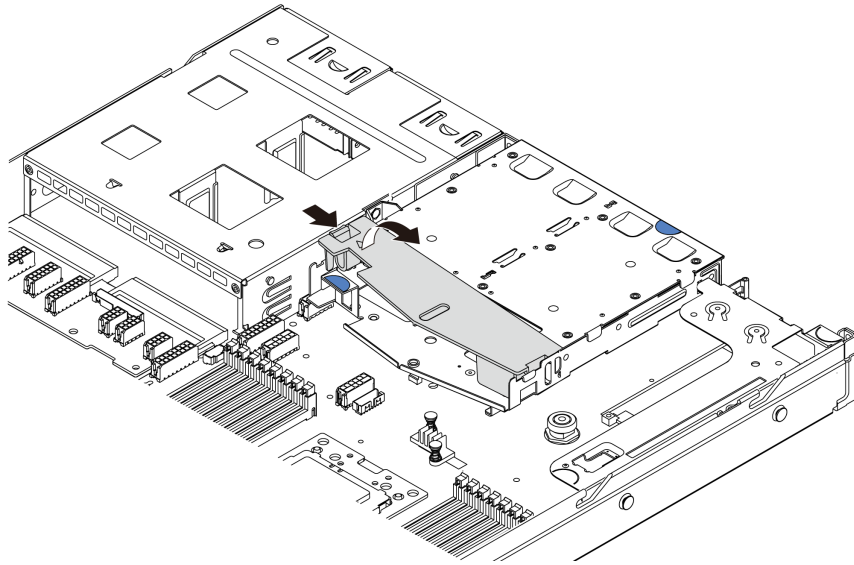


Figure 112. Air baffle removal

- Step 2. Disconnect the cables from the rear backplane.
- Step 3. Carefully lift the rear backplane out of the rear hot-swap drive cage.

Note: There are two types of rear backplanes. The rear backplane you want to install might be different from the following illustration, but the installation method is the same.

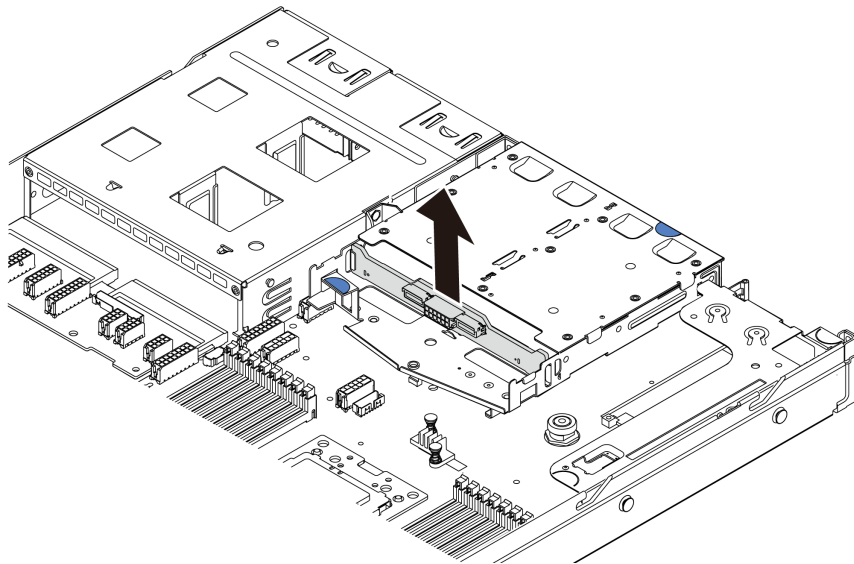
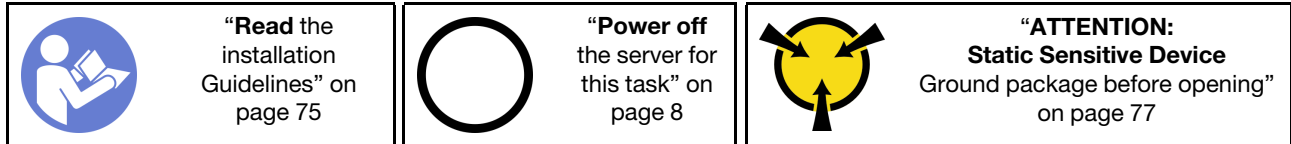


Figure 113. Rear backplane removal

If you are instructed to return the old rear backplane, follow all packaging instructions and use any packaging materials that are provided.

Install the rear backplane

Use this information to install the rear backplane.



Before installing the rear backplane, touch the static-protective package that contains the new rear backplane to any unpainted surface on the outside of the server. Then, take the new rear backplane out of the package and place it on a static-protective surface.

To install the rear backplane, complete the following steps:

Watch the procedure. A video of the installation process is available:

- Youtube: <https://www.youtube.com/playlist?list=PLYV5R7hVcs-DTDY1ImpIPpJV0zo7dKq14>
- Youku: http://list.youku.com/albumlist/show/id_52222446.html

Step 1. Align the rear backplane with the rear hot-swap drive cage and lower it into the rear hot-swap drive cage.

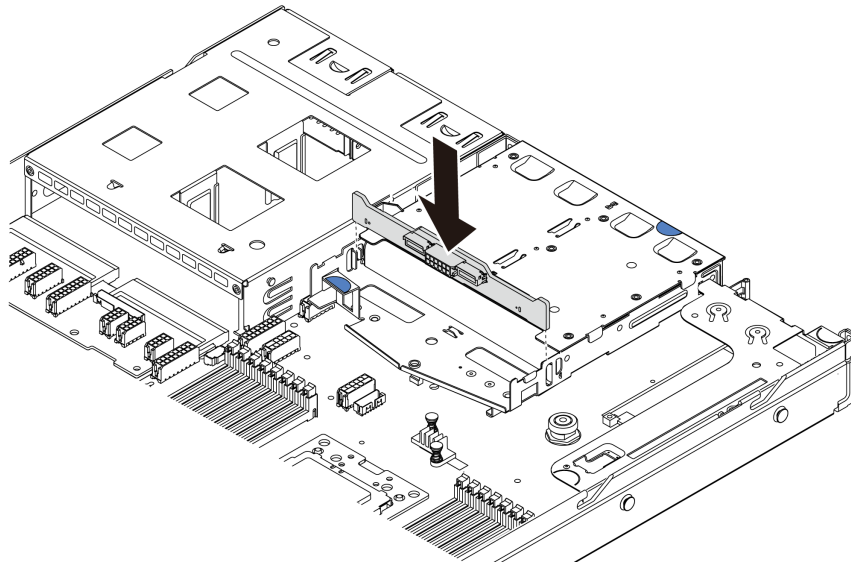


Figure 114. Rear backplane installation

Step 2. Connect the signal cable and the power cable on the rear backplane.

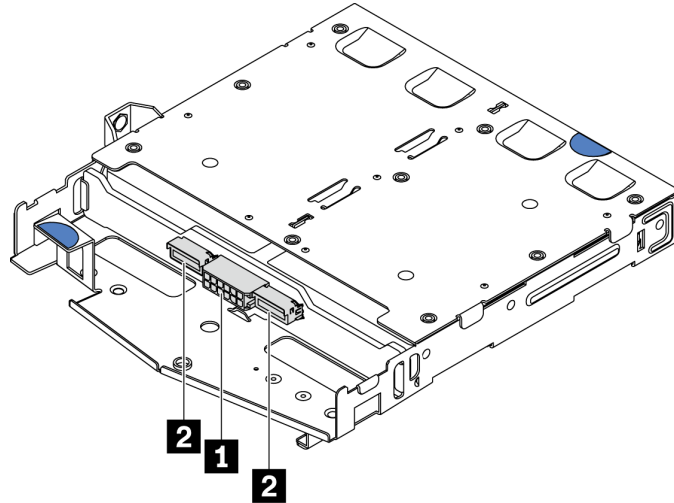


Figure 115. NVMe rear backplane connectors

1	Power connector
2	NVMe signal connector

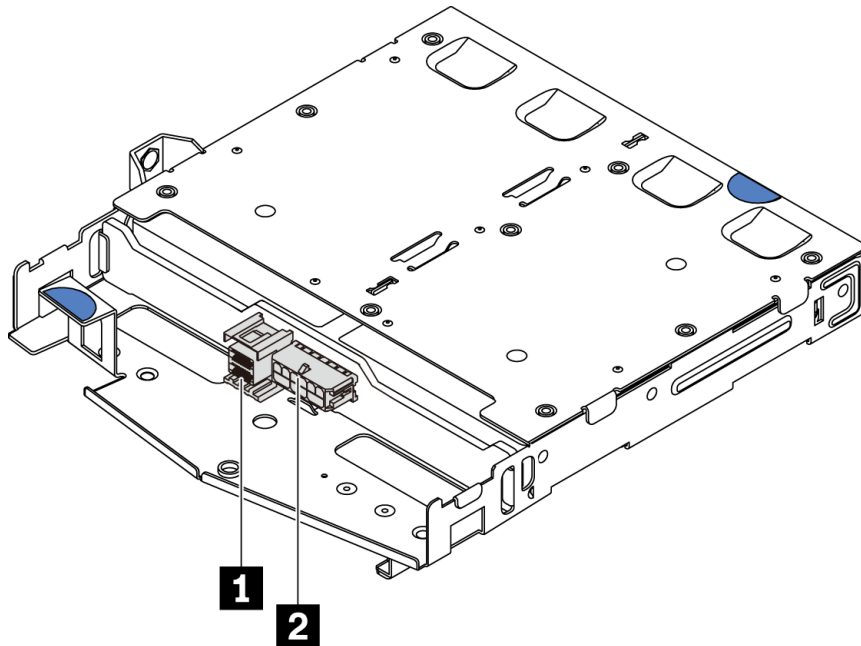


Figure 116. SAS/SATA rear backplane connectors

1	SAS/SATA signal connector
2	Power connector

Step 3. Install the air baffle into the rear hot-swap drive cage as shown.

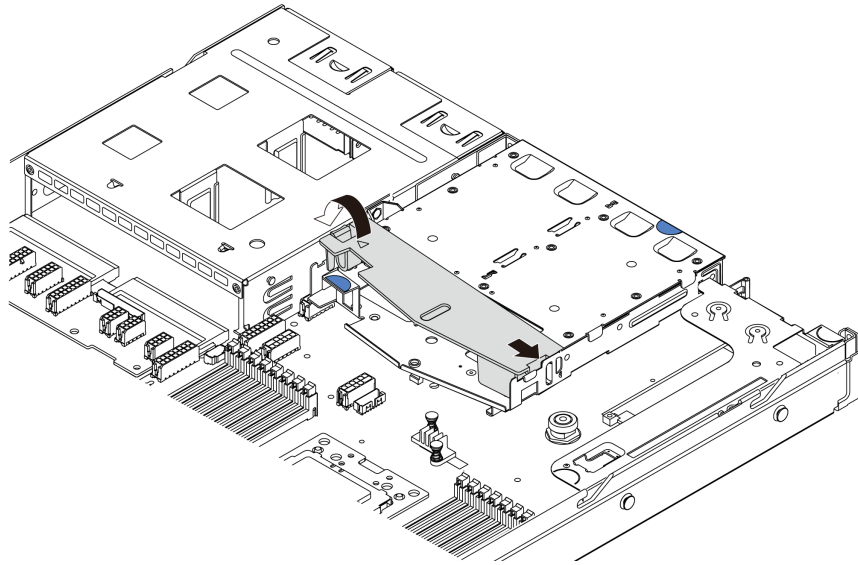


Figure 117. Air baffle installation

After installing the rear backplane:


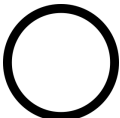

1. Reinstall the drives or drive fillers into the rear hot-swap drive cage. See “Install a hot-swap drive” on page 104.
2. Complete the parts replacement. See “Complete the parts replacement” on page 189.

CMOS battery replacement

Use this information to remove and install the CMOS battery.

Remove the CMOS battery

Use this information to remove the CMOS battery.

 <p>“Read the installation Guidelines” on page 75</p>	 <p>“Power off the server for this task” on page 8</p>	 <p>“ATTENTION: Static Sensitive Device Ground package before opening” on page 77</p>
--	---	---

The following tips describe information that you must consider when removing the CMOS battery.

- Lenovo has designed this product with your safety in mind. The lithium CMOS battery must be handled correctly to avoid possible danger. If you replace the CMOS battery, you must adhere to the following instructions.
- If you replace the original lithium battery with a heavy-metal battery or a battery with heavy-metal components, be aware of the following environmental consideration. Batteries and accumulators that contain heavy metals must not be disposed of with normal domestic waste. They will be taken back free of charge by the manufacturer, distributor, or representative, to be recycled or disposed of in a proper manner.
- To order replacement batteries, call 1-800-IBM-SERV within the U.S., and 1-800-465-7999 or 1-800-465-6666 within Canada. Outside the U.S. and Canada, call your support center or business partner.

Note: After you replace the CMOS battery, you must reconfigure the server and reset the system date and time.

S004



CAUTION:

When replacing the lithium battery, use only Lenovo specified part number or an equivalent type battery recommended by the manufacturer. If your system has a module containing a lithium battery, replace it only with the same module type made by the same manufacturer. The battery contains lithium and can explode if not properly used, handled, or disposed of. *Do not:*

- Throw or immerse into water
- Heat to more than 100°C (212°F)
- Repair or disassemble

Dispose of the battery as required by local ordinances or regulations.

S002



CAUTION:

The power control button on the device and the power switch on the power supply do not turn off the electrical current that is 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.

Before removing the CMOS battery:

1. Remove the top cover. See “Remove the top cover” on page 83.
2. Remove any parts and disconnect any cables that might impede your access to the CMOS battery.

To remove the CMOS battery, complete the following steps:

Watch the procedure. A video of the removal process is available:

- Youtube: <https://www.youtube.com/playlist?list=PLYV5R7hVcs-DTDY1ImpIPpJV0zo7dKq14>
- Youku: http://list.youku.com/albumlist/show/id_52222446.html

Step 1. Locate the CMOS battery. See “System board components” on page 20.

Step 2. Press the battery clip as shown and carefully lift CMOS battery out of the socket.

Attention:

- Failing to remove the CMOS battery properly might damage the socket on the system board. Any damage to the socket might require replacing the system board.
- Do not tilt or push the CMOS battery by using excessive force.

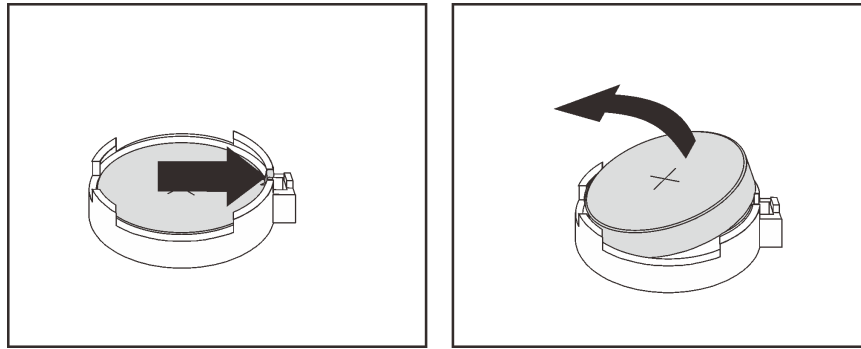



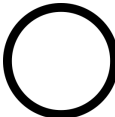

Figure 118. CMOS battery removal

After removing the CMOS battery:

1. Install a new one. See “Install the CMOS battery” on page 133.
2. Dispose of the CMOS battery as required by local ordinances or regulations.

Install the CMOS battery

Use this information to install the CMOS battery.

 <p>“Read the installation Guidelines” on page 75</p>	 <p>“Power off the server for this task” on page 8</p>	 <p>“ATTENTION: Static Sensitive Device Ground package before opening” on page 77</p>
---	--	--

The following tips describe information that you must consider when installing the CMOS battery.

- Lenovo has designed this product with your safety in mind. The lithium battery must be handled correctly to avoid possible danger. If you install the CMOS battery, you must adhere to the following instructions.

Note: In the U. S., call 1-800-IBM-4333 for information about battery disposal.

- If you replace the original lithium battery with a heavy-metal battery or a battery with heavy-metal components, be aware of the following environmental consideration. Batteries and accumulators that contain heavy metals must not be disposed of with normal domestic waste. They will be taken back free of charge by the manufacturer, distributor, or representative, to be recycled or disposed of in a proper manner.
- To order replacement batteries, call 1-800-IBM-SERV within the U.S., and 1-800-465-7999 or 1-800-465-6666 within Canada. Outside the U.S. and Canada, call your support center or business partner.

Note: After you install the CMOS battery, you must reconfigure the server and reset the system date and time.

S004



CAUTION:

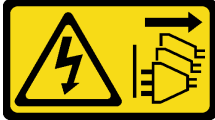
When replacing the lithium battery, use only Lenovo specified part number or an equivalent type battery recommended by the manufacturer. If your system has a module containing a lithium battery,

replace it only with the same module type made by the same manufacturer. The battery contains lithium and can explode if not properly used, handled, or disposed of. *Do not:*

- Throw or immerse into water
- Heat to more than 100°C (212°F)
- Repair or disassemble

Dispose of the battery as required by local ordinances or regulations.

S002



CAUTION:

The power control button on the device and the power switch on the power supply do not turn off the electrical current that is 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.

To install the CMOS battery, complete the following steps:

Watch the procedure. A video of the installation process is available:

- Youtube: <https://www.youtube.com/playlist?list=PLYV5R7hVcs-DTDY1ImpIPpJV0zo7dKq14>
- Youku: http://list.youku.com/albumlist/show/id_52222446.html

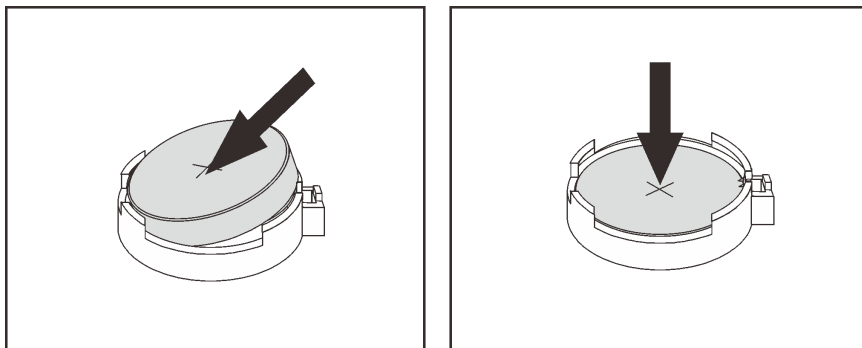


Figure 119. CMOS battery installation

Step 1. Touch the static-protective package that contains the new CMOS battery to any unpainted surface on the outside of the server. Then, take the new CMOS battery out of the package.

Step 2. Install the new CMOS battery. Ensure that the CMOS battery is seated in place.

After installing the CMOS battery:

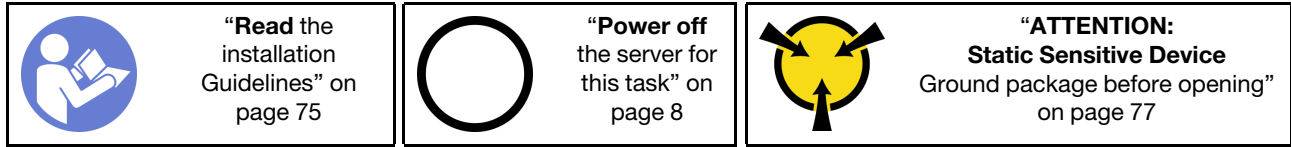
1. Complete the parts replacement. See “Complete the parts replacement” on page 189.
2. Use the Setup utility to set the date, time, and any passwords.

TPM adapter replacement

Use this information to remove and install the TPM adapter (sometimes called a daughter card).

Remove the TPM adapter

Use this information to remove the TPM adapter.



Before removing the TPM adapter, remove the top cover. See “Remove the top cover” on page 83.

To remove the TPM adapter, complete the following steps:

Watch the procedure. A video of the removal process is available:

- Youtube: <https://www.youtube.com/playlist?list=PLYV5R7hVcs-DTDY1ImpIPpJV0zo7dKq14>
- Youku: http://list.youku.com/albumlist/show/id_52222446.html

Step 1. Locate the TPM connector on the system board.

Step 2. Press and hold the release latch, and then lift the TPM adapter straight up.

Notes:

- Carefully handle the TPM adapter by its edges.
- Your TPM adapter might look slightly different from the illustration.

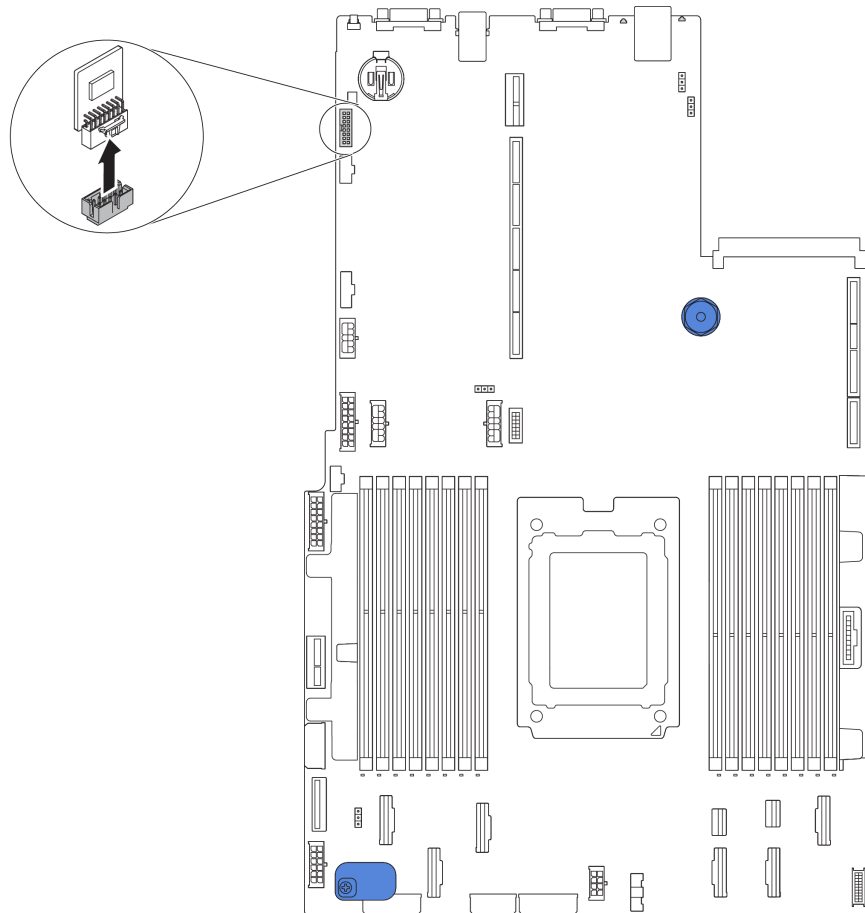

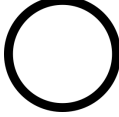



Figure 120. TPM adapter removal

If you are instructed to return the old TPM adapter, follow all packaging instructions and use any packaging materials that are provided.

Install the TPM adapter

Use this information to install the TPM adapter.

 <p>“Read the installation Guidelines” on page 75</p>	 <p>“Power off the server for this task” on page 8</p>	 <p>“ATTENTION: Static Sensitive Device Ground package before opening” on page 77</p>
---	--	--

Before installing the TPM adapter, touch the static-protective package that contains the new TPM adapter to any unpainted surface on the outside of the server. Then, take the new TPM adapter out of the package and place it on a static-protective surface.

To install the TPM adapter, complete the following steps:

Watch the procedure. A video of the installation process is available:

- Youtube: <https://www.youtube.com/playlist?list=PLYV5R7hVcs-DTDY1ImpIPpJV0zo7dKq14>
- Youku: http://list.youku.com/albumlist/show/id_52222446.html

Step 1. Locate the TPM connector on the system board.

Step 2. Insert the TPM adapter into the TPM connector on the system board.

Notes:

- Carefully handle the TPM adapter by its edges.
- Your TPM adapter might look slightly different from the illustration.

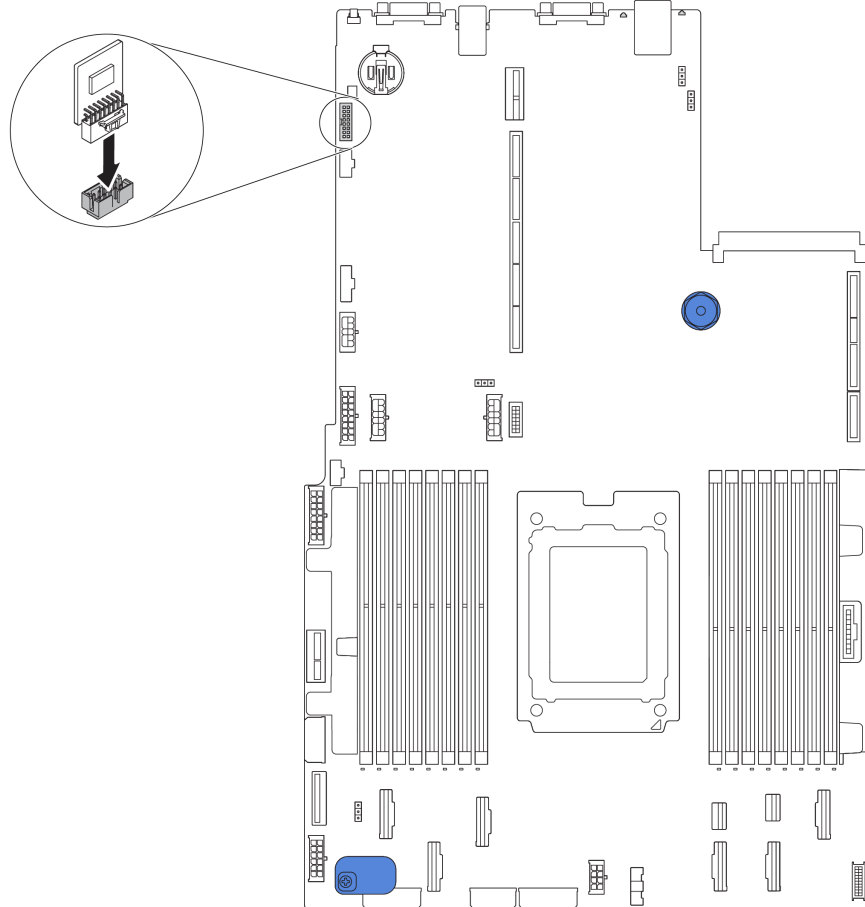


Figure 121. TPM adapter installation

After installing the TPM adapter, complete the parts replacement. See “Complete the parts replacement” on page 189.

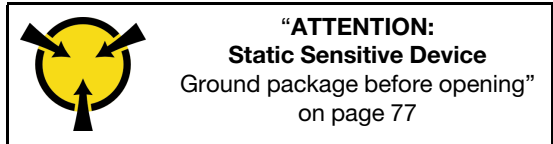
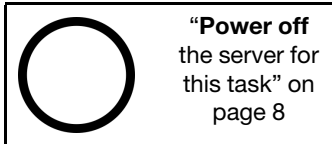
Rear hot-swap drive cage replacement

Use this information to remove and install the rear hot-swap drive cage.

Note: The term “hot-swap drive” refers to all the supported types of 2.5-inch hot-swap hard disk drives and hot-swap solid-state drives.

Remove the rear hot-swap drive cage

Use this information to remove the rear hot-swap drive cage.



Before removing the rear hot-swap drive cage:

1. Remove the top cover. See “Remove the top cover” on page 83.
2. Remove the drives or drive fillers installed in the rear hot-swap drive cage. See “Remove a hot-swap drive” on page 103 and “Install a hot-swap drive” on page 104.
3. Disconnect the rear hot-swap drive cage cables from the system board or the PCIe adapter.

To remove the rear hot-swap drive cage, complete the following step:

Watch the procedure. A video of the removal process is available:

- Youtube: <https://www.youtube.com/playlist?list=PLYV5R7hVcs-DTDY1ImpIPpJV0zo7dKq14>
- Youku: http://list.youku.com/albumlist/show/id_52222446.html

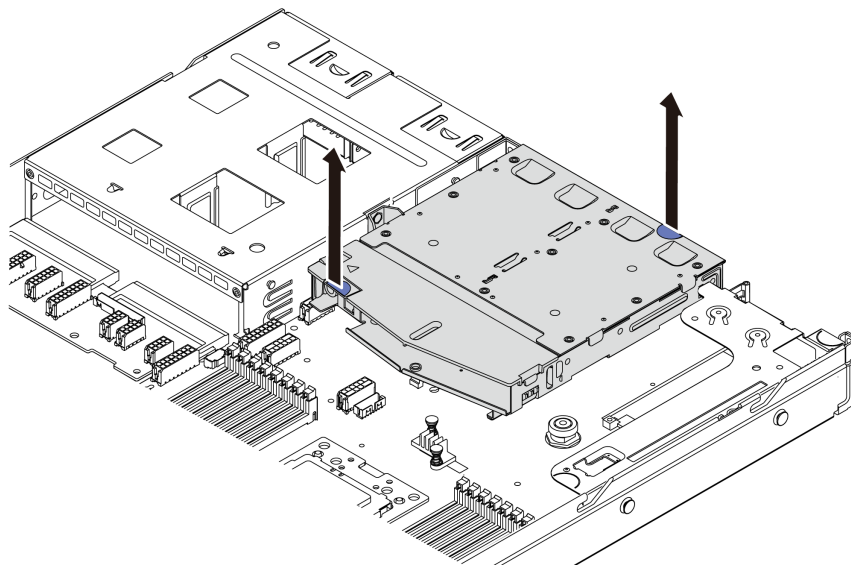


Figure 122. Rear hot-swap drive cage removal

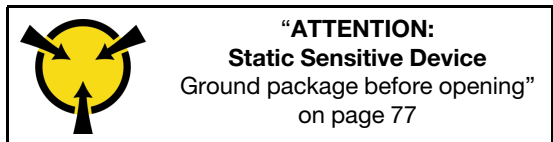
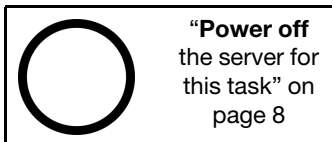
Step 1. Hold the two blue touch points and directly lift the rear hot-swap drive cage out of the chassis.

Step 2. If the rear backplane is reused, remove the rear backplane. See “Remove the rear backplane” on page 127.

If you are instructed to return the old rear hot-swap drive cage, follow all packaging instructions and use any packaging materials that are provided.

Install the rear hot-swap drive cage

Use this information to install the rear hot-swap drive cage.



Before installing the rear hot-swap drive cage, touch the static-protective package that contains the new rear hot-swap drive cage to any unpainted surface on the outside of the server. Then, take the new rear hot-swap drive cage out of the package and place it on a static-protective surface.

To install the rear hot-swap drive cage, complete the following steps:

Watch the procedure. A video of the installation process is available:

- Youtube: <https://www.youtube.com/playlist?list=PLYV5R7hVcs-DTDY1ImpIPpJV0zo7dKq14>
- Youku: http://list.youku.com/albumlist/show/id_52222446.html

Step 1. Gently press and hold the tab on the rear hot-swap drive cage as shown and remove the air baffle from the rear hot-swap drive cage.

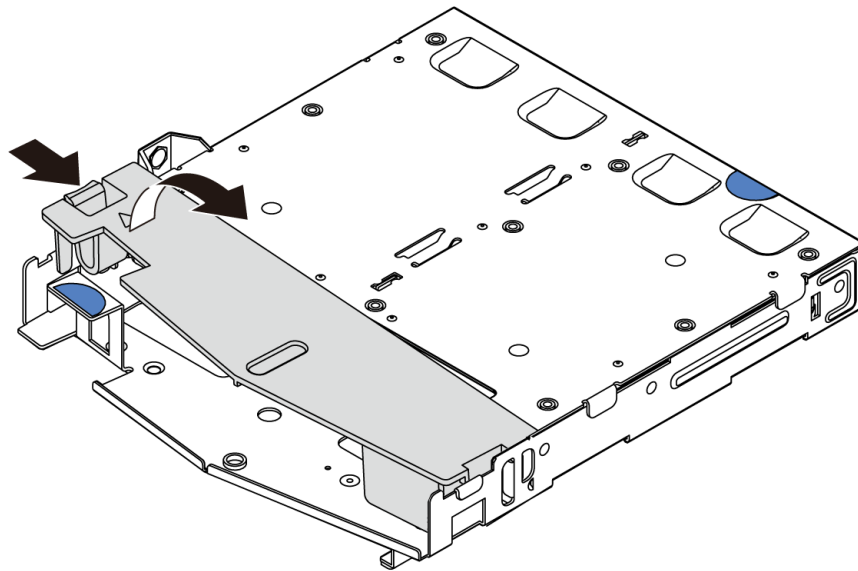


Figure 123. Air baffle removal

Step 2. Align the rear backplane with the rear hot-swap drive cage and lower it into the rear hot-swap drive cage.

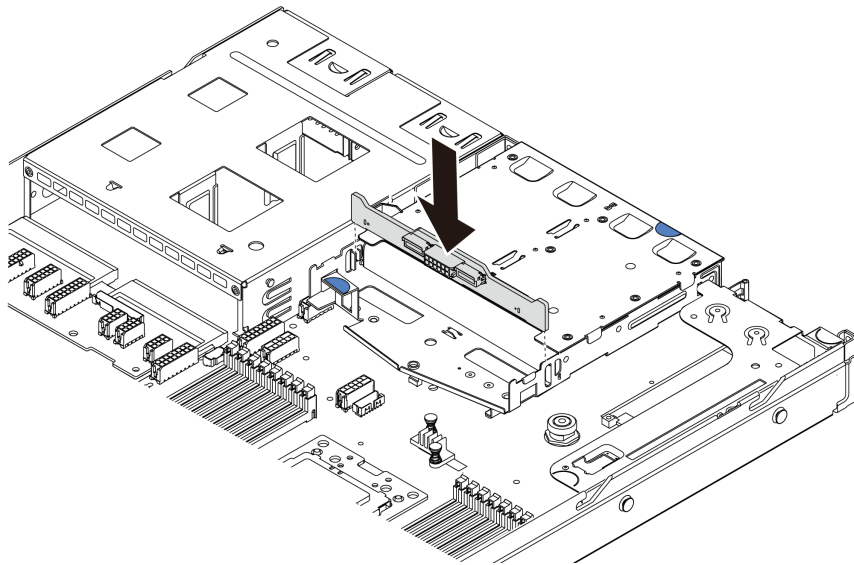


Figure 124. Rear backplane installation

Step 3. Connect the signal cable and the power cable on the rear backplane.

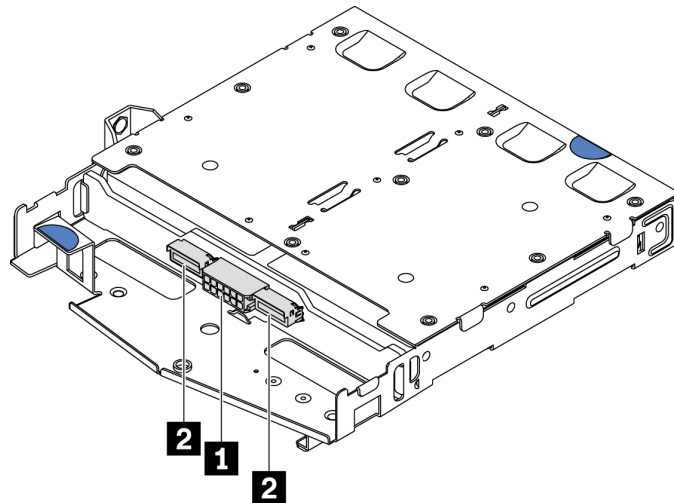


Figure 125. NVMe rear backplane connectors

1	Power connector
2	NVMe signal connector

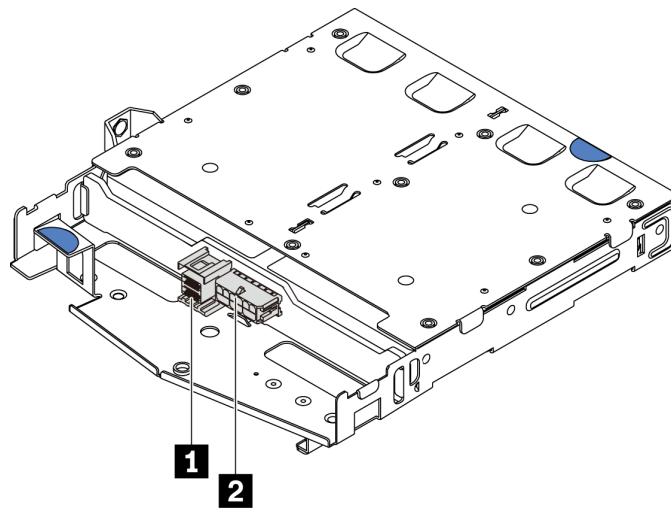


Figure 126. SAS/SATA rear backplane connectors

1	SAS/SATA signal connector
2	Power connector

Step 4. Install the air baffle into the rear hot-swap drive cage as shown.

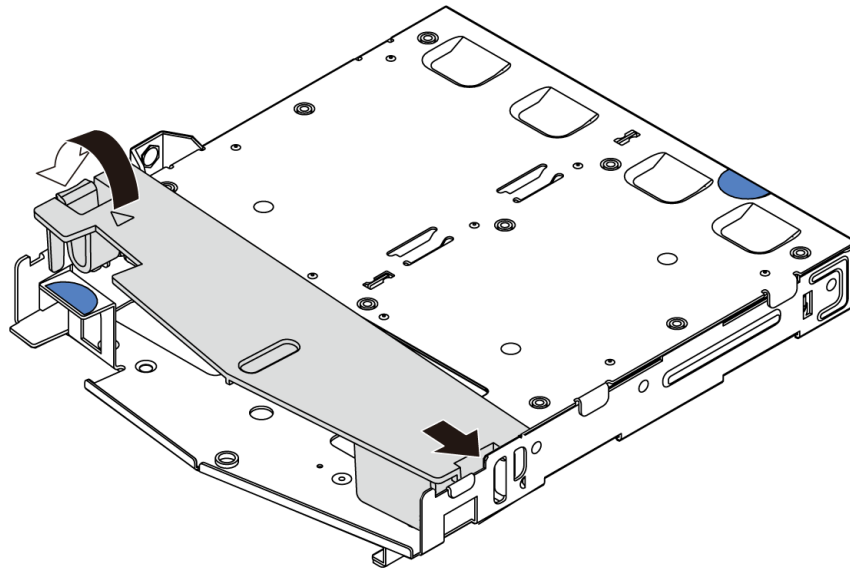


Figure 127. Air baffle installation

Step 5. Align the three pins on the rear hot-swap drive cage with the holes and slot in the chassis. Then, lower the rear hot-swap drive cage into the chassis until it is fully seated.

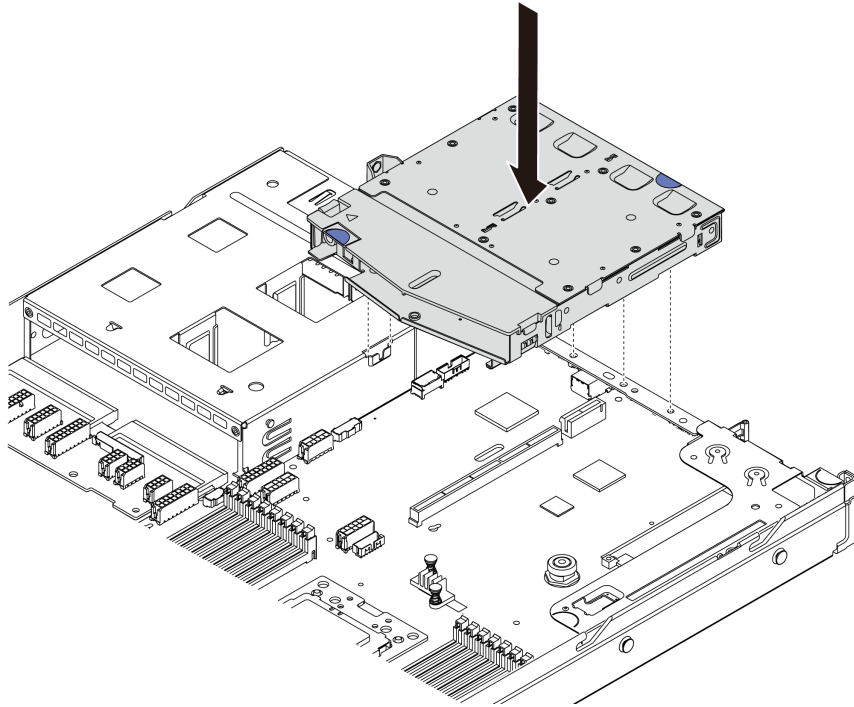


Figure 128. Rear hot-swap drive cage installation

Step 6. Connect the signal cable and connect the power cable to the system board. See “Internal cable routing” on page 21.

After installing the rear hot-swap drive cage:


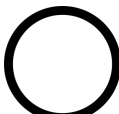

1. Reinstall the drives or drive fillers into the rear hot-swap drive cage. See “Install a hot-swap drive” on page 104.
2. Complete the parts replacement. See “Complete the parts replacement” on page 189.

Middle drive cage replacement

Use this information to remove and install the middle drive cage.

Remove the middle drive cage

Use this information to remove the middle drive cage.

 <p>“Read the installation Guidelines” on page 75</p>	 <p>“Power off the server for this task” on page 8</p>	 <p>“ATTENTION: Static Sensitive Device Ground package before opening” on page 77</p>
--	---	---

Before removing the middle drive cage:

1. Remove the top cover. See “Remove the top cover” on page 83.
2. Disconnect the cables from the backplane.

To remove the middle drive cage, complete the following steps:

Watch the procedure. A video of the removal process is available:

- Youtube: <https://www.youtube.com/playlist?list=PLYV5R7hVcs-DTDY1ImpIPpJV0zo7dKq14>
- Youku: http://list.youku.com/albumlist/show/id_52222446.html

Step 1. Remove all the installed drives from the drive bays in the middle cage. To remove the drives, do the following:

- a. Hold and lift the two blue handles.
- b. Pull the hot-swap drives from the internal drive cage. See “Remove a hot-swap drive” on page 103.

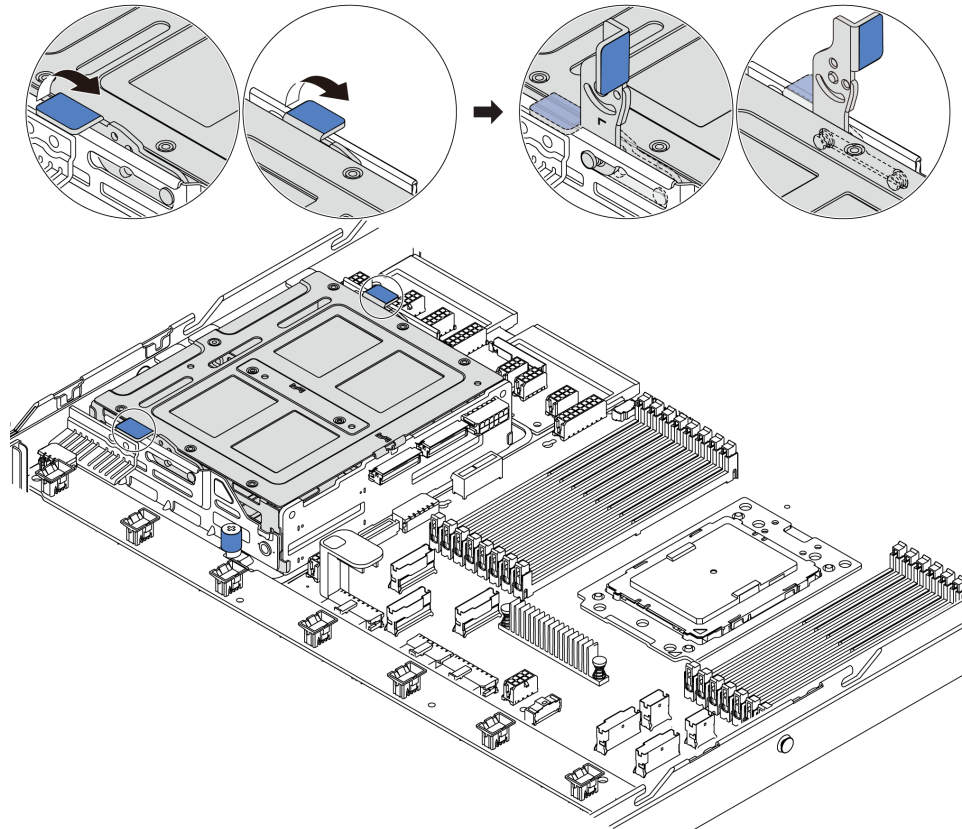


Figure 129. Internal drive removal-1

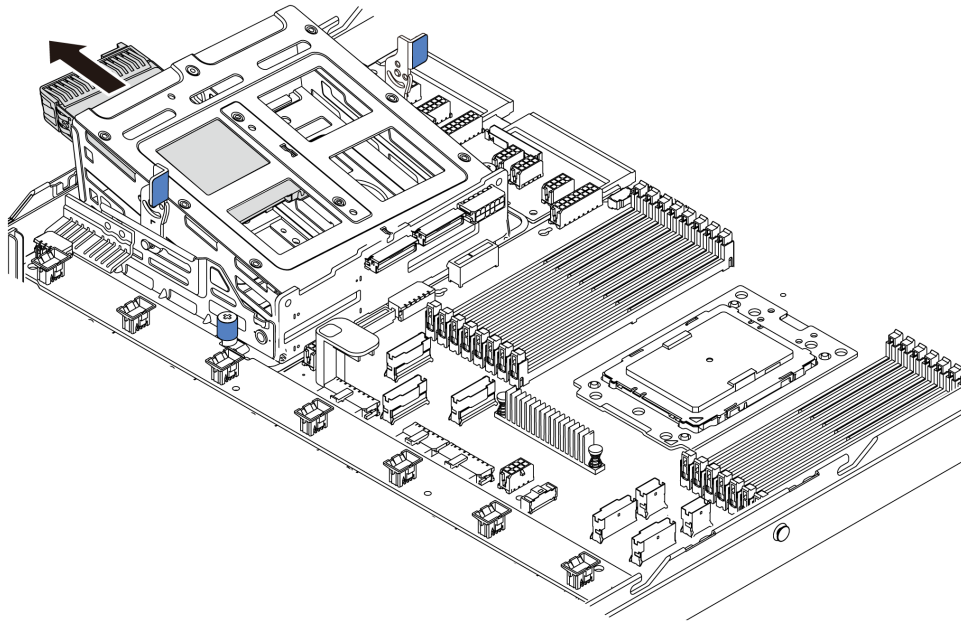


Figure 130. Internal drive removal-2

Step 2. Loosen the thumbscrews that secure the middle drive cage.

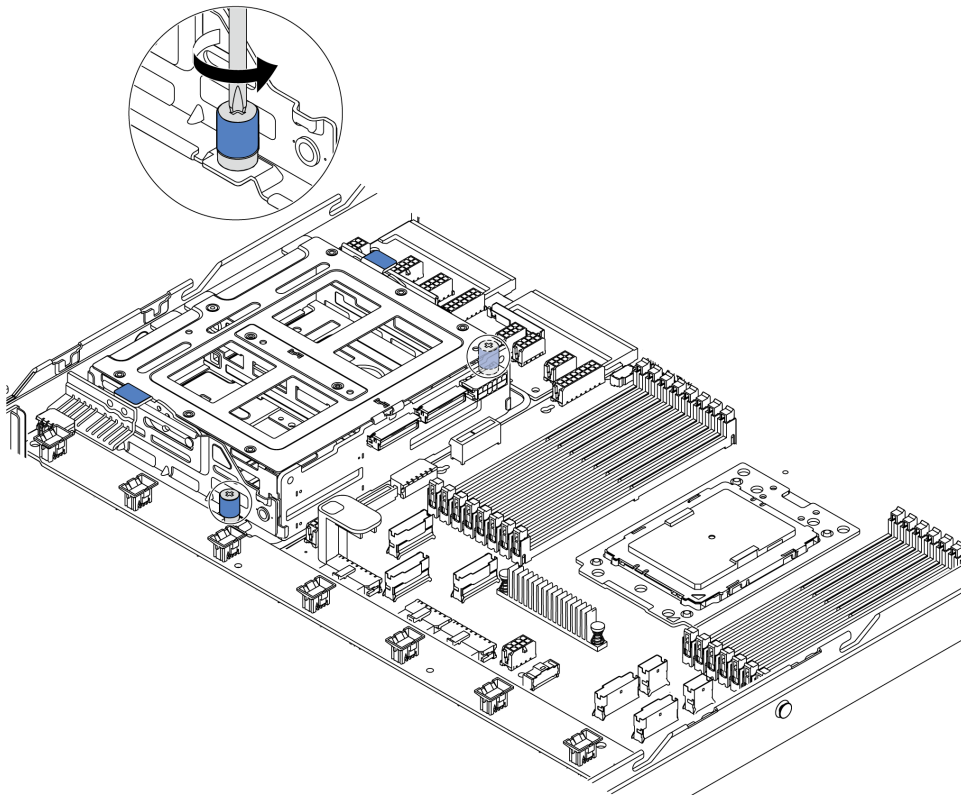


Figure 131. Middle drive cage removal-1

Step 3. Hold and lift the middle drive cage from the chassis as shown.

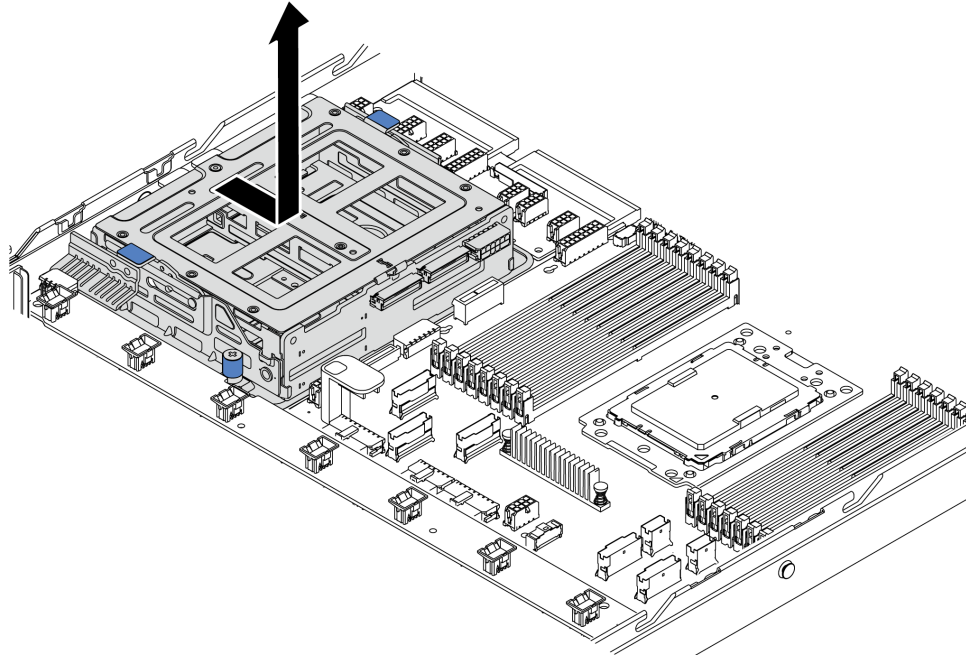


Figure 132. Middle drive cage removal-2

- Step 4. Remove the internal backplane from the middle drive cage.
- a. Remove the screws that secure the internal backplane in the middle drive cage.
 - b. Lift the internal backplane out of the middle drive cage.

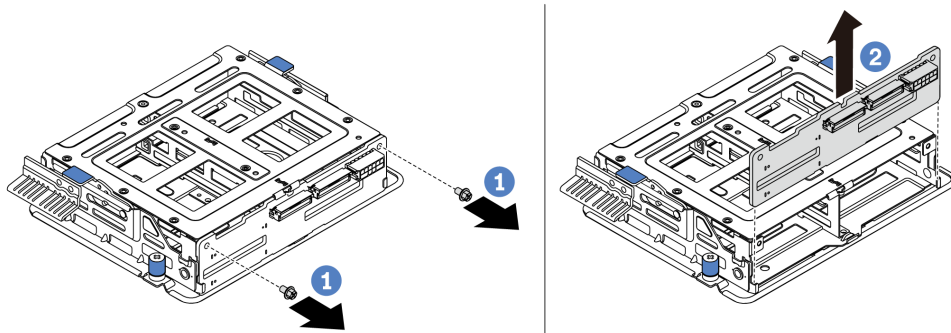





Figure 133. Internal backplane removal

If you are instructed to return the old middle drive cage, follow all packaging instructions and use any packaging materials that are provided.

Install the middle drive cage

Use this information to install the middle drive cage.

 <p>“Read the installation Guidelines” on page 75</p>	 <p>“Power off the server for this task” on page 8</p>	 <p>“ATTENTION: Static Sensitive Device Ground package before opening” on page 77</p>
--	---	---

Before installing the middle drive cage, touch the static-protective package that contains the new middle drive cage to any unpainted surface on the outside of the server. Then, take the new internal drive assembly out of the package and place it on a static-protective surface.

To install the middle drive cage, complete the following steps:

Watch the procedure. A video of the installation process is available:

- Youtube: <https://www.youtube.com/playlist?list=PLYV5R7hVcs-DTDY1ImpIPpJV0zo7dKq14>
- Youku: http://list.youku.com/albumlist/show/id_52222446.html

Step 1. Install the internal backplane on the middle drive cage.

- Align the internal backplane with the middle drive cage and lower it into the middle drive cage until it is fully seated.
- Install the screws to secure the internal backplane in place.

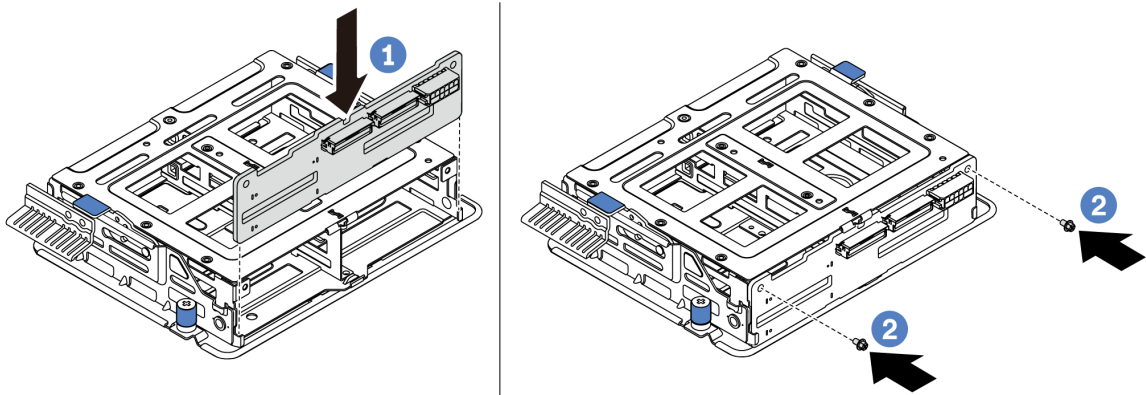


Figure 134. Internal backplane installation

Step 2. Align the two pins on the middle drive cage with the holes and slot in the chassis. Then, lower the middle drive assembly into the chassis and push forward the cage until it is fully seated.

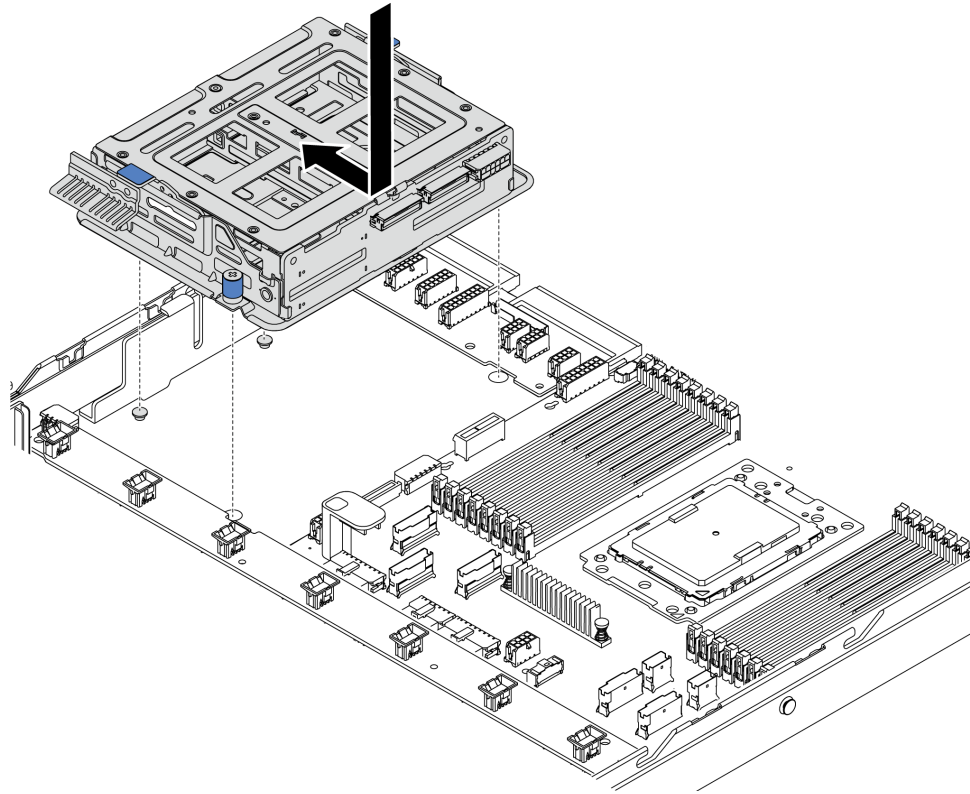


Figure 135. Middle drive cage installation-1

Step 3. Tighten the thumbscrews to secure the middle drive cage.

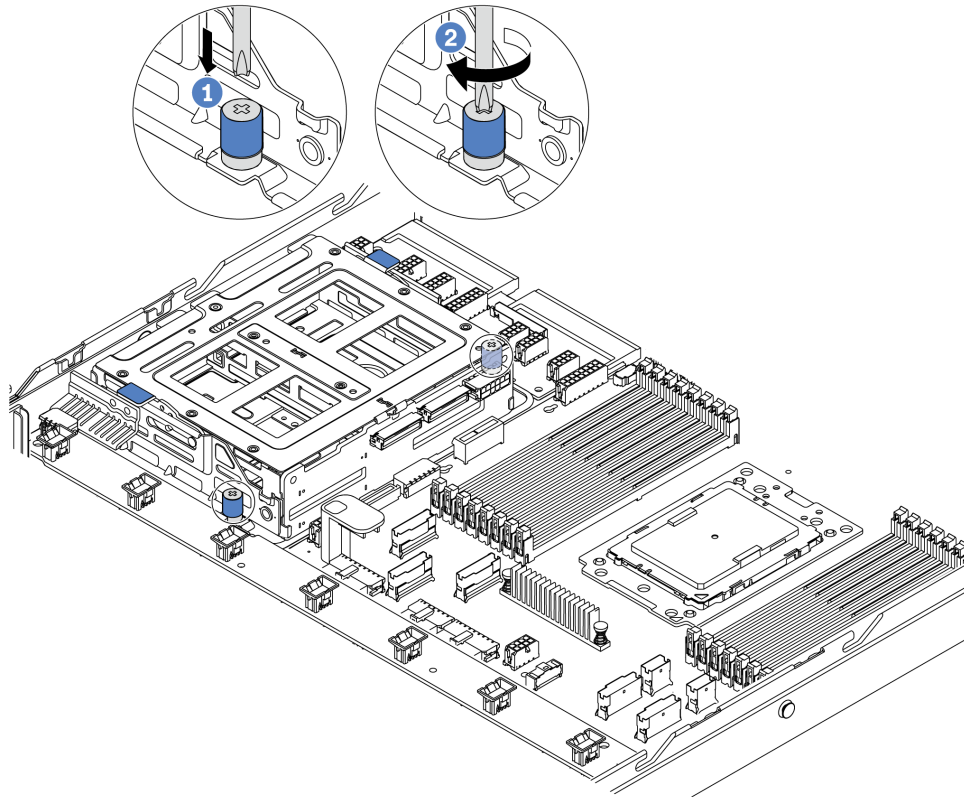


Figure 136. Middle drive cage installation-2

Step 4. Hold and lift the two blue handles. Install the hot-swap drives in the middle drive cage.

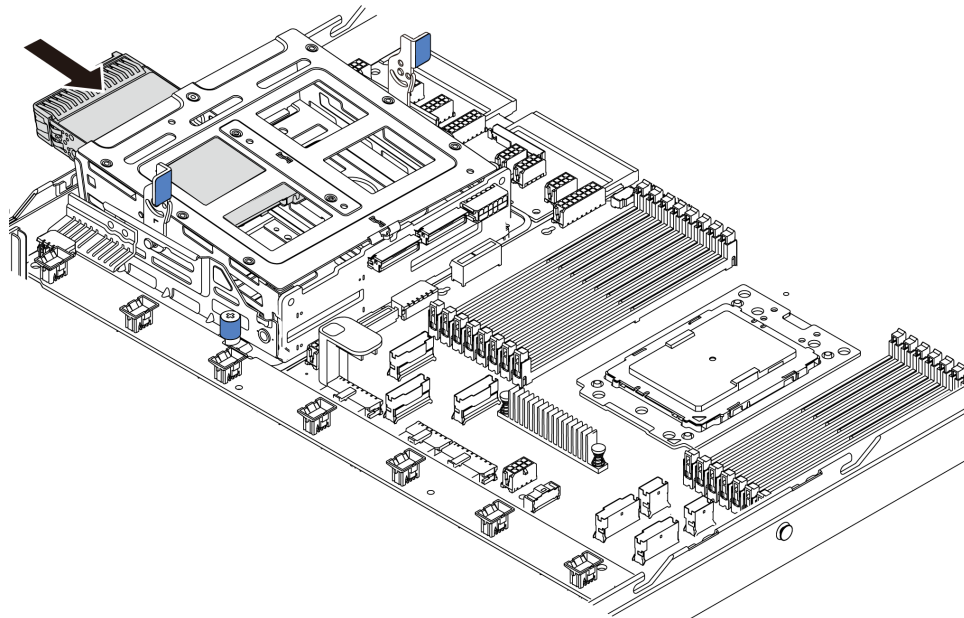


Figure 137. Internal hot-swap drive installation-1

Step 5. Press two blue handles and slide down the cage.

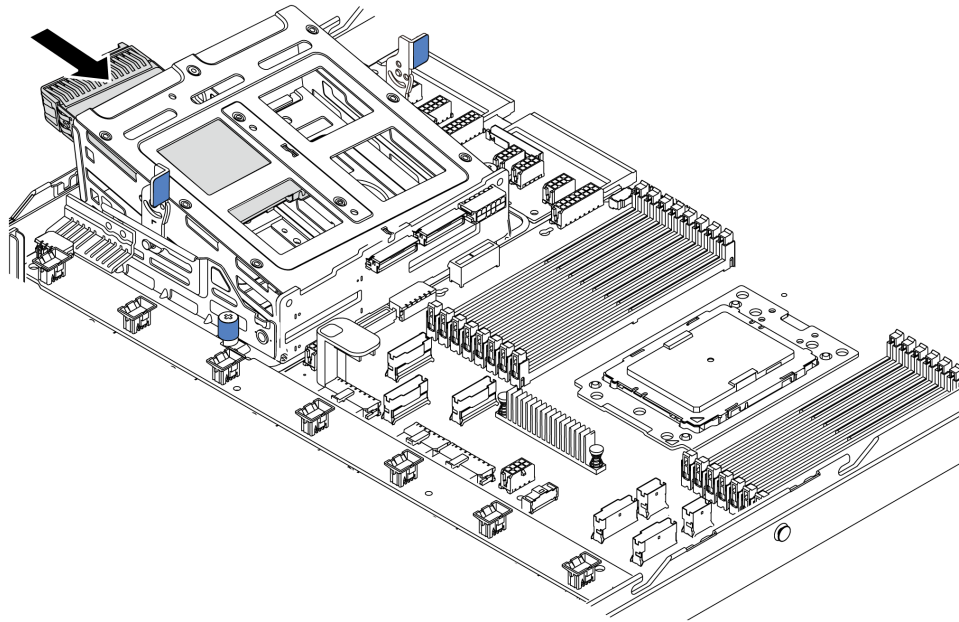


Figure 138. Internal hot-swap drive installation-2

After installing all hot-swap drives:

1. Use the Lenovo XClarity Provisioning Manager Lite to configure the RAID if necessary. For more information, see:
https://sysmgt.lenovofiles.com/help/topic/ixpml_v2/Introduction.html
2. Complete the parts replacement. See “Complete the parts replacement” on page 189.

M.2 adapter and M.2 drive replacement

Use this information to remove and install the M.2 adapter and M.2 drive (an assembled M.2 adapter and M.2 drive is also known as M.2 module).

Remove the M.2 adapter and M.2 drive

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

Before removing the M.2 adapter and M.2 drive:

1. Remove the top cover. See “Remove the top cover” on page 83.
2. For easier operation, remove the internal riser assembly next to the M.2 adapter. See “Remove the internal riser assembly” on page 111.

To remove the M.2 adapter and M.2 drive, complete the following steps:

Note: The M.2 adapter you want to remove might be different from the following illustrations, but the removal method is the same.

Watch the procedure. A video of the removal process is available:

- Youtube: <https://www.youtube.com/playlist?list=PLYV5R7hVcs-DTDY1ImpIPpJV0zo7dKq14>
- Youku: http://list.youku.com/albumlist/show/id_52222446.html

Step 1. Remove the M.2 drive from the M.2 adapter.

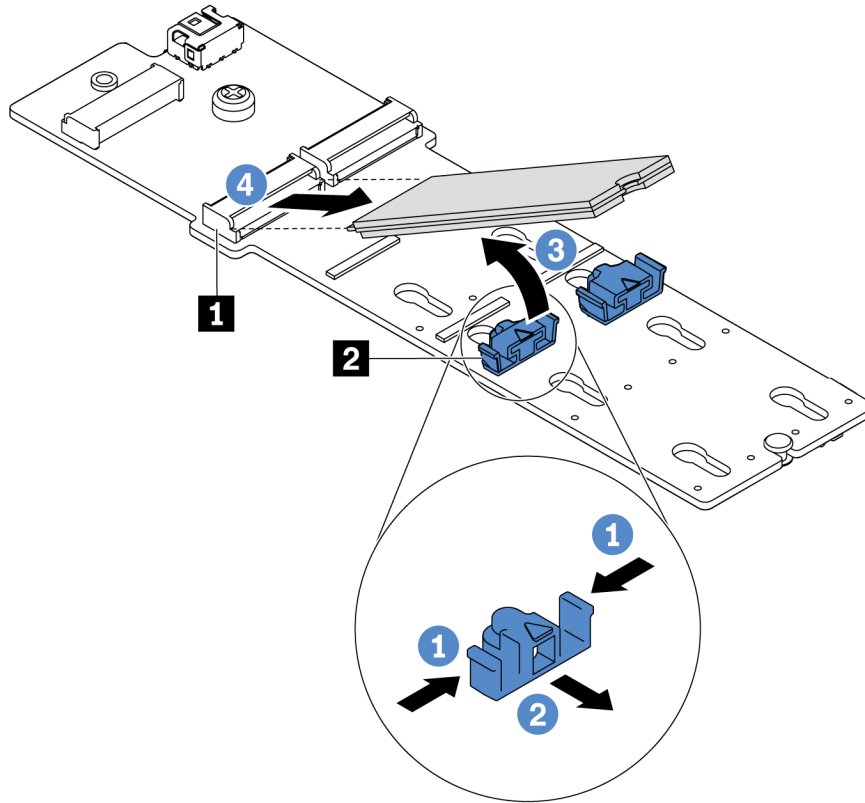


Figure 139. M.2 drive removal

- a. Press both sides of the retainer **2**.
- b. Slide the retainer backward to loosen the M.2 drive from the M.2 adapter.
- c. Rotate the M.2 drive away from the M.2 adapter.
- d. Pull the M.2 drive away from the connector **4** at an angle of approximately 30 degrees.

Step 2. Loosen the screw and remove the M.2 adapter from the bracket.

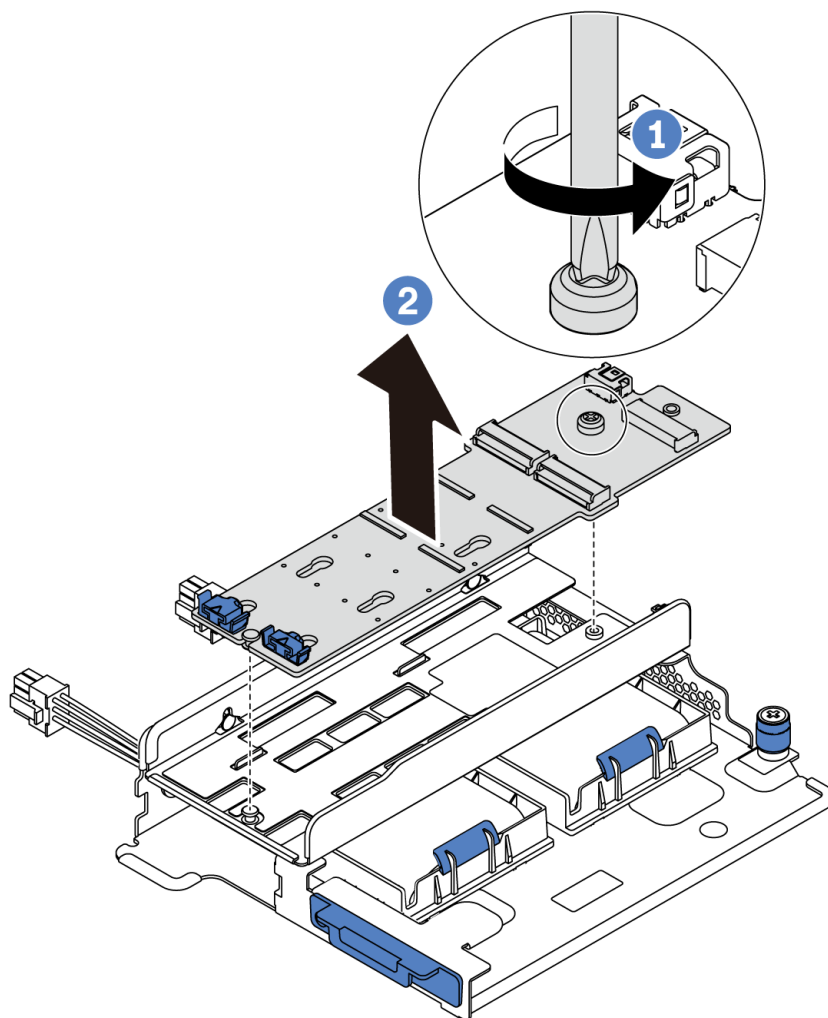


Figure 140. M.2 adapter removal

Step 3. Remove the M.2 adapter bracket if necessary.

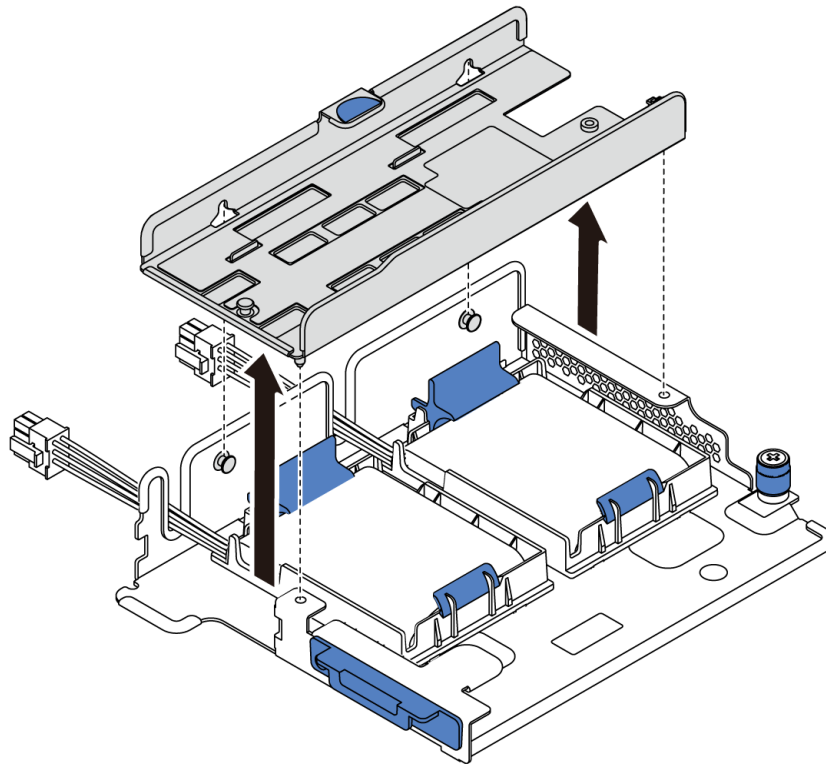


Figure 141. M.2 adapter bracket removal

Adjust the retainer on the M.2 adapter

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

	<p>“Read the installation Guidelines” on page 75</p>		<p>“Power off the server for this task” on page 8</p>		<p>“ATTENTION: Static Sensitive Device Ground package before opening” on page 77</p>
--	--	--	---	--	--

Before adjusting the retainer on the M.2 adapter, 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.

To adjust the retainer on the M.2 adapter, complete the following steps:

Note: The M.2 adapter might be different from the following illustrations, but the adjustment method is the same.

Watch the procedure. A video of the adjustment process is available:

- Youtube: <https://www.youtube.com/playlist?list=PLYV5R7hVcs-DTDY1ImpIPpJVOzo7dKq14>
- Youku: http://list.youku.com/albumlist/show/id_52222446.html

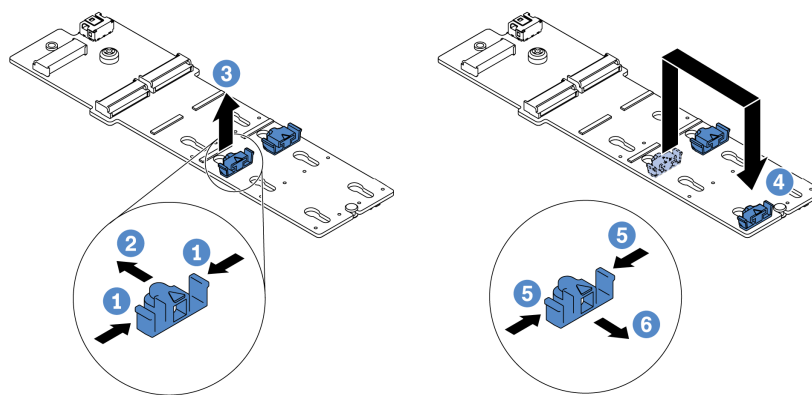

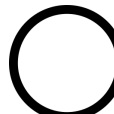



Figure 142. M.2 retainer adjustment

- Step 1. Press both sides of the retainers.
- Step 2. Move the retainer forward until it is in the large opening of the keyhole.
- Step 3. Take the retainer out of the keyhole.
- Step 4. Insert the retainer into the correct keyhole.
- Step 5. Press both sides of the retainer.
- Step 6. Slide the retainer backwards until it is seated in place.

Install the M.2 adapter and M.2 drive

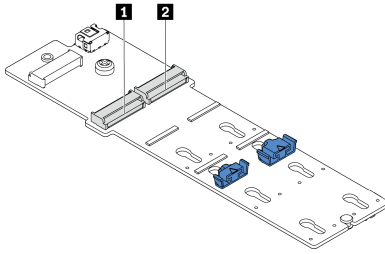
Use this information to install the M.2 adapter and M.2 drive.

 <p>“Read the installation Guidelines” on page 75</p>	 <p>“Power off the server for this task” on page 8</p>	 <p>“ATTENTION: Static Sensitive Device Ground package before opening” on page 77</p>
---	--	--

Before installing the M.2 adapter and M.2 drive:

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.
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 152.
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 143. M.2 drive slot

To install the M.2 adapter and M.2 drive, complete the following steps:

Notes:

- The M.2 adapter module is shipped with a loosen 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.

Watch the procedure. A video of the installation process is available:

- Youtube: <https://www.youtube.com/playlist?list=PLYV5R7hVcs-DTDY1ImpIPpJVOzo7dKq14>
- Youku: http://list.youku.com/albumlist/show/id_52222446.html

- Step 1. Install the internal riser assembly and install the super capacitor modules on the M.2/riser support bracket. See “Install a super capacitor module on the M.2/riser support bracket” on page 158.
- Step 2. Align the pins of the M.2 module bracket with the two holes on both sides of the M.2/riser support bracket, and then install the bracket on the super capacitor modules.

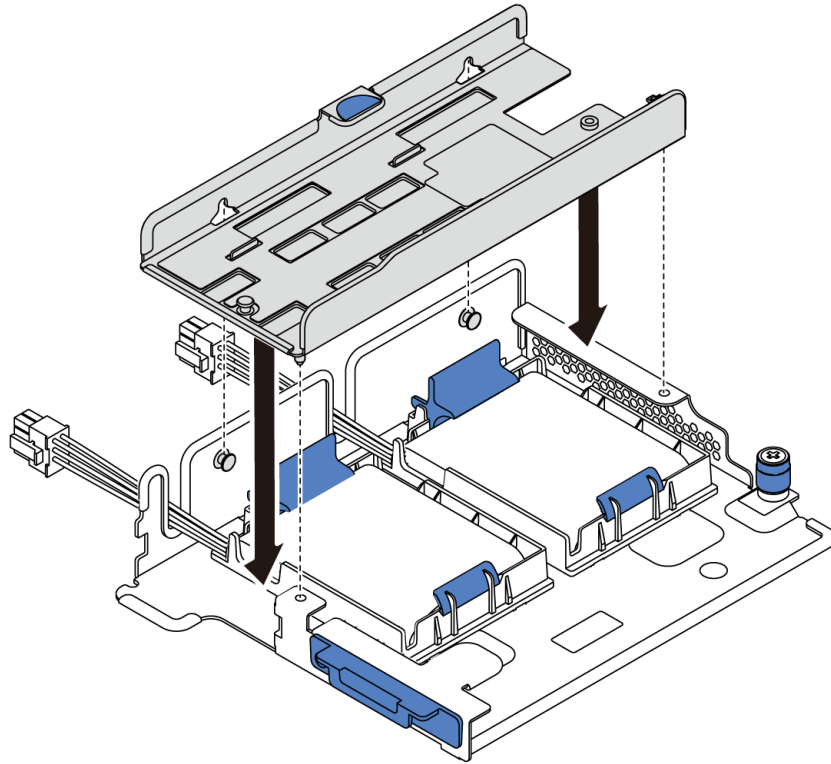


Figure 144. M.2 module bracket installation

Step 3. Install the M.2 adapter into the bracket and tighten the screw.

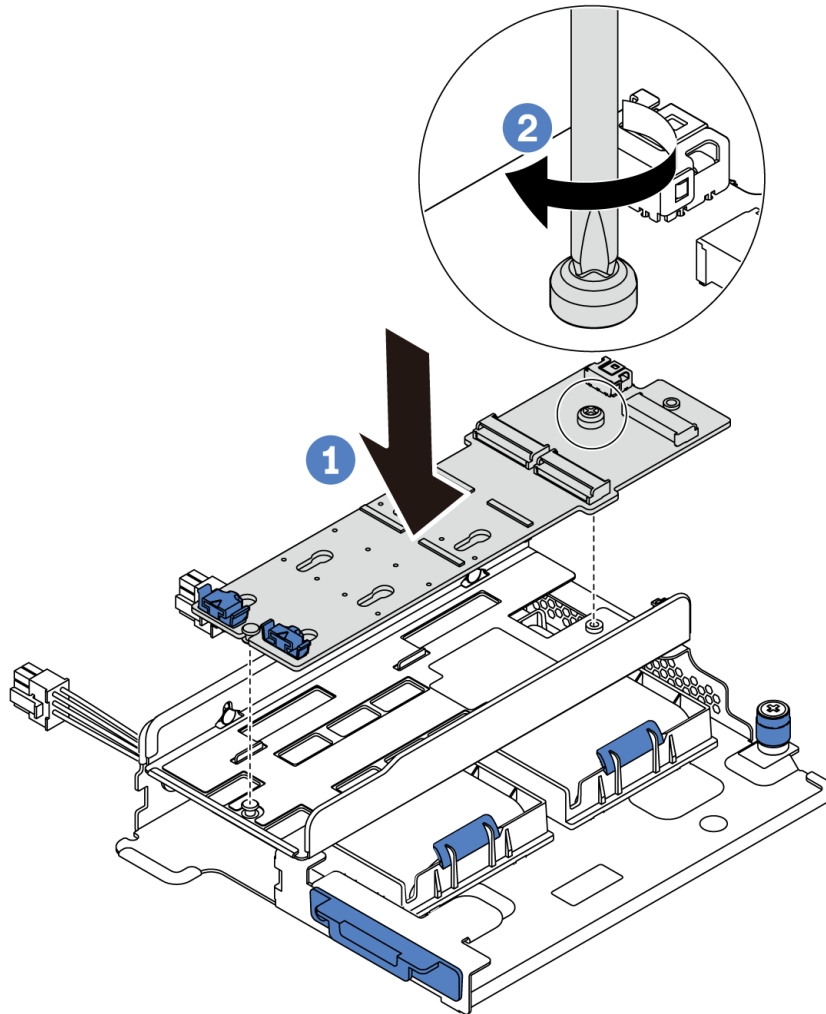


Figure 145. M.2 adapter installation

- Step 4. Install the M.2 drive on the M.2 adapter.
- 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.

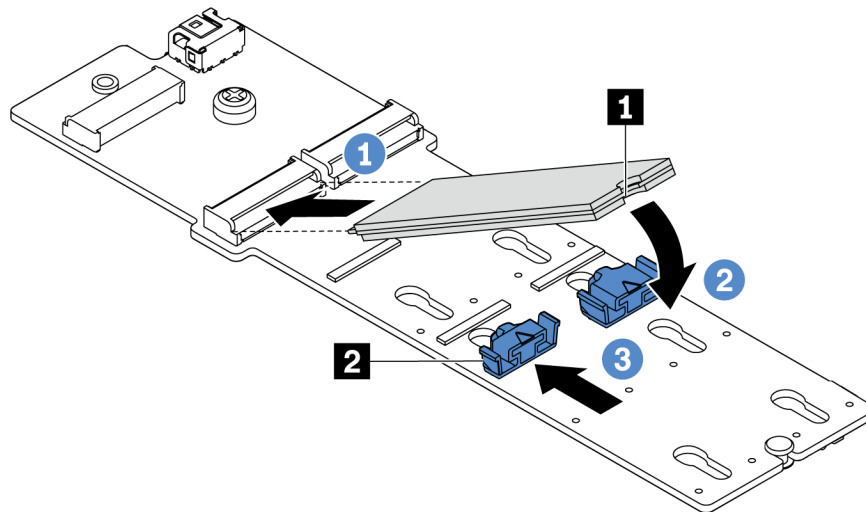


Figure 146. M.2 drive installation

After installing the M.2 drive and M.2 adapter:

1. Complete the parts replacement. See “Complete the parts replacement” on page 189.
2. Use the Lenovo XClarity Provisioning Manager Lite to configure the RAID. For more information, see: https://sysmgt.lenovofiles.com/help/topic/ixpml_v2/Introduction.html.

RAID super capacitor module replacement

Use this information to remove and install a RAID super capacitor module.


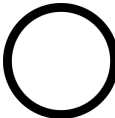

The RAID super capacitor module protects the cache memory on the installed RAID adapter. You can purchase a RAID super capacitor module from Lenovo.

For a list of supported options, see:

<http://www.lenovo.com/us/en/serverproven/>

Remove a super capacitor module on the M.2/riser support bracket

Use this information to remove a super capacitor module.

 <p>“Read the installation Guidelines” on page 75</p>	 <p>“Power off the server for this task” on page 8</p>	 <p>“ATTENTION: Static Sensitive Device Ground package before opening” on page 77</p>
--	---	---

Before removing a super capacitor module:

1. Remove the top cover. See “Remove the top cover” on page 83.
2. Remove the internal riser assembly. See “Remove the internal riser assembly” on page 111.
3. Remove the M.2 module and remove the M.2 adapter bracket if installed. See “Remove the M.2 adapter and M.2 drive” on page 149.
4. Disconnect the cable of the super capacitor module.

To remove a super capacitor module, complete the following steps:

Watch the procedure. A video of the removal process is available:

- Youtube: <https://www.youtube.com/playlist?list=PLYV5R7hVcs-DTDY1ImpIPpJV0zo7dKq14>
- Youku: http://list.youku.com/albumlist/show/id_52222446.html

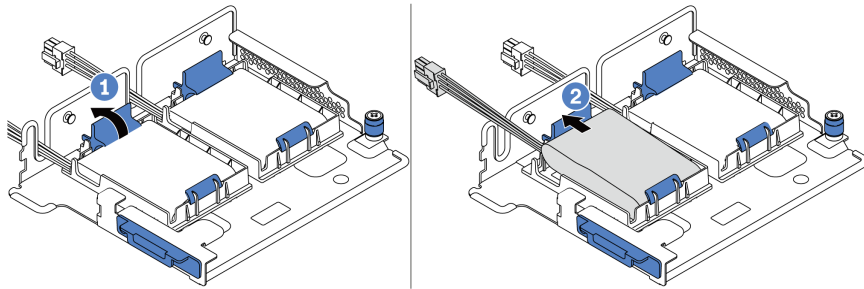



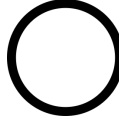

Figure 147. Super capacitor module removal

Step 1. Open the retention clip on the holder of the super capacitor module.

Step 2. Take the super capacitor module out of the holder.

Install a super capacitor module on the M.2/riser support bracket

Use this information to install a super capacitor module.

	<p>“Read the installation Guidelines” on page 75</p>		<p>“Power off the server for this task” on page 8</p>		<p>“ATTENTION: Static Sensitive Device Ground package before opening” on page 77</p>
--	--	--	---	---	--

Before installing the RAID super capacitor module on the chassis, 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.

To install a super capacitor module, complete the following steps:

Watch the procedure. A video of the installation process is available:

- Youtube: <https://www.youtube.com/playlist?list=PLYV5R7hVcs-DTDY1ImpIPpJV0zo7dKq14>
- Youku: http://list.youku.com/albumlist/show/id_52222446.html

Step 1. Open the retention clip on a holder, put a super capacitor module into the holder, and press it down to secure it into the holder.

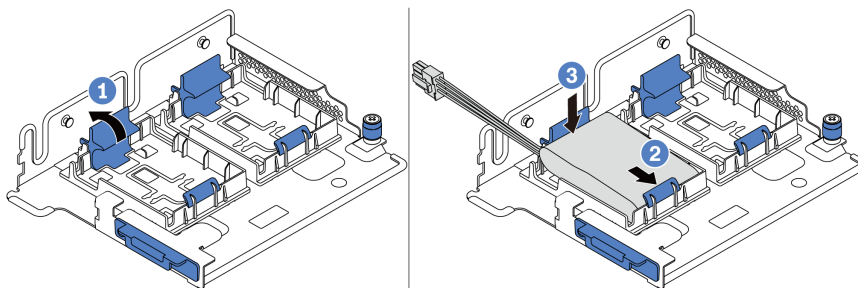


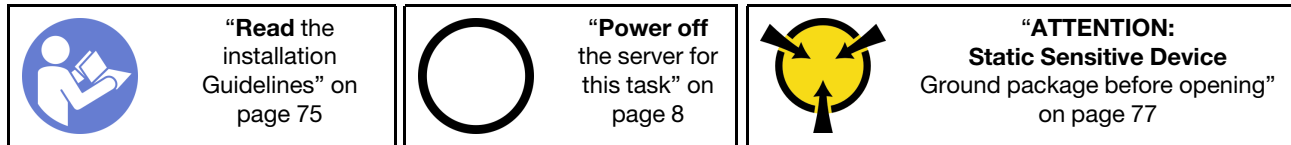
Figure 148. Super capacitor module installation

After installing the super capacitor module:

1. Connect the super capacitor module to an adapter with the extension cable that comes with the super capacitor module.
2. Complete the parts replacement. See “Complete the parts replacement” on page 189.

Remove the RAID super capacitor module on the chassis

Use this information to remove the RAID super capacitor module on the chassis.



Before removing the RAID super capacitor module on the chassis:

1. Remove the top cover. See “Remove the top cover” on page 83.
2. Disconnect the cable of the RAID super capacitor module.

To remove the RAID super capacitor module on the chassis, complete the following steps:

Watch the procedure. A video of the removal process is available:

- Youtube: <https://www.youtube.com/playlist?list=PLYV5R7hVcs-DTDY1ImpIPpJV0zo7dKq14>
- Youku: http://list.youku.com/albumlist/show/id_52222446.html

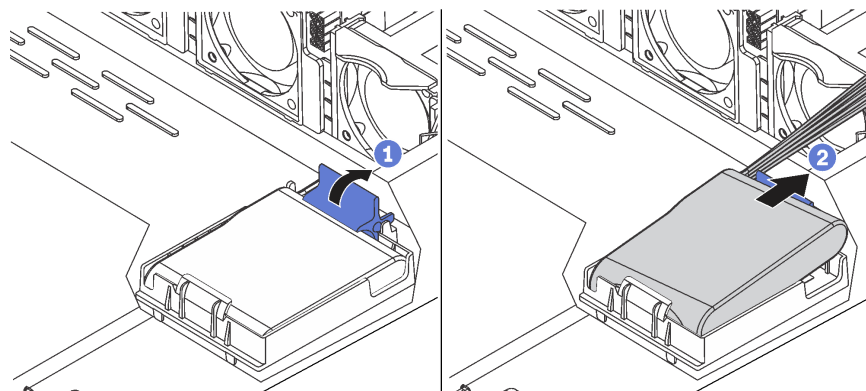


Figure 149. Removal of the RAID super capacitor module on the chassis

- Step 1. Open the retention clip on the holder of the RAID super capacitor module.
- Step 2. Take the RAID super capacitor module out of the holder.
- Step 3. Remove the RAID super capacitor module holder as shown if necessary.

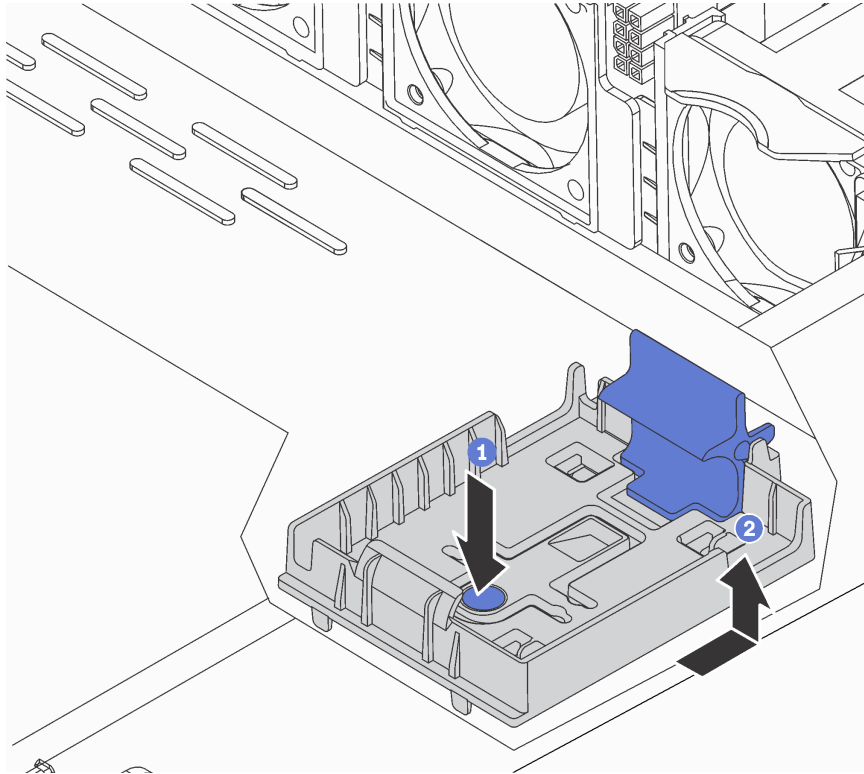

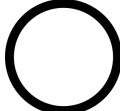



Figure 150. RAID super capacitor module holder removal

If you are instructed to return the old RAID super capacitor module, follow all packaging instructions and use any packaging materials that are provided.

Install the RAID super capacitor module on the chassis

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

 <p>“Read the installation Guidelines” on page 75</p>	 <p>“Power off the server for this task” on page 8</p>	 <p>“ATTENTION: Static Sensitive Device Ground package before opening” on page 77</p>
---	--	--

Before installing the RAID super capacitor module on the chassis, 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.

To install the RAID super capacitor module on the chassis, complete the following steps:

Watch the procedure. A video of the installation process is available:

- Youtube: <https://www.youtube.com/playlist?list=PLYV5R7hVcs-DTDY1ImpIPpJV0zo7dKq14>
- Youku: http://list.youku.com/albumlist/show/id_52222446.html

Step 1. If the server comes with a tray that covers the place of the RAID super capacitor module on the chassis, remove it first.

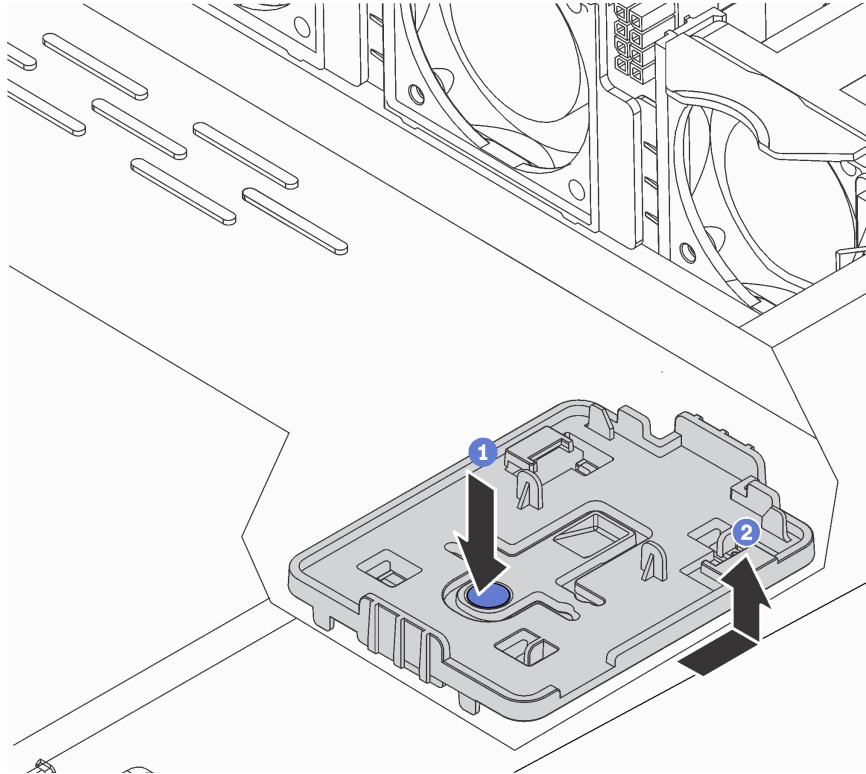


Figure 151. Tray removal

Step 2. If the server does not have a RAID super capacitor module holder on the chassis, install one first.

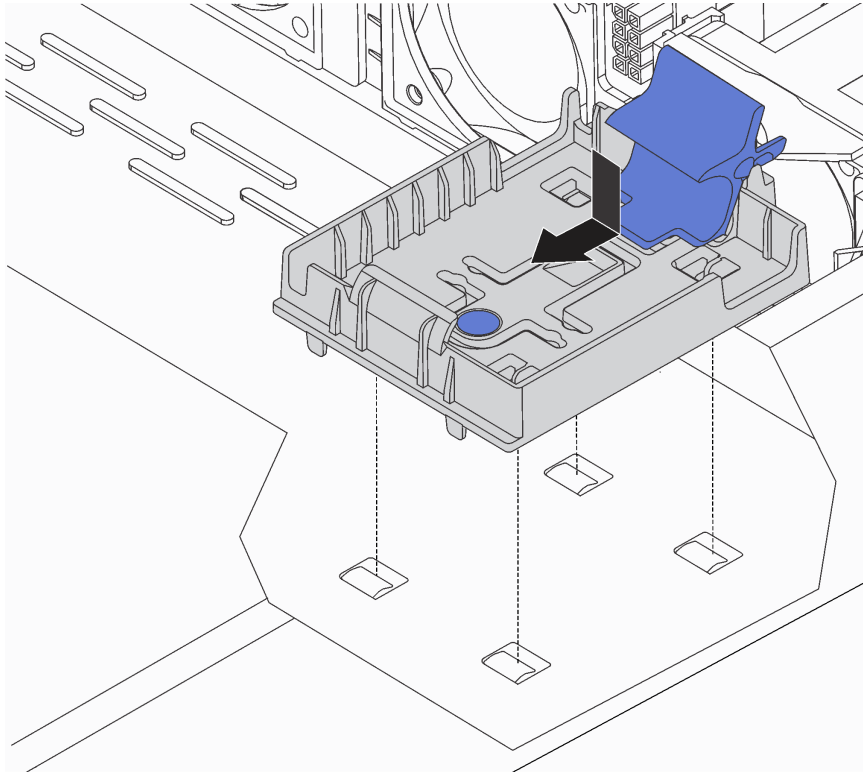


Figure 152. RAID super capacitor module holder installation

- Step 3. Open the retention clip on the holder, put the RAID super capacitor module into the holder and press it down to secure it into the holder.

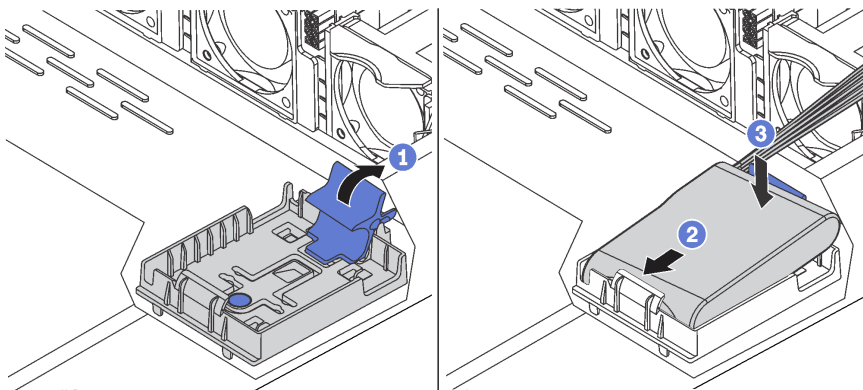


Figure 153. Installation of the RAID super capacitor module on the chassis

After installing the super capacitor module:

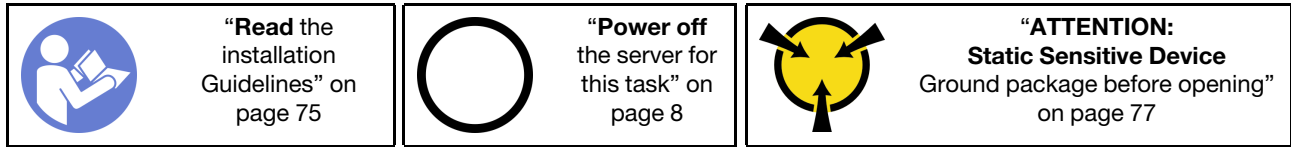
1. Connect the super capacitor module to an adapter with the extension cable that comes with the super capacitor module.
2. Complete the parts replacement. See “Complete the parts replacement” on page 189.

Front I/O assembly replacement

Use this information to remove and install the front I/O assembly.

Remove the front I/O assembly

Use this information to remove the front I/O assembly.



Before removing the front I/O assembly:

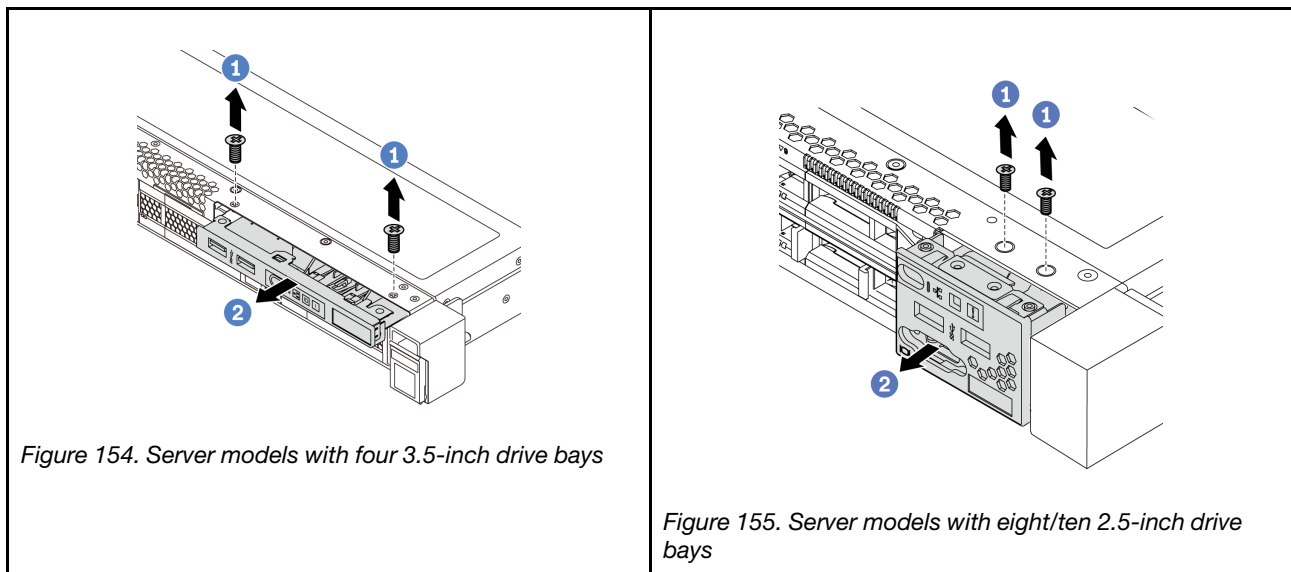
1. Remove the top cover. See “Remove the top cover” on page 83.
2. If the security bezel is installed, remove it. See “Remove the security bezel” on page 91.
3. Disconnect cables of the front I/O assembly from the front I/O assembly.

To remove the front I/O assembly, complete the following steps:

Watch the procedure. A video of the removal process is available:

- Youtube: <https://www.youtube.com/playlist?list=PLYV5R7hVcs-DTDY1ImpIPpJV0zo7dKq14>
- Youku: http://list.youku.com/albumlist/show/id_52222446.html

Table 15. Front I/O assembly removal



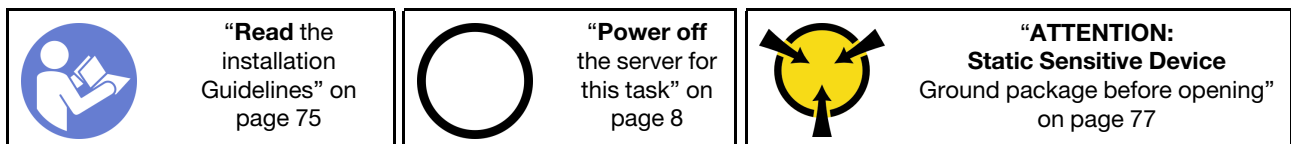
Step 1. Remove the screws that secure the front I/O assembly.

Step 2. Slide the front I/O assembly out of the assembly bay.

If you are instructed to return the old front I/O assembly, follow all packaging instructions and use any packaging materials that are provided.

Install the front I/O assembly

Use this information to install the front I/O assembly.



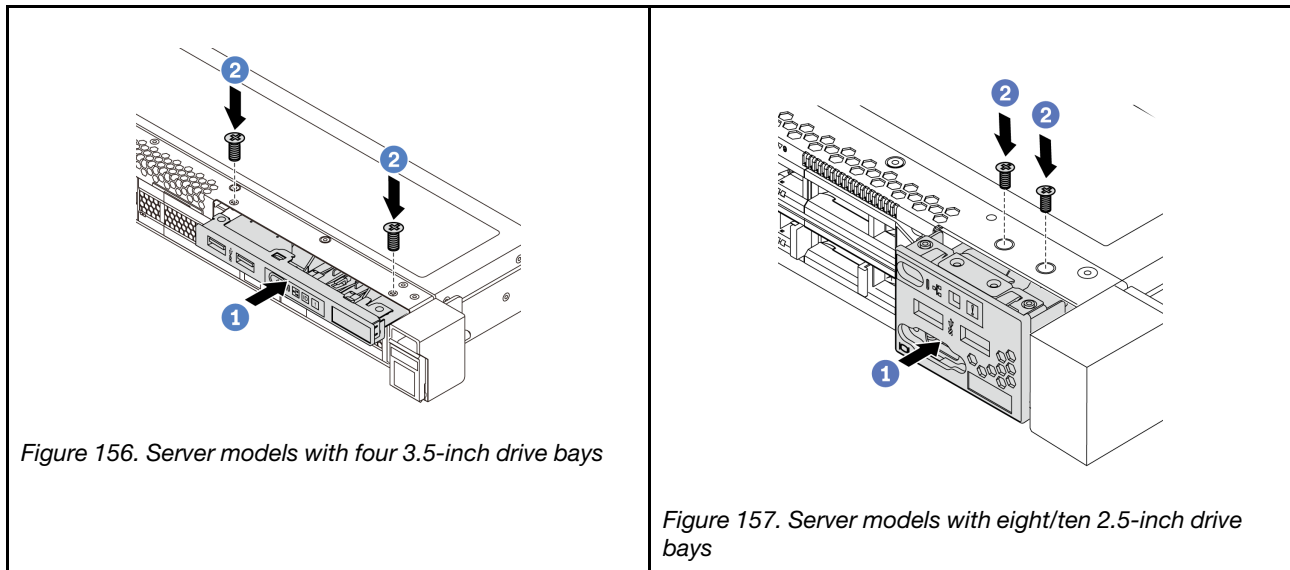
Before installing the front I/O assembly, touch the static-protective package that contains the new front I/O assembly to any unpainted surface on the outside of the server. Then, take the new front I/O assembly out of the package and place it on a static-protective surface.

To install the front I/O assembly, complete the following steps:

Watch the procedure. A video of the installation process is available:

- Youtube: <https://www.youtube.com/playlist?list=PLYV5R7hVcs-DTDY1ImpIPpJV0zo7dKq14>
- Youku: http://list.youku.com/albumlist/show/id_52222446.html

Table 16. Front I/O assembly installation



Step 1. Insert the front I/O assembly into the assembly bay.

Step 2. Install the screws to secure the front I/O assembly in place.

After installing the front I/O assembly:



1. Connect the cables of the front I/O assembly from the front I/O assembly to the system board. For the location of the connectors on the system board, refer to “System board components” on page 20.
2. Complete the parts replacement. See “Complete the parts replacement” on page 189.

Hot-swap power supply replacement

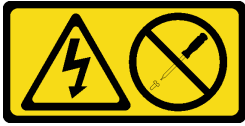
Use this information to remove and install a hot-swap power supply.

Remove a hot-swap power supply

Use this information to remove a hot-swap power supply.

 <p>“Read the installation Guidelines” on page 75</p>	 <p>“ATTENTION: Static Sensitive Device Ground package before opening” on page 77</p>
--	---

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.

S002



CAUTION:

The power control button on the device and the power switch on the power supply do not turn off the electrical current that is 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.

S001



Electrical current from power, telephone, and communication cables is hazardous.
To avoid a shock hazard:

- Do not connect or disconnect any cables or perform installation, maintenance, or reconfiguration of this product during an electrical storm.
- Connect all power cords to a properly wired and grounded electrical outlet.
- Connect to properly wired outlets any equipment that will be attached to this product.
- 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.
- Disconnect the attached power cords, telecommunications systems, networks, and modems before you open the device covers, unless instructed otherwise in the installation and configuration procedures.
- Connect and disconnect cables as described in the following table when installing, moving, or opening covers on this product or attached devices.

To Connect:	To Disconnect:
1. Turn everything OFF.	1. Turn everything OFF.
2. First, attach all cables to devices.	2. First, remove power cords from outlet.
3. Attach signal cables to connectors.	3. Remove signal cables from connectors.
4. Attach power cords to outlet.	4. Remove all cables from devices.
5. Turn device ON.	



Figure 158. Hot-swap power supply label on the cover

Attention: This type of power supply is hot-swap only when two power supplies are installed for redundancy. If only one power supply is installed, you must power off the server first before removing the power supply.

The following tips describe the information that you must consider when you remove a power supply with dc input.

CAUTION:

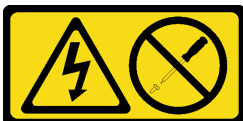
240 V dc input (input range: 180-300 V dc) is supported in Chinese Mainland ONLY. Power supply with 240 V dc input cannot support hot plugging power cord function. Before removing the power supply with dc input, please turn off server or disconnect dc power sources at the breaker panel or by turning off the power source. Then, remove the power cord.



在直流输入状态下，若电源供应器插座不支持热插拔功能，请务必不要对设备电源线进行热插拔。此操作可能导致设备损坏及数据丢失。因错误执行热插拔导致的设备故障或损坏，不属于保修范围。

NEVER CONNECT AND DISCONNECT THE POWER SUPPLY CABLE AND EQUIPMENT WHILE YOUR EQUIPMENT IS POWERED ON WITH DC SUPPLY (hot-plugging). Otherwise you may damage the equipment and result in data loss, the damages and losses result from incorrect operation of the equipment will not be covered by the manufacturers' warranty.

S035

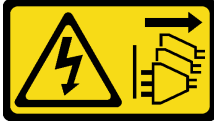


CAUTION:

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



Electrical current from power, telephone, and communication cables is hazardous. To avoid a shock hazard:

- Do not connect or disconnect any cables or perform installation, maintenance, or reconfiguration of this product during an electrical storm.
- Connect all power cords to a properly wired and grounded power source.
- Connect to properly wired power sources any equipment that will be attached to this product.
- 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.
- Disconnect the attached ac power cords, dc power sources, network connections, telecommunications systems, and serial cables before you open the device covers, unless you are instructed otherwise in the installation and configuration procedures.
- Connect and disconnect cables as described in the following table when you install, move, or open covers on this product or attached devices.

To Connect:

1. Turn OFF all power sources and equipment that is to be attached to this product.
2. Attach signal cables to the product.
3. Attach power cords to the product.
 - For ac systems, use appliance inlets.
 - For dc systems, ensure correct polarity of -48 V dc connections: RTN is + and -48 V dc is -. Earth ground should use a two-hole lug for safety.
4. Attach signal cables to other devices.
5. Connect power cords to their sources.
6. Turn ON all the power sources.

To Disconnect:

1. Turn OFF all power sources and equipment that is to be attached to this product.
 - For ac systems, remove all power cords from the chassis power receptacles or interrupt power at the ac power distribution unit.
 - For dc systems, disconnect dc power sources at the breaker panel or by turning off the power source. Then, remove the dc cables.
2. Remove the signal cables from the connectors.
3. Remove all cables from the devices.

To remove a hot-swap power supply, complete the following steps:

Watch the procedure. A video of the removal process is available:

- Youtube: <https://www.youtube.com/playlist?list=PLYV5R7hVcs-DTDY1ImpIPpJV0zo7dKq14>
- Youku: http://list.youku.com/albumlist/show/id_52222446.html

Step 1. If the server is in a rack, adjust the cable management arm (CMA) to gain access to the power supply.

If you have installed the 1U CMA Upgrade Kit for Toolless Slide Rail or Toolless Slide Rail Kit with 1U CMA, do the following:

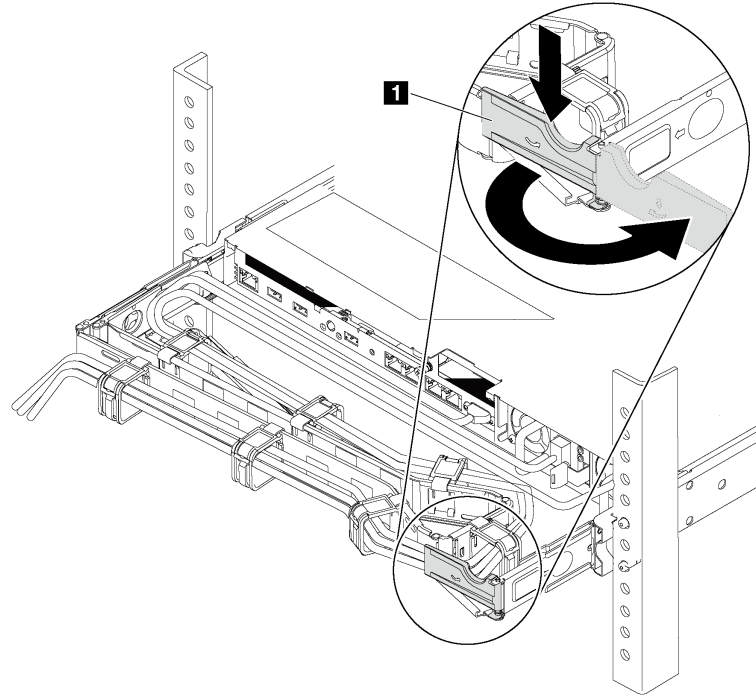


Figure 159. CMA adjustment

- a. Press down the stop bracket **1** and rotate it to the open position.
- b. Rotate the CMA out of the way to gain access to the power supply.

Step 2. Disconnect the power cord from the hot-swap power supply.

Note: If you are replacing two power supplies, do the power supply replacement one by one to ensure that the power supply to the server is not interrupted. Do not disconnect the power cord from the secondly replaced power supply until the power output LED for the firstly replaced power supply is lit. For the location of the power output LED, refer to “Rear view LEDs” on page 18.

Step 3. Press the release tab toward the handle and carefully pull the handle at the same time to slide the hot-swap power supply out of the chassis.

Note: Slightly pull the power supply upwards when sliding the power supply out of the chassis, if you have installed one of the following CMA kits:

- 1U CMA Upgrade Kit for Toolless Slide Rail
- Toolless Slide Rail Kit with 1U CMA

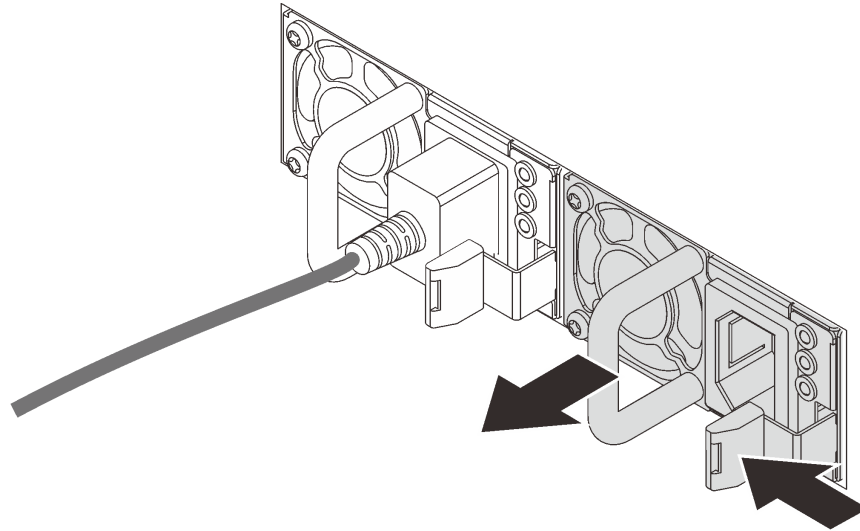


Figure 160. Hot-swap power supply removal

After removing the power supply:



1. Install a new power supply or install the power-supply filler to cover the power supply bay. See “Install a hot-swap power supply” on page 169.

Important: To ensure proper cooling during normal server operation, both of the power supply bays must be occupied. This means that each bay must have a power supply installed; or one has a power supply installed and the other has a power supply filler installed.

2. If you are instructed to return the old hot-swap power supply, follow all packaging instructions and use any packaging materials that are provided.

Install a hot-swap power supply

Use this information to install a hot-swap power supply.

 <p>“Read the installation Guidelines” on page 75</p>	 <p>“ATTENTION: Static Sensitive Device Ground package before opening” on page 77</p>
--	--

The following tips describe the type of power supply that the server supports and other information that you must consider when you install a power supply:

- The standard shipping has only one power supply installed in the server. For redundancy and hot-swap support, you must install an additional hot-swap power supply. Certain customized models might be shipped with two power supplies installed.
- Ensure that the devices that you are installing are supported. For a list of supported optional devices for the server, see <http://www.lenovo.com/us/en/serverproven/>

Notes:

- Ensure that the two power supplies installed on the server have the same wattage.

- If you are replacing the existing power supply with a new power supply of different wattage, attach the power rating label that comes with this option onto the existing label on the top cover near the power supply.



Figure 161. Hot-swap power supply label on the cover

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.

S002



CAUTION:

The power control button on the device and the power switch on the power supply do not turn off the electrical current that is 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.

S001





DANGER

Electrical current from power, telephone, and communication cables is hazardous.

To avoid a shock hazard:

- **Do not connect or disconnect any cables or perform installation, maintenance, or reconfiguration of this product during an electrical storm.**
- **Connect all power cords to a properly wired and grounded electrical outlet.**
- **Connect to properly wired outlets any equipment that will be attached to this product.**
- **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.**
- **Disconnect the attached power cords, telecommunications systems, networks, and modems before you open the device covers, unless instructed otherwise in the installation and configuration procedures.**
- **Connect and disconnect cables as described in the following table when installing, moving, or opening covers on this product or attached devices.**

To Connect:

1. Turn everything OFF.
2. First, attach all cables to devices.
3. Attach signal cables to connectors.
4. Attach power cords to outlet.
5. Turn device ON.

To Disconnect:

1. Turn everything OFF.
2. First, remove power cords from outlet.
3. Remove signal cables from connectors.
4. Remove all cables from devices.

The following tips describe the information that you must consider when you install a power supply with dc input.

CAUTION:

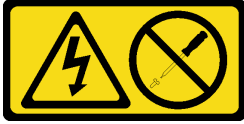
240 V dc input (input range: 180-300 V dc) is supported in Chinese Mainland ONLY. Power supply with 240 V dc input cannot support hot plugging power cord function. Before removing the power supply with dc input, please turn off server or disconnect dc power sources at the breaker panel or by turning off the power source. Then, remove the power cord.



在直流输入状态下，若电源供应器插座不支持热插拔功能，请务必不要对设备电源线进行热插拔。此操作可能导致设备损坏及数据丢失。因错误执行热插拔导致的设备故障或损坏，不属于保修范围。

NEVER CONNECT AND DISCONNECT THE POWER SUPPLY CABLE AND EQUIPMENT WHILE YOUR EQUIPMENT IS POWERED ON WITH DC SUPPLY (hot-plugging). Otherwise you may damage the equipment and result in data loss, the damages and losses result from incorrect operation of the equipment will not be covered by the manufacturers' warranty.

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**

Electrical current from power, telephone, and communication cables is hazardous.
To avoid a shock hazard:

- Do not connect or disconnect any cables or perform installation, maintenance, or reconfiguration of this product during an electrical storm.
- Connect all power cords to a properly wired and grounded power source.
- Connect to properly wired power sources any equipment that will be attached to this product.
- 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.
- Disconnect the attached ac power cords, dc power sources, network connections, telecommunications systems, and serial cables before you open the device covers, unless you are instructed otherwise in the installation and configuration procedures.
- Connect and disconnect cables as described in the following table when you install, move, or open covers on this product or attached devices.

To Connect:

1. Turn OFF all power sources and equipment that is to be attached to this product.
2. Attach signal cables to the product.
3. Attach power cords to the product.
 - For ac systems, use appliance inlets.
 - For dc systems, ensure correct polarity of -48 V dc connections: RTN is + and -48 V dc is -. Earth ground should use a two-hole lug for safety.
4. Attach signal cables to other devices.
5. Connect power cords to their sources.
6. Turn ON all the power sources.

To Disconnect:

1. Turn OFF all power sources and equipment that is to be attached to this product.
 - For ac systems, remove all power cords from the chassis power receptacles or interrupt power at the ac power distribution unit.
 - For dc systems, disconnect dc power sources at the breaker panel or by turning off the power source. Then, remove the dc cables.
2. Remove the signal cables from the connectors.
3. Remove all cables from the devices.

Before installing a hot-swap power supply, touch the static-protective package that contains the new hot-swap power supply to any unpainted surface on the outside of the server. Then, take the new hot-swap power supply out of the package and place it on a static-protective surface.

See “Technical rules for power supply” on page 77 before you install the power supply.

To install a hot-swap power supply, complete the following steps:

Watch the procedure. A video of the installation process is available:

- Youtube: <https://www.youtube.com/playlist?list=PLYV5R7hVcs-DTDY1ImpIPpJV0zo7dKq14>
- Youku: http://list.youku.com/albumlist/show/id_52222446.html

- Step 1. If the server is in a rack, adjust the CMA to gain access to the power supply bay.
If you have installed the 1U CMA Upgrade Kit for Toolless Slide Rail or Toolless Slide Rail Kit with 1U CMA, do the following:

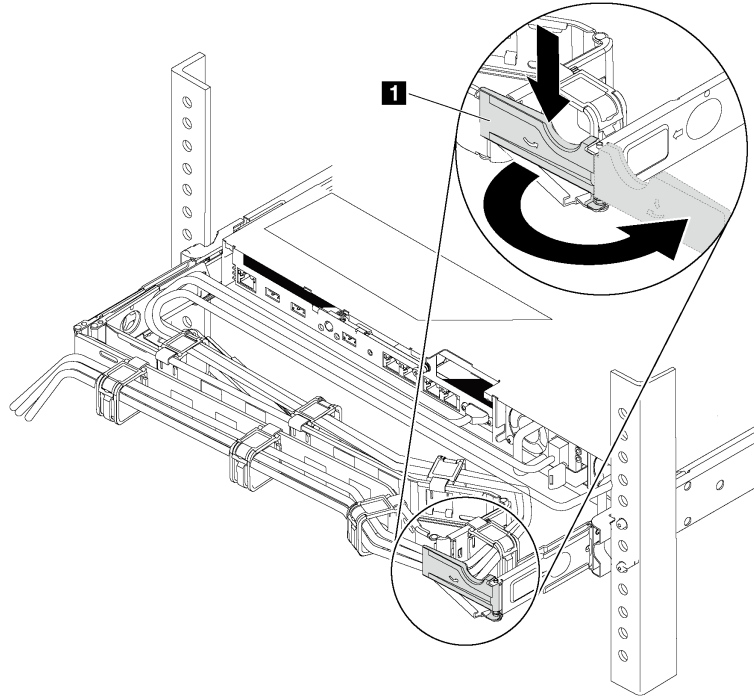


Figure 162. CMA adjustment

- a. Press down the stop bracket **1** and rotate it to the open position.
- b. Rotate the CMA out of the way to gain access to the power supply bay.

Step 2. Remove the power-supply filler.

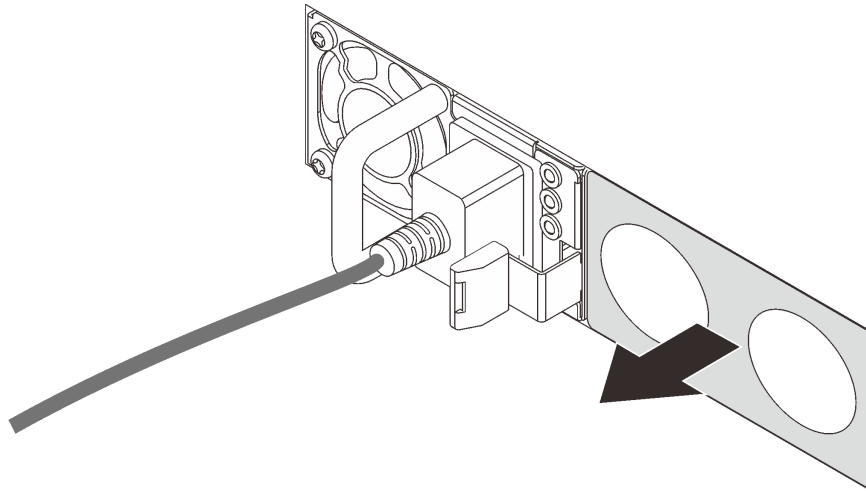


Figure 163. Hot-swap power supply filler removal

Step 3. Slide the new hot-swap power supply into the bay until the release latch clicks into place.

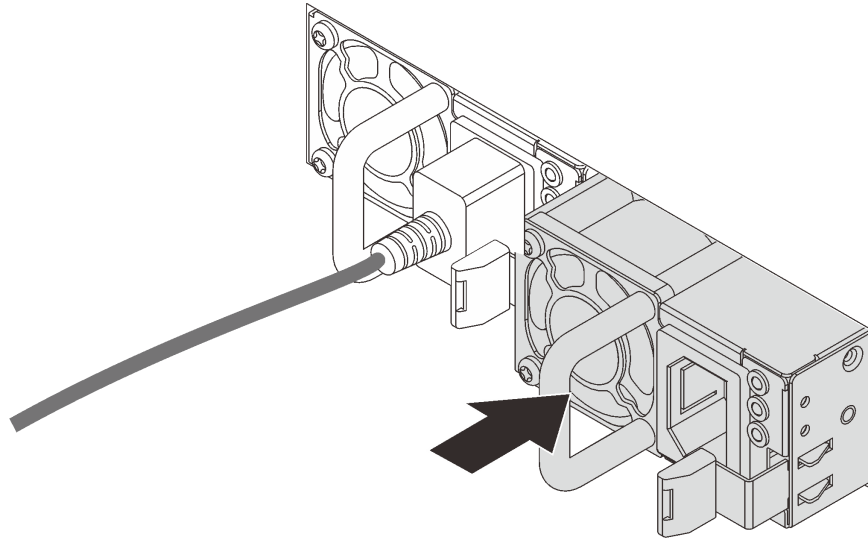


Figure 164. Hot-swap power supply installation

After installing the power supply:

1. Connect one end of the power cord to the new power supply connector; then, connect the other end of the power cord into a properly grounded electrical outlet.
2. If the server is powered off, power on the server. Ensure that both the power input LED and power output LED on the power supply are lit, indicating that the power supply is operating properly.

Heat sink and microprocessor replacement


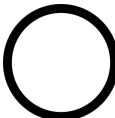

Use this information to remove and install a heat sink and microprocessor.

Depending on your configuration, refer to the specific topics to remove or install the heat sink and processor:

- “Remove a heat sink” on page 175
- “Remove a processor” on page 176
- “Install a heat sink” on page 179
- “Install a processor” on page 177

Remove a heat sink

Use this information to remove a heat sink.

 <p>“Read the installation Guidelines” on page 75</p>	 <p>“Power off the server for this task” on page 8</p>	 <p>“ATTENTION: Static Sensitive Device Ground package before opening” on page 77</p>
--	---	---

Notes:

- It may take some time for the heat sink to cool down after the system has been powered down.
- The heat sink is necessary to maintain proper thermal conditions for the processor. Do not power on the server with the heat sink removed.

Before removing the heat sink,

- Remove the top cover. See “Remove the top cover” on page 83.
- Remove the air baffle. See “Remove the air baffle” on page 85.
- Remove any parts and disconnect any cables that might impede your access to the heat sink and processor.

To remove a heat sink, complete the following steps:

Watch the procedure. A video of the removal process is available:

- Youtube: <https://www.youtube.com/playlist?list=PLYV5R7hVcs-DTDY1ImpIPpJV0zo7dKq14>
- Youku: http://list.youku.com/albumlist/show/id_52222446.html

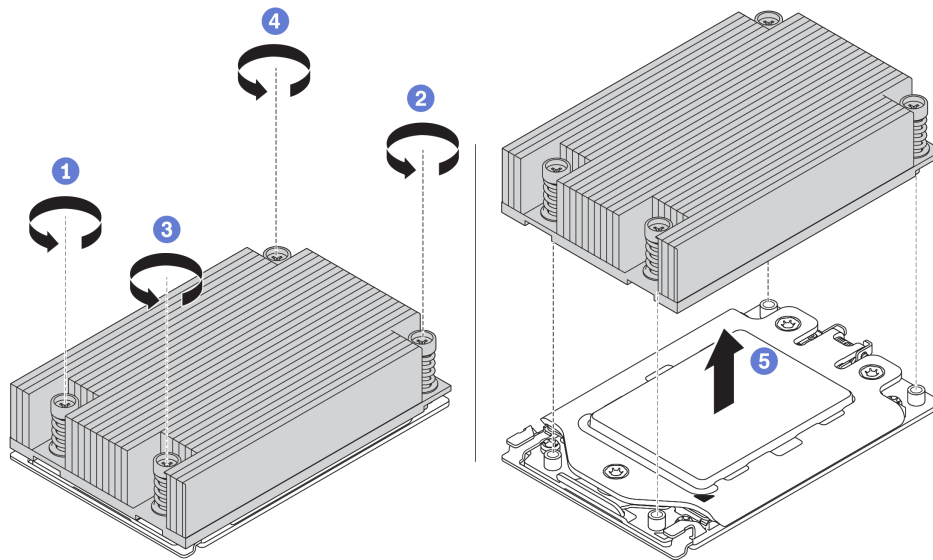


Figure 165. Removing a heat sink

Step 1. Use a Torx #T20 screwdriver to loosen all the captive screws in the *removal sequence* shown on the heat-sink label. After loosening each captive screw, wait for several seconds for the heat sink to loosen from the processor.


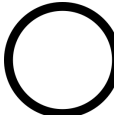

Step 2. Slightly lift the heat sink away from the system.

After removing a heat sink:

- If you are replacing a heat sink, install a new heat sink. See “Install a heat sink” on page 179.
- If you are replacing a processor, remove the processor. See “Remove a processor” on page 176.

Remove a processor

Use this information to remove a processor.

	“Read the installation Guidelines” on page 75		“Power off the server for this task” on page 8		“ATTENTION: Static Sensitive Device Ground package before opening” on page 77
---	--	---	---	--	---

Watch the procedure. A video of the removal process is available:

- Youtube: <https://www.youtube.com/playlist?list=PLYV5R7hVcs-DTDY1ImpIPpJV0zo7dKq14>
- Youku: http://list.youku.com/albumlist/show/id_52222446.html

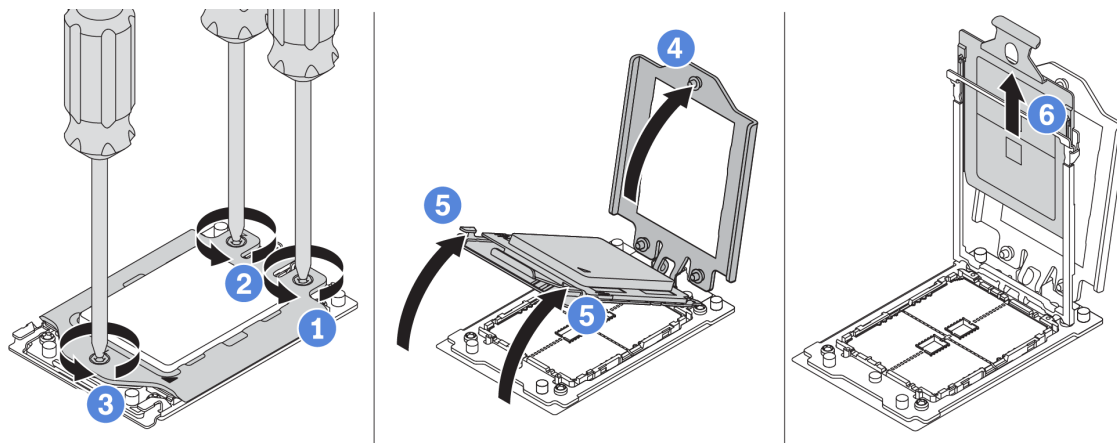





Figure 166. Removing a processor

- Step 1. Use a Torx #T20 screwdriver to loosen the captive screws in the *removal sequence* shown on the force frame.
- Step 2. Slightly lift up the force frame and the rail frame in the direction shown. The processor in the rail frame is spring-loaded.
- Step 3. Hold the blue tab of the processor carrier and slide the processor carrier out of the rail frame.

After removing the processor, install a new processor by referring to “Install a processor” on page 177.

Install a processor

Use this information to install a processor.

 <p>“Read the installation Guidelines” on page 75</p>	 <p>“Power off the server for this task” on page 8</p>	 <p>“ATTENTION: Static Sensitive Device Ground package before opening” on page 77</p>
--	---	---

Notes:

- See <http://www.lenovo.com/us/en/serverproven/> 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 “Firmware updates” on page 6.
- Optional devices available for your system might have specific processor requirements. See “Technical rules” on page 77.

To install a processor, complete the following steps:

Watch the procedure. A video of the installation process is available:

- Youtube: <https://www.youtube.com/playlist?list=PLYV5R7hVcs-DTDY1ImpIPpJV0zo7dKq14>
- Youku: http://list.youku.com/albumlist/show/id_52222446.html

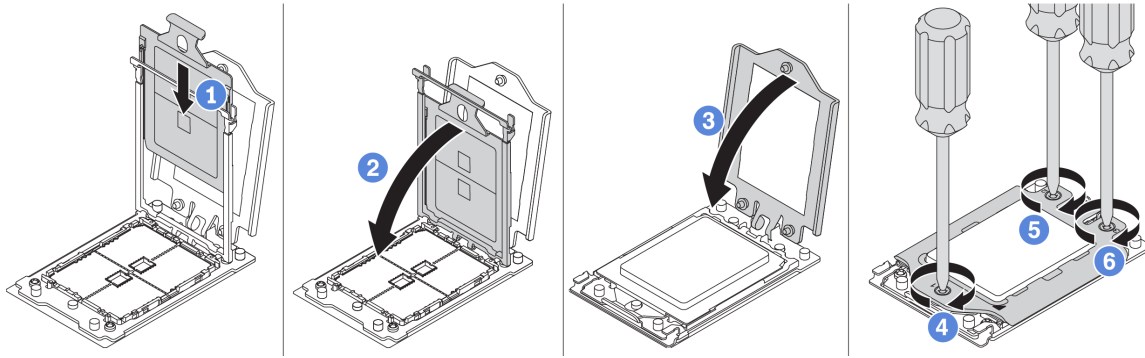



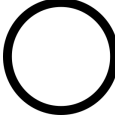

Figure 167. Installing a processor

- Step 1. Slide the processor carrier into the rail frame.
- Step 2. Push the rail frame down until the blue latches lock into place.
- Step 3. Close the force frame.
- Step 4. Tighten the screws in the *installation sequence* shown on the force frame.

After installing a processor, install the heat sink by referring to “Install a heat sink” on page 179.

Install a heat sink

Use this information to install a heat sink.

 <p>“Read the installation Guidelines” on page 75</p>	 <p>“Power off the server for this task” on page 8</p>	 <p>“ATTENTION: Static Sensitive Device Ground package before opening” on page 77</p>
--	---	---

Before installing the heat sink:

- If you use the existing heat sink:
 1. Remove the thermal grease on the heat sink by using an alcohol cleaning pad.
 2. Apply new thermal grease (ShinEtsu 7783D) in a quadrilateral design on the top of the processor.

Note: Do not apply too much thermal grease. Too much thermal grease can result in excess grease coming in contact with and contaminating the processor socket.

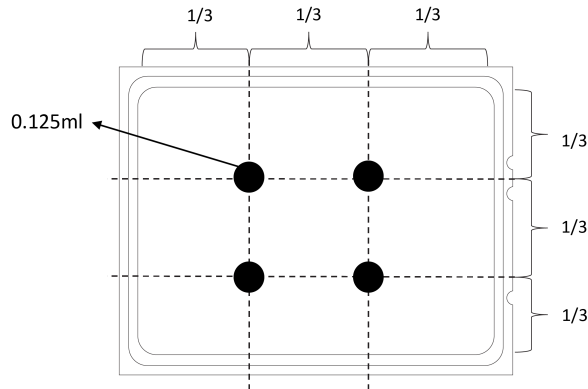


Figure 168. Applying thermal grease

- If you use a new heat sink, the thermal grease is pre-applied to the heat sink. Remove the protective cover and install the heat sink.

To install a heat sink, complete the following steps:

Watch the procedure. A video of the installation process is available:

- Youtube: <https://www.youtube.com/playlist?list=PLYV5R7hVcs-DTDY1ImpIPpJVZOzo7dKq14>
- Youku: http://list.youku.com/albumlist/show/id_52222446.html

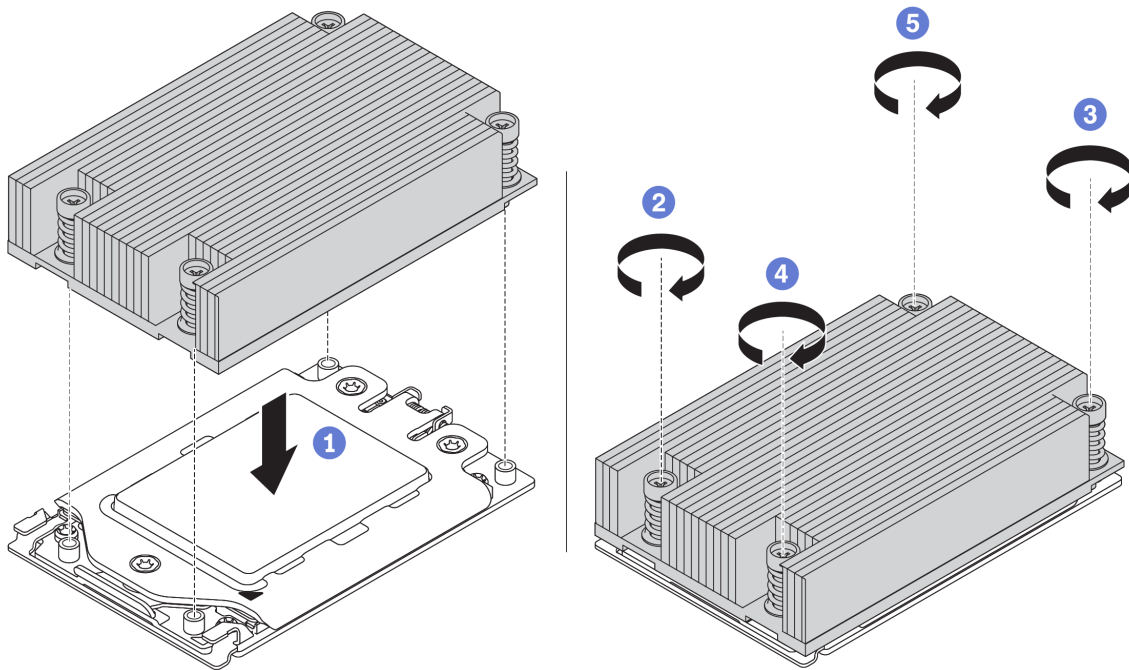


Figure 169. Installing a heat sink

- Step 1. 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.
- Step 2. Tighten all the captive screws in the *installation sequence* shown on the heat-sink label.

After installing a heat sink:

1. Install the air baffle. See “Install the air baffle” on page 86.
2. Install any parts that you have removed.
3. Complete the parts replacement. See “Complete the parts replacement” on page 189.

Fan board replacement

Use this information to remove and install the fan board.

Remove the fan board

Use this information to remove the fan board.

	<p>“Read the installation Guidelines” on page 75</p>	<p>“Power off the server for this task” on page 8</p>	<p>“ATTENTION: Static Sensitive Device Ground package before opening” on page 77</p>
--	--	---	--

Before removing the fan board:

1. Remove the top cover. See “Remove the top cover” on page 83.
2. If your server comes with an air baffle, remove it first. See “Remove the air baffle” on page 85.
3. Remove system fans. See “Remove a system fan” on page 94.

4. Disconnect the fan board power cable.
5. Disconnect any cables that might impede your access to the fan board. Before cable disconnection, record where the cables are connected to the system board.

To remove the fan board, complete the following steps:

Watch the procedure. A video of the removal process is available:

- Youtube: <https://www.youtube.com/playlist?list=PLYV5R7hVcs-DTDY1ImpIPpJV0zo7dKq14>
- Youku: http://list.youku.com/albumlist/show/id_52222446.html

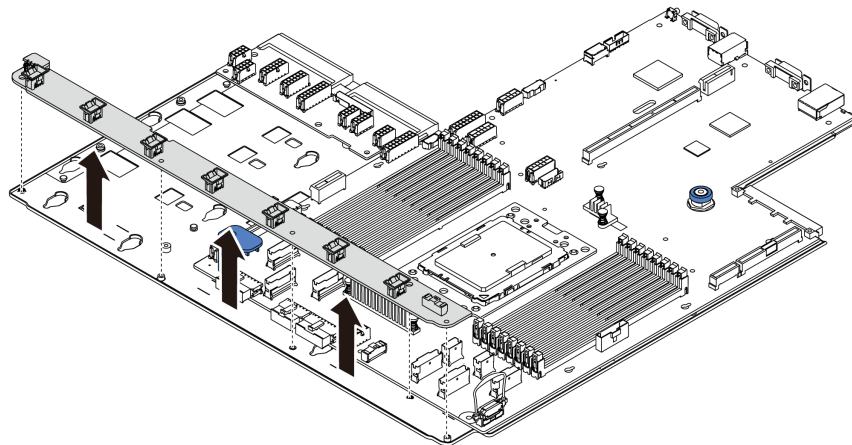



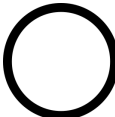

Figure 170. Fan board removal

- Step 1. Remove the five screws from the fan board.
- Step 2. Gently hold and lift the fan board from the system board tray.

If you are instructed to return the old fan board, follow all packaging instructions and use any packaging materials that are provided.

Install the fan board

Use this information to install the fan board.

	<p>“Read the installation Guidelines” on page 75</p>		<p>“Power off the server for this task” on page 8</p>		<p>“ATTENTION: Static Sensitive Device Ground package before opening” on page 77</p>
---	---	---	--	--	---

Before installing the fan board, touch the static-protective package that contains the new fan board to any unpainted surface on the outside of the server. Then, take the new fan board out of the package and place it on a static-protective surface.

To install the fan board, complete the following steps:

Watch the procedure. A video of the installation process is available:

- Youtube: <https://www.youtube.com/playlist?list=PLYV5R7hVcs-DTDY1ImpIPpJV0zo7dKq14>
- Youku: http://list.youku.com/albumlist/show/id_52222446.html

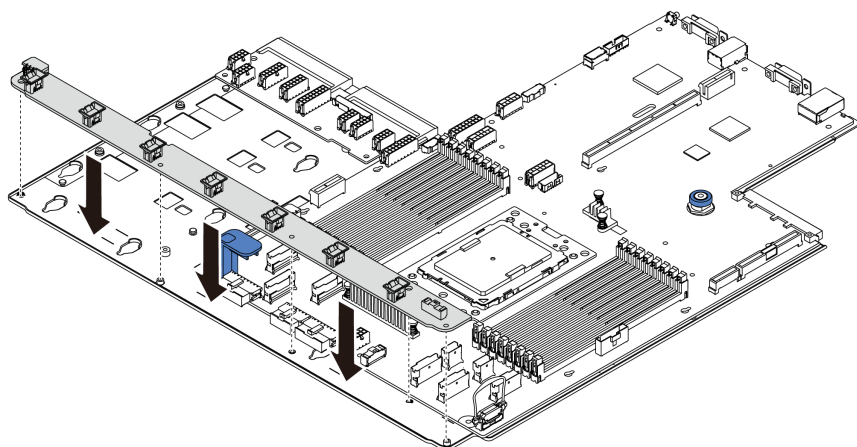


Figure 171. Fan board installation

Step 1. Gently hold and lower the fan board into the system board tray.

Step 2. Install the five screws to secure the fan board.

After installing the fan board:


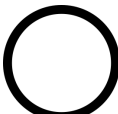

1. Install the system fans. See “Install a system fan” on page 95.
2. Connect the fan board power cable, and other cables you disconnected before. See “Power cable routing” on page 22.
3. Complete the parts replacement. See “Complete the parts replacement” on page 189.

Power inverter board (PIB) board replacement

Use this information to remove and install the power inverter board (PIB) board replacement.

Remove the PIB board

Use this information to remove the PIB board.

 <p>“Read the installation Guidelines” on page 75</p>	 <p>“Power off the server for this task” on page 8</p>	 <p>“ATTENTION: Static Sensitive Device Ground package before opening” on page 77</p>
--	---	---

Before removing the PIB board:

1. Remove the top cover. See “Remove the top cover” on page 83.
2. If your server comes with an air baffle, remove it first. See “Remove the air baffle” on page 85.
3. Disconnect all the cables on the PIB board.
4. Pull out the power supplies slightly. Ensure that they are disconnected from the system board.

To remove the PIB board, complete the following steps:

Watch the procedure. A video of the removal process is available:

- Youtube: <https://www.youtube.com/playlist?list=PLYV5R7hVcs-DTDY1ImpIPpJVOzo7dKq14>
- Youku: http://list.youku.com/albumlist/show/id_52222446.html

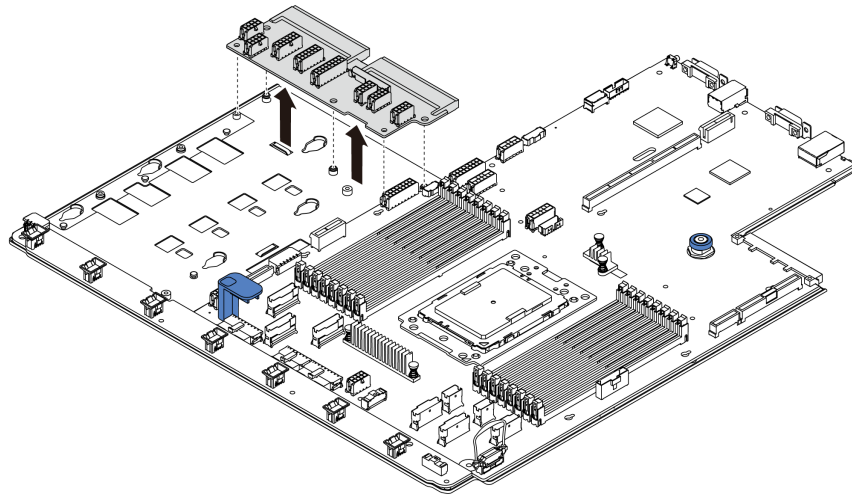



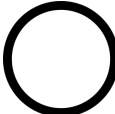

Figure 172. PIB board removal

- Step 1. Remove the five screws from the PIB board.
- Step 2. Gently hold and lift the PIB board from the system board tray.

If you are instructed to return the old PIB board, follow all packaging instructions and use any packaging materials that are provided.

Install the PIB board

Use this information to install the PIB board.

 <p>“Read the installation Guidelines” on page 75</p>	 <p>“Power off the server for this task” on page 8</p>	 <p>“ATTENTION: Static Sensitive Device Ground package before opening” on page 77</p>
---	--	--

Before installing the PIB board, touch the static-protective package that contains the new PIB board to any unpainted surface on the outside of the server. Then, take the new PIB board out of the package and place it on a static-protective surface.

To install the PIB board, complete the following steps:

Watch the procedure. A video of the installation process is available:

- Youtube: <https://www.youtube.com/playlist?list=PLYV5R7hVcs-DTDY1ImpIPpJV0zo7dKq14>
- Youku: http://list.youku.com/albumlist/show/id_52222446.html

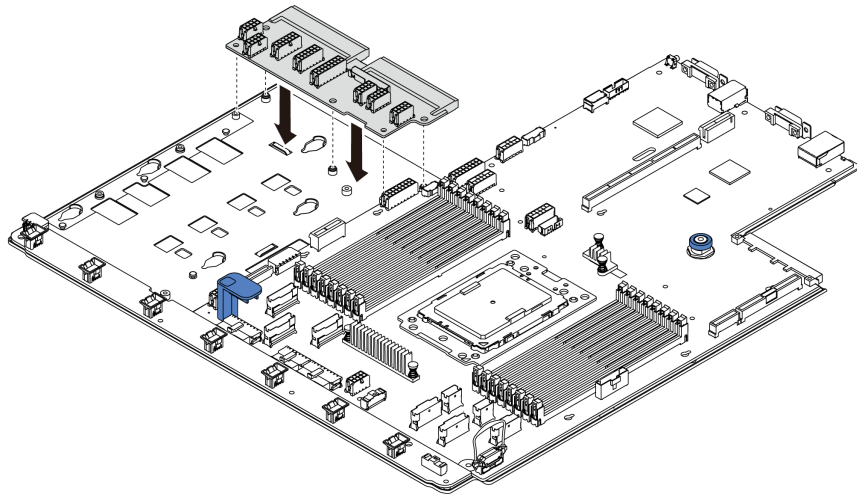


Figure 173. PIB board installation

Step 1. Gently hold and lower the PIB board into the system board tray.

Step 2. Install the five screws to secure the PIB board.

After installing the PIB board:

1. Connect all the cables from the PIB board.
2. Push the power supplies into the bays until they click into place.
3. Complete the parts replacement. See “Complete the parts replacement” on page 189.

System board replacement

Use this information to remove and install the system board.

S017



CAUTION:
Hazardous moving fan blades nearby.

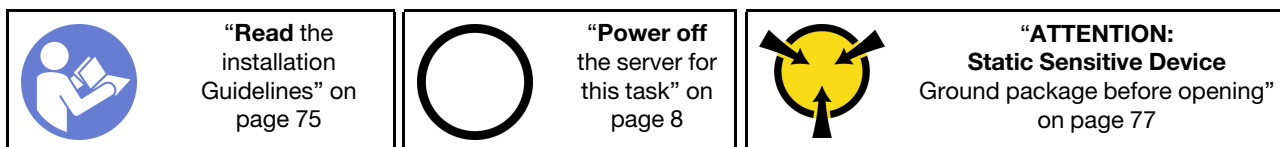
S012



CAUTION:
Hot surface nearby.

Remove the system board

Use this information to remove the system board.



Before removing the system board:

1. Remove the top cover. See “Remove the top cover” on page 83.
2. If your server comes with an air baffle, remove it first. See “Remove the air baffle” on page 85.
3. Record where the cables are connected to the system board; then, disconnect all the cables.

Attention: Disengage all latches, cable clips, release tabs, or locks on cable connectors beforehand. Failing to release them before removing the cables will damage the cable connectors on the system board. Any damage to the cable connectors may require replacing the system board.

4. Remove any of the following components that are installed on the system board and put them in a safe, static-protective place. See the related topics in Chapter 3 “Hardware replacement procedures” on page 75.
 - Fan board
 - PIB board
 - System fans
 - Heat sink and processor
 - Memory modules
 - M.2 adapter
 - Riser assemblies
 - Rear hot-swap drive cage
 - RAID super capacitor module
 - CMOS battery
 - Middle drive cage
5. Pull out the power supplies slightly. Ensure that they are disconnected from the system board.

To remove the system board, complete the following steps:

Watch the procedure. A video of the removal process is available:

- Youtube: <https://www.youtube.com/playlist?list=PLYV5R7hVcs-DTDY1ImplPpJV0zo7dKq14>
- Youku: http://list.youku.com/albumlist/show/id_52222446.html

Note: Depending on the model, the blue lift handle on your system board might look slightly different from the illustration below.

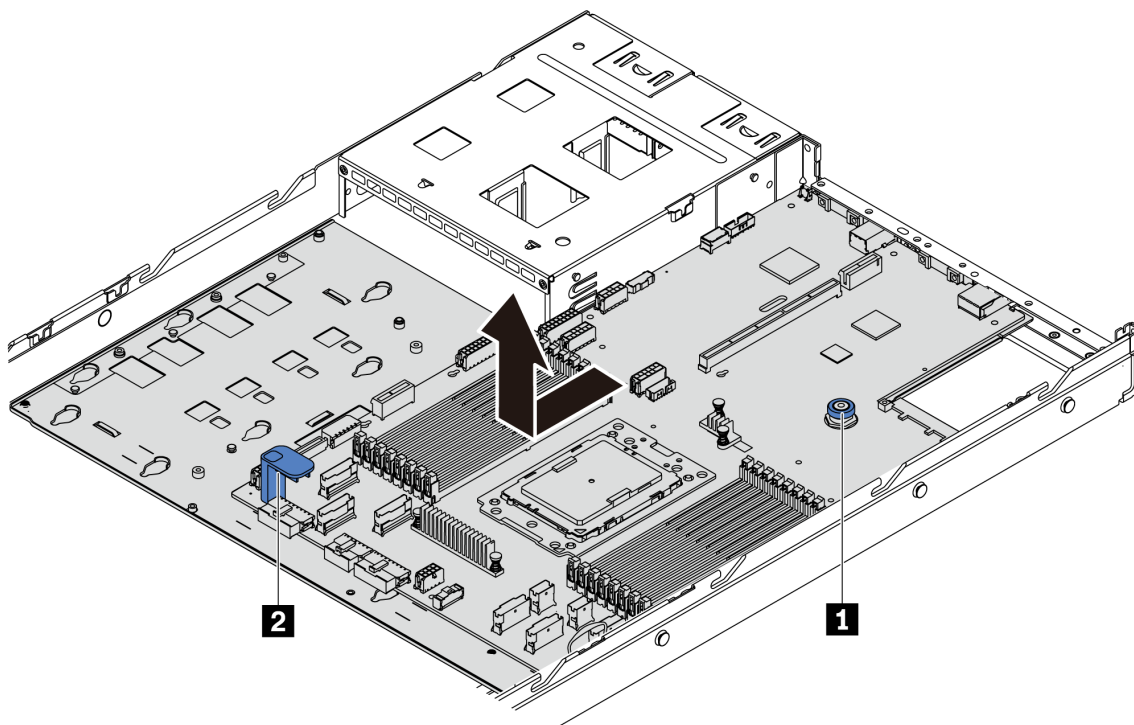


Figure 174. System board removal

- Step 1. Lift the release pin **1** and hold the lift handle **2** at the same time and slide the system board toward the front of the server.
- Step 2. Lift the system board out of the chassis.

If you are instructed to return the old system board, follow all packaging instructions and use any packaging materials that are provided.

Important: Before you return the system board, make sure that CPU socket is covered. There is a CPU external cap covering the CPU socket on the new system board. Slide the CPU external cap out from the CPU socket on the new system board, and install the external cap on the CPU socket on the removed system board.

Install the system board

Use this information to install the system board.

	<p>“Read the installation Guidelines” on page 75</p>	<p>“Power off the server for this task” on page 8</p>	<p>“ATTENTION: Static Sensitive Device Ground package before opening” on page 77</p>
--	---	--	---

Before installing the system board, touch the static-protective package that contains the new system board to any unpainted surface on the outside of the server. Then, take the new system board out of the package and place it on a static-protective surface.

To install the system board, complete the following steps:

Watch the procedure. A video of the installation process is available:

- Youtube: <https://www.youtube.com/playlist?list=PLYV5R7hVcs-DTDY1ImpIPpJV0zo7dKq14>

- Youku: http://list.youku.com/albumlist/show/id_52222446.html

Note: Depending on the model, the blue lift handle on your system board might look slightly different from the illustration below.

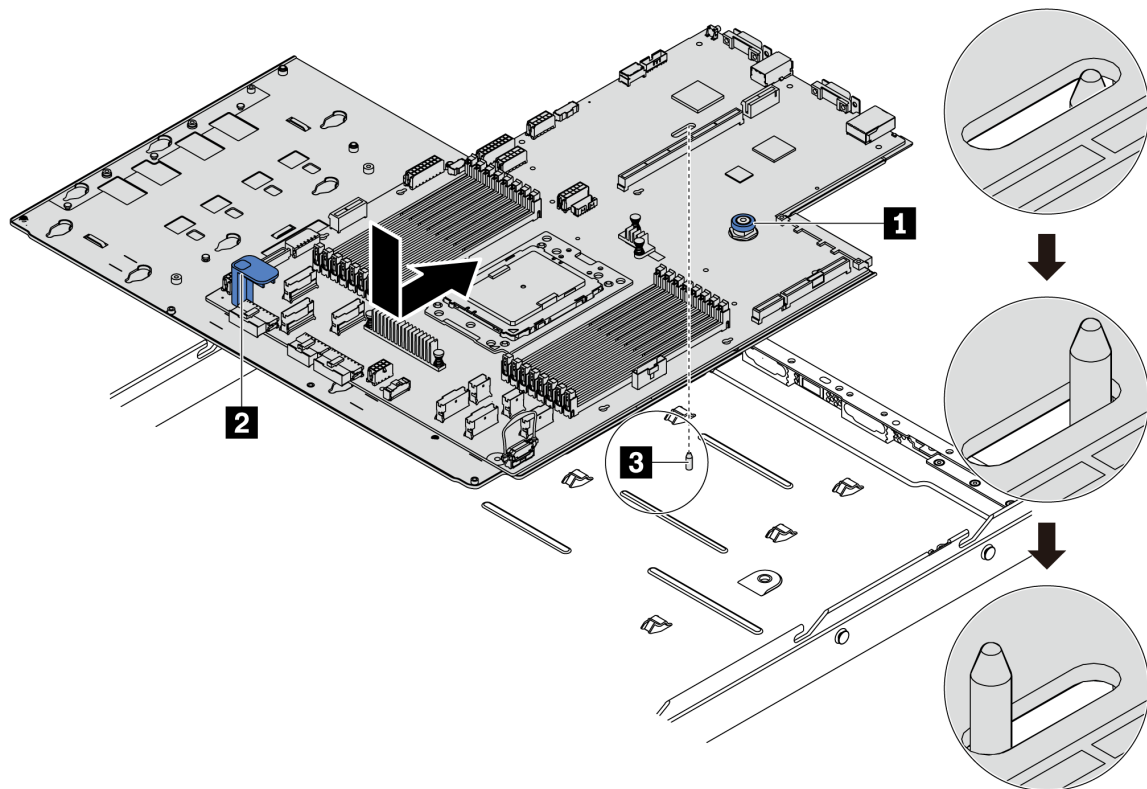


Figure 175. System board installation

- Step 1. Hold the release pin **1** and the lift handle **2** at the same time to lower the system board into the chassis.
- Step 2. Slide the system board to the rear of the server until the system board snaps into position. Ensure that:
- The new system board is engaged by the mounting stud **3** on the chassis.
 - The rear connectors on the new system board are inserted into the corresponding holes in the rear panel.
 - The release pin **1** secures the system board in place.

After installing the system board:

1. Push the power supplies into the bays until they click into place.
2. Install any of the following components that are removed from the system board. See the related topics in this chapter. See Chapter 3 “Hardware replacement procedures” on page 75
 - Fan board
 - PIB board
 - System fans
 - Heat sink and processor
 - Memory modules

- M.2 adapter
 - Riser assemblies
 - Rear hot-swap drive cage
 - RAID super capacitor module
 - CMOS battery
 - Middle drive cage
3. Update the Universal Unique Identifier (UUID) and SMBIOS/DMI data with new vital product data (VPD). Use the Provisioning Manager to update the UUID and SMBIOS/DMI. See “Update the Universal Unique Identifier (UUID)” on page 188 and “Update the DMI/SMBIOS data” on page 188.
 4. Enable TPM. See “Enable TPM” on page 188.
 5. Optionally, enable Secure Boot.

Update the Universal Unique Identifier (UUID)

The Universal Unique Identifier (UUID) must be updated when the system board is replaced. Use the Lenovo XClarity Provisioning Manager Lite to update the UUID in the UEFI-based server.

1. Start the server and press F11 to display the Lenovo XClarity Provisioning Manager Lite interface.
2. From the System Summary page, click **Update VPD**.
3. Update the UUID.

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 Lite to update the DMI in the UEFI-based server.

1. Start the server and press F11 to display the Lenovo XClarity Provisioning Manager Lite interface.
2. From the System Summary page, click **Update VPD**.
3. Update the asset tag information.

Enable TPM

The server supports Trusted Platform Module (TPM) of version 2.0.

When a system board is replaced, you must make sure that the TPM policy is set correctly.

CAUTION:

Take special care when setting the TPM policy. If it is not set correctly, the system board can become unusable.

Set the TPM policy

By default, a replacement system board is shipped with the TPM policy set to **undefined**. You must modify this setting to match the setting that was in place for the system board that is being replaced.

You can set the TPM policy from Lenovo XClarity Provisioning Manager Lite.

Complete the following steps to set the TPM policy.

- Step 1. Start the server and when prompted, press F11 to display Lenovo XClarity Provisioning Manager Lite.
- Step 2. If the power-on Administrator password is required, enter the password.

Step 3. From the System Summary page, click **Update VPD**.

Step 4. Set the policy to one of the following settings.

- **NationZ TPM 2.0 enabled - China only.** Customers in Chinese Mainland should choose this setting if a NationZ TPM 2.0 adapter is installed.
- **TPM enabled - ROW.** Customers outside Chinese Mainland should choose this setting.
- **Permanently disabled.** Customers in Chinese Mainland should use this setting if no TPM adapter is installed.

Although the setting **undefined** is available as a policy setting, it should not be used.

Assert Physical Presence

Before you can assert Physical Presence, the Physical Presence Policy must be enabled. By default, the Physical Presence Policy is enabled with a timeout of 30 minutes.

If the Physical Presence Policy is enabled, you can assert Physical Presence through hardware jumpers on the system board.

Notes: If the Physical Presence Policy has been disabled:

1. Set the hardware Physical Presence jumper on the system board to assert Physical Presence.
2. Enable the Physical Presence Policy using F1 (UEFI Settings).

Assert Physical Presence through the hardware

You can also assert hardware Physical Presence through the use of a jumper on the system board. For more information about asserting hardware Physical Presence through the use of a jumper, see: “System board jumpers” on page 68.

Enable UEFI Secure Boot

Optionally, you can enable UEFI Secure Boot.

Physical Presence must be asserted if you are going to enable UEFI Secure Boot. See “Assert Physical Presence” on page 189.

You can enable UEFI Secure Boot from UEFI System Setup interface. To enable UEFI Secure Boot from System Setup interface:

1. Start the server and when prompted, press F1 to display System Setup interface.
2. From the UEFI Setup page, click **Security → Secure Boot**.
3. Enable Secure Boot and save the settings.

Complete the parts replacement

Use this information to complete the parts replacement.

To complete the parts replacement, do the following:

1. Ensure that all components have been reassembled correctly and that no tools or loose screws are left inside your server.
2. Properly route and secure the cables in the server. Refer to the cable connecting and routing information for each component.
3. If you have removed the top cover, reinstall it. See “Install the top cover” on page 84.

4. Reconnect external cables and power cords to the server.

Attention: To avoid component damage, connect the power cords last.

5. Update the server configuration if necessary.

- Download and install the latest device drivers: <http://datacentersupport.lenovo.com>
- Update the system firmware. See “Firmware updates” on page 6.
- Use the Lenovo XClarity Provisioning Manager Lite to configure the RAID if you have installed or removed a hot-swap drive, a RAID adapter, or the M.2 adapter and M.2 drive. For more information, see:
https://sysmgt.lenovofiles.com/help/topic/ixpml_v2/Introduction.html

Chapter 4. Problem determination

Use the information in this section to isolate and resolve issues that you might encounter while using your server.

Lenovo servers can be configured to automatically notify Lenovo Support if certain events are generated. You can configure automatic notification, also known as Call Home, from management applications, such as the Lenovo XClarity Administrator. If you configure automatic problem notification, Lenovo Support is automatically alerted whenever a server encounters a potentially significant event.

To isolate a problem, you should typically begin with the event log of the application that is managing the server:

- If you are managing the server from the Lenovo XClarity Administrator, begin with the Lenovo XClarity Administrator event log.
- If you are using some other management application, begin with the ThinkSystem System Manager event log.

Event logs

An *alert* is a message or other indication that signals an event or an impending event. Alerts are generated by the ThinkSystem System Manager or by UEFI in the servers. These alerts are stored in the ThinkSystem System Manager Event Log. If the server is managed by the Lenovo XClarity Provisioning Manager Lite or by the Lenovo XClarity Administrator, alerts are automatically forwarded to those management applications.

Note: For a listing of events, including user actions that might need to be performed to recover from an event, see the *Messages and Codes Reference*.

Lenovo XClarity Administrator event log

If you are using Lenovo XClarity Administrator to manage server, network, and storage hardware, you can view the events from all managed devices through the XClarity Administrator.

Logs

The Event log provides a history of hardware and management conditions that have been detected.

Show:

All Event Sources

All Dates

Severity	Serviceability	Date and Time	System	Event	System Type	Source ID
Warning	Support	Jan 30, 2017, 7:40:07 AM	Chassis114:...	Node Node 08 device	Chassis	Jan 30, 20
Warning	Support	Jan 30, 2017, 7:40:07 AM	Chassis114:...	Node Node 02 device	Chassis	Jan 30, 20
Warning	User	Jan 30, 2017, 7:40:07 AM	Chassis114:...	I/O module IO Module	Chassis	Jan 30, 20
Warning	User	Jan 30, 2017, 7:40:07 AM	Chassis114:...	Node Node 08 incom	Chassis	Jan 30, 20

Figure 176. Lenovo XClarity Administrator event log

For more information about working with events from XClarity Administrator, see:

http://sysmgt.lenovofiles.com/help/topic/com.lenovo.lxca.doc/events_vieweventlog.html

ThinkSystem System Manager event log

The ThinkSystem System Manager monitors the physical state of the server and its components using sensors that measure internal physical variables such as temperature, power-supply voltages, fan speeds, and component status. The ThinkSystem System Manager provides various interfaces to systems management software and to system administrators and users to enable remote management and control of a server.

IPMI Event Log All sensor event logs

Filter by Date: Start Date End Date Filter by type: All Events All Sensors

UTC Offset: GMT + 8:0

Event Log: 5 out of 5 event entries

ID	Sensor Name	Sensor Type	Description	Status	Time
5	DIMM_2	memory	Extended SEL dataUnqualified DIMM Serial Number:32333434678568	asserted	January 1st 2019, 9:18:39 am
4	BMC_Boot_Up	microcontroller_or_coprocessor	device enabled	asserted	January 1st 2019, 8:00:21 am
3	ACPI_State	system_acpi_power_state	s5 or g2 soft off	asserted	January 1st 2019, 8:00:21 am
2	BMC_Boot_Up	microcontroller_or_coprocessor	device enabled	asserted	January 1st 2019, 8:00:28 am
1	ACPI_State	system_acpi_power_state	s5 or g2 soft off	asserted	January 1st 2019, 8:00:28 am

Figure 177. ThinkSystem System Manager event log

For more information about accessing the ThinkSystem System Manager event log, see:

https://thinksystem.lenovofiles.com/help/topic/7Y98/bmc_user_guide.pdf

General problem determination procedures

Use the information in this section to resolve problems if the event log does not contain specific errors or the server is inoperative.

If you are not sure about the cause of a problem and the power supplies are working correctly, complete the following steps to attempt to resolve the problem:

1. Power off the server.
2. Make sure that the server is cabled correctly.
3. Remove or disconnect the following devices, one at a time, until you find the failure. Power on and configure the server each time you remove or disconnect a device.
 - Any external devices,
 - Surge-suppressor device (on the server).
 - Printer, mouse, and non-Lenovo devices,
 - Each adapter.
 - Hard disk drives.
 - Memory modules until you reach the minimum configuration that is supported for the server.

Note: For minimal configuration for debugging, see “Specifications” on page 3.

4. Power on the server.

If the problem is solved when you remove an adapter from the server, but the problem recurs when you install the same adapter again, suspect the adapter. If the problem recurs when you replace the adapter with a different one, try a different PCIe slot.

If the problem appears to be a networking problem and the server passes all system tests, suspect a network cabling problem that is external to the server.

Resolving suspected power problems

Power problems can be difficult to solve. For example, a short circuit can exist anywhere on any of the power distribution buses. Usually, a short circuit will cause the power subsystem to shut down because of an overcurrent condition.

Complete the following steps to diagnose and resolve a suspected power problem.

Step 1. Check the event log and resolve any errors related to the power.

Note: Start with the event log of the application that is managing the server. For more information about event logs, see “Event logs” on page 191.

Step 2. Check for short circuits, for example, if a loose screw is causing a short circuit on a circuit board.

Step 3. Remove the adapters and disconnect the cables and power cords to all internal and external devices until the server is at the minimum configuration that is required for the server to start. See “Specifications” on page 3 to determine the minimum configuration for your server.

Step 4. Reconnect all ac power cords and turn on the server. If the server starts successfully, reseal the adapters and devices one at a time until the problem is isolated.

If the server does not start from the minimum configuration, replace the components in the minimum configuration one at a time until the problem is isolated.

Resolving suspected Ethernet controller problems

The method that you use to test the Ethernet controller depends on which operating system you are using. See the operating-system documentation for information about Ethernet controllers, and see the Ethernet controller device-driver readme file.

Complete the following steps to attempt to resolve suspected problems with the Ethernet controller.

- Step 1. Make sure that the correct device drivers, which come with the server are installed and that they are at the latest level.
- Step 2. Make sure that the Ethernet cable is installed correctly.
 - The cable must be securely attached at all connections. If the cable is attached but the problem remains, try a different cable.
 - If you set the Ethernet controller to operate at 100 Mbps or 1000 Mbps, you must use Category 5 cabling.
- Step 3. Determine whether the hub supports auto-negotiation. If it does not, try configuring the integrated Ethernet controller manually to match the speed and duplex mode of the hub.
- Step 4. Check the Ethernet controller LEDs on the rear panel of the server. These LEDs indicate whether there is a problem with the connector, cable, or hub.
 - The Ethernet link status LED is lit when the Ethernet controller receives a link pulse from the hub. If the LED is off, there might be a defective connector or cable or a problem with the hub.
 - The Ethernet transmit/receive activity LED is lit when the Ethernet controller sends or receives data over the Ethernet network. If the Ethernet transmit/receive activity is off, make sure that the hub and network are operating and that the correct device drivers are installed.
- Step 5. Check the LAN activity LED on the rear of the server. The LAN activity LED is lit when data is active on the Ethernet network. If the LAN activity LED is off, make sure that the hub and network are operating and that the correct device drivers are installed.
- Step 6. Check for operating-system-specific causes of the problem, and also make sure that the operating system drivers are installed correctly.
- Step 7. Make sure that the device drivers on the client and server are using the same protocol.

If the Ethernet controller still cannot connect to the network but the hardware appears to be working, the network administrator must investigate other possible causes of the error.

Troubleshooting by symptom

Use this information to find solutions to problems that have identifiable symptoms.

To use the symptom-based troubleshooting information in this section, complete the following steps:

1. Check the event log of the application that is managing the server and follow the suggested actions to resolve any event codes.
 - If you are managing the server from the Lenovo XClarity Administrator, begin with the Lenovo XClarity Administrator event log.
 - If you are managing the server from the Chassis Management Module 2, begin with the Chassis Management Module 2 event log.
 - If you are using some other management application, begin with the ThinkSystem System Manager event log.

For more information about event logs, see “Event logs” on page 191.

2. Review this section to find the symptoms that you are experiencing and follow the suggested actions to resolve the issue.

3. If the problem persists, contact support (see “Contacting Support” on page 210).

Power on and power off problems

Use this information to resolve issues when powering on or powering off the server.

- “Embedded hypervisor is not in the boot list” on page 195
- “The power-control button does not work, and the reset button does work (server does not start)” on page 195
- “Server does not power on” on page 196
- “Server does not power off” on page 196

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 <http://www.lenovo.com/us/en/serverproven/> 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 ThinkSystem System Manager documentation:

https://thinksystem.lenovofiles.com/help/topic/7Y98/bmc_user_guide.pdf

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.

The power-control button does not work, and the reset button does work (server does not start)

Note: The power-control button will not function until approximately 1 to 3 minutes after the server has been connected to ac power.

Complete the following steps until the problem is resolved:

1. Make sure that the power-control button on the server is working correctly:
 - a. Disconnect the server power cords.
 - b. Reconnect the server power cords.
 - c. Reseat the operator information panel cable, and then repeat steps a and b.
 - If the server starts, reseat the operator information panel.
 - If the problem remains, replace the operator information panel.
2. Make sure that:
 - The power cords are correctly connected to the server and to a working electrical outlet.
 - The LEDs on the power supply do not indicate a problem.
3. Reseat the power supplies.
4. Replace each power supply, restarting the server each time:

- Memory modules
 - Power supplies
5. If you just installed an optional device, remove it, and restart the server. If the server starts, you might have installed more devices than the power supply supports.

Server does not power on

Complete the following steps until the problem is resolved:

1. Make sure that the ac power is applied correctly to the server. Make sure that the ac power cords are correctly connected to the server and to a working electrical outlet.
2. Check the event log for any events related to the server not powering on.
3. Check for any LEDs that are flashing amber.
4. Check the power LED on the system board.
5. Reseat the power supply.
6. Replace the power supply.

Server does not power off

Complete the following steps until the problem is resolved:

1. Determine whether you are using an Advanced Configuration and Power Interface (ACPI) or a non-ACPI operating system. If you are using a non-ACPI operating system, complete the following steps:
 - a. Press Ctrl+Alt+Delete.
 - b. Turn off the server by pressing the power-control button and holding it down for 5 seconds.
 - c. Restart the server.
 - d. If the server fails POST and the power-control button does not work, disconnect the power cord for 20 seconds; then, reconnect the power cord and restart the server.
2. If the problem remains or if you are using an ACPI-aware operating system, suspect the system board.

Memory problems

Use this information to resolve issues related to memory.

- “Displayed system memory is less than installed physical memory” on page 196
- “Multiple rows of DIMMs in a branch identified as failing” on page 197

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.
 - The memory modules installed are from the same vendor.
2. Check memory module event logs and run memory module diagnostics:
 - a. Identify the failing memory module, and install the failing memory module in a different slot.
 - b. Restart the server and check the memory module event logs. If the problem is related to the memory module slot, replace the failing the memory module.
 3. Reseat the DIMMs, and then restart the server.
 4. Run memory diagnostics. When you start a server and press F11, the Lenovo XClarity Provisioning Manager Lite interface is displayed by default. You can perform memory diagnostics from this interface. From the Diagnostic page, click **Run Diagnostic → Memory test**.
 5. 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.
 6. Reseat the DIMM.
 7. Restart the server.

Multiple rows of DIMMs in a branch identified as failing

1. Reseat the DIMMs; then, restart the server.
2. Remove the lowest-numbered DIMM pair of those that are identified and replace it with an identical known good DIMM; then, restart the server. Repeat as necessary. If the failures continue after all identified DIMMs are replaced, go to step 4.
3. Return the removed DIMMs, one at a time, to their original connectors, restarting the server after each DIMM, until a DIMM fails. Replace each failing DIMM with an identical known good DIMM, restarting the server after each DIMM replacement. Repeat step 3 until you have tested all removed DIMMs.
4. Replace the lowest-numbered DIMM of those identified; then, restart the server. Repeat as necessary.
5. Reverse the DIMMs between the channels (of the same processor), and then restart the server. If the problem is related to a DIMM, replace the failing DIMM.
6. (Trained technician only) Replace the system board.

Hard disk drive problems

Use this information to resolve issues related to the hard disk drives.

- “Server cannot recognize a hard disk drive” on page 197
- “Multiple hard disk drives fail” on page 198
- “Multiple hard disk drives are offline” on page 198
- “A replacement hard disk drive does not rebuild” on page 199
- “Green hard disk drive activity LED does not represent actual state of associated drive” on page 199
- “Yellow hard disk drive status LED does not represent actual state of associated drive” on page 199

Server cannot recognize a hard disk 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 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:
 - 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 F11, the Lenovo XClarity Provisioning Manager Lite interface is displayed by default. You can perform hard disk drive diagnostics from this interface. From the Diagnostic page, click **Run Diagnostic → HDD 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 the hard disk drive backplane.
 - 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 F11, the Lenovo XClarity Provisioning Manager Lite interface is displayed by default. You can perform hard disk drive diagnostics from this interface. From the Diagnostic page, click **Run Diagnostic → HDD test**.

Based on those tests:

- If the adapter 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.

Multiple hard disk drives fail

Complete the following steps until the problem is solved:

- View the ThinkSystem System Manager event log for events related to power supplies and resolve those events.
- Make sure that the device drivers and firmware for the hard disk drive and server are at the latest level

Important: Some cluster solutions require specific code levels or coordinated code updates. If the device is part of a cluster solution, verify that the latest level of code is supported for the cluster solution before you update the code.

Multiple hard disk drives are offline

Complete the following steps until the problem is solved:

- View the ThinkSystem System Manager event log for events related to power supplies and resolve those events.

- View the storage subsystem log for events related to the storage subsystem and resolve those events.

A replacement hard disk drive does not rebuild

Complete the following steps until the problem is solved:

1. Make sure that the hard disk drive is recognized by the adapter (the green hard disk drive activity LED is flashing).
2. Review the SAS/SATA RAID adapter documentation to determine the correct configuration parameters and settings.

Green hard disk drive activity LED does not represent actual state of associated drive

Complete the following steps until the problem is solved:

1. If the green hard disk drive activity LED does not flash when the drive is in use, run the diagnostics tests for the hard disk drives. When you start a server and press F11, the Lenovo XClarity Provisioning Manager Lite interface is displayed by default. You can perform hard disk drive diagnostics from this interface. From the Diagnostic page, click **Run Diagnostic → HDD test**.
2. If the drive passes the test, replace the backplane.
3. If the drive fails the test, replace the drive.

Yellow hard disk drive status LED does not represent actual state of associated drive

Complete the following steps until the problem is solved:

1. Turn off the server.
2. Reseat the SAS/SATA adapter.
3. Reseat the backplane signal cable and backplane power cable.
4. Reseat the hard disk drive.
5. Turn on the server and observe the activity of the hard disk drive LEDs.

Monitor and video problems

Use this information to solve problems related to a monitor or video.

- “Incorrect characters are displayed” on page 199
- “Screen is blank” on page 199
- “Screen goes blank when you start some application programs” on page 200
- “The monitor has screen jitter, or the screen image is wavy, unreadable, rolling, or distorted” on page 200
- “The wrong characters appear on the screen” on page 200

Incorrect characters are displayed

Complete the following steps:

1. Verify that the language and locality settings are correct for the keyboard and operating system.
2. If the wrong language is displayed, update the server firmware to the latest level. See “Firmware updates” on page 6.

Screen is blank

1. If the server is attached to a KVM switch, bypass the KVM switch to eliminate it as a possible cause of the problem: connect the monitor cable directly to the correct connector on the rear of the server.
2. The management controller remote presence function is disabled if you install an optional video adapter. To use the management controller remote presence function, remove the optional video adapter.

3. If the server is installed with the graphical adapters while turning on the server, the Lenovo logo displays on the screen after approximately 3 minutes. This is normal operation while the system loads.
4. Make sure that:
 - The server is turned on. If there is no power to the server, the screen will be blank.
 - The monitor cables are connected correctly.
 - The monitor is turned on and the brightness and contrast controls are adjusted correctly.
5. Make sure that the correct server is controlling the monitor, if applicable.
6. Make sure that corrupted server firmware is not affecting the video; see “Firmware updates” on page 6.
7. Observe the checkpoint LEDs on the system board; if the codes are changing, go to step 6.
8. Replace the following components one at a time, in the order shown, restarting the server each time:
 - a. Monitor
 - b. Video adapter (if one is installed)
 - c. (Trained technician only) System board

Screen goes blank when you start some application programs

1. Make sure that:
 - The application program is not setting a display mode that is higher than the capability of the monitor.
 - You installed the necessary device drivers for the application.

The monitor has screen jitter, or the screen image is wavy, unreadable, rolling, or distorted

1. If the monitor self-tests show that the monitor is working correctly, consider the location of the monitor. Magnetic fields around other devices (such as transformers, appliances, fluorescents, and other monitors) can cause screen jitter or wavy, unreadable, rolling, or distorted screen images. If this happens, turn off the monitor.

Attention: Moving a color monitor while it is turned on might cause screen discoloration.

Move the device and the monitor at least 305 mm (12 in.) apart, and turn on the monitor.

Notes:

- a. To prevent diskette drive read/write errors, make sure that the distance between the monitor and any external diskette drive is at least 76 mm (3 in.).
 - b. Non-Lenovo monitor cables might cause unpredictable problems.
2. Reseat the monitor cable.
 3. Replace the components listed in step 2 one at a time, in the order shown, restarting the server each time:
 - a. Monitor cable
 - b. Video adapter (if one is installed)
 - c. Monitor
 - d. (Trained technician only) System board

The wrong characters appear on the screen

Complete the following steps until the problem is solved:

1. Verify that the language and locality settings are correct for the keyboard and operating system.
2. If the wrong language is displayed, update the server firmware to the latest level. See “Firmware updates” on page 6.

Keyboard, mouse, or USB-device problems

Use this information to solve problems related to a keyboard, mouse, or USB device.

- “All or some keys on the keyboard do not work” on page 201
- “Mouse does not work” on page 201
- “USB-device does not work” on page 201

All or some keys on the keyboard do not work

1. Make sure that:
 - The keyboard cable is securely connected.
 - The server and the monitor are turned on.
2. If you are using a USB keyboard, run the Setup utility and enable keyboardless operation.
3. If you are using a USB keyboard and it is connected to a USB hub, disconnect the keyboard from the hub and connect it directly to the server.
4. Replace the keyboard.

Mouse does not work

1. Make sure that:
 - The mouse cable is securely connected to the server.
 - The mouse device drivers are installed correctly.
 - The server and the monitor are turned on.
 - The mouse option is enabled in the Setup utility.
2. If you are using a USB mouse and it is connected to a USB hub, disconnect the mouse from the hub and connect it directly to the server.
3. Replace the mouse.

USB-device does not work

1. Make sure that:
 - The correct USB device driver is installed.
 - The operating system supports USB devices.
2. Make sure that the USB configuration options are set correctly in system setup.
Restart the server and press F1 to display the system setup interface. Then, click **Advanced → USB Configuration**.
3. If you are using a USB hub, disconnect the USB device from the hub and connect it directly to the server.

Optional-device problems

Use this information to solve problems related to optional devices.

- “External USB device not recognized” on page 201
- “A Lenovo optional device that worked previously does not work now. ” on page 202
- “A Lenovo optional device that was just installed does not work” on page 202
- “A Lenovo optional device that worked previously does not work now. ” on page 202

External USB device not recognized

Complete the following steps until the problem is resolved:

1. Make sure that the proper drivers are installed on the compute node. See the product documentation for the USB device for information about device drivers.
2. Use the Setup utility to make sure that the device is configured correctly.
3. If the USB device is plugged into a hub or the console breakout cable, unplug the device and plug it directly into the USB port on the front of the compute node.

PCIe adapter is not recognized or is not functioning

Complete the following steps until the problem is resolved:

1. Check the event log and resolve any issues related to the device.
2. Validate that the device is supported for the server (see <http://www.lenovo.com/us/en/serverproven/>).
3. Make sure that the adapter is installed in a correct slot.
4. Make sure that the proper device drivers are installed for the device.
5. Resolve any resource conflicts if running legacy mode (UEFI).
6. Check <http://datacentersupport.lenovo.com> for any tech tips (also known as retain tips or service bulletins) that might be related to the adapter.
7. Ensure any adapter external connections are correct and that the connectors are not physically damaged.

A Lenovo optional device that was just installed does not work

1. Make sure that:
 - The device is supported for the server (see <http://www.lenovo.com/us/en/serverproven/>).
 - 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 F1 to display the system setup interface. Whenever memory or any other device is changed, you must update the configuration.
2. Reseat the device that you just installed.
3. Replace the device that you just installed.

A Lenovo optional device that worked previously does not work now.

1. Make sure that all of the cable connections for the device are secure.
2. If the device comes with test instructions, use those instructions to test the device.
3. If the failing device is a SCSI device, make sure that:
 - The cables for all external SCSI devices are connected correctly.
 - The last device in each SCSI chain, or the end of the SCSI cable, is terminated correctly.
 - Any external SCSI device is turned on. You must turn on an external SCSI device before you turn on the server.
4. Reseat the failing device.
5. Replace the failing device.

Serial-device problems

Use this information to solve problems with serial ports or devices.

- “Number of displayed serial ports is less than the number of installed serial ports” on page 203
- “Serial device does not work” on page 203

Number of displayed serial ports is less than the number of installed serial ports

Complete the following steps until the problem is solved.

1. Make sure that:
 - Each port is assigned a unique address in the Setup utility and none of the serial ports is disabled.
 - The serial-port adapter (if one is present) is seated correctly.
2. Reseat the serial port adapter.
3. Replace the serial port adapter.

Serial device does not work

1. Make sure that:
 - The device is compatible with the server.
 - The serial port is enabled and is assigned a unique address.
 - The device is connected to the correct connector.
2. Reseat the following components:
 - a. Failing serial device.
 - b. Serial cable.
3. Replace the following components:
 - a. Failing serial device.
 - b. Serial cable.
4. (Trained technician only) Replace the system board.

Intermittent problems

Use this information to solve intermittent problems.

- “Intermittent external device problems” on page 203
- “Intermittent KVM problems” on page 203
- “Intermittent unexpected reboots” on page 204

Intermittent external device problems

Complete the following steps until the problem is solved.

1. Make sure that the correct device drivers are installed. See the manufacturer's Web site for documentation.
2. For a USB device:
 - a. Make sure that the device is configured correctly.

Restart the server and press F1 to display the system setup interface. Then, click **Advanced → USB Configuration**.
 - b. Connect the device to another port. If using a USB hub, remove the hub and connect the device directly to the compute node. Make sure that the device is configured correctly for the port.

Intermittent KVM problems

Complete the following steps until the problem is solved.

Video problems:

1. Make sure that all cables and the console breakout cable are properly connected and secure.

2. Make sure that the monitor is working properly by testing it on another compute node.
3. Test the console breakout cable on a working compute node to ensure that it is operating properly. Replace the console breakout cable if it is defective.

Keyboard problems:

Make sure that all cables and the console breakout cable are properly connected and secure.

Mouse problems:

Make sure that all cables and the console breakout cable are properly connected and secure.

Intermittent unexpected reboots

Note: Some correctable errors require that the server reboot so that it can disable a device, such as a memory module or a processor to allow the machine to boot up properly.

1. If the reset occurs after the operating system starts, disable any automatic server restart (ASR) utilities, such as the Automatic Server Restart IPMI Application for Windows, or any ASR devices that are installed.
2. See the management controller event log to check for an event code that indicates a reboot. See “Event logs” on page 191 for information about viewing the event log.

Power problems

Use this information to resolve issues related to power.

System error LED is on and event log "Power supply has lost input" is displayed

To resolve the problem, ensure that:

1. The power supply is properly connected to a power cord.
2. The power cord is connected to a properly grounded electrical outlet for the server.

Network problems

Use this information to resolve issues related to networking.

- “Cannot wake server using Wake on LAN” on page 204
- “Could not log in using LDAP account with SSL enabled” on page 205

Cannot wake server using Wake on LAN

Complete the following steps until the problem is resolved:

1. If you are using the dual-port network adapter and the server is connected to the network using Ethernet 5 connector, check the system-error log or TSM system event log, make sure:
 - a. Fan 3 is running in standby mode, if Emulex dual port 10GBase-T embedded adapter is installed.
 - b. The room temperature is not too high (see “Specifications” on page 3).
 - c. The air vents are not blocked.
 - d. The air baffle is installed securely.
2. Reseat the dual-port network adapter.
3. Turn off the server and disconnect it from the power source; then, wait 10 seconds before restarting the server.
4. If the problem still remains, replace the dual-port network adapter.

Could not log in using LDAP account with SSL enabled

Complete the following steps until the problem is resolved:

1. Make sure that the license key is valid.
2. Generate a new license key and log in again.

Observable problems

Use this information to solve observable problems.

- “The server immediately displays the POST Event Viewer when it is turned on” on page 205
- “Server is unresponsive (POST is complete and operating system is running)” on page 205
- “Server is unresponsive (cannot press F1 to start System Setup)” on page 206
- “Voltage system board fault is displayed in the event logs” on page 206
- “Unusual smell” on page 206
- “Server seems to be running hot” on page 206
- “Cracked parts or cracked chassis” on page 207

The server immediately displays the POST Event Viewer when it is turned on

Complete the following steps until the problem is solved.

1. Check BMC event logs and resolve the errors in the event logs.
2. Make sure that the UEFI firmware and BMC firmware are the latest version.
3. Revert the system to the minimum configuration.
4. Correct any errors that are indicated by the light path diagnostics LEDs.
5. 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 <http://www.lenovo.com/us/en/serverproven/>

6. (Trained technician only) Make sure that the processor is seated correctly.
7. Replace the following components one at a time, in the order shown, and restart the server each time:
 - a. (Trained technician only) Processor
 - b. (Trained technician only) System board

Server is unresponsive (POST is complete and operating system is running)

Complete the following steps until the problem is solved.

- If you are in the same location as the compute node, complete the following steps:
 1. If you are using a KVM connection, make sure that the connection is operating correctly. Otherwise, make sure that the keyboard and mouse are operating correctly.
 2. If possible, log in to the compute node and verify that all applications are running (no applications are hung).
 3. Restart the compute node.
 4. If the problem remains, make sure that any new software has been installed and configured correctly.
 5. Contact your place of purchase of the software or your software provider.
- If you are accessing the compute node from a remote location, complete the following steps:

1. Make sure that all applications are running (no applications are hung).
2. Attempt to log out of the system and log back in.
3. Validate the network access by pinging or running a trace route to the compute node from a command line.
 - a. If you are unable to get a response during a ping test, attempt to ping another compute node in the enclosure to determine whether it is a connection problem or compute node problem.
 - b. Run a trace route to determine where the connection breaks down. Attempt to resolve a connection issue with either the VPN or the point at which the connection breaks down.
4. Restart the compute node remotely through the management interface.
5. If the problem remains, verify that any new software has been installed and configured correctly.
6. Contact your place of purchase of the software or your software provider.

Server is unresponsive (cannot press F1 to start System Setup)

Configuration changes, such as added devices or adapter firmware updates, and firmware or application code problems can cause the server to fail POST (the power-on self-test).

If this occurs, the server responds in either of the following ways:

- The server restarts automatically and attempts POST again.
- The server hangs, and you must manually restart the server for the server to attempt POST again.

After a specified number of consecutive attempts (automatic or manual), the server reverts to the default UEFI configuration and starts System Setup so that you can make the necessary corrections to the configuration and restart the server. If the server is unable to successfully complete POST with the default configuration, there might be a problem with the system board.

Voltage system board fault is displayed in the event logs

Complete the following steps until the problem is solved.

1. Check BMC event logs and resolve the errors described in the event logs according to *ThinkSystem System Manager User Guide*. See https://thinksystem.lenovofiles.com/help/topic/7Y98/bmc_user_guide.pdf.
2. Update UEFI firmware and BMC firmware to the latest version.
3. Revert the system to the minimum configuration. See “Specifications” on page 3 for the minimally required number of processors and DIMMs.
4. Restart the system.
 - If the system restarts, add each of the items that you removed one at a time, restarting 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.

Unusual smell

Complete the following steps until the problem is solved.

1. An unusual smell might be coming from newly installed equipment.
2. If the problem remains, contact Lenovo Support.

Server seems to be running hot

Complete the following steps until the problem is solved.

Multiple compute nodes or chassis:

1. Make sure that the room temperature is within the specified range (see “Specifications” on page 3).
2. Check the management processor event log for rising temperature events. If there are no events, the compute node is running within normal operating temperatures. Note that you can expect some variation in temperature.

Cracked parts or cracked chassis

Contact Lenovo Support.

Software problems

Use this information to solve software problems.

1. To determine whether the problem is caused by the software, make sure that:
 - The server has the minimum memory that is needed to use the software. For memory requirements, see the information that comes with the software.

Note: If you have just installed an adapter or memory, the server might have a memory-address conflict.

 - The software is designed to operate on the server.
 - Other software works on the server.
 - The software works on another server.
2. If you receive any error messages while you use the software, see the information that comes with the software for a description of the messages and suggested solutions to the problem.
3. Contact your place of purchase of the software.

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.

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 <http://www.lenovo.com/us/en/serverproven/> to make sure that the hardware and software is 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.

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.

Gathering information needed to call Support

If you believe that you require warranty service for your Lenovo product, the service technicians will be able to assist you more efficiently if you prepare before you call. You can also see <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://www-947.ibm.com/support/servicerequest/Home.action> 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 Lite**

Use the Collect Service Data function of Lenovo XClarity Provisioning Manager Lite to collect system service data. You can collect existing system log data or run a new diagnostic to collect new data.

- **BMC**

You can use the BMC Web user 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 https://thinksystem.lenovofiles.com/help/topic/7Y98/bmc_user_guide.pdf.

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/supportphonenumber> 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.
1009 Think Place
Morrisville, NC 27560
U.S.A.
Attention: Lenovo VP of Intellectual Property*

LENOVO PROVIDES THIS PUBLICATION "AS IS" WITHOUT WARRANTY OF ANY KIND, EITHER EXPRESS OR IMPLIED, INCLUDING, BUT NOT LIMITED TO, THE IMPLIED WARRANTIES OF NON-INFRINGEMENT, MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE. Some jurisdictions do not allow disclaimer of express or implied warranties in certain transactions, therefore, this statement may not apply to you.

This information could include technical inaccuracies or typographical errors. Changes are periodically made to the information herein; these changes will be incorporated in new editions of the publication. Lenovo may make improvements and/or changes in the product(s) and/or the program(s) described in this publication at any time without notice.

The products described in this document are not intended for use in implantation or other life support applications where malfunction may result in injury or death to persons. The information contained in this document does not affect or change Lenovo product specifications or warranties. Nothing in this document shall operate as an express or implied license or indemnity under the intellectual property rights of Lenovo or third parties. All information contained in this document was obtained in specific environments and is presented as an illustration. The result obtained in other operating environments may vary.

Lenovo may use or distribute any of the information you supply in any way it believes appropriate without incurring any obligation to you.

Any references in this publication to non-Lenovo Web sites are provided for convenience only and do not in any manner serve as an endorsement of those Web sites. The materials at those Web sites are not part of the materials for this Lenovo product, and use of those Web sites is at your own risk.

Any performance data contained herein was determined in a controlled environment. Therefore, the result obtained in other operating environments may vary significantly. Some measurements may have been made on development-level systems and there is no guarantee that these measurements will be the same on generally available systems. Furthermore, some measurements may have been estimated through extrapolation. Actual results may vary. Users of this document should verify the applicable data for their specific environment.

Trademarks

LENOVO, THINKSYSTEM, and XCLARITY are trademarks of Lenovo.

AMD and EPYC are trademarks of AMD Corporation in United States. Microsoft and Windows are trademarks of the Microsoft group of companies. Linux is a registered trademark of Linus Torvalds. All other trademarks are the property of their respective owners. © 2019 Lenovo.

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.

Lenovo makes no representations or warranties with respect to non-Lenovo products. Support (if any) for the non-Lenovo products is provided by the third party, not Lenovo.

Some software might differ from its retail version (if available) and might not include user manuals or all program functionality.

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 17. Limits for particulates and gases

Contaminant	Limits
Particulate	<ul style="list-style-type: none"> The room air must be continuously filtered with 40% atmospheric dust spot efficiency (MERV 9) according to ASHRAE Standard 52.2¹. Air that enters a data center must be filtered to 99.97% efficiency or greater, using high-efficiency particulate air (HEPA) filters that meet MIL-STD-282. The deliquescent relative humidity of the particulate contamination must be more than 60%². The room must be free of conductive contamination such as zinc whiskers.
Gaseous	<ul style="list-style-type: none"> Copper: Class G1 as per ANSI/ISA 71.04-1985³ Silver: Corrosion rate of less than 300 Å in 30 days
<p>¹ ASHRAE 52.2-2008 - <i>Method of Testing General Ventilation Air-Cleaning Devices for Removal Efficiency by Particle Size</i>. Atlanta: American Society of Heating, Refrigerating and Air-Conditioning Engineers, Inc.</p> <p>² 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>³ 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>	

Telecommunication regulatory statement

This product may not be certified in your country for connection by any means whatsoever to interfaces of public telecommunications networks. Further certification may be required by law prior to making any such connection. Contact a Lenovo representative or reseller for any questions.

Electronic emission notices

When you attach a monitor to the equipment, you must use the designated monitor cable and any interference suppression devices that are supplied with the monitor.

Additional electronic emissions notices are available at:

<http://thinksystem.lenovofiles.com/help/index.jsp>

Taiwan 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	○	○	○	○	○	○
機械組套件	-	○	○	○	○	○
空氣傳動設備	-	○	○	○	○	○
冷卻組套件	-	○	○	○	○	○
內存模組	-	○	○	○	○	○
處理器模組	-	○	○	○	○	○
電纜組套件	-	○	○	○	○	○
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 import and export contact information

Contacts are available for Taiwan import and export information.

委製商/進口商名稱: 台灣聯想環球科技股份有限公司
 進口商地址: 台北市南港區三重路 66 號 8 樓
 進口商電話: 0800-000-702

Index

A

- air baffle
 - installing 86
 - removing 85
 - replacing 85
- assert
 - physical presence 189

B

- backplane
 - replacing 121
- backplane for eight 2.5-inch hot-swap drives
 - removing 123
 - replacing 124
- backplane for four 3.5-inch hot-swap drives
 - removing 121
 - replacing 122
- backplane for ten 2.5-inch hot-swap drives
 - removing 125
 - replacing 126

C

- cable routing
 - backplane 22
 - fan board 22
 - GPU 22
 - M.2 module 60
 - middle drive cage 22
 - PIB board 22
 - rear drive cage 22
 - super capacitor 62
 - VGA connector 63
- CMOS battery
 - install 133
 - remove 131
 - replacing 131
- collecting service data 210
- completing
 - parts replacement 189
- contamination, particulate and gaseous 212
- cover
 - installing 84
 - removing 83
 - replacing 82
- CPU
 - installing 177
 - replacing 175
- creating a personalized support web page 209
- custom support web page 209

D

- devices, static-sensitive
 - handling 77
- DIMM
 - replacing 97

E

- enable

- TPM 188
- Ethernet
 - controller
 - troubleshooting 194
- Ethernet controller problems
 - solving 194

F

- fan board
 - installing 181
 - replacing 180
- fan error LED 66
- firmware updates 6
- front I/O assembly
 - installing 163
 - removing 163
 - replacing 162

G

- gaseous contamination 212
- Getting help 209
- GPU
 - installing 120
 - removing 120
 - replacing 120
- graphic processing unit
 - installing 120
 - removing 120
- guidelines
 - options installation 75
 - system reliability 76

H

- handling static-sensitive devices 77
- hard disk drive
 - installing 104
 - replacing 102
- hard disk drive problems 197
- hard disk drives
 - removing 103
- hardware service and support telephone numbers 210
- heat sink
 - installing 179
 - removing 175
 - replacing 175
- Heat sink and microprocessor
 - replacing 175
- help 209
- hot-swap drive
 - installing 104
 - replacing 102
- hot-swap drives
 - removing 103
- hot-swap power supply
 - installing 169
 - remove 164
 - replacing 164

I

- ID label 1
- important notices 212
- install
 - CMOS battery 133
- installation
 - guidelines 75
- installation guidelines 75
- installing
 - air baffle 86
 - CPU 177
 - fan board 181
 - front I/O assembly 163
 - GPU 120
 - graphic processing unit 120
 - hard disk drive 104
 - heat sink 179
 - hot-swap drive 104
 - hot-swap power supply 169
 - memory module 101
 - microprocessor 177
 - middle drive cage 145
 - OCP 3.0 Ethernet adapter 106
 - PCIe adapter 117
 - PIB board 183
 - processor 177, 179
 - rack latches 89
 - RAID super capacitor module on the chassis 160
 - rear backplane 128
 - rear hot-swap drive cage 138
 - riser card 110
 - security bezel 92
 - system board 186
 - system fan 95
 - top cover 84
 - TPM adapter 136
- insufficient PCIe resource
 - solving 201
- intermittent problems 203
- internal cable routing 21
- internal riser assembly
 - installing 112
 - removing 111
 - replacing 111
- introduction 1

J

- jumper 68

K

- keyboard problems 201

M

- M.2 adapter and M.2 drive
 - installing 153
 - replacing 149
- memory
 - problems 196
- memory module
 - removing 97
- memory module error LED 66
- memory module, install 101
- memory modules
 - removal 97
- memory modules installation rules 99
- microprocessor
 - installing 177

- replacing 175
- middle drive cage
 - replacing 142
- monitor problems 199
- mouse problems 201

N

- network
 - problems 204
- network access label 1
- notes, important 212
- notices 211

O

- observable problems 205
- OCP 3.0 Ethernet adapter
 - replacing 105
- optional-device problems 201

P

- particulate contamination 212
- parts list 69
- parts replacement, completing 189
- PCIe
 - troubleshooting 201
- PCIe adapter
 - installing 117
 - removing 114
 - replacing 113
- physical presence 189
- PIB board
 - installing 183
 - replacing 182
- power
 - problems 204
- power cords 73
- power off the server 8
- power on the server 8
- power problems 193
- problems
 - Ethernet controller 194
 - hard disk drive 197
 - intermittent 203
 - keyboard 201
 - memory 196
 - monitor 199
 - mouse 201
 - network 204
 - observable 205
 - optional devices 201
 - PCIe 201
 - power 193, 204
 - power on and power off 195
 - serial-device 202
 - software 207
 - USB device 201
 - video 199
- processor
 - installing 175–177, 179
 - removing 176
 - replacing 175
- processor-heat-sink module
 - installing 177

R

- rack latches
 - installing 89
 - removing 87
 - replacing 87
- RAID super capacitor module
 - replacing 157
- RAID super capacitor module on the chassis
 - installing 160
 - removing 159
- rear backplane
 - installing 128
 - removing 127
- rear hot-swap drive cage
 - installing 138
 - removing 137
 - replacing 137
- Rear view 14
- remove
 - CMOS battery 131
 - fan board 180
 - hot-swap power supply 164
 - M.2 adapter and M.2 drive 149
 - OCP 3.0 Ethernet adapter 105
 - PIB board 182
- removing
 - air baffle 85
 - backplane for eight 2.5-inch hot-swap drives 123
 - backplane for four 3.5-inch hot-swap drives 121
 - backplane for ten 2.5-inch hot-swap drives 125
 - front I/O assembly 163
 - GPU 120
 - graphic processing unit 120
 - hard disk drive 103
 - heat sink 175
 - hot-swap drive 103
 - internal riser assembly 111
 - memory modules 97
 - middle drive cage 142
 - PCIe adapter 114
 - processor 175–176
 - rack latches 87
 - RAID super capacitor module on the chassis 159
 - rear backplane 127
 - rear hot-swap drive cage 137
 - riser card 108
 - security bezel 91
 - super capacitor module 157
 - system board 184
 - system fan 94
 - top cover 83
 - TPM adapter 135
- removing, memory module 97
- replacing
 - air baffle 85
 - backplane 121
 - backplane for eight 2.5-inch hot-swap drives 124
 - backplane for four 3.5-inch hot-swap drives 122
 - backplane for ten 2.5-inch hot-swap drives 126
 - CMOS battery 131
 - CPU 175
 - DIMM 97
 - fan board 180
 - front I/O assembly 162
 - GPU 120
 - graphics processing unit 120
 - hard disk drive 102
 - heat sink 175
 - Heat sink and microprocessor 175
 - hot-swap drive 102
 - hot-swap power supply 164
 - internal riser assembly 111
 - M.2 adapter and M.2 drive 149
 - microprocessor 175

- middle drive cage 142
- OCP 3.0 Ethernet adapter 105
- PCIe adapter 113
- PIB board 182
- processor 175
- rack latches 87
- RAID super capacitor module 157
- rear hot-swap drive cage 137
- riser card 107
- security bezel 91
- system board 184
- system fan 94
- top cover 82
- TPM adapter 134

- retainer on M.2 adapter
 - adjusting 152
- riser card
 - installing 110
 - removing 108
 - replacing 107

S

- safety iii
- safety inspection checklist iv
- Secure Boot 189
- security advisories 8
- security bezel
 - installing 92
 - removing 91
 - replacing 91
- serial-device problems 202
- server model with eight 2.5-inch SAS/SATA drives 32
- server model with four 3.5-inch SAS/SATA drives 24
- server model with six 2.5-inch SAS/SATA drives and four 2.5-inch NVMe drives 40
- server model with ten 2.5-inch SAS/SATA/NVMe drives 47
- server power on or power off problems 195
- service and support
 - before you call 209
 - hardware 210
 - software 210
- service data 210
- software 11, 13
- software problems 207
- software service and support telephone numbers 210
- solving
 - Ethernet controller problems 194
 - insufficient PCIe resource 201
 - solving power problems 193
- static-sensitive devices
 - handling 77
- super capacitor module
 - installing 158
 - removing 157
- support web page, custom 209
- system board
 - installing 186
 - removing 184
 - replacing 184
- system board components 20
- system board LED 66
- system error LED 66
- system fan
 - installing 95
 - removing 94
 - replacing 94
- system ID LED 66
- system power LED 66
- system reliability guidelines 76

T

- Taiwan BSMI RoHS declaration 214
- Taiwan import and export contact information 214
- Tech Tips 8
- Technical rules for drives 81
- Technical rules for HBA/RAID adapters 82
- Technical rules for PCIe adapter 82
- Technical rules for power supply 77
- Technical rules for processors 77
- telecommunication regulatory statement 213
- telephone numbers 210
- top cover
 - installing 84
 - removing 83
 - replacing 82
- TPM 188
- TPM adapter
 - installing 136
 - removing 135
 - replacing 134
- TPM policy 188
- trademarks 212
- troubleshooting 199, 201, 207
 - by symptom 194
 - hard disk drive problems 197
 - intermittent problems 203
 - keyboard problems 201
 - memory problems 196
 - mouse problems 201
 - network problems 204
 - observable problems 205

- power on and power off problems 195
- power problems 204
- serial-device problems 202
- symptoms-based troubleshooting 194
- USB-device problems 201
- video 199

Trusted Platform Module 188

U

- UEFI Secure Boot 189
- update firmware 6
- updating
 - DMI/SMBIOS 188
 - Universal Unique Identifier (UUID) 188
- USB-device problems 201

V

- video problems 199

W

- warranty 1
- working inside the server
 - power on 76

Lenovo