



# 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:

[https://pubs.lenovo.com/safety\\_documentation/](https://pubs.lenovo.com/safety_documentation/)

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>

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# Contents

## Contents . . . . . i

## Safety . . . . . v

Safety inspection checklist . . . . . vi

## Chapter 1. Introduction . . . . . 1

Specifications . . . . . 2

Particulate contamination . . . . . 8

Firmware updates . . . . . 9

Tech Tips . . . . . 11

Security advisories . . . . . 12

Power on the server . . . . . 12

Power off the server . . . . . 12

## Chapter 2. Server components . . . . . 13

Front view . . . . . 13

Operator information panel . . . . . 15

Rear view . . . . . 16

Rear view LEDs . . . . . 20

System board components . . . . . 22

System board LEDs . . . . . 23

System board jumpers . . . . . 26

Internal cable routing . . . . . 27

Power/Sideband cable routing . . . . . 28

Server model with four 3.5-inch SAS/SATA drives . . . . . 30

Server model with eight 2.5-inch SAS/SATA drives . . . . . 39

Server model with six 2.5-inch SAS/SATA drives and four 2.5-inch NVMe drives . . . . . 47

Server model with ten 2.5-inch SAS/SATA/NVMe drives . . . . . 55

M.2 module cable routing . . . . . 70

Super capacitor cable routing . . . . . 70

VGA/USB/Front panel connector . . . . . 72

Intrusion switch cable routing . . . . . 74

Parts list . . . . . 75

Power cords . . . . . 78

## Chapter 3. Hardware replacement procedures . . . . . 81

Installation Guidelines . . . . . 81

Safety inspection checklist . . . . . 82

System reliability guidelines . . . . . 83

Working inside the server with the power on . . . . . 83

Handling static-sensitive devices . . . . . 84

Memory module installation rules . . . . . 84

Technical rules . . . . . 86

Technical rules for processor and heat sink . . . . . 86

Technical rules for power supply . . . . . 87

Technical rules for system fans . . . . . 89

Technical rules for GPU adapters . . . . . 89

Technical rules for drives . . . . . 91

Technical rules for HBA/RAID adapters . . . . . 92

Technical rules for PCIe NVMe adapter . . . . . 92

Technical rules for Ethernet adapters . . . . . 92

Technical rules for OCP 3.0 Ethernet adapters . . . . . 94

Top cover replacement . . . . . 94

Remove the top cover . . . . . 94

Install the top cover . . . . . 96

Air baffle replacement . . . . . 97

Remove the air baffle . . . . . 97

Install the air baffle . . . . . 98

Rack latches replacement . . . . . 99

Remove the rack latches . . . . . 99

Install the rack latches . . . . . 101

Security bezel replacement . . . . . 103

Remove the security bezel . . . . . 103

Install the security bezel . . . . . 104

System fan replacement . . . . . 106

Remove a system fan . . . . . 106

Install a system fan . . . . . 108

Memory module replacement . . . . . 109

Remove a memory module . . . . . 109

Install a memory module . . . . . 111

Hot-swap drive replacement . . . . . 113

Remove a hot-swap drive . . . . . 113

Install a hot-swap drive . . . . . 114

OCP 3.0 Ethernet adapter replacement . . . . . 116

Remove the OCP 3.0 Ethernet adapter . . . . . 116

Install the OCP 3.0 Ethernet adapter . . . . . 117

Internal riser assembly replacement . . . . . 118

Remove the internal riser assembly . . . . . 118

Install the internal riser assembly . . . . . 119

Riser card replacement . . . . . 120

Remove a riser card . . . . . 121

Install a riser card . . . . . 123

PCIe adapter replacement . . . . . 124

Remove a PCIe adapter . . . . . 125

Install a PCIe adapter . . . . . 128

Intrusion switch replacement . . . . . 131

Remove an intrusion switch . . . . . 131

Install an intrusion switch . . . . . 132

GPU replacement . . . . .	133
Remove a GPU adapter . . . . .	133
Install a GPU adapter . . . . .	134
Backplane replacement. . . . .	134
Remove the backplane for four 3.5-inch hot-swap drives . . . . .	134
Install the backplane for four 3.5-inch hot-swap drives . . . . .	135
Remove the backplane for eight 2.5-inch hot-swap drives . . . . .	136
Install the backplane for eight 2.5-inch hot-swap drives . . . . .	137
Remove the backplane for ten 2.5-inch hot-swap drives . . . . .	138
Install the backplane for ten 2.5-inch hot-swap drives . . . . .	139
Remove the rear backplane . . . . .	140
Install the rear backplane . . . . .	142
CMOS battery replacement . . . . .	144
Remove the CMOS battery . . . . .	144
Install the CMOS battery . . . . .	146
TPM adapter replacement. . . . .	148
Remove the TPM adapter . . . . .	148
Install the TPM adapter . . . . .	149
Rear hot-swap drive cage replacement . . . . .	150
Remove the rear hot-swap drive cage . . . . .	150
Install the rear hot-swap drive cage . . . . .	151
Middle drive cage replacement. . . . .	155
Remove the middle drive cage . . . . .	155
Install the middle drive cage . . . . .	158
M.2 adapter and M.2 drive replacement . . . . .	161
Remove the M.2 adapter and M.2 drive. . . . .	161
Adjust the retainer on the M.2 adapter . . . . .	165
Install the M.2 adapter and M.2 drive. . . . .	166
RAID super capacitor module replacement . . . . .	170
Remove a super capacitor module on the M.2/riser support bracket . . . . .	170
Install a super capacitor module on the M.2/riser support bracket . . . . .	170
Remove the RAID super capacitor module on the chassis . . . . .	171
Install the RAID super capacitor module on the chassis . . . . .	173
Front I/O assembly replacement . . . . .	175
Remove the front I/O assembly . . . . .	175
Install the front I/O assembly . . . . .	176
Hot-swap power supply replacement . . . . .	176
Remove a hot-swap power supply. . . . .	177
Install a hot-swap power supply . . . . .	181
Heat sink and microprocessor replacement . . . . .	186
Remove a heat sink . . . . .	186
Remove a processor . . . . .	188

Install a processor . . . . .	188
Install a heat sink . . . . .	189
Fan board replacement . . . . .	191
Remove the fan board . . . . .	191
Install the fan board . . . . .	192
Power inverter board (PIB) replacement . . . . .	193
Remove the PIB board . . . . .	193
Install the PIB board . . . . .	194
System board replacement (trained technician only) . . . . .	195
Remove the system board . . . . .	196
Install the system board . . . . .	197
Update the Vital Product Data (VPD) . . . . .	199
Enable TPM . . . . .	200
Enable UEFI Secure Boot . . . . .	201
Complete the parts replacement . . . . .	202

<b>Chapter 4. Problem determination . . . . .</b>	<b>.203</b>
Event logs . . . . .	203
Light path diagnostics . . . . .	204
General problem determination procedures . . . . .	204
Resolving suspected power problems . . . . .	205
Resolving suspected Ethernet controller problems . . . . .	205
Troubleshooting by symptom . . . . .	206
Power on and power off problems. . . . .	206
Memory problems . . . . .	208
Hard disk drive problems . . . . .	209
Monitor and video problems . . . . .	211
Keyboard, mouse, or USB-device problems . . . . .	212
Optional-device problems . . . . .	213
Serial-device problems . . . . .	214
Intermittent problems. . . . .	215
Power problems. . . . .	216
Network problems . . . . .	216
Observable problems. . . . .	217
Software problems. . . . .	219

<b>Appendix A. Hardware disassembling for recycle . . . . .</b>	<b>.221</b>
Disassembling the system board for recycle. . . . .	221

<b>Appendix B. Getting help and technical assistance . . . . .</b>	<b>.223</b>
Before you call . . . . .	223
Collecting service data . . . . .	224
Contacting Support . . . . .	224

<b>Appendix C. Notices. . . . .</b>	<b>.225</b>
Trademarks . . . . .	226

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Important notes . . . . .	226
Telecommunication regulatory statement. . . . .	226
Electronic emission notices . . . . .	226
Taiwan Region BSMI RoHS declaration. . . . .	227

Taiwan Region import and export contact information . . . . .	227
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<b>Index . . . . .</b>	<b>.229</b>
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## 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.

在安裝本产品之前，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་ཐབས་འདི་བདེ་སྤྱད་མ་བྱས་གོང་། སྐྱོར་གྱི་ཡིད་གཟབ་  
བྱ་འདྲ་མིན་ཡིད་པའི་འོད་མེར་བལྟ་དགོས།

Bu ürünü kurmadan önce güvenlik bilgilerini okuyun.

مەزكۇر مەھسۇلاتنى ئورنىتىشتىن بۇرۇن بىخەتەرلىك ئۇچۇرلىرىنى ئوقۇپ چىقىڭ.

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

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## Safety inspection checklist

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

### Notes:

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

### CAUTION:

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

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

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

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

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

- a. Go to:

<http://dcsc.lenovo.com/#/>

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





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## 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.

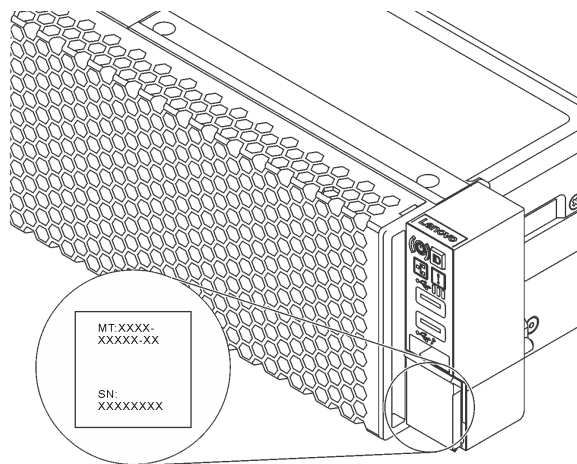


Figure 1. Location of the ID label

### 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"><li>• 1U</li><li>• Height: 43.0 mm (1.69 inches)</li><li>• Width:<ul style="list-style-type: none"><li>– With rack latches: 482.0 mm (19.0 inches)</li><li>– Without rack latches: 434.4 mm (17.1 inches)</li></ul></li><li>• Depth: 778.3 mm (30.6 inches)</li></ul> <p><b>Note:</b> 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"><li>• One AMD® EPYC™ 7002 or 7003 processor</li><li>• Designed for Land Grid Array (LGA) 4094 (SP3) socket</li><li>• Scalable up to 64 cores</li><li>• Thermal Design Power (TDP): up to 280 watts</li></ul> <p>For a list of supported processors, see: <a href="https://serverproven.lenovo.com/">https://serverproven.lenovo.com/</a></p> <p>For technical rules of storage controller adapters, see “<a href="#">Technical rules for processor and heat sink</a>” on page 86.</p>
Heat sink	<ul style="list-style-type: none"><li>• Standard heat sink</li><li>• High-performance heat sink</li></ul>

Table 1. Server specifications (continued)

Specification	Description
Memory	<ul style="list-style-type: none"> <li>• Slots: 16 memory module slots</li> <li>• Minimum memory: 8 GB</li> <li>• Maximum memory: 2 TB</li> <li>• Supported memory module type: <ul style="list-style-type: none"> <li>– TruDDR4 2933, single-rank/dual-rank, 8 GB/16 GB/32 GB/64 GB RDIMM</li> <li>– TruDDR4 3200, dual-rank, 16 GB/32 GB/64 GB RDIMM</li> <li>– TruDDR4 2933, quad-rank, 128 GB 3DS RDIMM</li> <li>– TruDDR4 3200, quad-rank, 128 GB 3DS RDIMM</li> </ul> </li> </ul> <p><b>Note:</b> The operating speed and total memory capacity depend on the processor model and UEFI settings.</p> <p>For installation rules about memory modules, see <a href="#">“Memory module installation rules” on page 84</a>.</p> <p>For a list of supported memory, see the Lenovo ServerProven Web site: <a href="https://static.lenovo.com/us/en/serverproven/index.shtml">https://static.lenovo.com/us/en/serverproven/index.shtml</a>.</p>
Operating systems	<p>Supported and certified operating systems:</p> <ul style="list-style-type: none"> <li>• Microsoft Windows Server</li> <li>• VMware ESXi</li> <li>• Red Hat Enterprise Linux</li> <li>• SUSE Linux Enterprise Server</li> </ul> <p>References:</p> <ul style="list-style-type: none"> <li>• Complete list of available operating systems: <a href="https://lenovopress.lenovo.com/osig">https://lenovopress.lenovo.com/osig</a>.</li> <li>• OS deployment instructions: See “Deploy the operating system” in <i>Setup Guide</i>.</li> </ul>
Internal drives	<ul style="list-style-type: none"> <li>• Up to two M.2 drives</li> <li>• Up to four 3.5-inch hot-swap SAS/SATA drives</li> <li>• Up to twelve 2.5-inch hot-swap SAS/SATA drives</li> <li>• Up to sixteen NVMe drives</li> </ul>
PCIe slots	<p>Depending on the model, your server supports up to three PCIe slots in the rear. For detailed information, see <a href="#">“Rear view” on page 16</a>.</p>
Graphics processing unit (GPU)	<ul style="list-style-type: none"> <li>• Maximum: three GPUs</li> <li>• Type: <ul style="list-style-type: none"> <li>– NVIDIA Tesla T4</li> <li>– NVIDIA Quadro P620</li> <li>– Nvidia A2</li> </ul> </li> </ul> <p>For technical rules of storage controller adapters, see <a href="#">“Technical rules for GPU adapters” on page 89</a>.</p>

Table 1. Server specifications (continued)

Specification	Description
Input/Output (I/O) features	<ul style="list-style-type: none"> <li>• Front panel: <ul style="list-style-type: none"> <li>– One VGA connector (optional)</li> <li>– Two USB 3.2 Gen 1 (5 Gbps) connectors</li> </ul> </li> <li>• Rear panel: <ul style="list-style-type: none"> <li>– One VGA connector</li> <li>– Two USB 3.2 Gen 1 (5 Gbps) connectors</li> <li>– Ethernet connectors on OCP 3.0 Ethernet adapter (optional)</li> <li>– One RJ45 BMC management network connector</li> <li>– One serial port</li> </ul> </li> </ul>
HBA/RAID adapters (depending on the model)	<p>Support for JBOD mode :</p> <ul style="list-style-type: none"> <li>• 430-8i SAS/SATA 12G HBA adapter</li> <li>• 430-16i SAS/SATA 12G HBA adapter</li> <li>• 430-8e SAS/SATA 12G HBA adapter</li> <li>• 430-16e SAS/SATA 12G HBA adapter</li> <li>• 440-8i SAS/SATA PCIe 12G HBA adapter</li> <li>• 440-16i SAS/SATA PCIe 12G HBA adapter</li> <li>• 440-16e SAS/SATA PCIe 12G HBA adapter</li> <li>• 440-8e SAS/SATA PCIe 12G Gen4 HBA adapter</li> </ul> <p>Support for JBOD mode and RAID levels 0, 1, 5, 10, and 50:</p> <ul style="list-style-type: none"> <li>• 530-8i PCIe 12G RAID adapter</li> <li>• 540-8i PCIe 12G RAID Adapter</li> <li>• 730-8i 1G Cache PCIe 12G RAID adapter</li> <li>• 730-8i 2G Flash PCIe 12G RAID adapter</li> </ul> <p>Support for JBOD mode and RAID levels 0, 1, 5, 10 ,50 , 6 and 60:</p> <ul style="list-style-type: none"> <li>• 930-8i 2G Flash PCIe 12G RAID adapter</li> <li>• 930-16i 4G Flash PCIe 12G RAID adapter</li> <li>• 930-8e 4G Flash PCIe 12G RAID adapter</li> <li>• 930-16e 4G Flash PCIe 12G RAID adapter</li> <li>• 940-8i 4G Flash PCIe 12G RAID adapter</li> <li>• 940-16i 4G Flash PCIe 12G RAID adapter</li> <li>• 940-8e 4G Flash PCIe 12G RAID Adapter</li> </ul> <p>For technical rules of storage controller adapters, see <a href="#">“Technical rules for HBA/RAID adapters” on page 92</a>.</p>
System fans	<p>Seven dual-rotor hot-swap fans (including one redundant fan rotor)</p> <p><b>Note:</b> If there is an OCP module installed, when the system is powered off but still plugged in to AC power, fans 6 and 7 may continue to spin at a much lower speed. This is the system design to provide proper cooling for the OCP module.</p>

Table 1. Server specifications (continued)

Specification	Description
Power supplies	<p>One or two hot-swap power supplies for redundancy support:</p> <ul style="list-style-type: none"> <li>• 550-watt ac 80 PLUS Platinum</li> <li>• 750-watt ac 80 PLUS Platinum</li> <li>• 750-watt ac 80 PLUS Titanium</li> <li>• 1100-watt ac 80 PLUS Platinum</li> <li>• 1100-watt -48V DC</li> </ul>
Minimal configuration for debugging	<ul style="list-style-type: none"> <li>• One processor in processor socket 1</li> <li>• One memory module in slot 1</li> <li>• One power supply</li> <li>• One HDD drive or one M.2 drive (if OS is needed for debugging)</li> <li>• Six system fans (depending on the configuration)</li> </ul>

Table 1. Server specifications (continued)

Specification	Description																																
Acoustical noise emissions	The declared acoustic noise levels are based on below configurations, which may change depending on configurations and conditions:																																
	<table><tr><th>Config.</th><th>Typical</th><th>Storage rich</th><th>GPU rich</th></tr><tr><td>CPU</td><td>1 x 155 W</td><td>1 x 155 W</td><td>1 x 155 W</td></tr><tr><td>DIMM</td><td>8 x 32 GB</td><td>16 x 64 GB</td><td>16 x 64 GB</td></tr><tr><td>Ethernet</td><td>X710-T2L OCP</td><td>10 GbE BASE-T 4-port PCIe</td><td>10 GbE BASE-T 4-port PCIe</td></tr><tr><td>PSU</td><td>2 x 750 W</td><td>2 x 750 W</td><td>2 x 1100 W</td></tr><tr><td>RAID</td><td>530-8i RAID</td><td>NA</td><td>930-16i RAID</td></tr><tr><td>Drive</td><td>8 x 2.5" HDD</td><td>16 x 2.5" NVMe SSD</td><td>10 x 2.5" HDD</td></tr><tr><td>GPU</td><td>NA</td><td>NA</td><td>2 x T4 GPU</td></tr></table>	Config.	Typical	Storage rich	GPU rich	CPU	1 x 155 W	1 x 155 W	1 x 155 W	DIMM	8 x 32 GB	16 x 64 GB	16 x 64 GB	Ethernet	X710-T2L OCP	10 GbE BASE-T 4-port PCIe	10 GbE BASE-T 4-port PCIe	PSU	2 x 750 W	2 x 750 W	2 x 1100 W	RAID	530-8i RAID	NA	930-16i RAID	Drive	8 x 2.5" HDD	16 x 2.5" NVMe SSD	10 x 2.5" HDD	GPU	NA	NA	2 x T4 GPU
	Config.	Typical	Storage rich	GPU rich																													
	CPU	1 x 155 W	1 x 155 W	1 x 155 W																													
	DIMM	8 x 32 GB	16 x 64 GB	16 x 64 GB																													
	Ethernet	X710-T2L OCP	10 GbE BASE-T 4-port PCIe	10 GbE BASE-T 4-port PCIe																													
	PSU	2 x 750 W	2 x 750 W	2 x 1100 W																													
	RAID	530-8i RAID	NA	930-16i RAID																													
	Drive	8 x 2.5" HDD	16 x 2.5" NVMe SSD	10 x 2.5" HDD																													
	GPU	NA	NA	2 x T4 GPU																													
Acoustic noise levels:																																	
Sound power levels (L <sub>WA,m</sub> )																																	
<table><tr><th>Status</th><th>Typical</th><th>Storage rich</th><th>GPU rich</th></tr><tr><td>Idling</td><td>5.7 Bel</td><td>7.0 Bel</td><td>7.0 Bel</td></tr><tr><td>Operating</td><td>5.9 Bel</td><td>7.2 Bel</td><td>8.5 Bel</td></tr></table>	Status	Typical	Storage rich	GPU rich	Idling	5.7 Bel	7.0 Bel	7.0 Bel	Operating	5.9 Bel	7.2 Bel	8.5 Bel																					
Status	Typical	Storage rich	GPU rich																														
Idling	5.7 Bel	7.0 Bel	7.0 Bel																														
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Sound pressure level (L <sub>pA,m</sub> )																																	
<table><tr><th>Status</th><th>Typical</th><th>Storage rich</th><th>GPU rich</th></tr><tr><td>Idling</td><td>41 dBA</td><td>54 dBA</td><td>54 dBA</td></tr><tr><td>Operating</td><td>43 dBA</td><td>56 dBA</td><td>69 dBA</td></tr></table>	Status	Typical	Storage rich	GPU rich	Idling	41 dBA	54 dBA	54 dBA	Operating	43 dBA	56 dBA	69 dBA																					
Status	Typical	Storage rich	GPU rich																														
Idling	41 dBA	54 dBA	54 dBA																														
Operating	43 dBA	56 dBA	69 dBA																														
Notes:																																	
<ul style="list-style-type: none"><li>These sound levels were measured in controlled acoustical environments according to procedures specified by ISO7779 and are reported in accordance with ISO 9296.</li><li>Government regulations (such as those prescribed by OSHA or European Community Directives) may govern noise level exposure in the workplace and may apply to you and your server installation. The actual sound pressure levels in your installation depend upon a variety of factors, including the number of racks in the installation; the size, materials, and configuration of the room; the noise levels from other equipment; the room ambient temperature, and employee's location in relation to the equipment. Further, compliance with such government regulations depends on a variety of additional factors, including the duration of employees' exposure and whether employees wear hearing protection. Lenovo recommends that you consult with qualified experts in this field to determine whether you are in compliance with the applicable regulations.</li></ul>																																	

Table 1. Server specifications (continued)

Specification	Description																														
Electrical input	<table><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><th>-48 V dc</th></tr><tr><td>550-watt 80 PLUS Platinum</td><td>√</td><td>√</td><td>√</td><td>×</td></tr><tr><td>750-watt 80 PLUS Platinum</td><td>√</td><td>√</td><td>√</td><td>×</td></tr><tr><td>750-watt 80 PLUS Titanium</td><td>×</td><td>√</td><td>√</td><td>×</td></tr><tr><td>1100-watt 80 PLUS Platinum</td><td>√</td><td>√</td><td>√</td><td>×</td></tr><tr><td>1100-watt -48V DC</td><td>×</td><td>×</td><td>×</td><td>√</td></tr></table>	Power supply	100–127 V ac (50–60 Hz)	200–240 V ac (50–60 Hz)	240 V dc*	-48 V dc	550-watt 80 PLUS Platinum	√	√	√	×	750-watt 80 PLUS Platinum	√	√	√	×	750-watt 80 PLUS Titanium	×	√	√	×	1100-watt 80 PLUS Platinum	√	√	√	×	1100-watt -48V DC	×	×	×	√
	Power supply	100–127 V ac (50–60 Hz)	200–240 V ac (50–60 Hz)	240 V dc*	-48 V dc																										
	550-watt 80 PLUS Platinum	√	√	√	×																										
	750-watt 80 PLUS Platinum	√	√	√	×																										
	750-watt 80 PLUS Titanium	×	√	√	×																										
	1100-watt 80 PLUS Platinum	√	√	√	×																										
	1100-watt -48V DC	×	×	×	√																										
<b>CAUTION:</b> 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.																															
Environment																															
The server is supported in the following environment:  <b>Note:</b> This server is designed for standard data center environment and recommended to be placed in industrial data center.  • Air temperature: – Operating: – 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. – 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): – Operating: – 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)																															

Table 1. Server specifications (continued)

Specification	Description
	<ul style="list-style-type: none"> <li>– Shipment or storage: 8%–90%</li> <li>• Particulate contamination</li> </ul> <p><b>Attention:</b> 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"> <li>• The processor TDP is 120/155 watts.</li> <li>• There is no NVMe drive, rear drive cage, M.2 drive, GPU adapter, Ethernet adapter of 10 GbE or higher, or PCIe NVMe adapter installed.</li> </ul> <p><b>Note:</b> 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>

## Particulate contamination

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

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



Table 2. Limits for particulates and gases

Contaminant	Limits
Reactive gases	<p>Severity level G1 as per ANSI/ISA 71.04-1985<sup>1</sup>:</p> <ul style="list-style-type: none"> <li>The copper reactivity level shall be less than 200 Angstroms per month (<math>\text{\AA}/\text{month} \approx 0.0035 \mu\text{g}/\text{cm}^2\text{-hour weight gain}</math>).<sup>2</sup></li> <li>The silver reactivity level shall be less than 200 Angstroms per month (<math>\text{\AA}/\text{month} \approx 0.0035 \mu\text{g}/\text{cm}^2\text{-hour weight gain}</math>).<sup>3</sup></li> <li>The reactive monitoring of gaseous corrosivity must be conducted approximately 5 cm (2 in.) in front of the rack on the air inlet side at one-quarter and three-quarter frame height off the floor or where the air velocity is much higher.</li> </ul>
Airborne particulates	<p>Data centers must meet the cleanliness level of ISO 14644-1 class 8.</p> <p>For data centers without airside economizer, the ISO 14644-1 class 8 cleanliness might be met by choosing one of the following filtration methods:</p> <ul style="list-style-type: none"> <li>The room air might be continuously filtered with MERV 8 filters.</li> <li>Air entering a data center might be filtered with MERV 11 or preferably MERV 13 filters.</li> </ul> <p>For data centers with airside economizers, the choice of filters to achieve ISO class 8 cleanliness depends on the specific conditions present at that data center.</p> <ul style="list-style-type: none"> <li>The deliquescent relative humidity of the particulate contamination should be more than 60% RH.<sup>4</sup></li> <li>Data centers must be free of zinc whiskers.<sup>5</sup></li> </ul>

<sup>1</sup> ANSI/ISA-71.04-1985. *Environmental conditions for process measurement and control systems: Airborne contaminants*. Instrument Society of America, Research Triangle Park, North Carolina, U.S.A.

<sup>2</sup> The derivation of the equivalence between the rate of copper corrosion growth in the thickness of the corrosion product in  $\text{\AA}/\text{month}$  and the rate of weight gain assumes that  $\text{Cu}_2\text{S}$  and  $\text{Cu}_2\text{O}$  grow in equal proportions.

<sup>3</sup> The derivation of the equivalence between the rate of silver corrosion growth in the thickness of the corrosion product in  $\text{\AA}/\text{month}$  and the rate of weight gain assumes that  $\text{Ag}_2\text{S}$  is the only corrosion product.

<sup>4</sup> 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.

<sup>5</sup> Surface debris is randomly collected from 10 areas of the data center on a 1.5 cm diameter disk of sticky electrically conductive tape on a metal stub. If examination of the sticky tape in a scanning electron microscope reveals no zinc whiskers, the data center is considered free of zinc whiskers.

## 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 installed operating system executing on the target server itself.
- **Off-Target update.** The installation or update is initiated from a computing device interacting directly with the server's 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
<b>Lenovo XClarity Provisioning Manager</b> Limited to core system firmware only.	✓			✓	✓		
<b>ThinkSystem System Manager</b> Supports core system firmware and most advanced I/O option firmware updates		✓		✓	✓	✓	
<b>Lenovo XClarity Essentials Bootable Media Creator</b> 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	✓				✓	✓	✓
<b>Lenovo XClarity Administrator</b> Supports core system firmware and I/O firmware updates	✓ <sup>1</sup>	✓ <sup>2</sup>		✓	✓		

### Notes:

1. For I/O firmware updates.
2. For BMC and UEFI firmware updates.

The latest firmware can be found at the following site:

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

- **Lenovo XClarity Provisioning Manager**

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

**Note:** By default, the Lenovo XClarity Provisioning Manager Graphical User Interface is displayed when you start the server and press the key specified in the on-screen instructions. If you have changed that default to be the text-based system setup, you can bring up the Graphical User Interface from the text-based system setup interface.

For additional information about using Lenovo XClarity Provisioning Manager to update firmware, see:

“Firmware Update” section in the LXPM documentation compatible with your server at <https://pubs.lenovo.com/lxpm-overview/>

**Important:** Lenovo XClarity Provisioning Manager (LXPM) supported version varies by product. All versions of Lenovo XClarity Provisioning Manager are referred to as Lenovo XClarity Provisioning Manager and LXPM in this document, unless specified otherwise. To see the LXPM version supported by your server, go to <https://pubs.lenovo.com/lxpm-overview/>.

- **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.

For additional information about using ThinkSystem System Manager to update firmware, see:

[https://thinksystem.lenovofiles.com/help/topic/7Y00/bmc\\_user\\_guide.pdf](https://thinksystem.lenovofiles.com/help/topic/7Y00/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>

- **Lenovo XClarity Administrator**

If you are managing multiple servers using the Lenovo XClarity Administrator, you can update firmware for all managed servers through that interface. Firmware management is simplified by assigning firmware-compliance policies to managed endpoints. When you create and assign a compliance policy to managed endpoints, Lenovo XClarity Administrator monitors changes to the inventory for those endpoints and flags any endpoints that are out of compliance.

For additional information about using Lenovo XClarity Administrator to update firmware, see:

[https://sysmgt.lenovofiles.com/help/topic/com.lenovo.lxca.doc/update\\_fw.html](https://sysmgt.lenovofiles.com/help/topic/com.lenovo.lxca.doc/update_fw.html)

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## 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 on **How To's** from the navigation pane.
3. Click **Article Type** → **Solution** from the drop-down menu.

Follow the on-screen instructions to choose the category for the problem that you are having.

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## 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](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 12](#).

---

## 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/7Y00/bmc\\_user\\_guide.pdf](https://thinksystem.lenovofiles.com/help/topic/7Y00/bmc_user_guide.pdf).

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## Chapter 2. Server components

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

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### 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.

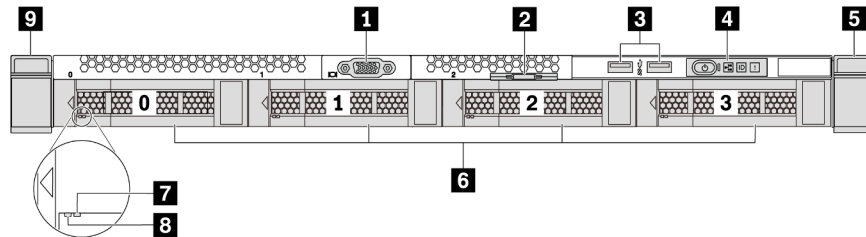


Figure 3. Front view of server model with four 3.5-inch drive bays

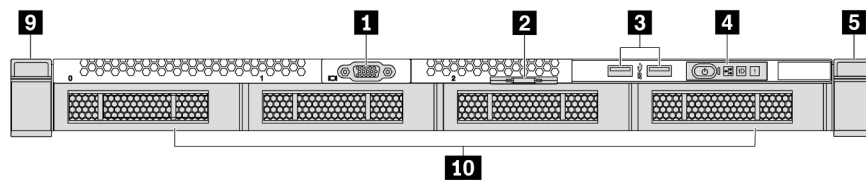


Figure 4. Front view of server model without a backplane (for four 3.5-inch drive bays)

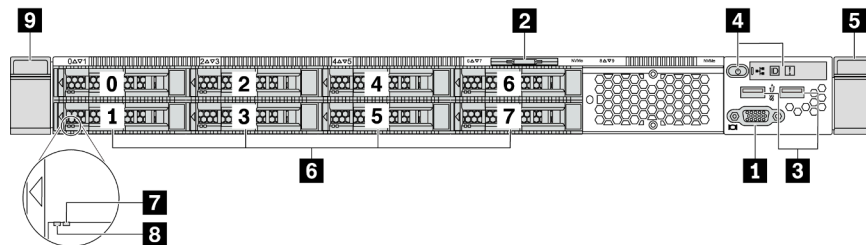


Figure 5. Front view of server model with eight 2.5-inch drive bays

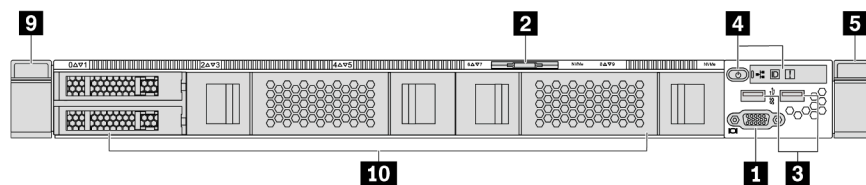


Figure 6. Front view of server model without a backplane (for ten 2.5-inch drive bays)

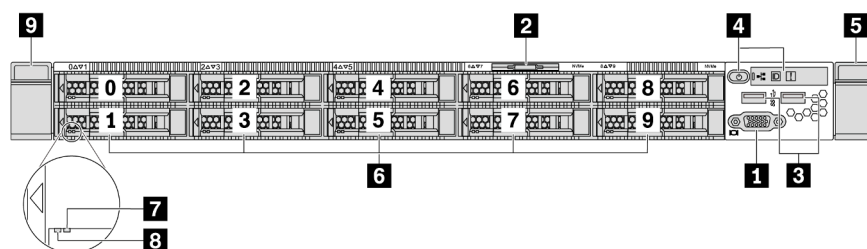


Figure 7. Front view of server model with ten 2.5-inch drive bays

Table 3. Components on the front of the server

<b>1</b> VGA connector (optional)	<b>2</b> Pull-out information tab
<b>3</b> USB 3.2 Gen 1 (5 Gbps) connectors	<b>4</b> Operator information panel
<b>5</b> Rack latch (right)	<b>6</b> Hot-swap drive bays
<b>7</b> Drive status LED (yellow)	<b>8</b> Drive activity LED (green)
<b>9</b> Rack latch (left)	<b>10</b> 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 3.2 Gen 1 (5 Gbps) 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 15](#).

### 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.

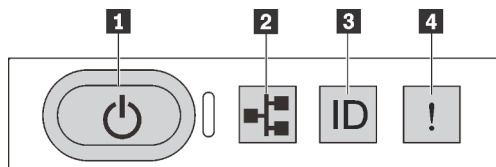


Figure 8. Operator information panel

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. See: [“Power on the server” on page 12](#). The power status LED helps you determine the current power status.

Status	Color	Description
Solid on	Green	The server is on and running.
Slow blinking (about one flash per second)	Green	The server is off and is ready to be powered on (standby state).
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 use 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"> <li>• Processor error</li> <li>• Memory module error</li> <li>• Storage failure</li> <li>• PCIe adapter failure</li> <li>• Power supply error</li> <li>• Fan failure</li> <li>• Mainboard failure</li> </ul>	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.

### 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.

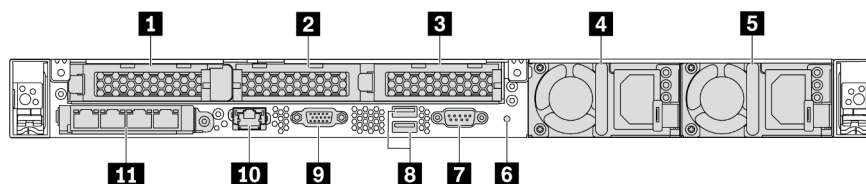


Figure 9. Rear view of server model with three PCIe slots



Table 5. Components on the rear of the server

<b>1</b> PCIe slot 1 on riser 1 assembly	<b>2</b> PCIe slot 2 on riser 2 assembly
<b>3</b> PCIe slot 3 on riser 2 assembly	<b>4</b> Power supply 1
<b>5</b> Power supply 2 (optional)	<b>6</b> NMI button
<b>7</b> Serial port	<b>8</b> USB 3.2 Gen 1 (5 Gbps) connectors
<b>9</b> VGA connector	<b>10</b> RJ45 BMC management network connector
<b>11</b> 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.

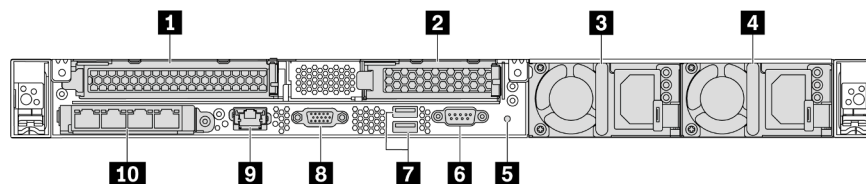


Figure 10. Rear view of server model with two PCIe slots

Table 6. Components on the rear of the server

<b>1</b> PCIe slot 1 on riser 1 assembly	<b>2</b> PCIe slot 3 on riser 2 assembly
<b>3</b> Power supply 1	<b>4</b> Power supply 2 (optional)
<b>5</b> NMI button	<b>6</b> Serial port
<b>7</b> USB 3.2 Gen 1 (5 Gbps) connectors	<b>8</b> VGA connector
<b>9</b> BMC management network connector	<b>10</b> 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.

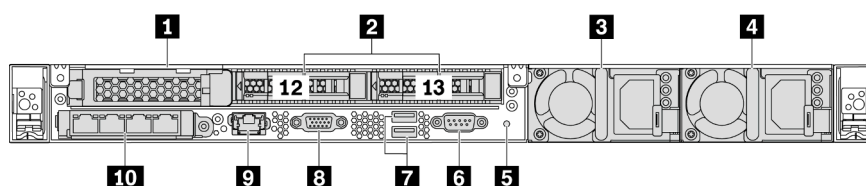


Figure 11. Rear view of server model with two hot-swap drive bays and one PCIe slot

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 3.2 Gen 1 (5 Gbps) connectors	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.

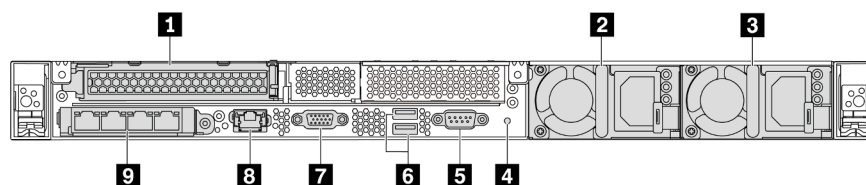


Figure 12. Rear view of server model with one PCIe slot

Table 8. Components on the rear of the server

<b>1</b> PCIe slot 1 on riser 1 assembly	<b>2</b> Power supply 1
<b>3</b> Power supply 2 (optional)	<b>4</b> NMI button
<b>5</b> Serial port	<b>6</b> USB 3.2 Gen 1 (5 Gbps) connectors
<b>7</b> VGA connector	<b>8</b> BMC management Ethernet connector
<b>9</b> 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.

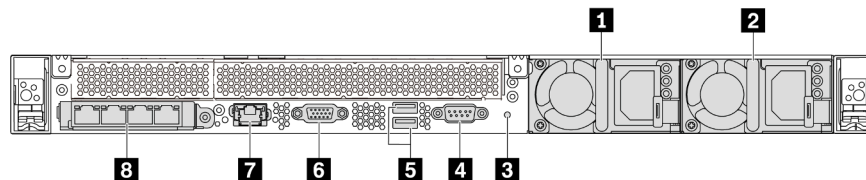


Figure 13. Rear view of server model with no PCIe slot

Table 9. Components on the rear of the server

<b>1</b> Power supply 1	<b>2</b> Power supply 2 (optional)
<b>3</b> NMI button	<b>4</b> Serial port
<b>5</b> USB 3.2 Gen 1 (5 Gbps) connectors	<b>6</b> VGA connector
<b>7</b> BMC management network connector	<b>8</b> 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 20](#).

- **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 3.2 Gen 1 (5 Gbps) 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)**



Figure 14. OCP module (two connectors)

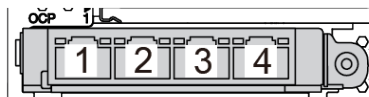


Figure 15. OCP module (four connectors)

**Notes:**

- The OCP 3.0 Ethernet adapter provides two or four extra Ethernet connectors for network connections.
- Any of the connectors (connector 1 by default) on the OCP module can function as a shared management connector.

---

## 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.

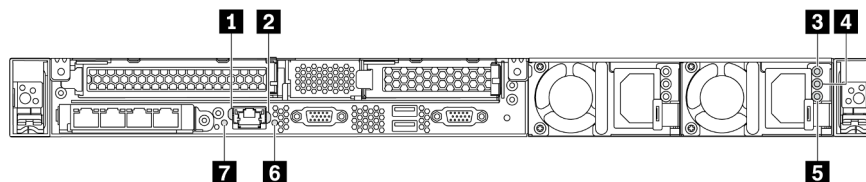


Figure 16. Rear view LEDs

Table 10. LEDs on the rear view of the server

<b>1</b> Ethernet link LED	<b>2</b> Ethernet activity LED
<b>3</b> Power input LED	<b>4</b> Power output LED
<b>5</b> Power supply error LED	<b>6</b> System ID LED
<b>7</b> 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
<b>1</b> Ethernet link LED	Green	On	Network link is established.
	None	Off	Network link is disconnected.
<b>2</b> 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
<b>3</b> Power input LED	<ul style="list-style-type: none"> <li>Green: The power supply is connected to the ac power source.</li> <li>Off: The power supply is disconnected from the ac power source or a power problem occurs.</li> </ul>
<b>4</b> Power output LED	<ul style="list-style-type: none"> <li>Green: The server is on and the power supply is working normally.</li> <li>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.  To disable zero-output mode, start the Setup utility, go to <b>Advanced → Power → Zero Output</b> and select <b>Disable</b>. If you disable the zero-out mode, both power supplies will be in the active state.</li> <li>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.</li> </ul>
<b>5</b> Power supply error LED	<ul style="list-style-type: none"> <li>Yellow: The power supply has failed. To resolve the issue, replace the power supply.</li> <li>Off: The power supply is working normally.</li> </ul>

#### **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 16](#).

## System board components

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

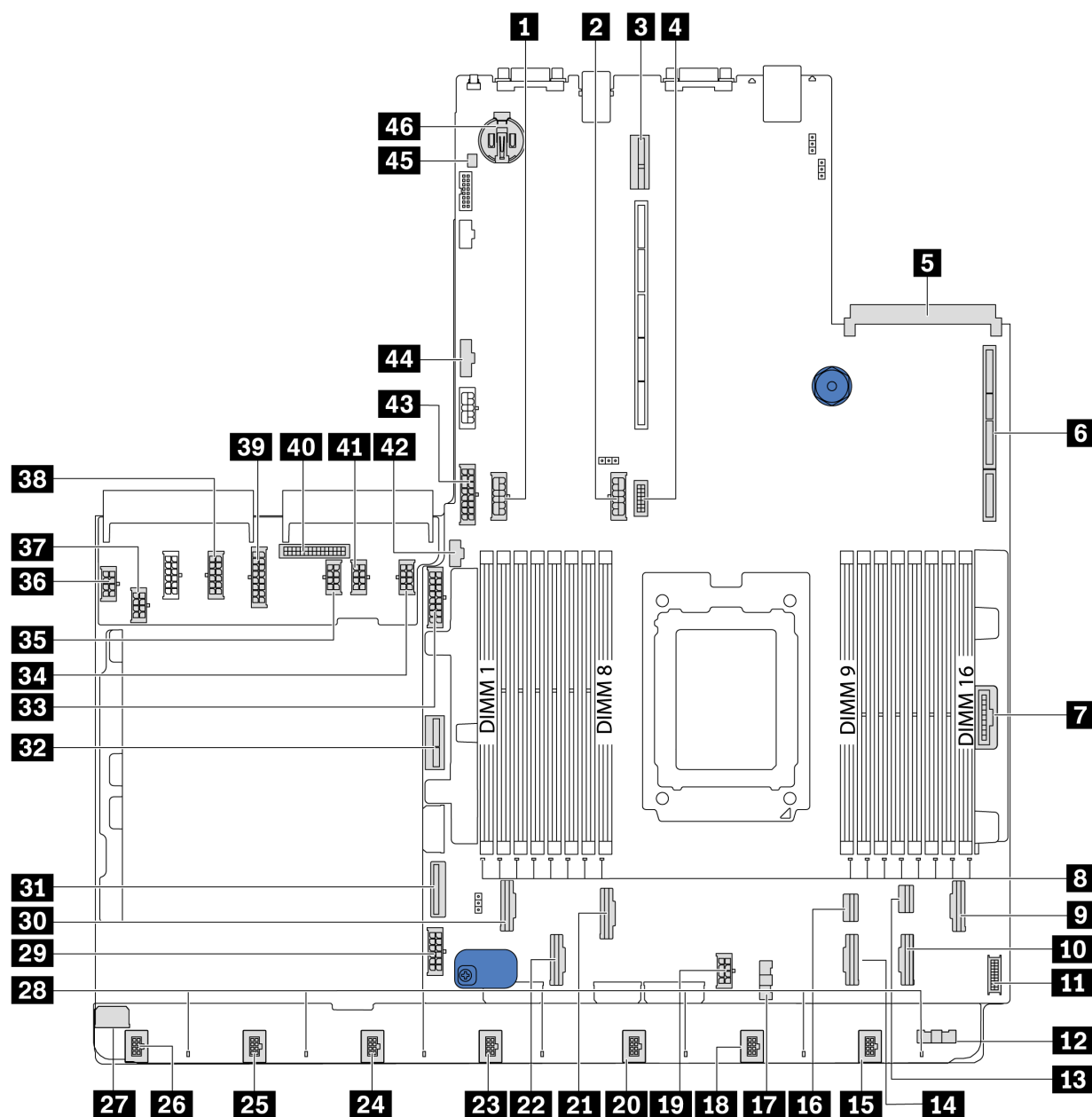


Figure 17. System board components

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

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

**Note:**

## System board LEDs

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

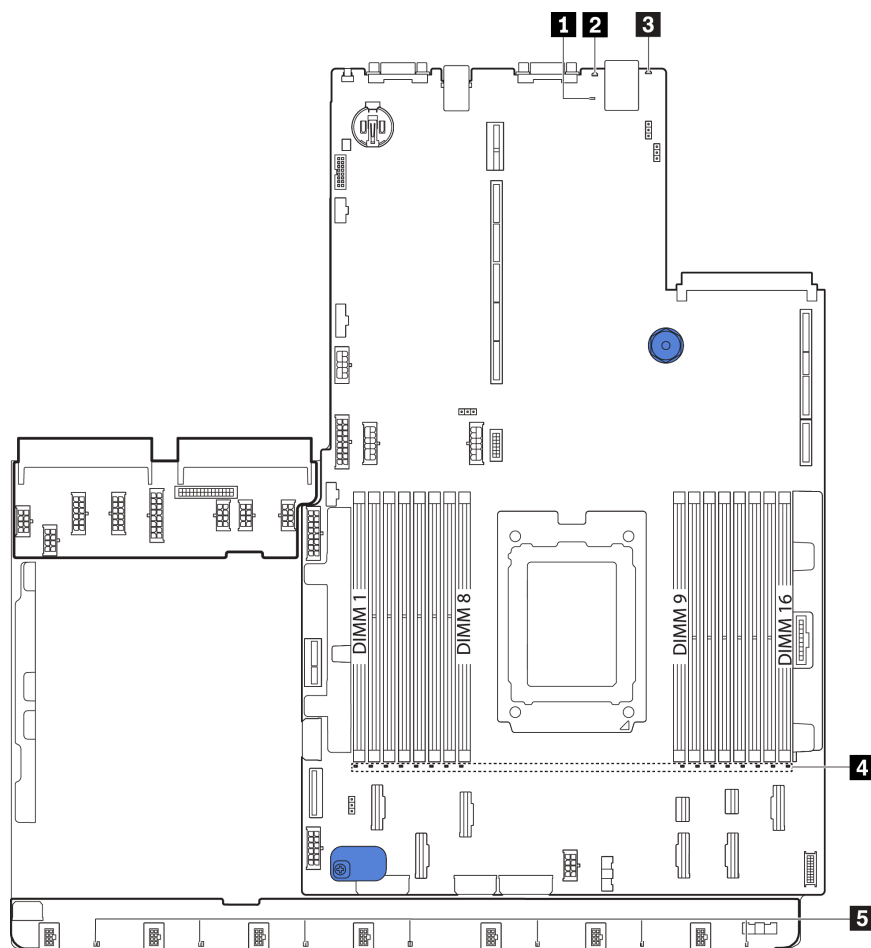


Figure 18. System board LEDs

Table 11. LEDs on the system board

Callout	Callout
<b>1</b> BMC heart beat LED	<b>2</b> System ID LED
<b>3</b> System error LED	<b>4</b> DIMM error LEDs (16)
<b>5</b> 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 15](#).

### **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.

### 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:
  - [https://pubs.lenovo.com/safety\\_documentation/](https://pubs.lenovo.com/safety_documentation/)
  - “Handling static-sensitive devices” on page 84
- Any system-board switch or jumper block that is not shown in the illustrations in this document are reserved.

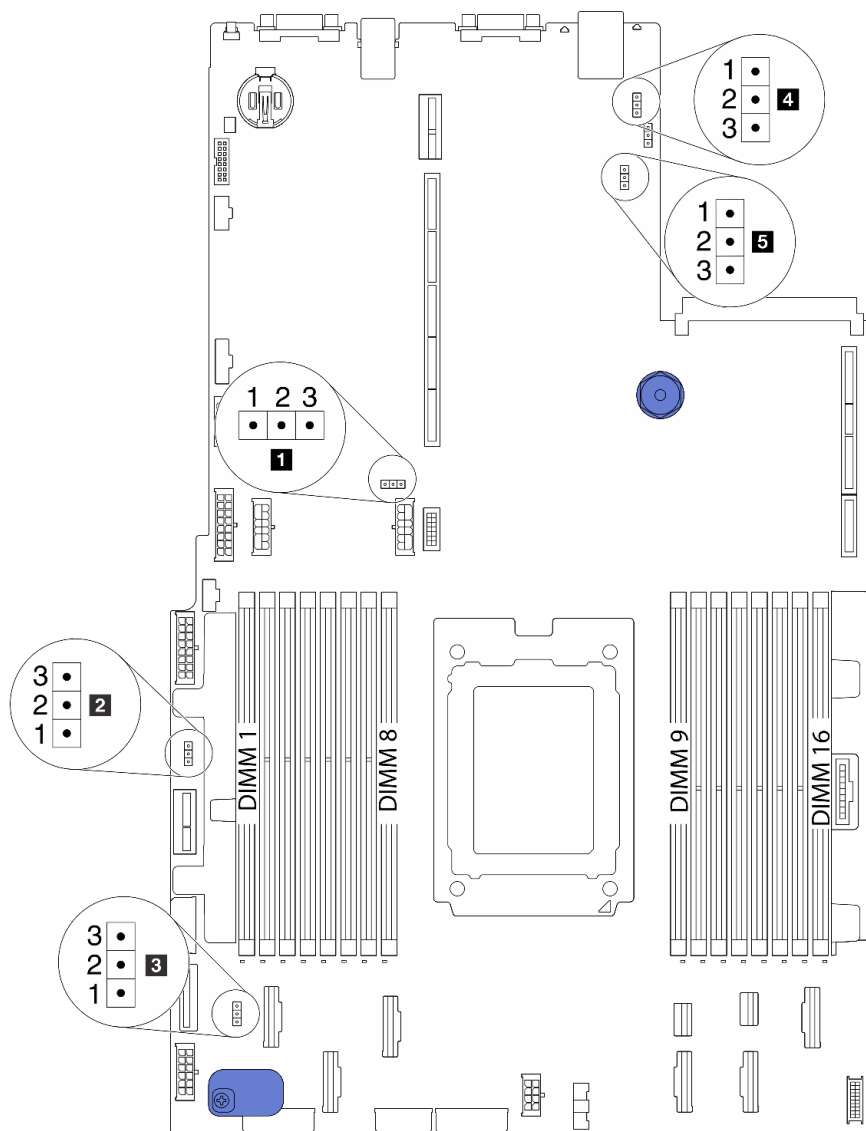


Figure 19. System board jumpers

Table 12. Jumper description

Jumper name	Jumper number	Jumper setting
<b>1</b> Clear CMOS jumper	J3	<ul style="list-style-type: none"> <li>Pins 1 and 2: The jumper is in default setting.</li> <li>Pins 2 and 3: Clear CMOS settings.</li> </ul>
<b>2</b> Enable FPGA flash jumper	J11	<ul style="list-style-type: none"> <li>Pins 1 and 2: The jumper is in default setting.</li> <li>Pins 2 and 3: Enable FPGA flash.</li> </ul>
<b>3</b> Clear password jumper <sup>1</sup>	J6	<ul style="list-style-type: none"> <li>Pins 1 and 2: The jumper is in default setting.</li> <li>Pins 2 and 3: Clear the power-on password.</li> </ul>
<b>4</b> TPM Physical Presence jumper	J10	<ul style="list-style-type: none"> <li>Pins 1 and 2: The jumper is in default setting.</li> <li>Pins 2 and 3: TPM Physical Presence is asserted.</li> </ul>
<b>5</b> BMC loads to default jumper	J9	<ul style="list-style-type: none"> <li>Pins 1 and 2: The jumper is in default setting.</li> <li>Pins 2 and 3: BMC loads to factory default.</li> </ul>

**Note:** <sup>1</sup>The jumper is used for clearing the UEFI password. After clearing the UEFI password, you can boot into setup to set a new password.

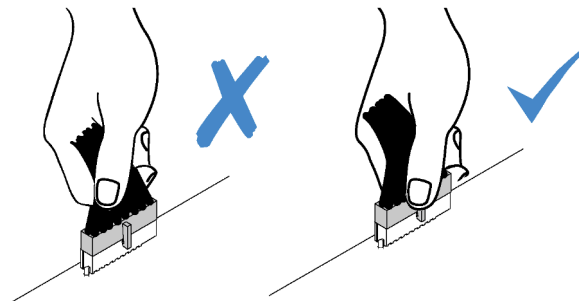
## Internal cable routing

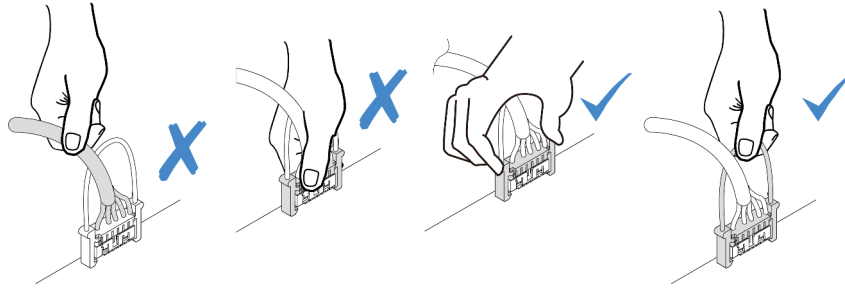
Some of the components in the server have internal cables and cable connectors.

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/Sideband cable routing

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

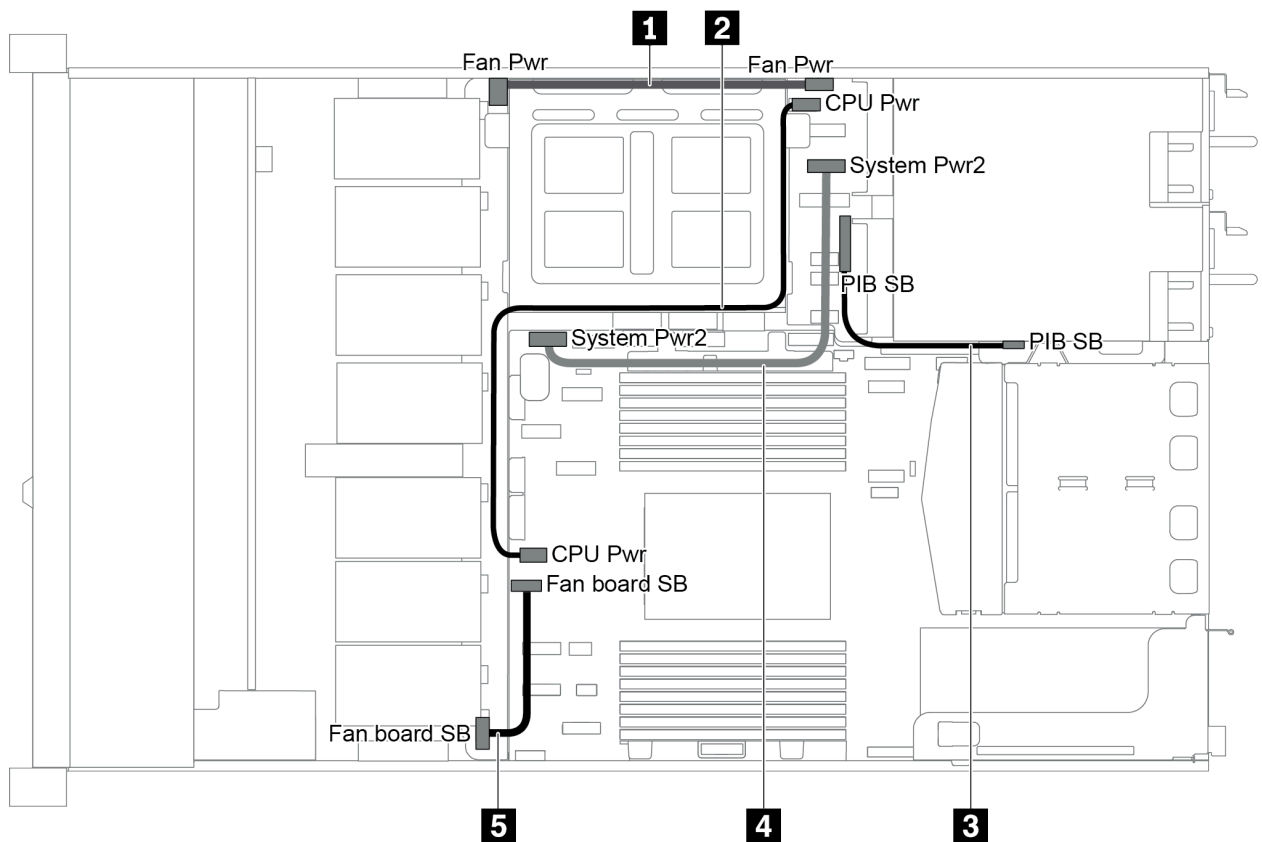


Figure 20. 2.5-inch chassis-1

Cable	From	To
<b>1</b>	Fan board power connector on the fan board	Fan board power connector on the PIB board
<b>2</b>	CPU power connector on the PIB board	CPU power connector on the system board
<b>3</b>	PIB sideband connector on the PIB board	PIB sideband connector on the system board

Cable	From	To
<b>4</b>	System power connector 2 on the PIB board	System power connector 2 on the system board
<b>5</b>	Sideband connector on the fan board	Fan sideband connector on the system board

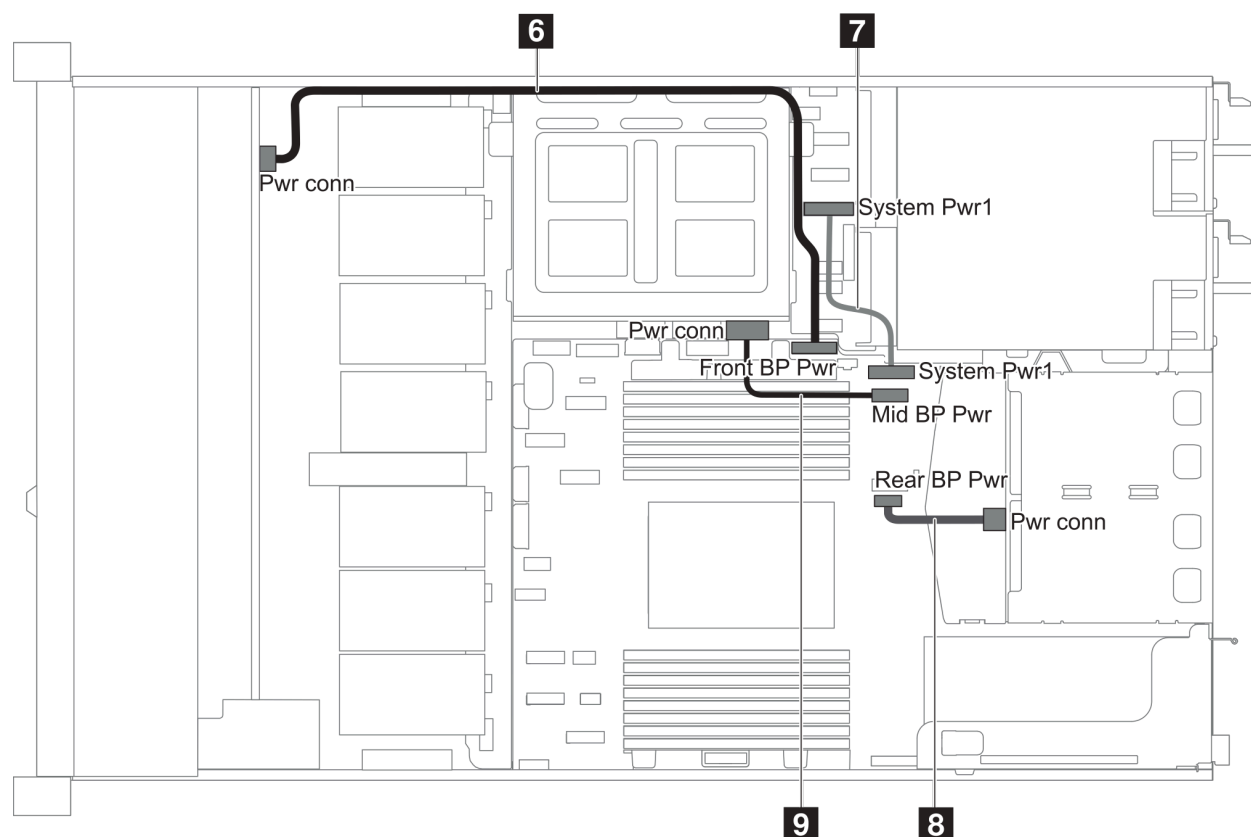


Figure 21. 2.5-inch chassis-2

Cable	From	To
<b>6</b>	Front backplane power connector on the front backplane	Front backplane power connector on the system board
<b>7</b>	System power connector 1 on the PIB board	System power connector 1 on the system board
<b>8</b>	Power connector on the rear backplane	Rear backplane power connector on the system board
<b>9</b>	Power connector on the middle backplane	Middle backplane power connector on the system board

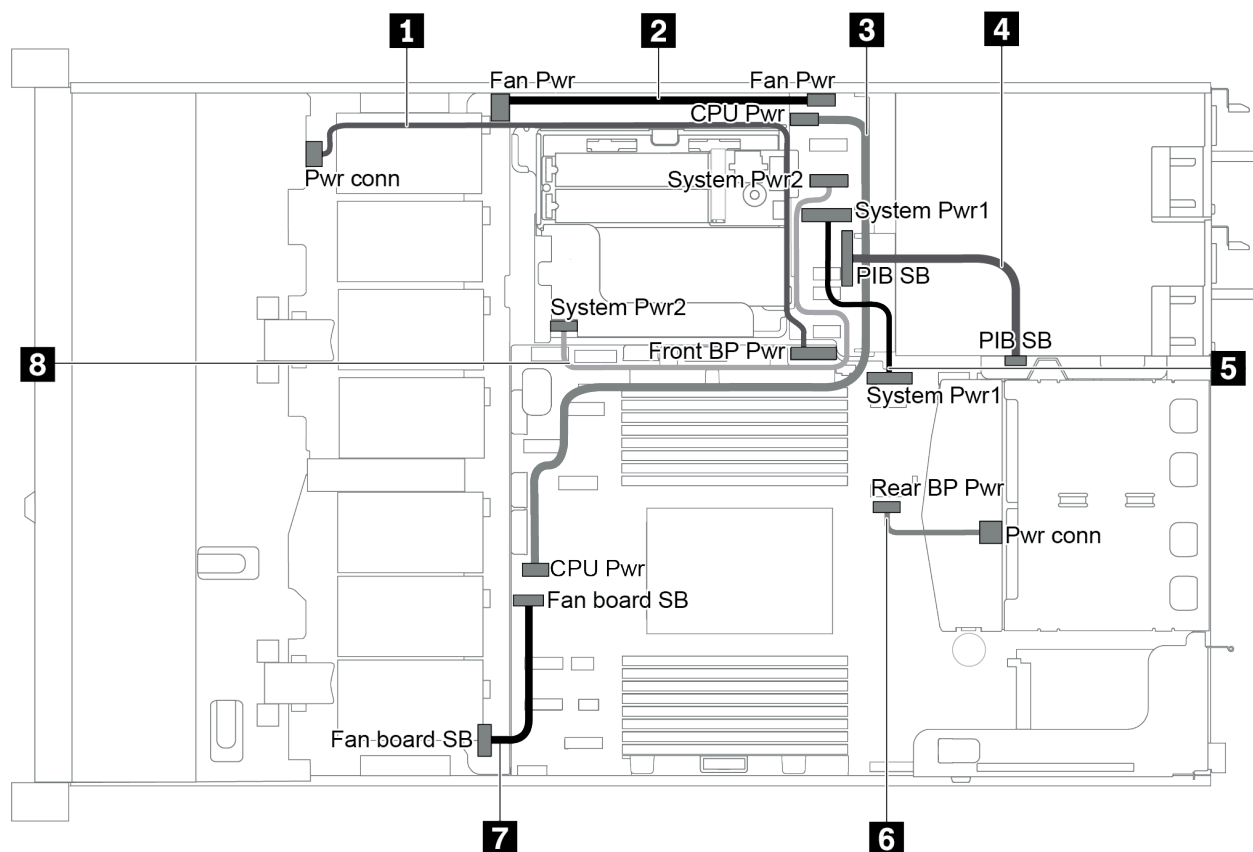


Figure 22. 3.5-inch chassis

Cable	From	To
<b>1</b>	Power connector on the front backplane	Front backplane power connector on the system board
<b>2</b>	Fan board power connector on the fan board	Fan board power connector on the PIB board
<b>3</b>	CPU power connector on the PIB board	CPU power connector on the system board
<b>4</b>	PIB sideband connector on the PIB board	PIB sideband connector on the system board
<b>5</b>	System power connector 1 on the PIB board	System power connector 1 on the system board
<b>6</b>	Power connector on the rear backplane	Rear backplane power connector on the system board
<b>7</b>	Sideband connector on the fan board	Fan sideband connector on the system board
<b>8</b>	System power connector 2 on the PIB board	System power connector 2 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.

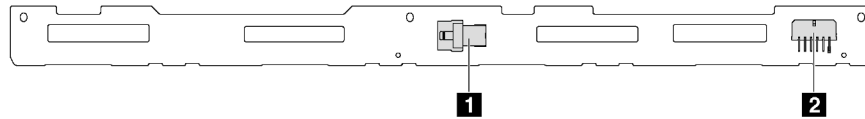


Figure 23. Connectors on the backplane for four 3.5-inch SAS/SATA drives

**1** SAS connector

**2** Power connector

For power cable connection, see [“Power/Sideband cable routing” on page 28](#).

Refer to the following cable routing for different configurations:

- [“Four 3.5-inch SATA drives” on page 32](#)
- [“Four 3.5-inch SAS/SATA drives and one 8i RAID/HBA adapter” on page 33](#)
- [“Four 3.5-inch SATA drives and rear SAS/SATA drive assembly” on page 34](#)
- [“Four 3.5-inch SAS/SATA drives, rear SAS/SATA drive assembly and one 8i RAID/HBA adapter” on page 35](#)
- [“Four 3.5-inch SATA drives and rear NVMe drive assembly” on page 35](#)
- [“Four 3.5-inch SAS/SATA drives, rear NVMe drive assembly and one 8i RAID/HBA adapter” on page 36](#)
- [“Four 3.5-inch SATA drives and middle drive cage” on page 37](#)
- [“Four 3.5-inch SAS/SATA drives, middle drive cage and one 8i RAID/HBA adapter” on page 39](#)

## Four 3.5-inch SATA drives

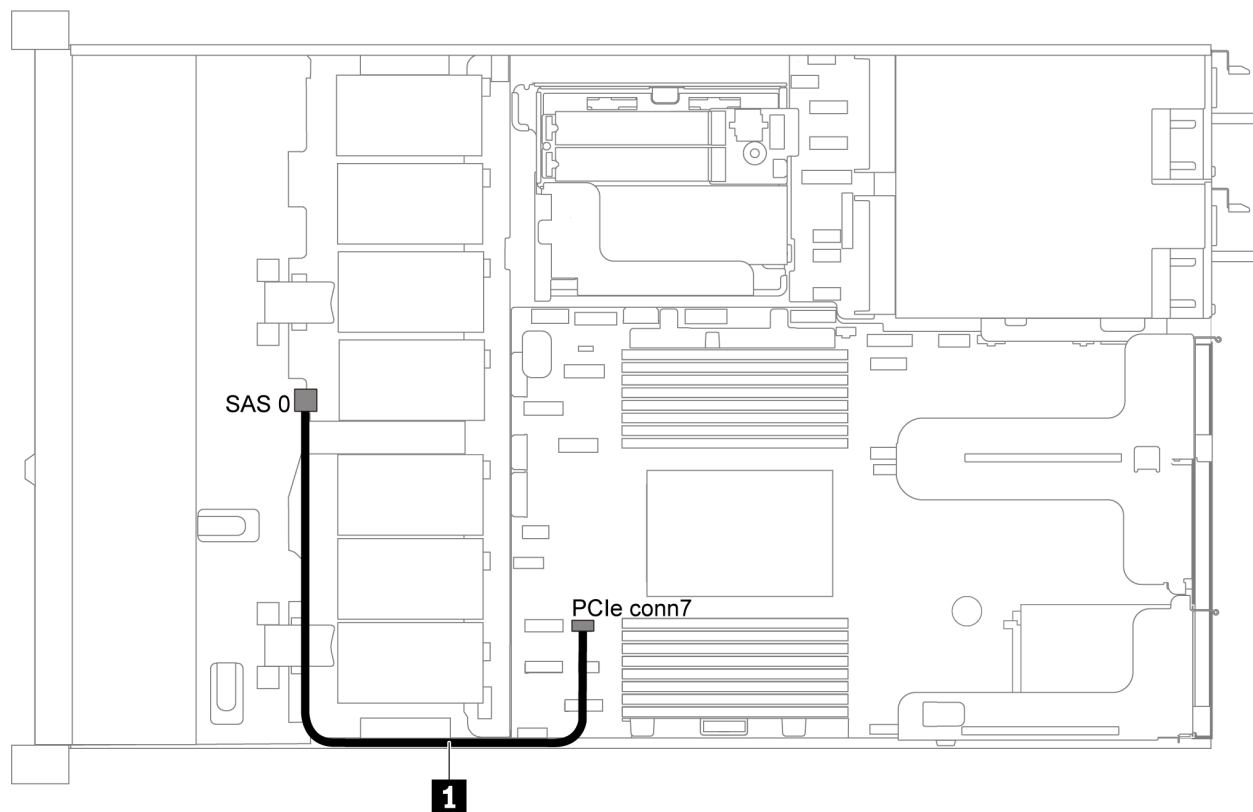


Figure 24. Cable routing for server model with four 3.5-inch SATA drives

**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
<b>1</b> 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/HBA adapter

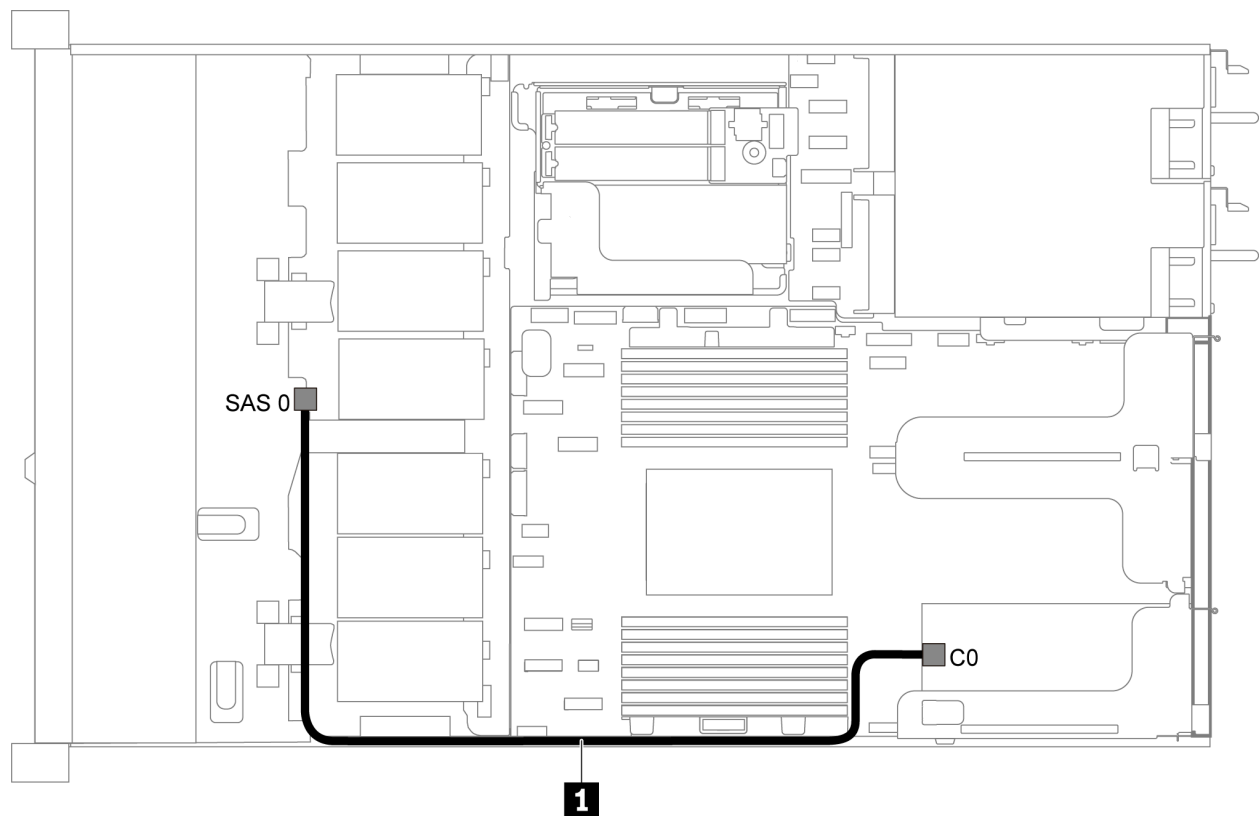


Figure 25. Cable routing for server model with four 3.5-inch SAS/SATA drives and one 8i RAID/HBA adapter

**Note:** RAID/HBA adapters can be installed in PCIe slot 1 or internal riser assembly.

Cable	From	To
<b>1</b> SAS signal cable for front backplane	SAS connector on the front backplane	C0 connector on the RAID/HBA 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.

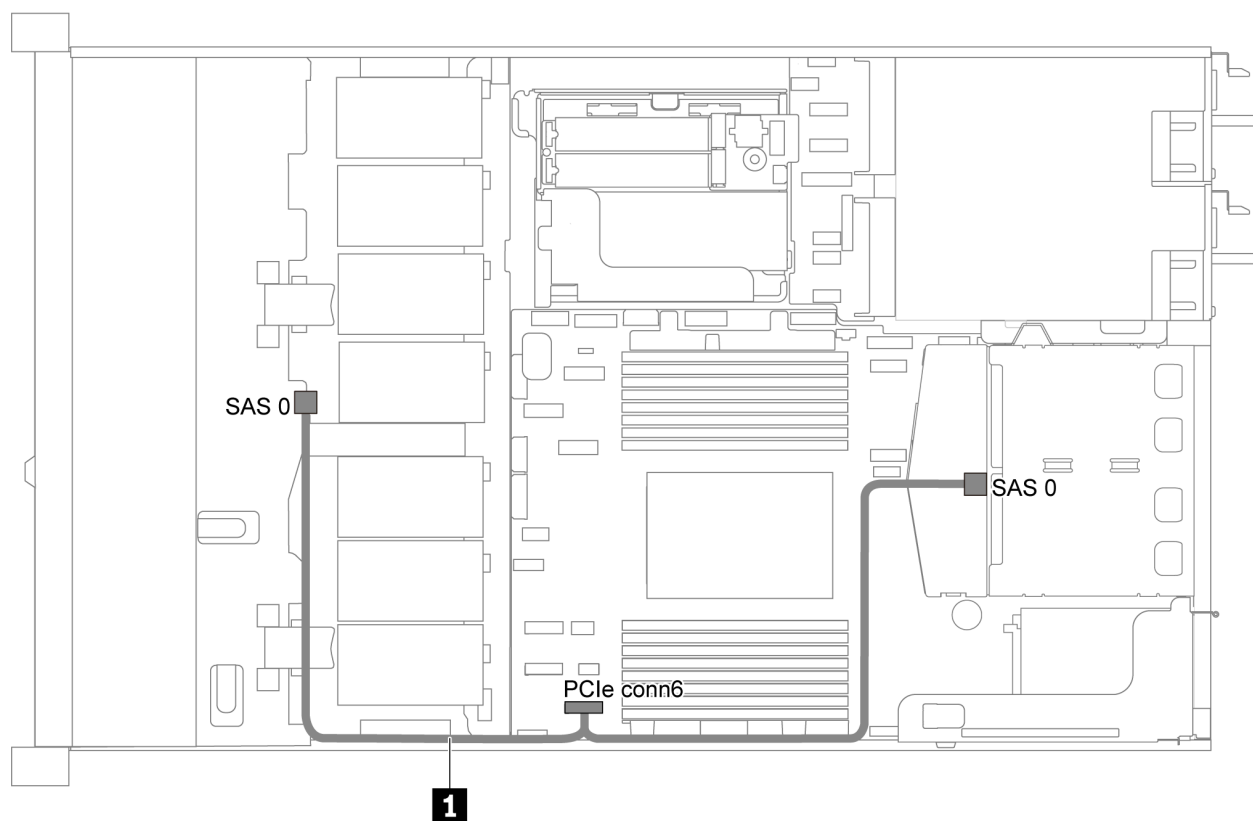


Figure 26. Cable routing for server model with four 3.5-inch SATA drives and rear SAS/SATA drive assembly

Cable	From	To
<b>1</b> SAS signal cable for front backplane	SAS connector on the front backplane	PCIe connector 6 on the system board

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

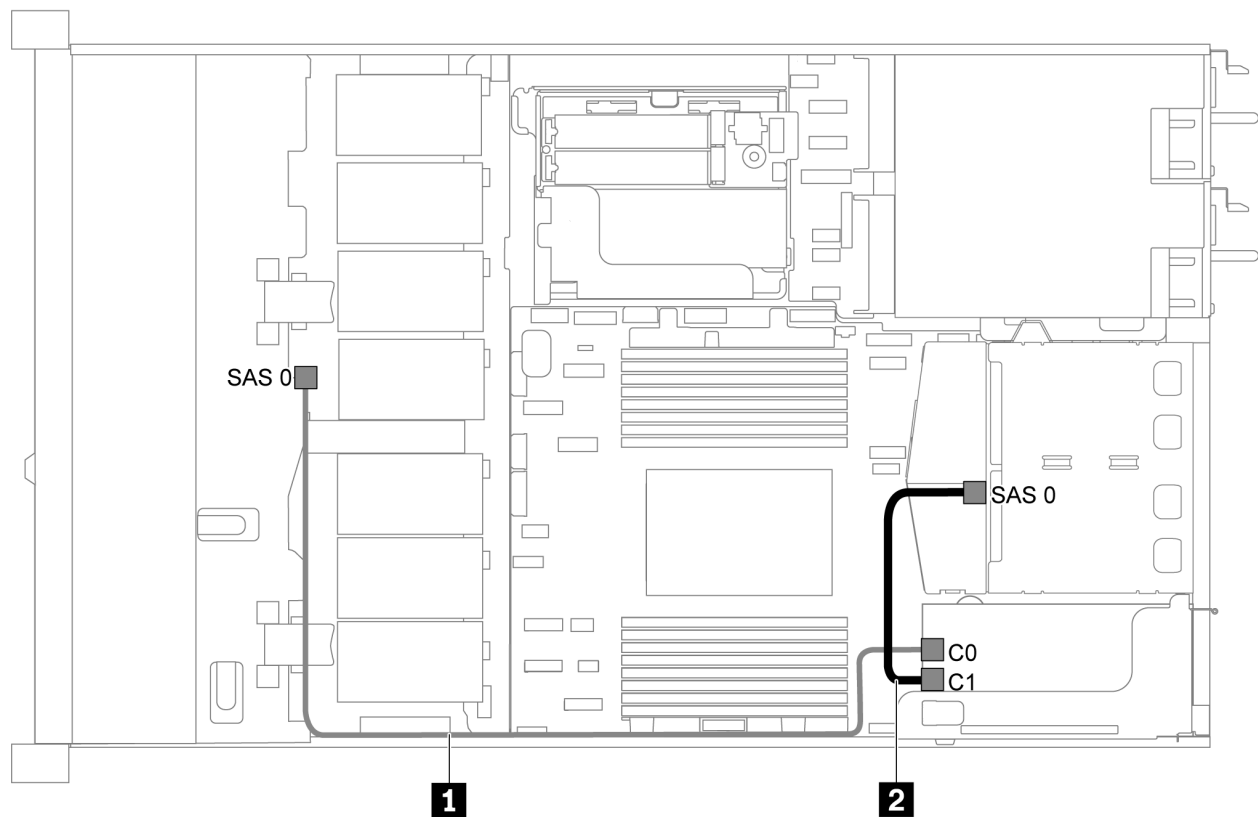


Figure 27. Cable routing for server model with four 3.5-inch SAS/SATA drives, rear SAS/SATA drive assembly and one 8i RAID/HBA adapter

#### Notes:

- RAID/HBA adapters can be installed in PCIe slot 1 or internal riser assembly.
- When a Gen 4 RAID/HBA adapter is installed, ensure that you use the corresponding Gen 4 cable:

#### ThinkSystem SR635 2.5" SAS/SATA 2-Bay Rear Backplane X40 RAID Cable Kit

Cable	From	To
<b>1</b> SAS signal cable for front backplane	SAS connector on the front backplane	The RAID/HBA adapter <ul style="list-style-type: none"><li>• Gen 3: C0</li><li>• Gen 4: C0</li></ul>
<b>2</b> SAS signal cable for rear backplane	SAS connector on the rear backplane	The RAID/HBA adapter <ul style="list-style-type: none"><li>• Gen 3: C1</li><li>• Gen 4: C0</li></ul>

### 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.

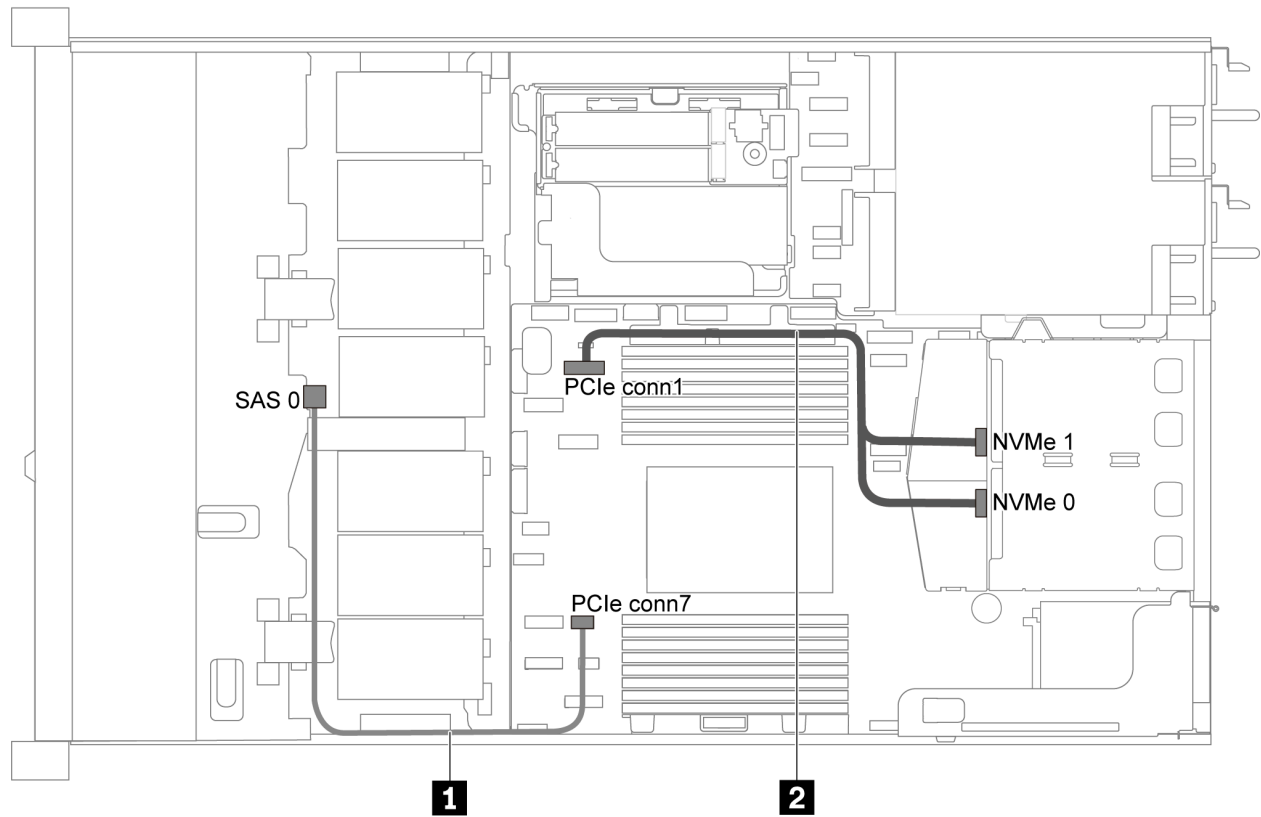


Figure 28. Cable routing for server model with four 3.5-inch SATA drives and rear NVMe drive assembly

Cable	From	To
<b>1</b> SAS signal cable for front backplane	SAS connector on the front backplane	PCIe connector 7 on the system board
<b>2</b> 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/HBA 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.

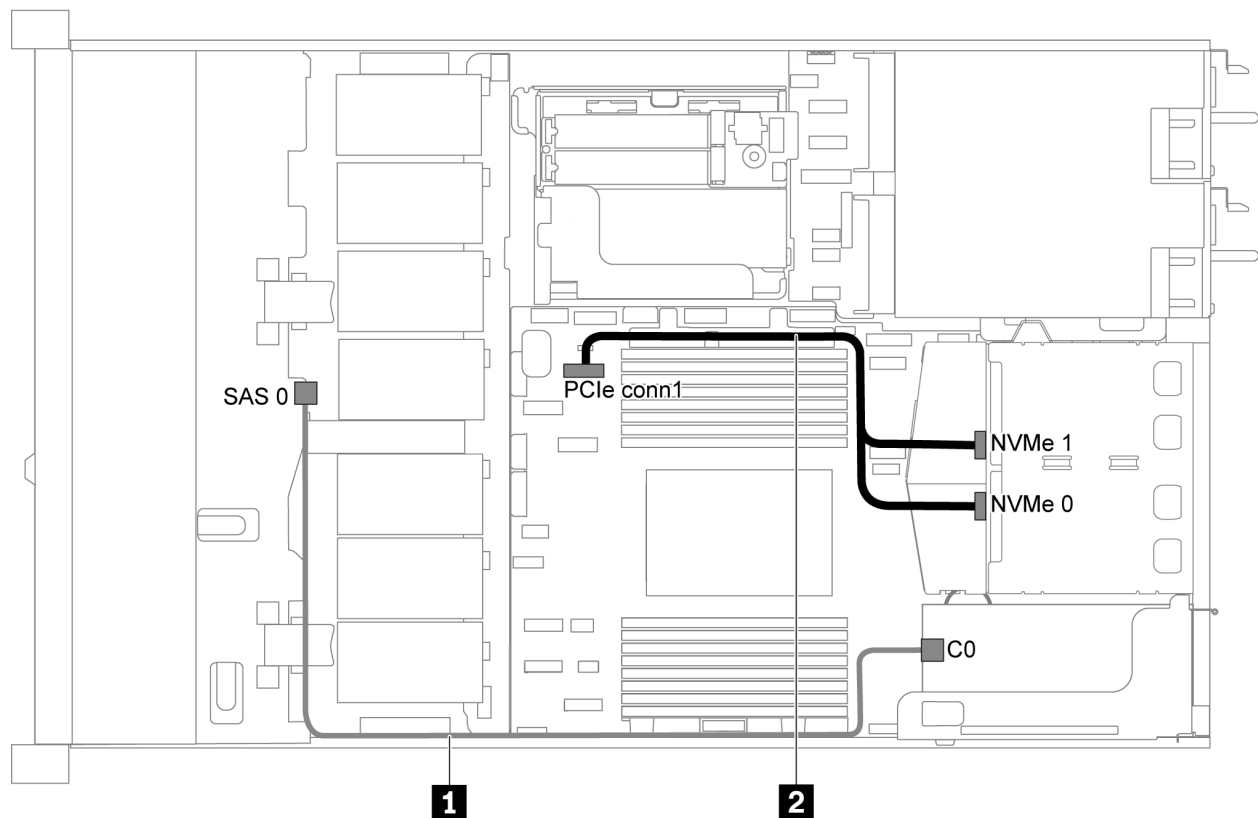


Figure 29. Cable routing for server model with four 3.5-inch SAS/SATA drives, rear NVMe drive assembly and one 8i RAID/HBA adapter

#### Notes:

- RAID/HBA adapters can be installed in PCIe slot 1 or internal riser assembly.
- When a Gen 4 RAID/HBA adapter is installed, ensure that you use the corresponding Gen 4 cable:

#### ThinkSystem SR635 3.5" SAS/SATA 4-Bay X40 RAID Cable Kit

Cable	From	To
<b>1</b> SAS signal cable for front backplane	SAS connector on the front backplane	C0 connector on the RAID/HBA adapter
<b>2</b> 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.

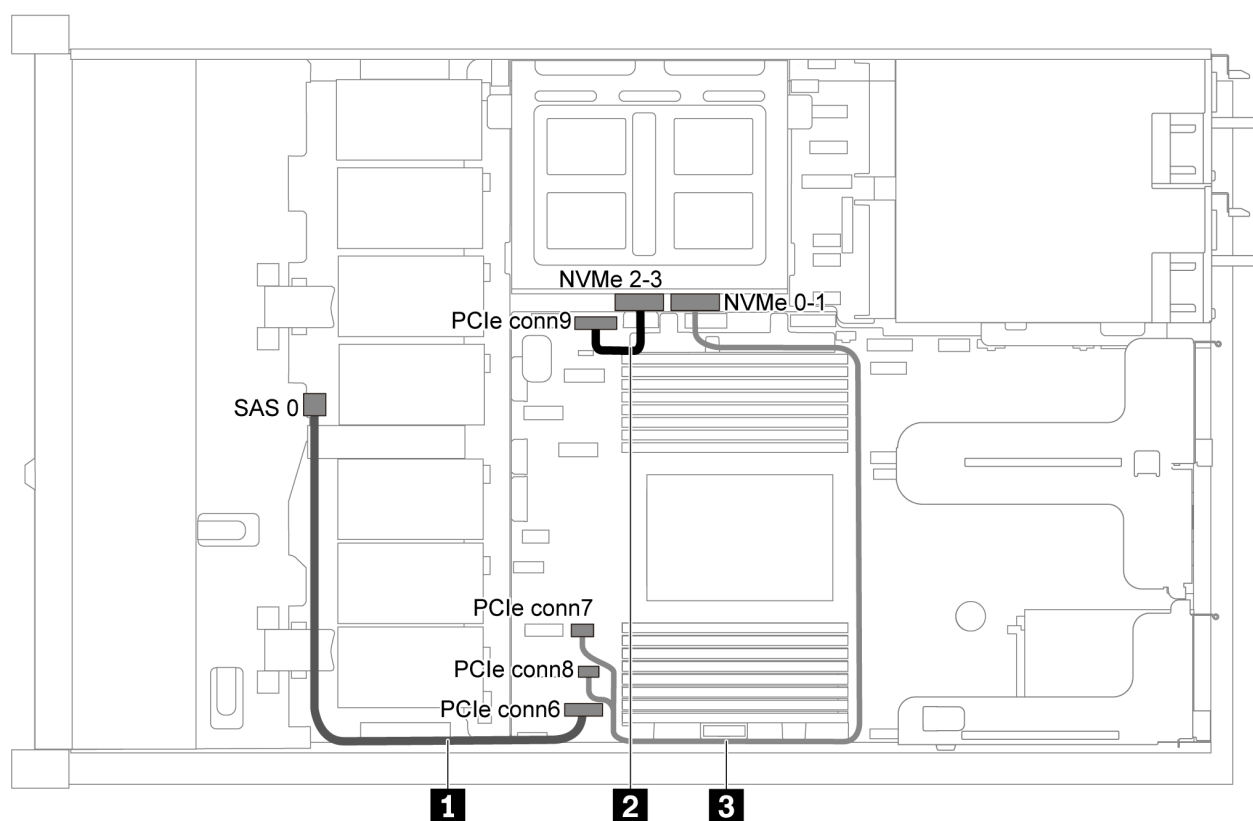


Figure 30. Cable routing for server model with four 3.5-inch SATA drives and middle drive cage

Cable	From	To
<b>1</b> SAS signal cable for front backplane	SAS connector on the front backplane	PCIe connector 6 on the system board
<b>2</b> NVMe signal cable for internal backplane	NVMe 2-3 connector on the internal backplane	PCIe connector 9 on the system board
<b>3</b> 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/HBA adapter

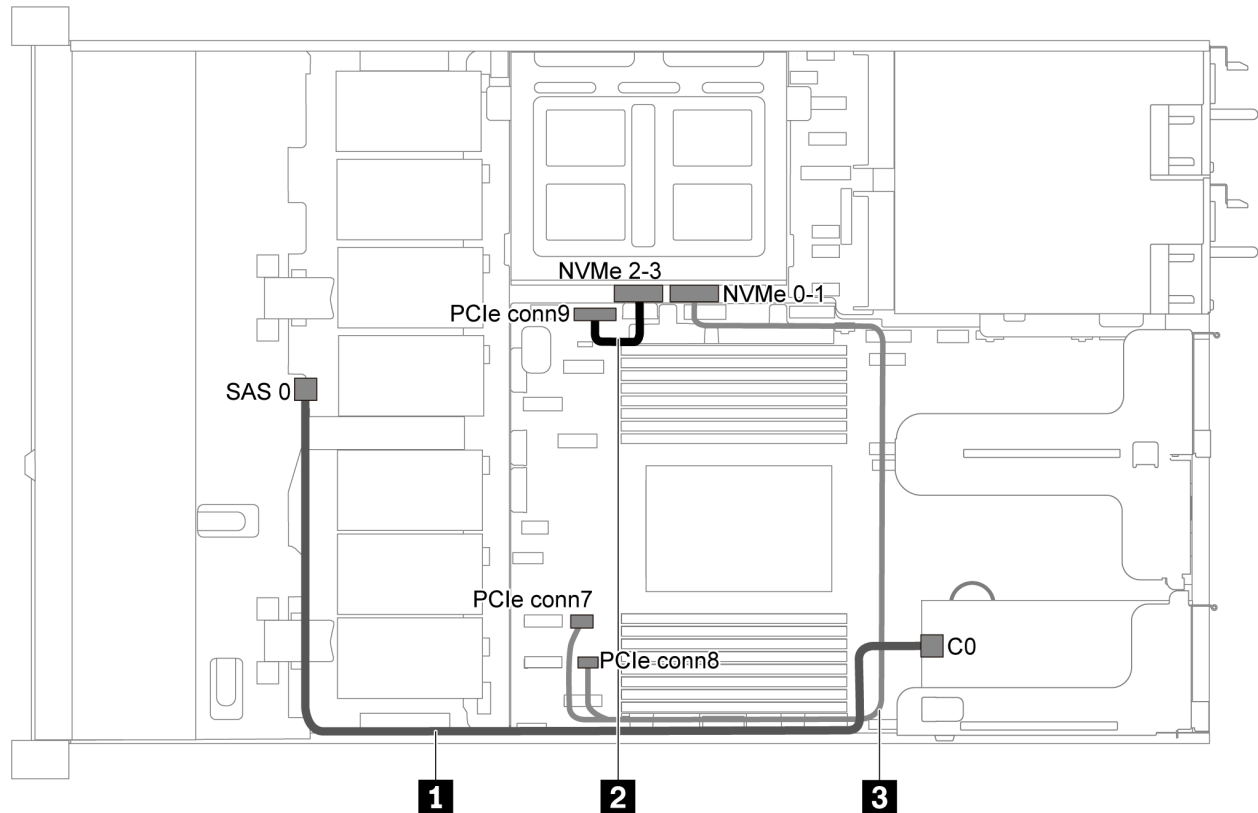


Figure 31. Cable routing for server model with four 3.5-inch SAS/SATA drives, middle drive cage and one 8i RAID/HBA adapter

**Note:** When a Gen 4 RAID/HBA adapter is installed, ensure that you use the corresponding Gen 4 cable:

#### ThinkSystem SR635 3.5" SAS/SATA 4-Bay X40 RAID Cable Kit

Cable	From	To
<b>1</b> SAS signal cable for front backplane	SAS connector on the front backplane	C0 connector on the RAID/HBA adapter
<b>2</b> NVMe signal cable for internal backplane	NVMe 2–3 connector on the internal backplane	PCIe connector 9 on the system board
<b>3</b> 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.

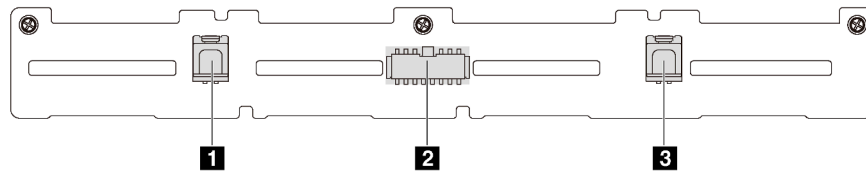


Figure 32. Connectors on the backplane for eight 2.5-inch SAS/SATA drives

**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 41](#)
- [“Eight 2.5-inch SAS/SATA drives and one 8i RAID/HBA adapter” on page 42](#)
- [“Eight 2.5-inch SATA drives and rear SAS/SATA drive assembly” on page 42](#)
- [“Eight 2.5-inch SAS/SATA drives, rear SAS/SATA drive assembly and two 8i RAID/HBA adapters” on page 44](#)
- [“Eight 2.5-inch SAS/SATA drives, rear SAS/SATA drive assembly and one 16i RAID/HBA adapter” on page 45](#)
- [“Eight 2.5-inch SATA drives and rear NVMe drive assembly” on page 45](#)
- [“Eight 2.5-inch SAS/SATA drives, rear NVMe drive assembly and one 8i RAID/HBA adapter” on page 46](#)

For power cable connection, see [“Power/Sideband cable routing” on page 28](#).



## 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.

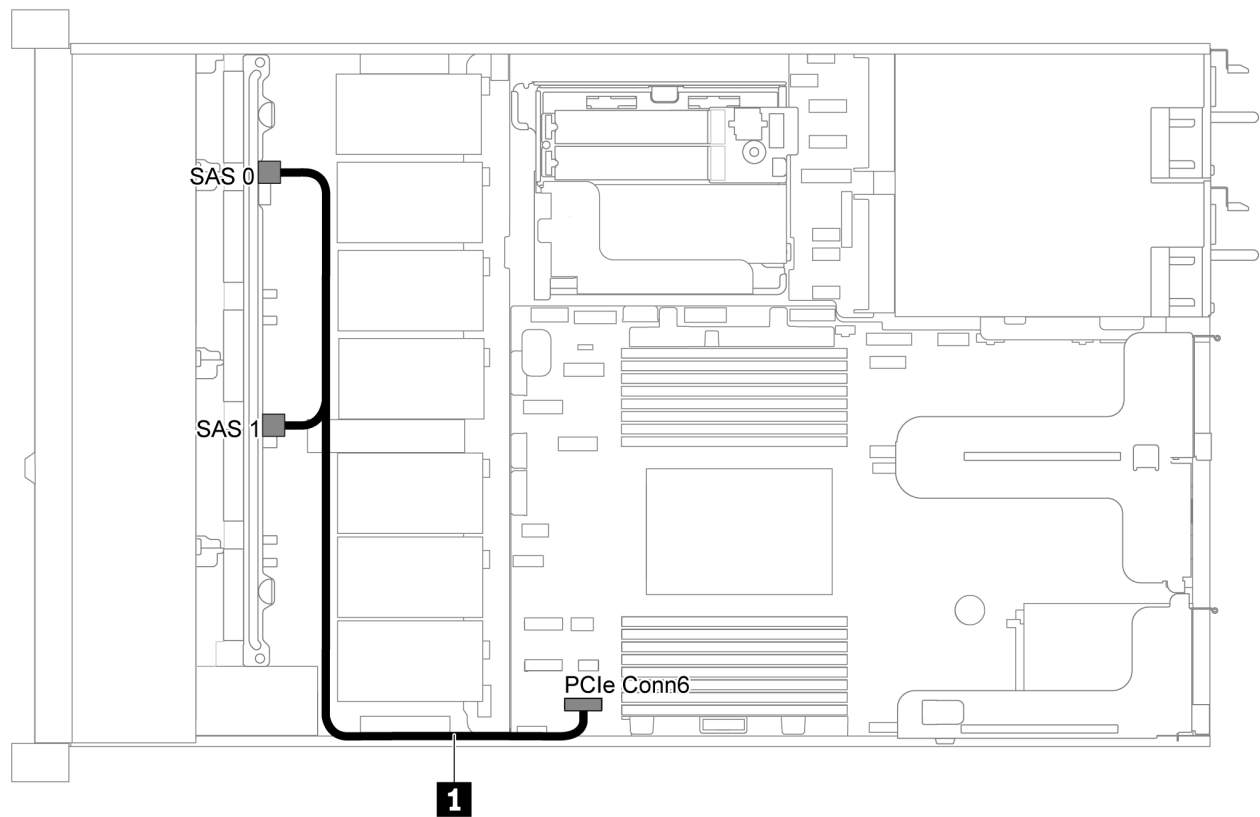


Figure 33. Cable routing for server model with eight 2.5-inch SATA drives

Cable	From	To
<b>1</b> 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/HBA adapter

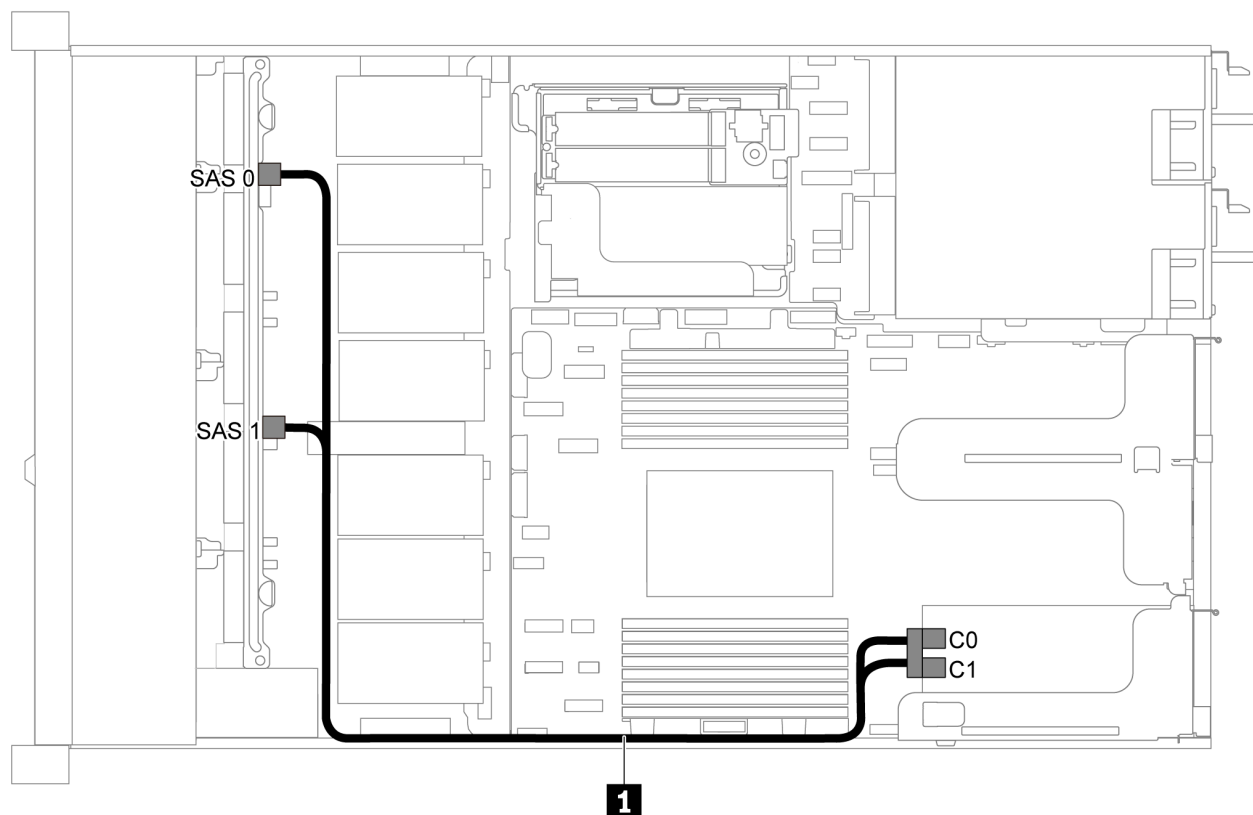


Figure 34. Cable routing for server model with eight 2.5-inch SAS/SATA drives and one 8i RAID/HBA adapter

### Notes:

- RAID/HBA adapters can be installed in PCIe slot 1 or internal riser assembly.
- When a Gen 4 RAID/HBA adapter is installed, ensure that you use the corresponding Gen 4 cable:

#### ThinkSystem SR635 2.5" SAS/SATA 8-Bay X40 RAID Cable Kit

Cable	From	To
<b>1</b> SAS signal cable for front backplane	SAS 0 and SAS 1 connectors on the front backplane	The RAID/HBA adapter <ul style="list-style-type: none"> <li>Gen 3: C0C1</li> <li>Gen 4: C0</li> </ul>

## 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.

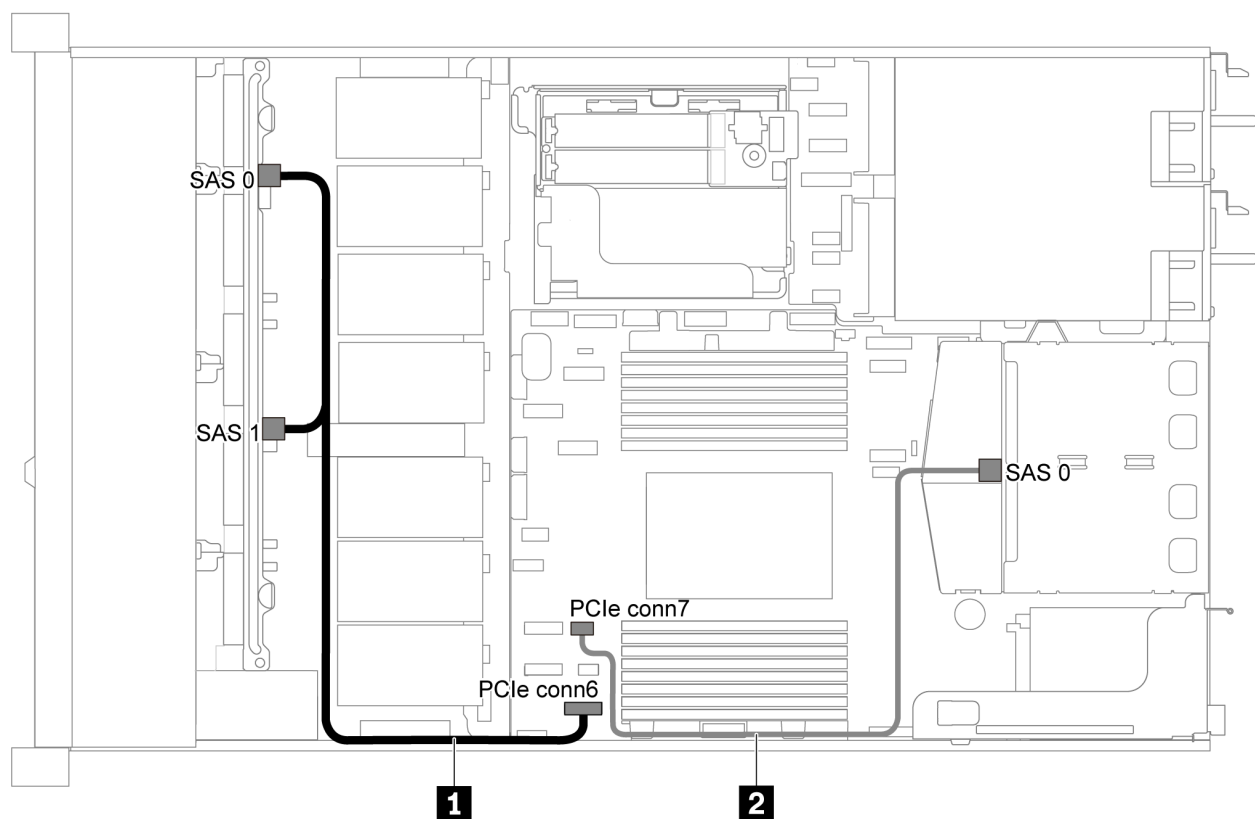


Figure 35. Cable routing for server model with eight 2.5-inch SATA drives and rear SAS/SATA drive assembly

Cable	From	To
<b>1</b> SAS signal cable for front backplane	SAS 0 and SAS 1 connectors on the front backplane	PCIe connector 6 on the system board
<b>2</b> 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/HBA adapters

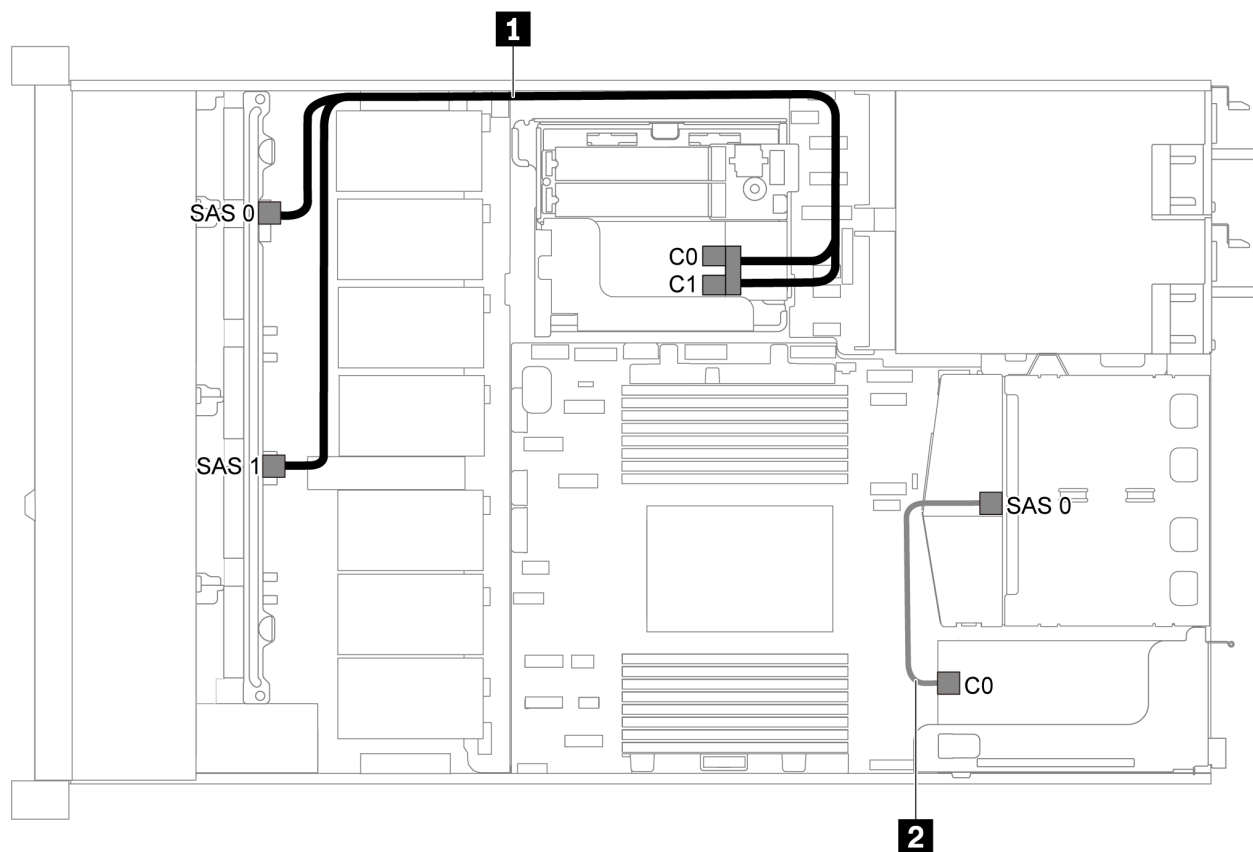


Figure 36. Cable routing for server model with eight 2.5-inch SAS/SATA drives, rear SAS/SATA drive assembly and two 8i RAID/HBA adapters

### Notes:

- When a Gen 4 RAID/HBA adapter is installed, ensure that you use the corresponding Gen 4 cable:  
 For cable 1: **ThinkSystem SR635 2.5" SAS/SATA 8-Bay X40 RAID Cable Kit**  
 For cable 2: **ThinkSystem SR635 2.5" SAS/SATA 2-Bay Rear Backplane X40 RAID Cable Kit**

Cable	From	To
<b>1</b> SAS signal cable for front backplane	SAS 0 and SAS 1 connectors on the front backplane	The RAID/HBA adapter <ul style="list-style-type: none"> <li>Gen 3: C0C1</li> <li>Gen 4: C0</li> </ul>
<b>2</b> SAS signal cable for rear backplane	SAS connector on the rear backplane	C0 connectors on the RAID/HBA adapter

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

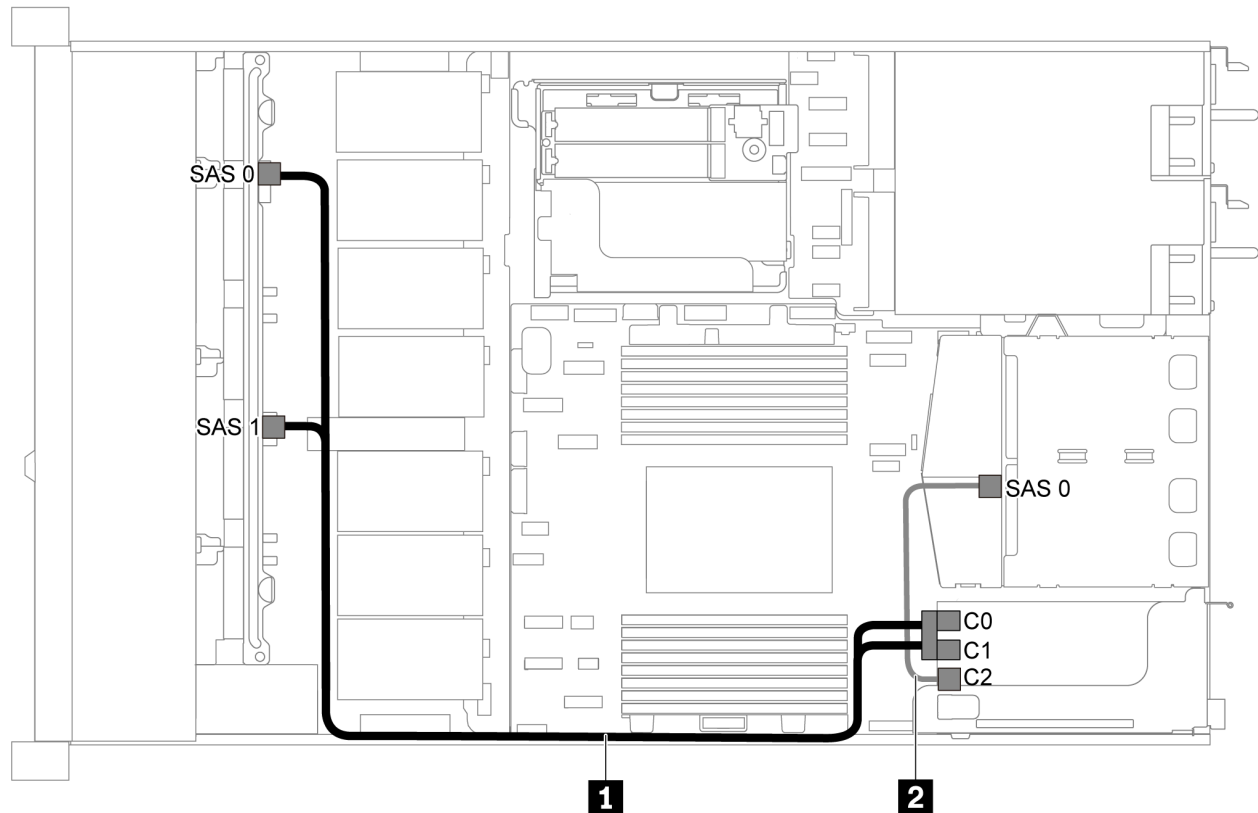


Figure 37. Cable routing for server model with eight 2.5-inch SAS/SATA drives, rear SAS/SATA drive assembly and one 16i RAID/HBA adapter

### Notes:

- RAID/HBA adapters can be installed in PCIe slot 1 or internal riser assembly.
- When a Gen 4 RAID/HBA adapter is installed, ensure that you use the corresponding Gen 4 cable:

For cable 1: **ThinkSystem SR635 2.5" SAS/SATA 8-Bay X40 RAID Cable Kit**

For cable 2: **ThinkSystem SR635 2.5" SAS/SATA 2-Bay Rear Backplane X40 RAID Cable Kit**

Cable	From	To
<b>1</b> SAS signal cable for front backplane	SAS 0 and SAS 1 connectors on the front backplane	The RAID/HBA adapter <ul style="list-style-type: none"> <li>Gen 3: C0C1</li> <li>Gen 4: C0</li> </ul>
<b>2</b> SAS signal cable for rear backplane	SAS connector on the rear backplane	The RAID/HBA adapter <ul style="list-style-type: none"> <li>Gen 3: C2</li> <li>Gen 4: C1</li> </ul>

## 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.

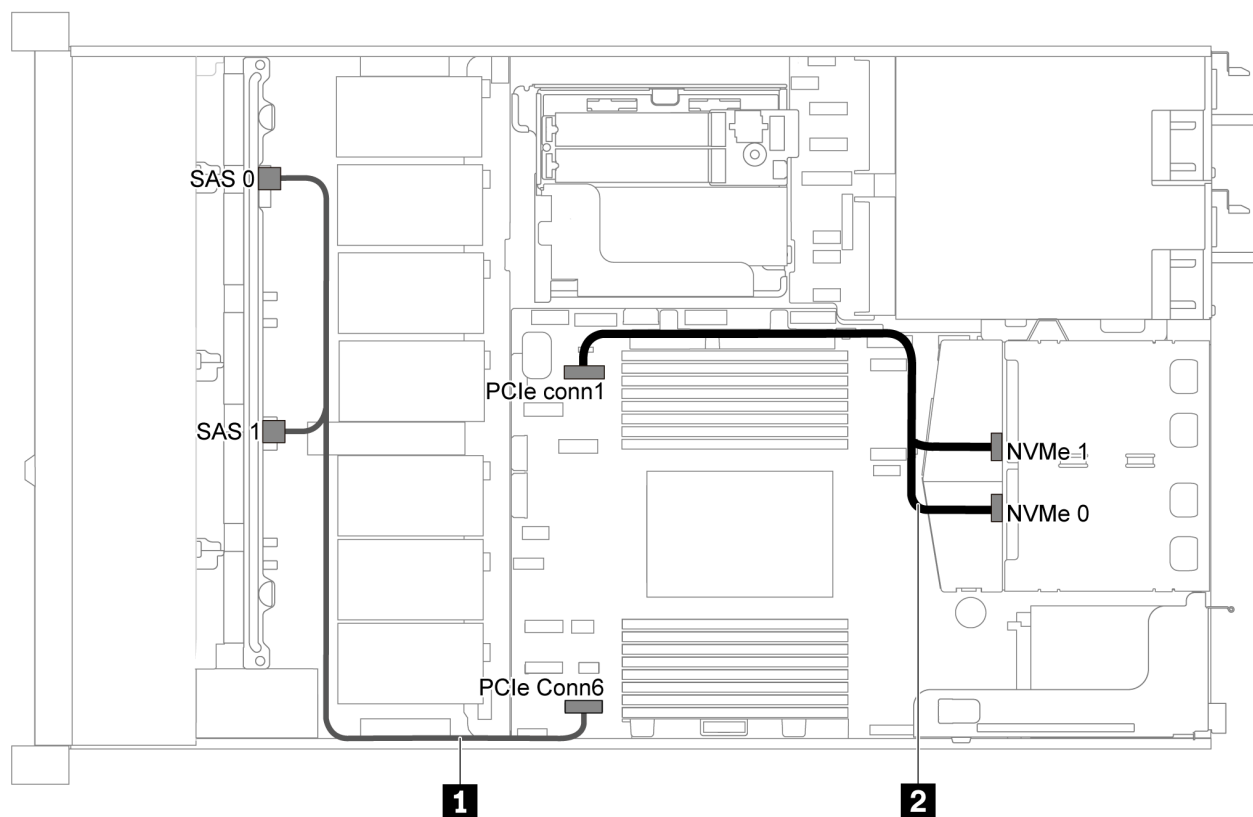


Figure 38. Cable routing for server model with eight 2.5-inch SATA drives and rear NVMe drive assembly

Cable	From	To
<b>1</b> SAS signal cable for front backplane	SAS 0 and SAS 1 connectors on the front backplane	PCIe connector 6 on the system board
<b>2</b> 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/HBA 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.

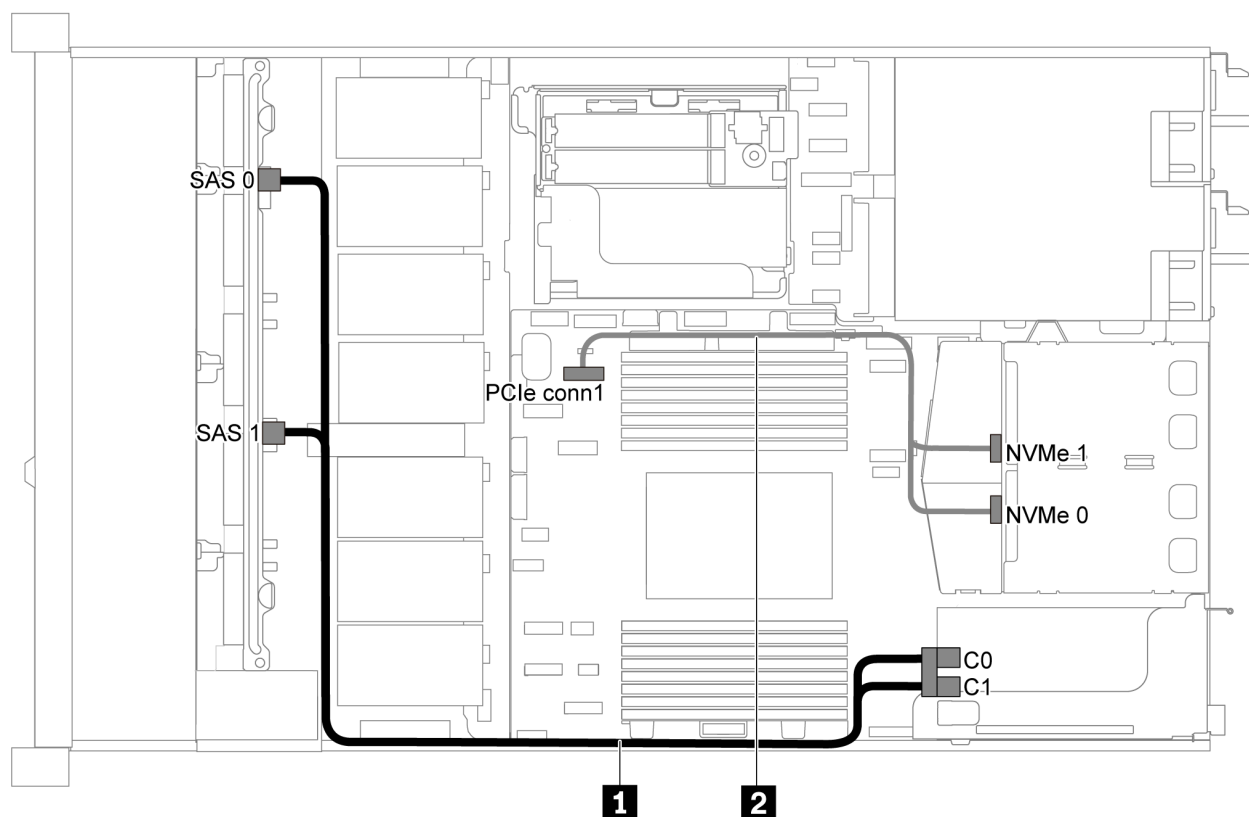


Figure 39. Cable routing for server model with eight 2.5-inch SAS/SATA drives, rear NVMe drive assembly and one 8i RAID/HBA adapter

#### Notes:

- RAID/HBA adapters can be installed in PCIe slot 1 or internal riser assembly.
- When a Gen 4 RAID/HBA adapter is installed, ensure that you use the corresponding Gen 4 cable:

#### ThinkSystem SR635 2.5" SAS/SATA 8-Bay X40 RAID Cable Kit

Cable	From	To
<b>1</b> SAS signal cable for front backplane	SAS 0 and SAS 1 connectors on the front backplane	The RAID/HBA adapter <ul style="list-style-type: none"> <li>Gen 3: C0C1</li> <li>Gen 4: C0</li> </ul>
<b>2</b> 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.

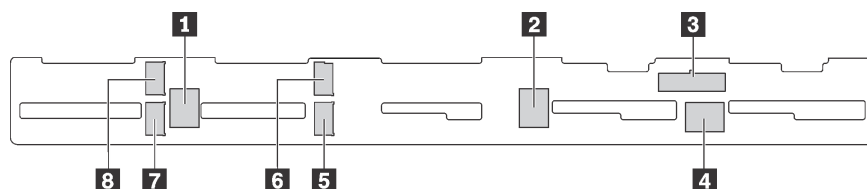


Figure 40. Connectors on the backplane for six 2.5-inch SAS/SATA drives and four 2.5-inch NVMe drives

- |                           |                           |                           |                           |
|---------------------------|---------------------------|---------------------------|---------------------------|
| <b>1</b> SAS 2 connector  | <b>2</b> SAS 1 connector  | <b>3</b> Power connector  | <b>4</b> SAS 0 connector  |
| <b>5</b> NVMe 1 connector | <b>6</b> NVMe 0 connector | <b>7</b> NVMe 3 connector | <b>8</b> NVMe 2 connector |

#### Notes:

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

For power cable connection, see [“Power/Sideband cable routing” on page 28](#).

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 48](#)
- [“Six 2.5-inch SAS/SATA drives, four 2.5-inch NVMe drives and one 16i RAID/HBA adapter” on page 50](#)
- [“Six 2.5-inch SATA drives, four 2.5-inch NVMe drives and rear SAS/SATA drive assembly” on page 51](#)
- [“Six 2.5-inch SAS/SATA drives, four 2.5-inch NVMe drives, rear SAS/SATA drive assembly and one 16i RAID/HBA adapter” on page 52](#)
- [“Six 2.5-inch SATA drives, four 2.5-inch NVMe drives and rear NVMe drive assembly” on page 53](#)
- [“Six 2.5-inch SAS/SATA drives, four 2.5-inch NVMe drives, rear NVMe drive assembly and one 16i RAID/HBA adapter” on page 54](#)

#### 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.



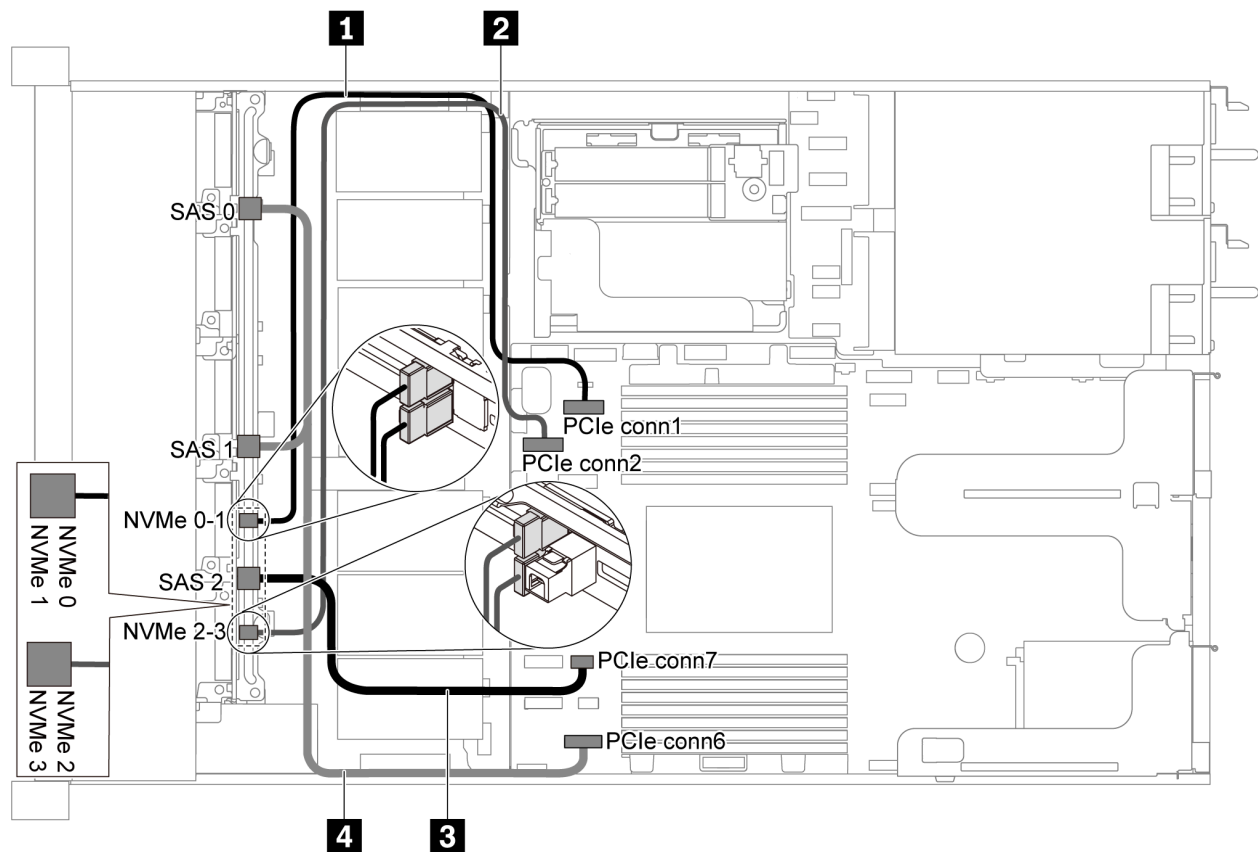


Figure 41. Cable routing for server model with six 2.5-inch SATA drives and four 2.5-inch NVMe drives

Cable	From	To
<b>1</b> NVMe signal cable for front backplane	NVMe 0 and NVMe 1 connectors on the front backplane	PCIe connector 1 on the system board
<b>2</b> NVMe signal cable for front backplane	NVMe 2 and NVMe 3 connectors on the front backplane	PCIe connector 2 on the system board
<b>3</b> SAS signal cable for front backplane	SAS 2 connector on the front backplane	PCIe connector 7 on the system board
<b>4</b> 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/HBA adapter

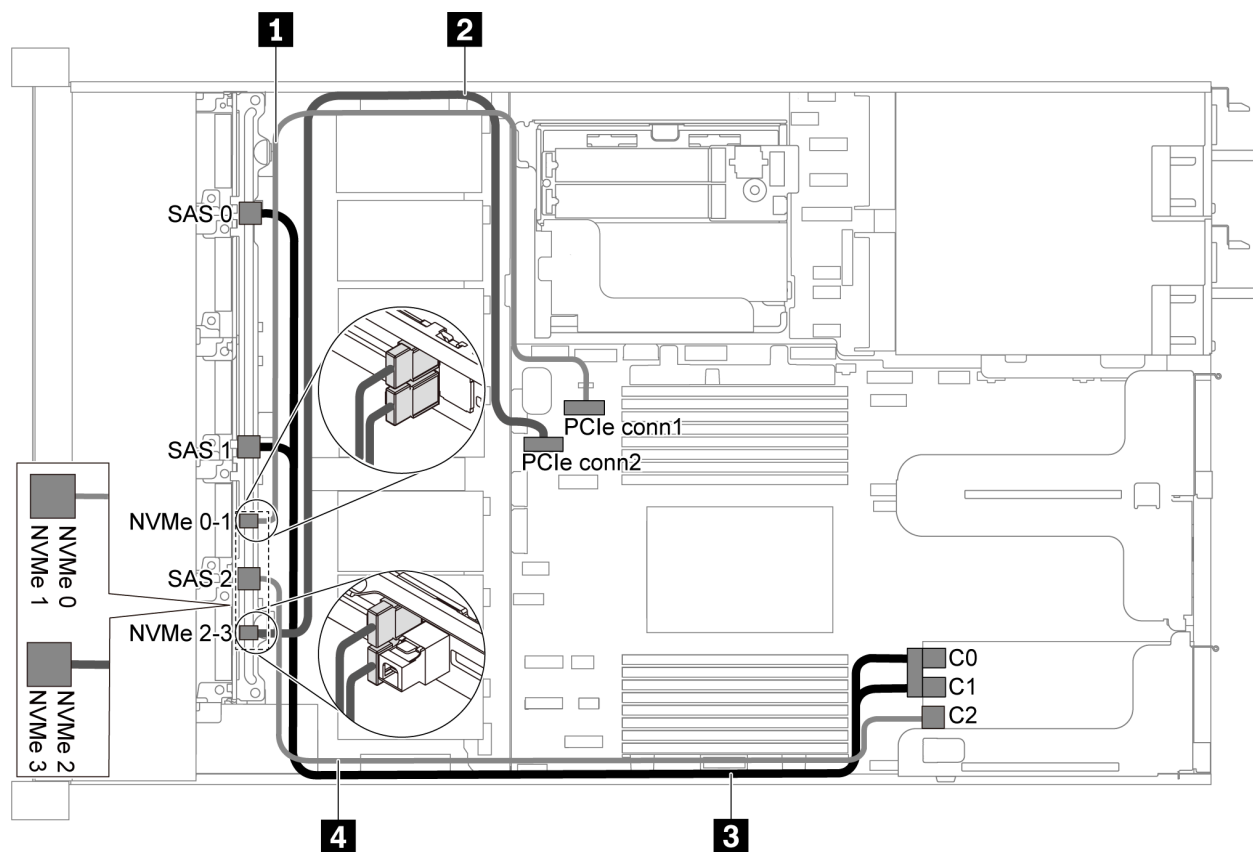


Figure 42. Cable routing for server model with six 2.5-inch SAS/SATA drives, four 2.5-inch NVMe drives and one 16i RAID/HBA adapter

### Notes:

- RAID/HBA adapters can be installed in PCIe slot 1 or internal riser assembly.
- When a Gen 4 RAID/HBA adapter is installed, ensure that you use the corresponding Gen 4 cable:

#### ThinkSystem SR635 Front 6x2.5" SAS/SATA + 4x2.5" AnyBay X40 RAID Cable Kit

Cable	From	To
<b>1</b> NVMe signal cable for front backplane	NVMe 0 and NVMe 1 connectors on the front backplane	PCIe connector 1 on the system board
<b>2</b> NVMe signal cable for front backplane	NVMe 2 and NVMe 3 connectors on the front backplane	PCIe connector 2 on the system board
<b>3</b> SAS signal cable for front backplane	SAS 0 and SAS 1 connectors on the front backplane	The RAID/HBA adapter <ul style="list-style-type: none"> <li>Gen 3: C0C1</li> <li>Gen 4: C0</li> </ul>
<b>4</b> SAS signal cable for front backplane	SAS 2 connector on the front backplane	The RAID/HBA adapter <ul style="list-style-type: none"> <li>Gen 3: C2</li> <li>Gen 4: C1</li> </ul>

## 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.

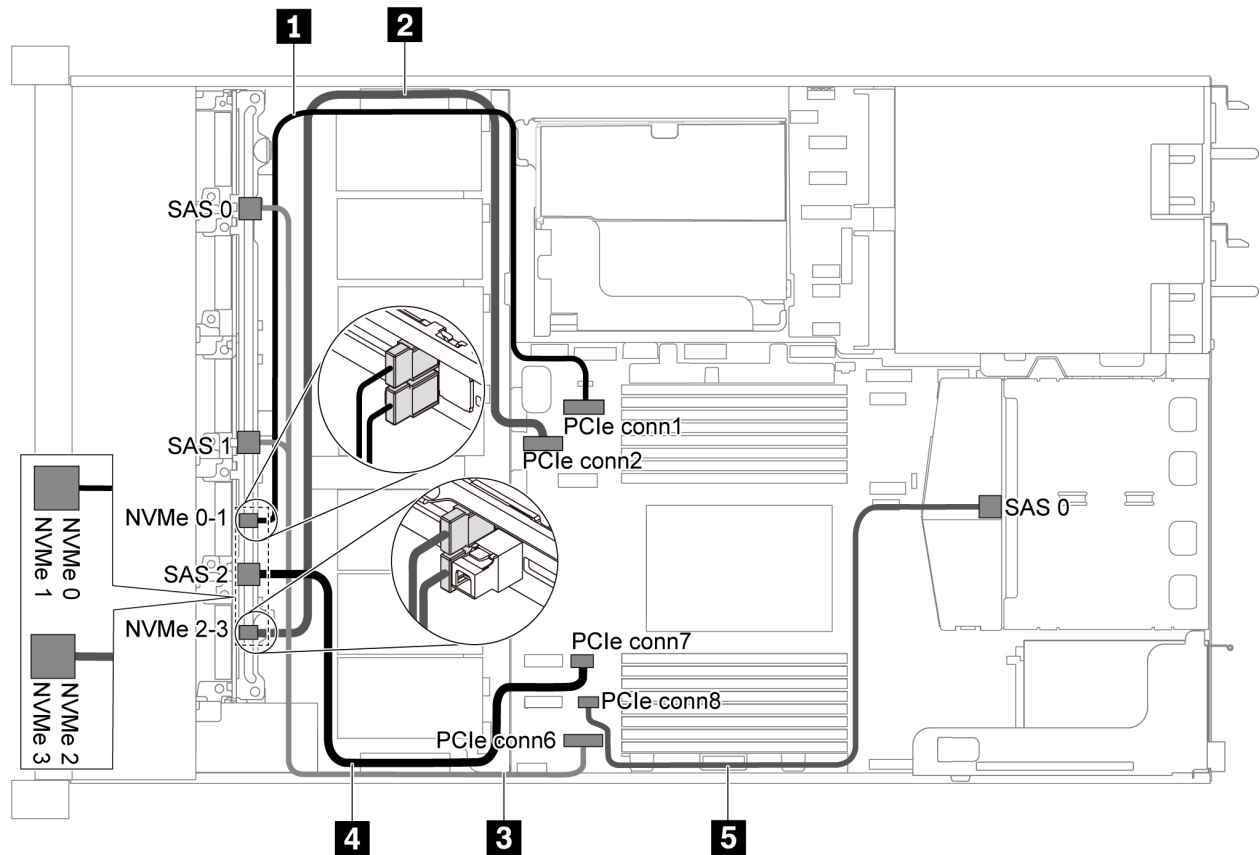


Figure 43. Cable routing for server model with six 2.5-inch SATA drives, four 2.5-inch NVMe drives and rear SAS/SATA drive assembly

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

Cable	From	To
<b>1</b> NVMe signal cable for front backplane	NVMe 0 and NVMe 1 connectors on the front backplane	PCIe connector 1 on the system board
<b>2</b> NVMe signal cable for front backplane	NVMe 2 and NVMe 3 connectors on the front backplane	PCIe connector 2 on the system board
<b>3</b> SAS signal cable for front backplane	SAS 0 and SAS 1 connectors on the front backplane	PCIe connector 6 on the system board
<b>4</b> SAS signal cable for front backplane	SAS 2 connector on the front backplane	PCIe connector 7 on the system board
<b>5</b> 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/HBA 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.

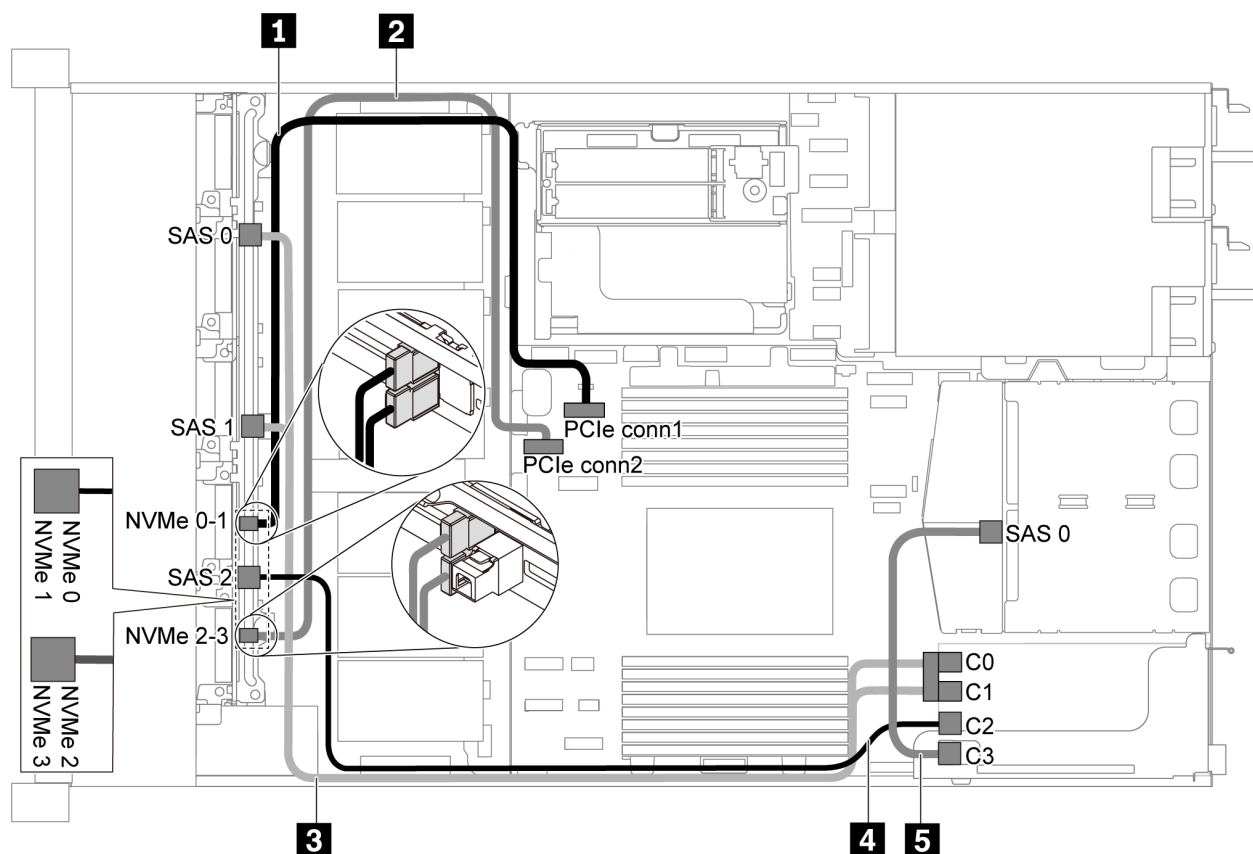


Figure 44. Cable routing for server model with six 2.5-inch SAS/SATA drives, four 2.5-inch NVMe drives, rear SAS/SATA drive assembly and one 16i RAID/HBA adapter

### Notes:

- RAID/HBA adapters can be installed in PCIe slot 1 or internal riser assembly.
- When a Gen 4 RAID/HBA adapter is installed, ensure that you use the corresponding Gen 4 cable:

For cable 3: **ThinkSystem SR635 Front 6x2.5" SAS/SATA + 4x2.5" AnyBay X40 RAID Cable Kit**

For cable 4 and 5: **ThinkSystem SR635 2.5" SAS/SATA 2-Bay Rear Backplane X40 RAID Cable Kit**

Cable	From	To
<b>1</b> NVMe signal cable for front backplane	NVMe 0 and NVMe 1 connectors on the front backplane	PCIe connector 1 on the system board
<b>2</b> NVMe signal cable for front backplane	NVMe 2 and NVMe 3 connectors on the front backplane	PCIe connector 2 on the system board
<b>3</b> SAS signal cable for front backplane	SAS 0 and SAS 1 connectors on the front backplane	The RAID/HBA adapter <ul style="list-style-type: none"> <li>Gen 3: C0C1</li> <li>Gen 4: C0</li> </ul>

Cable	From	To
<b>4</b> SAS signal cable for front backplane	SAS 2 connector on the front backplane	The RAID/HBA adapter <ul style="list-style-type: none"> <li>Gen 3: C2</li> <li>Gen 4: C1</li> </ul>
<b>5</b> SAS signal cable for rear backplane	SAS connector on the rear backplane	The RAID/HBA adapter <ul style="list-style-type: none"> <li>Gen 3: C3</li> <li>Gen 4: C1</li> </ul>

### 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.

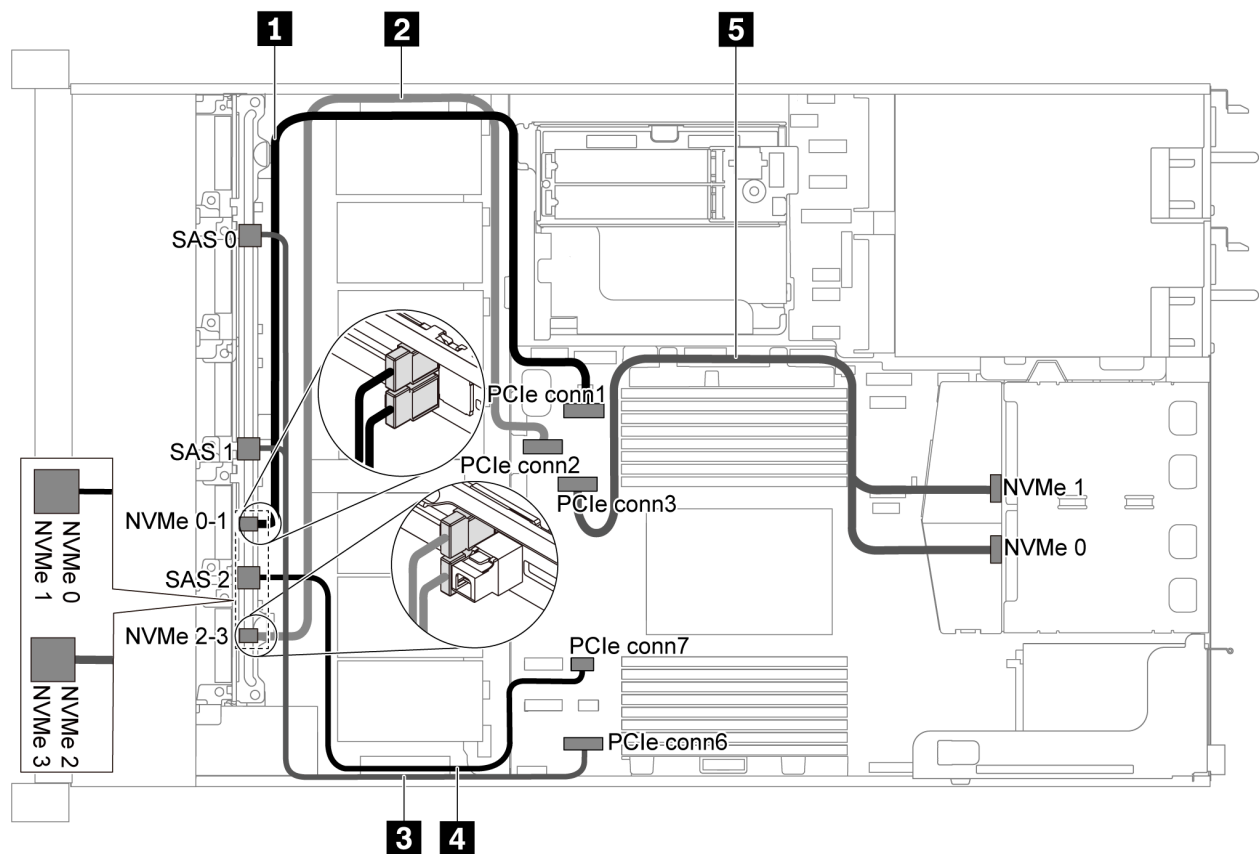


Figure 45. Cable routing for server model with six 2.5-inch SATA drives, four 2.5-inch NVMe drives and rear NVMe drive assembly

Cable	From	To
<b>1</b> NVMe signal cable for front backplane	NVMe 0 and NVMe 1 connectors on the front backplane	PCIe connector 1 on the system board
<b>2</b> NVMe signal cable for front backplane	NVMe 2 and NVMe 3 connectors on the front backplane	PCIe connector 2 on the system board
<b>3</b> SAS signal cable for front backplane	SAS 0 and SAS1 connectors on the front backplane	PCIe connector 6 on the system board
<b>4</b> SAS signal cable for front backplane	SAS 2 connector on the front backplane	PCIe connector 7 on the system board
<b>5</b> 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/HBA 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.

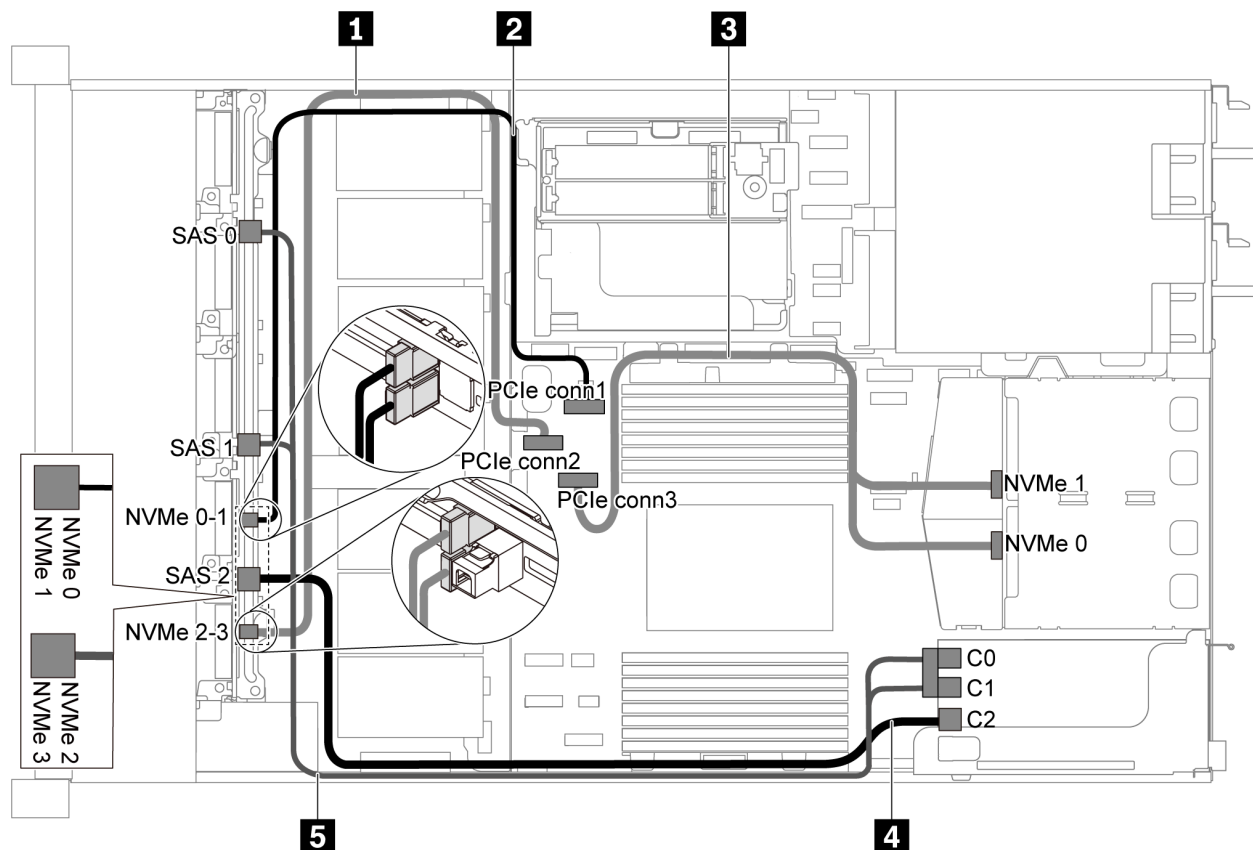


Figure 46. Cable routing for server model with six 2.5-inch SAS/SATA drives, four 2.5-inch NVMe drives, rear NVMe drive assembly and one 16i RAID/HBA adapter

#### Notes:

- RAID/HBA adapters can be installed in PCIe slot 1 or internal riser assembly.
- When a Gen 4 RAID/HBA adapter is installed, ensure that you use the corresponding Gen 4 cable:

## ThinkSystem SR635 Front 6x2.5" SAS/SATA + 4x2.5" AnyBay X40 RAID Cable Kit

Cable	From	To
<b>1</b> NVMe signal cable for front backplane	NVMe 2 and NVMe 3 connectors on the front backplane	PCIe connector 2 on the system board
<b>2</b> NVMe signal cable for front backplane	NVMe 0 and NVMe 1 connectors on the front backplane	PCIe connector 1 on the system board
<b>3</b> NVMe signal cable for rear backplane	NVMe connectors on the rear backplane	PCIe connector 3 on the system board
<b>4</b> SAS signal cable for front backplane	SAS 2 connector on the front backplane	The RAID/HBA adapter <ul style="list-style-type: none"> <li>• Gen 3: C2</li> <li>• Gen 4: C1</li> </ul>
<b>5</b> SAS signal cable for front backplane	SAS 0 and SAS 1 connectors on the front backplane	The RAID/HBA adapter <ul style="list-style-type: none"> <li>• Gen 3: C0C1</li> <li>• Gen 4: C0</li> </ul>

## 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.

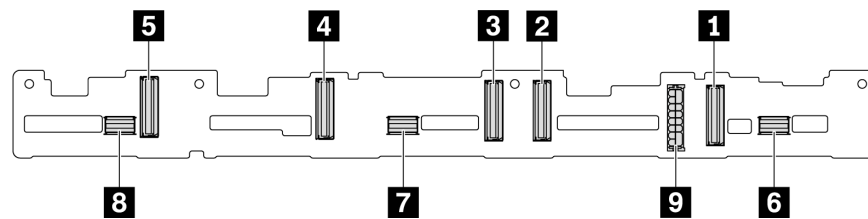


Figure 47. Connectors on the backplane for ten 2.5-inch SAS/SATA/NVMe drives

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

For power cable connection, see [“Power/Sideband cable routing” on page 28](#).

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/NVMe drives” on page 56](#)
- [“Ten 2.5-inch SAS/SATA/NVMe drives and one 16i RAID/HBA adapter” on page 57](#)
- [“Ten 2.5-inch SATA/NVMe drives and rear SAS/SATA drive assembly” on page 58](#)
- [“Ten 2.5-inch SAS/SATA/NVMe drives, rear SAS/SATA drive assembly and one 16i RAID/HBA adapter” on page 59](#)
- [“Ten 2.5-inch SAS/SATA/NVMe drives, rear NVMe drive assembly and one 16i RAID/HBA adapter” on page 61](#)

- “Ten 2.5-inch SAS/SATA/NVMe drives, rear SAS/SATA drive assembly, middle NVMe drive assembly and one 16i RAID/HBA adapter” on page 62
- “Ten 2.5-inch NVMe drives, rear NVMe drive assembly and middle NVMe drive assembly” on page 64
- “Ten 2.5-inch SAS/SATA/NVMe drives, rear NVMe drive assembly, middle NVMe drive assembly and one 16i RAID/HBA adapter” on page 66
- “Ten 2.5-inch SAS/SATA/NVMe drives, middle NVMe drive assembly and one 16i RAID/HBA adapter” on page 68

### Ten 2.5-inch SATA/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.

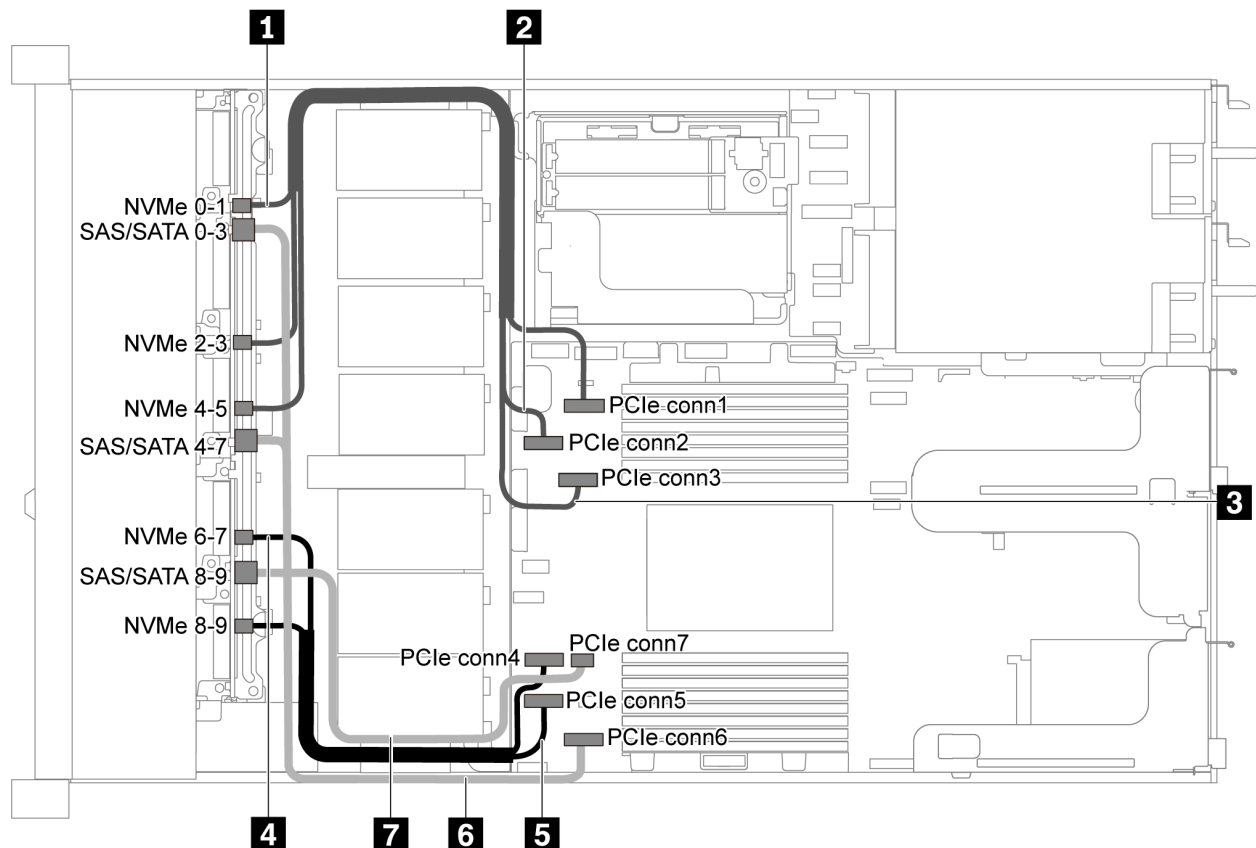


Figure 48. Cable routing for server model with ten 2.5-inch SATA/NVMe drives

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



Cable	From	To
<b>5</b> NVMe signal cable for front backplane	NVMe 8–9 connector on the front backplane	PCIe connector 5 on the system board
<b>6</b> 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
<b>7</b> 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/NVMe drives and one 16i RAID/HBA adapter

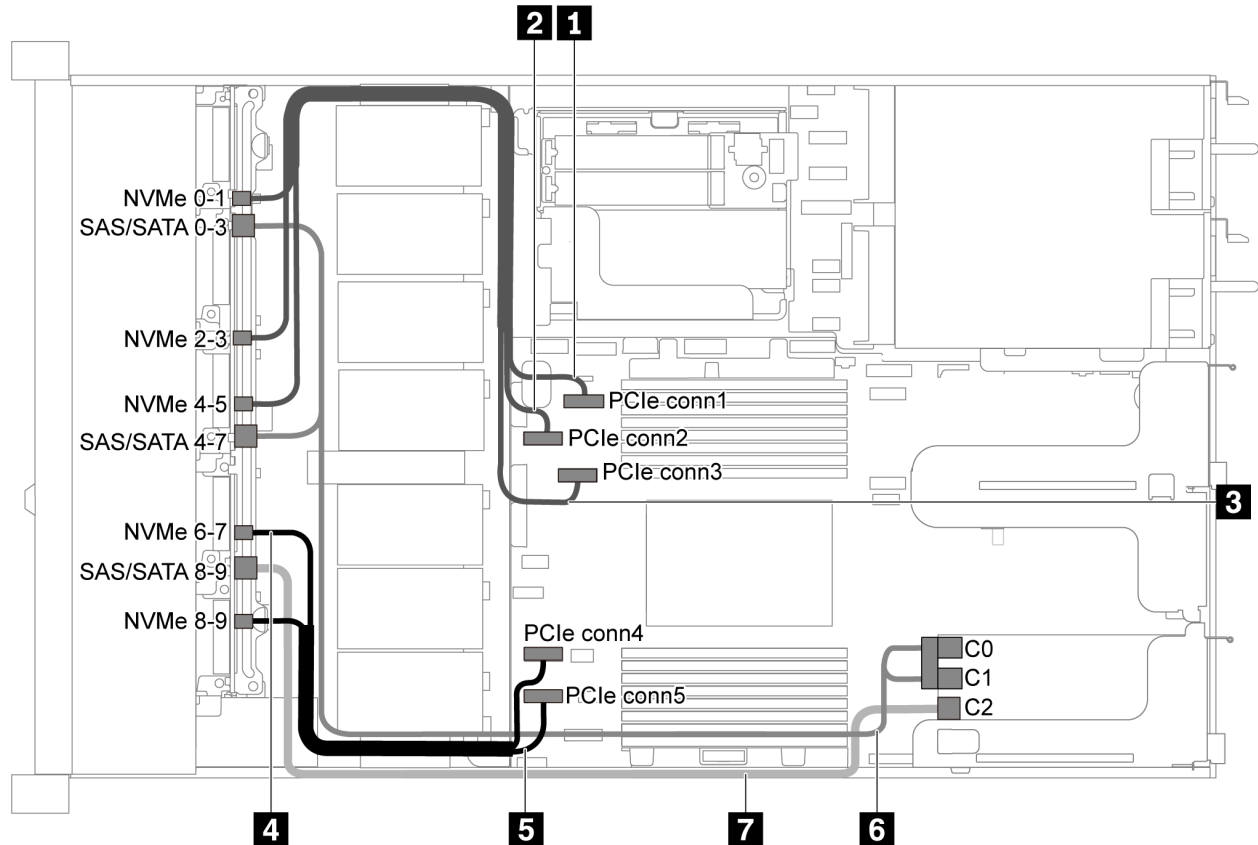


Figure 49. Cable routing for server model with ten 2.5-inch SAS/SATA/NVMe drives and one 16i RAID/HBA adapter

#### Notes:

- RAID/HBA adapters can be installed in PCIe slot 1 or internal riser assembly.
- When a Gen 4 RAID/HBA adapter is installed, ensure that you use the corresponding Gen 4 cable:

#### ThinkSystem SR635 2.5" SAS/SATA/AnyBay 10-Bay X40 RAID Cable Kit

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

Cable	From	To
<b>3</b> NVMe signal cable for front backplane	NVMe 4–5 connector on the front backplane	PCIe connector 3 on the system board
<b>4</b> NVMe signal cable for front backplane	NVMe 6–7 connector on the front backplane	PCIe connector 4 on the system board
<b>5</b> NVMe signal cable for front backplane	NVMe 8–9 connector on the front backplane	PCIe connector 5 on the system board
<b>6</b> SAS signal cable for front backplane	SAS/SATA 0–3 and SAS/SATA 4–7 connectors on the front backplane	The RAID/HBA adapter in PCIe slot 1 <ul style="list-style-type: none"> <li>• Gen 3: C0C1</li> <li>• Gen 4: C0</li> </ul>
<b>7</b> SAS signal cable for front backplane	SAS/SATA 8–9 connector on the front backplane	The RAID/HBA adapter in PCIe slot 1 <ul style="list-style-type: none"> <li>• Gen 3: C2</li> <li>• Gen 4: C1</li> </ul>

### Ten 2.5-inch SATA/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.

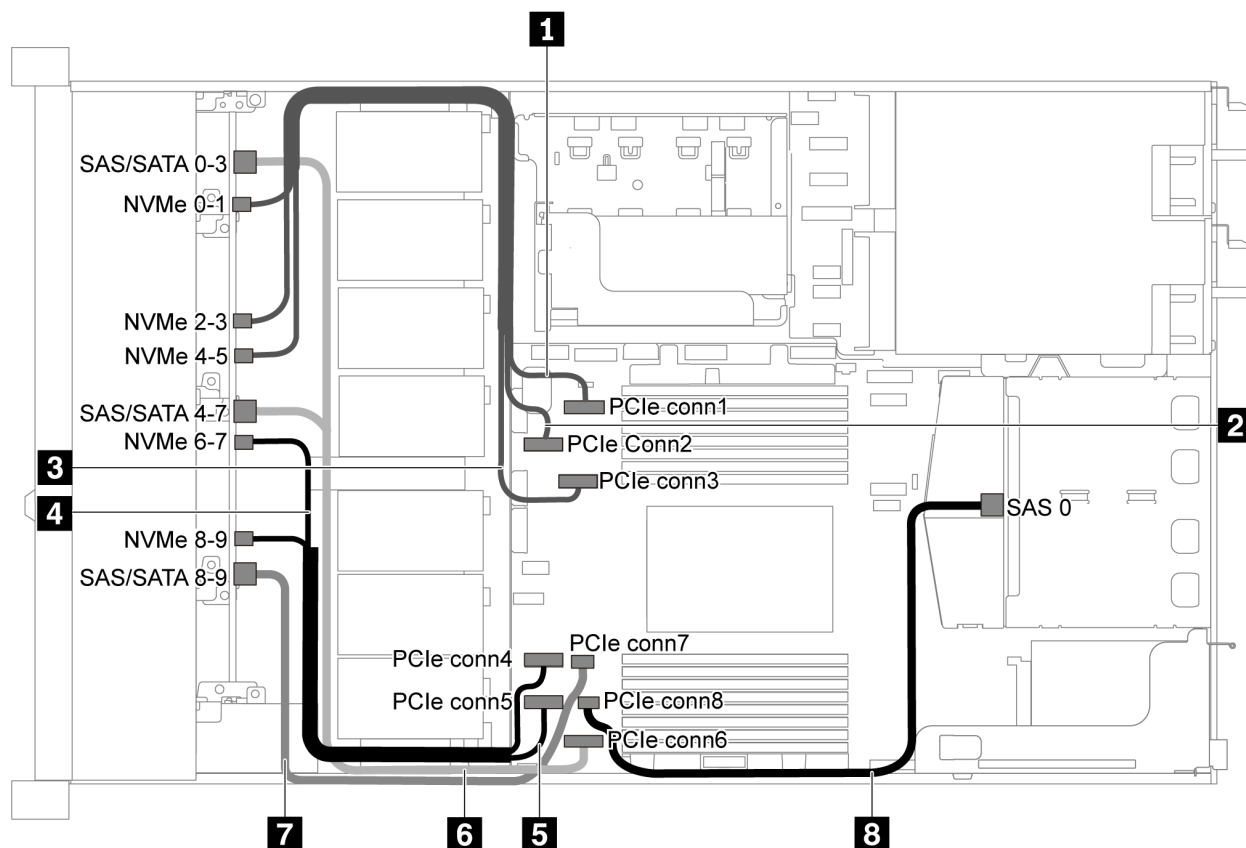


Figure 50. Cable routing for server model with ten 2.5-inch SATA/NVMe drives and rear SAS/SATA drive assembly

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

Cable	From	To
<b>1</b> NVMe signal cable for front backplane	NVMe 0–1 connector on the front backplane	PCIe connector 1 on the system board
<b>2</b> NVMe signal cable for front backplane	NVMe 2–3 connector on the front backplane	PCIe connector 2 on the system board
<b>3</b> NVMe signal cable for front backplane	NVMe 4–5 connector on the front backplane	PCIe connector 3 on the system board
<b>4</b> NVMe signal cable for front backplane	NVMe 6–7 connector on the front backplane	PCIe connector 4 on the system board
<b>5</b> NVMe signal cable for front backplane	NVMe 8–9 connector on the front backplane	PCIe connector 5 on the system board
<b>6</b> 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
<b>7</b> SAS signal cable for front backplane	SAS/SATA 8–9 connector on the front backplane	PCIe connector 7 on the system board
<b>8</b> 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/NVMe drives, rear SAS/SATA drive assembly and one 16i RAID/HBA 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.

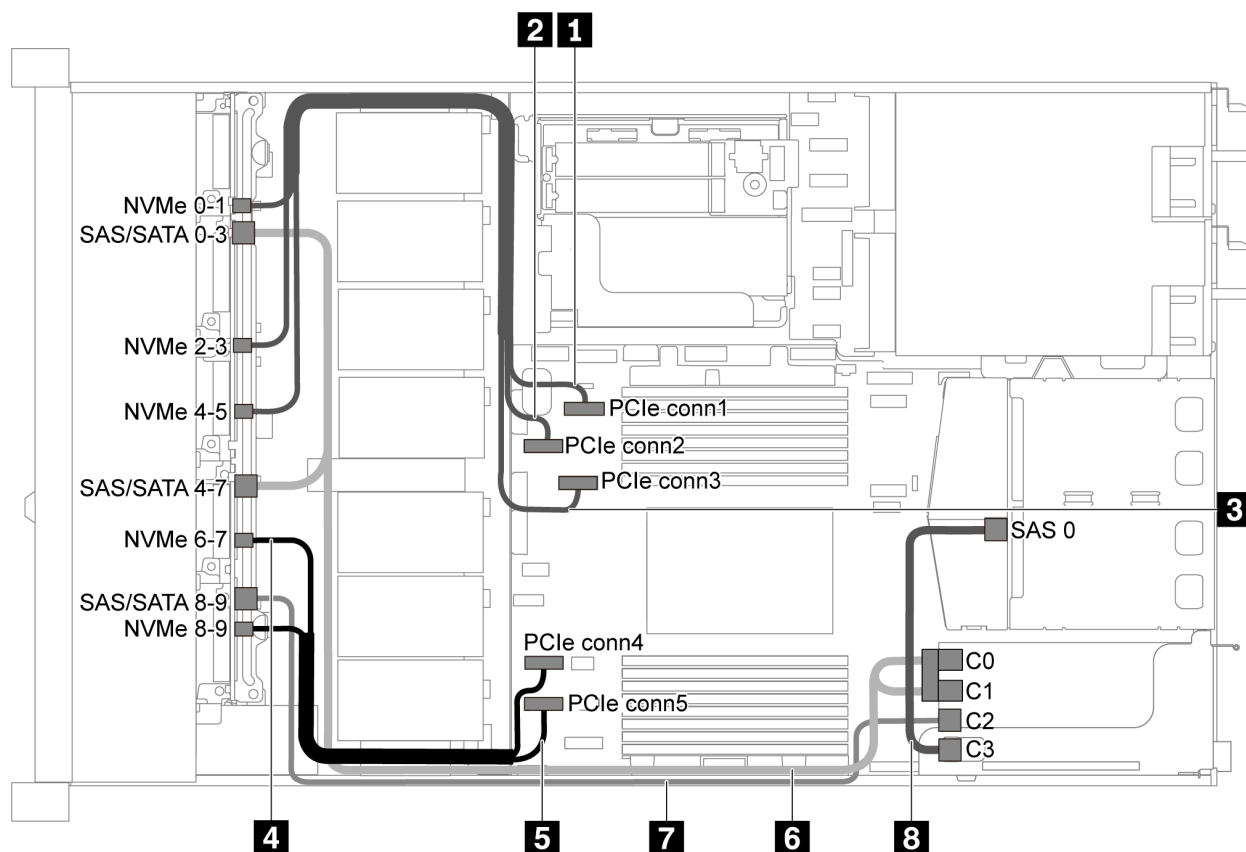


Figure 51. Cable routing for server model with ten 2.5-inch SAS/SATA/NVMe drives, rear SAS/SATA drive assembly and one 16i RAID/HBA adapter

#### Notes:

- RAID/HBA adapters can be installed in PCIe slot 1 or internal riser assembly.
- When a Gen 4 RAID/HBA adapter is installed, ensure that you use the corresponding Gen 4 cable:

For cable 6: **ThinkSystem SR635 2.5" SAS/SATA/AnyBay 10-Bay X40 RAID Cable Kit**

For cable 7 and 8: **ThinkSystem SR635 2.5" SAS/SATA 2-Bay Rear Backplane X40 RAID Cable Kit**

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

Cable	From	To
<b>6</b> SAS signal cable for front backplane	SAS/SATA 0–3 and SAS/SATA 4–7 connectors on the front backplane	The RAID/HBA adapter in PCIe slot 1 <ul style="list-style-type: none"> <li>Gen 3: C0C1</li> <li>Gen 4: C0</li> </ul>
<b>7</b> SAS signal cable for front backplane	SAS/SATA 8–9 connector on the front backplane	The RAID/HBA adapter in PCIe slot 1 <ul style="list-style-type: none"> <li>Gen 3: C2</li> <li>Gen 4: C1</li> </ul>
<b>8</b> SAS signal cable for rear backplane	SAS connector on the rear backplane	The RAID/HBA adapter in PCIe slot 1 <ul style="list-style-type: none"> <li>Gen 3: C3</li> <li>Gen 4: C1</li> </ul>

### Ten 2.5-inch SAS/SATA/NVMe drives, rear NVMe drive assembly and one 16i RAID/HBA 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.

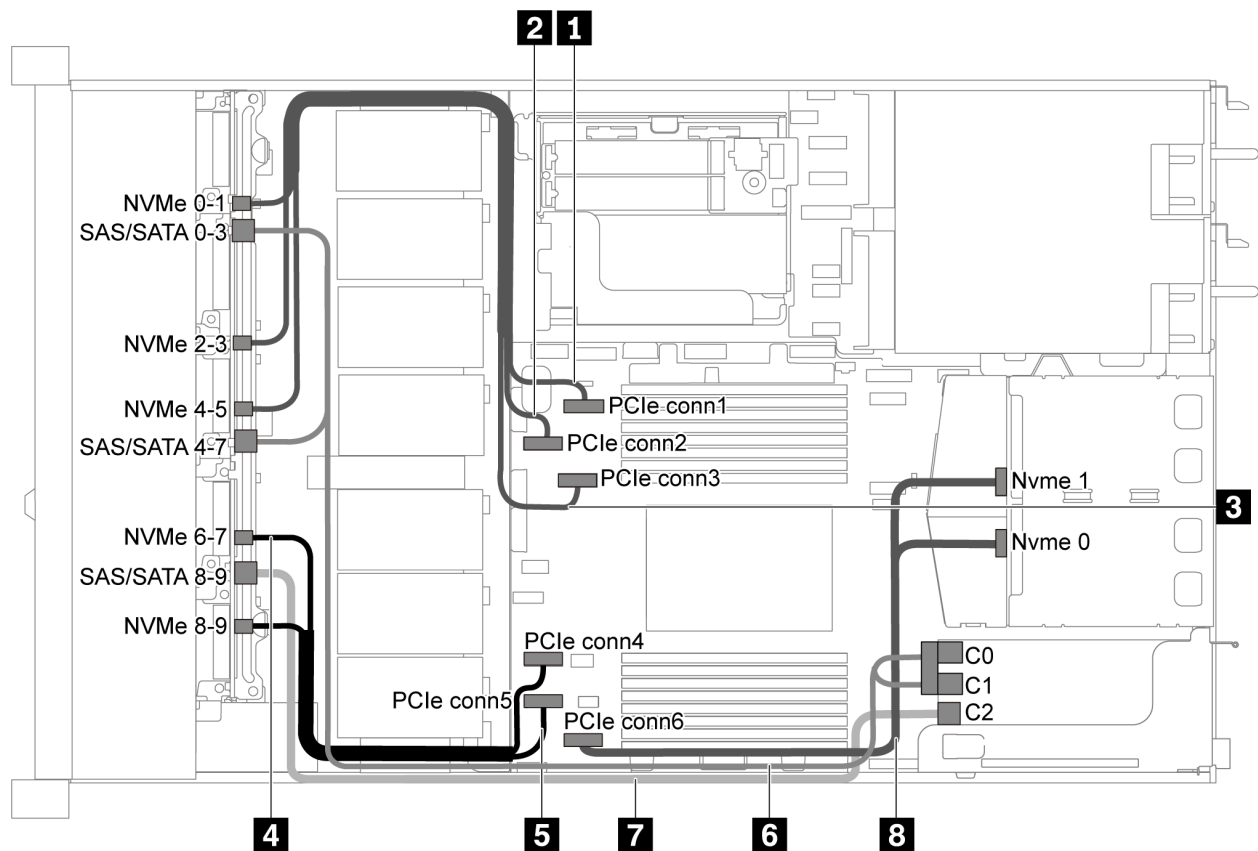


Figure 52. Cable routing for server model with ten 2.5-inch SAS/SATA/NVMe drives, rear NVMe drive assembly and one 16i RAID/HBA adapter

#### Notes:

- RAID/HBA adapters can be installed in PCIe slot 1 or internal riser assembly.
- When a Gen 4 RAID/HBA adapter is installed, ensure that you use the corresponding Gen 4 cable:

## ThinkSystem SR635 2.5" SAS/SATA/AnyBay 10-Bay X40 RAID Cable Kit

Cable	From	To
<b>1</b> NVMe signal cable for front backplane	NVMe 0–1 connector on the front backplane	PCIe connector 1 on the system board
<b>2</b> NVMe signal cable for front backplane	NVMe 2–3 connector on the front backplane	PCIe connector 2 on the system board
<b>3</b> NVMe signal cable for front backplane	NVMe 4–5 connector on the front backplane	PCIe connector 3 on the system board
<b>4</b> NVMe signal cable for front backplane	NVMe 6–7 connector on the front backplane	PCIe connector 4 on the system board
<b>5</b> NVMe signal cable for front backplane	NVMe 8–9 connector on the front backplane	PCIe connector 5 on the system board
<b>6</b> SAS signal cable for front backplane	SAS/SATA 0–3 and SAS/SATA 4–7 connectors on the front backplane	The RAID/HBA adapter in PCIe slot 1 <ul style="list-style-type: none"> <li>• Gen 3: C0C1</li> <li>• Gen 4: C0</li> </ul>
<b>7</b> SAS signal cable for front backplane	SAS/SATA 8–9 connector on the front backplane	The RAID/HBA adapter in PCIe slot 1 <ul style="list-style-type: none"> <li>• Gen 3: C2</li> <li>• Gen 4: C1</li> </ul>
<b>8</b> 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/NVMe drives, rear SAS/SATA drive assembly, middle NVMe drive assembly and one 16i RAID/HBA 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 configuration.

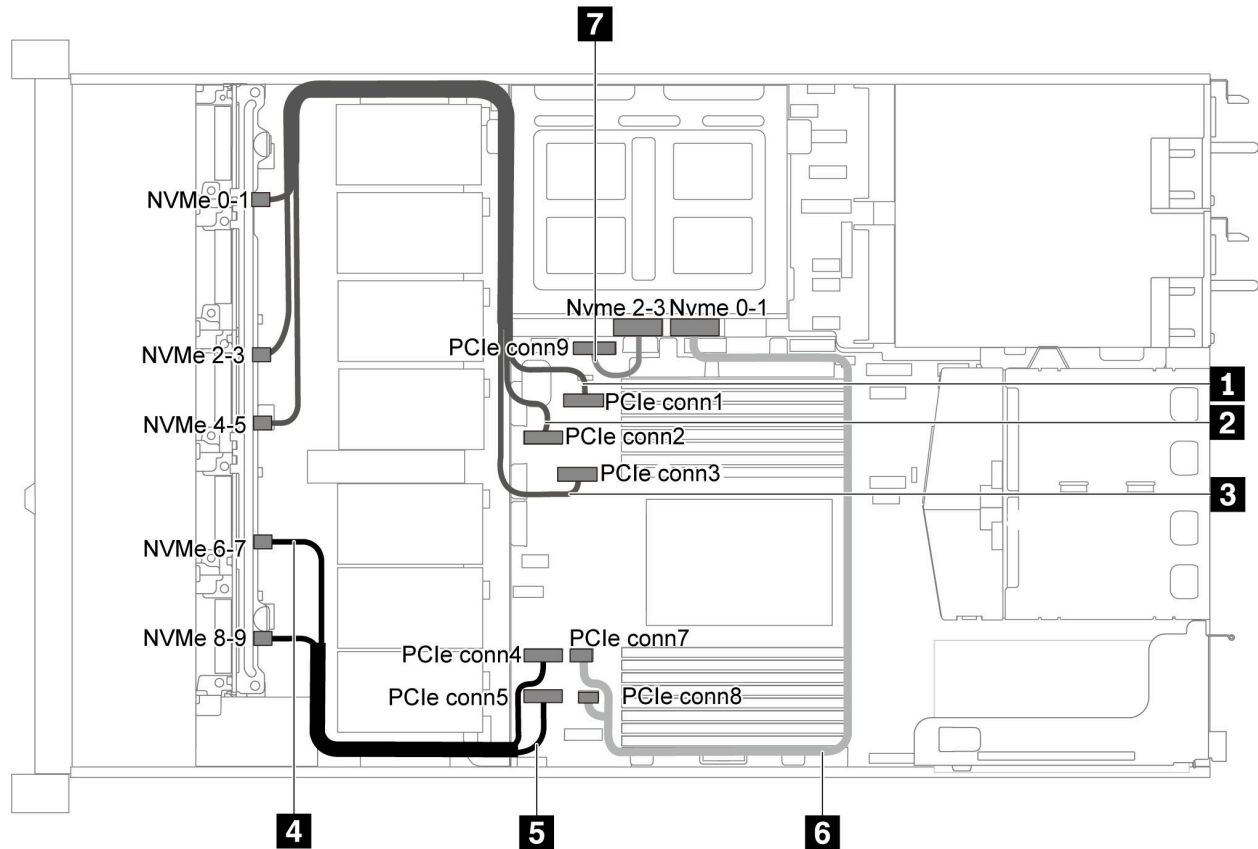


Figure 53. Cable routing for server model with ten 2.5-inch SAS/SATA/NVMe drives, rear SAS/SATA drive assembly, middle NVMe drive assembly and one 16i RAID/HBA adapter-1

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

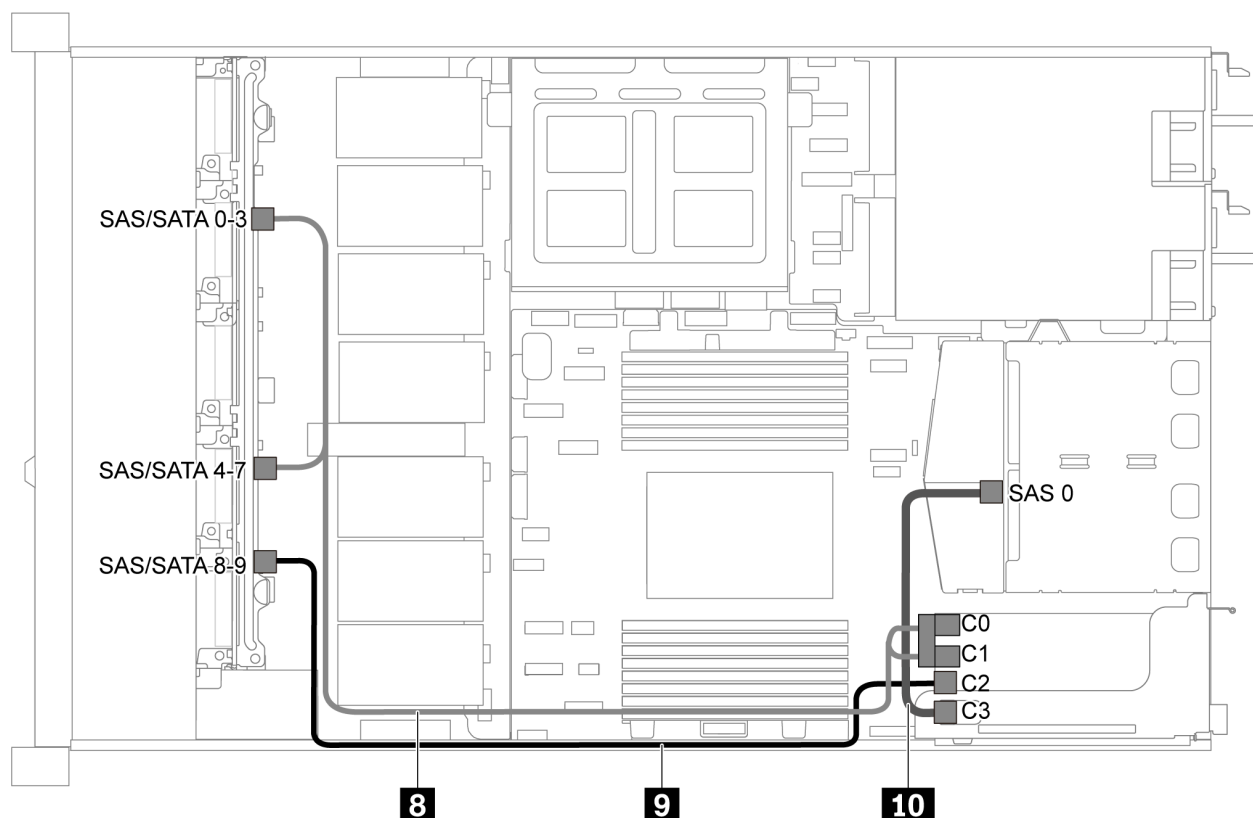


Figure 54. Cable routing for server model with ten 2.5-inch SAS/SATA/NVMe drives, rear SAS/SATA drive assembly, middle NVMe drive assembly and one 16i RAID/HBA adapter-2

**Note:** When a Gen 4 RAID/HBA adapter is installed, ensure that you use the corresponding Gen 4 cable:

For cable 8: **ThinkSystem SR635 2.5" SAS/SATA/AnyBay 10-Bay X40 RAID Cable Kit**

For cable 9 and 10: **ThinkSystem SR635 2.5" SAS/SATA 2-Bay Rear Backplane X40 RAID Cable Kit**

Cable	From	To
<b>8</b> SAS signal cable for front backplane	SAS/SATA 0-3 and SAS/SATA 4-7 connectors on the front backplane	The RAID/HBA adapter in PCIe slot 1 <ul style="list-style-type: none"> <li>Gen 3: C0C1</li> <li>Gen 4: C0</li> </ul>
<b>9</b> SAS signal cable for front backplane	SAS/SATA 8-9 connector on the front backplane	The RAID/HBA adapter in PCIe slot 1 <ul style="list-style-type: none"> <li>Gen 3: C2</li> <li>Gen 4: C1</li> </ul>
<b>10</b> SAS signal cable for rear backplane	SAS 0 connector on the middle backplane	The RAID/HBA adapter in PCIe slot 1 <ul style="list-style-type: none"> <li>Gen 3: C3</li> <li>Gen 4: C1</li> </ul>

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

**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. For the following configurations without the rear hot-swap drive cage or middle NVMe drive assembly, you can also refer to the illustration and table for the cable routing.

- Ten 2.5-inch NVMe drives: Connect Cable **1** and Cable **2**
- Ten 2.5-inch NVMe drives and rear NVMe drive assembly: Connect Cable **1**, Cable **2**, and Cable **5**
- Ten 2.5-inch NVMe drives and middle NVMe drive assembly: Connect Cable **1**, Cable **2**, Cable **3**, and Cable **4**

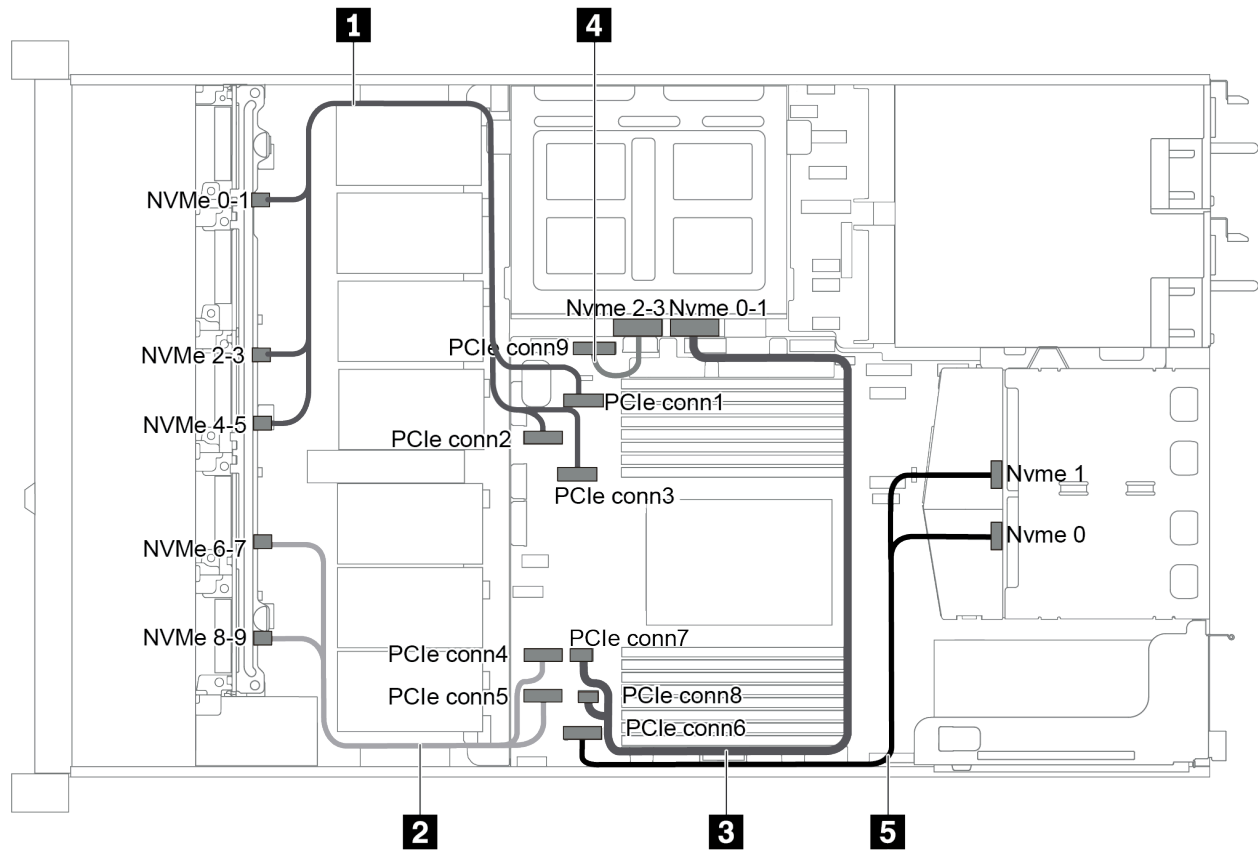


Figure 55. Cable routing for server model with ten 2.5-inch NVMe drives, rear NVMe drive assembly and middle NVMe drive assembly

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

## Ten 2.5-inch SAS/SATA/NVMe drives, rear NVMe drive assembly, middle NVMe drive assembly and one 16i RAID/HBA 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 configuration.

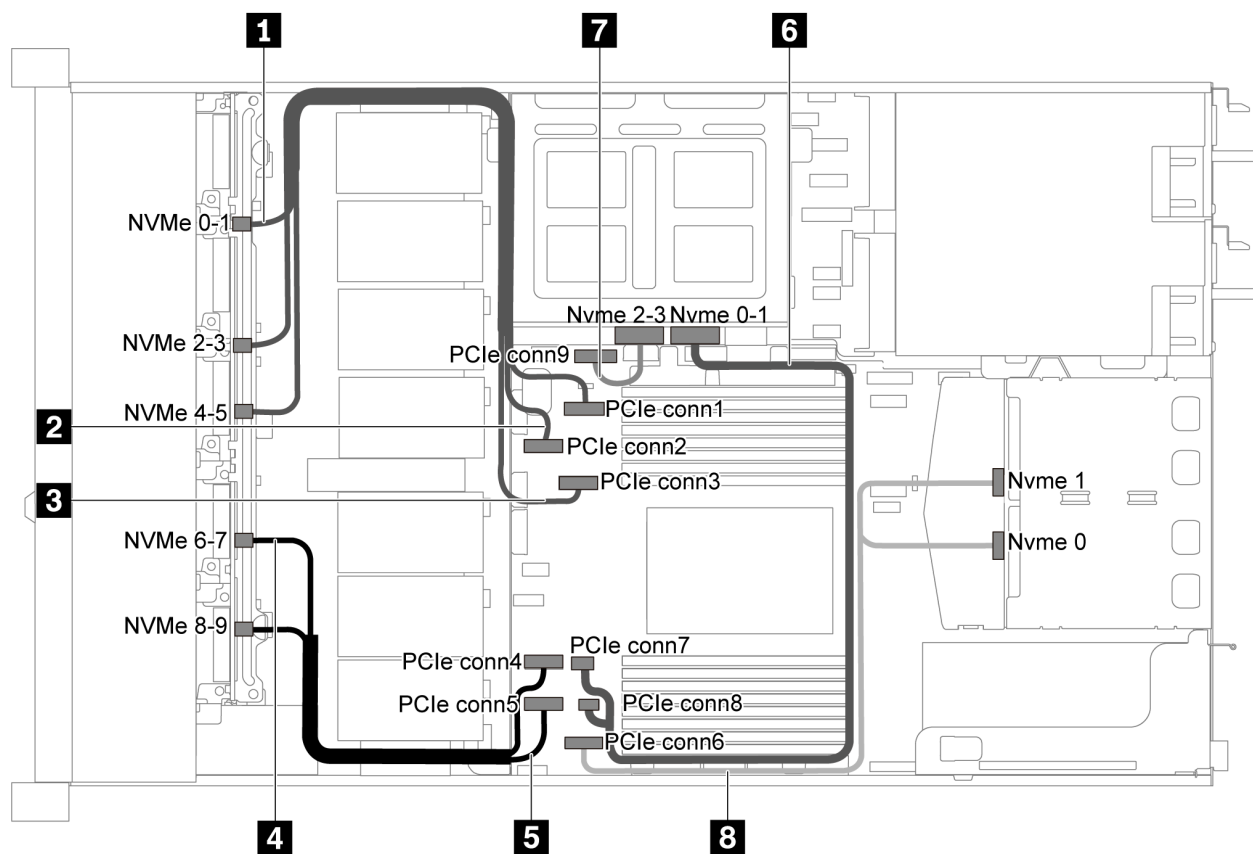


Figure 56. Cable routing for server model with ten 2.5-inch SAS/SATA/NVMe drives, rear NVMe drive assembly, middle NVMe drive assembly and one 16i RAID/HBA adapter-1

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

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

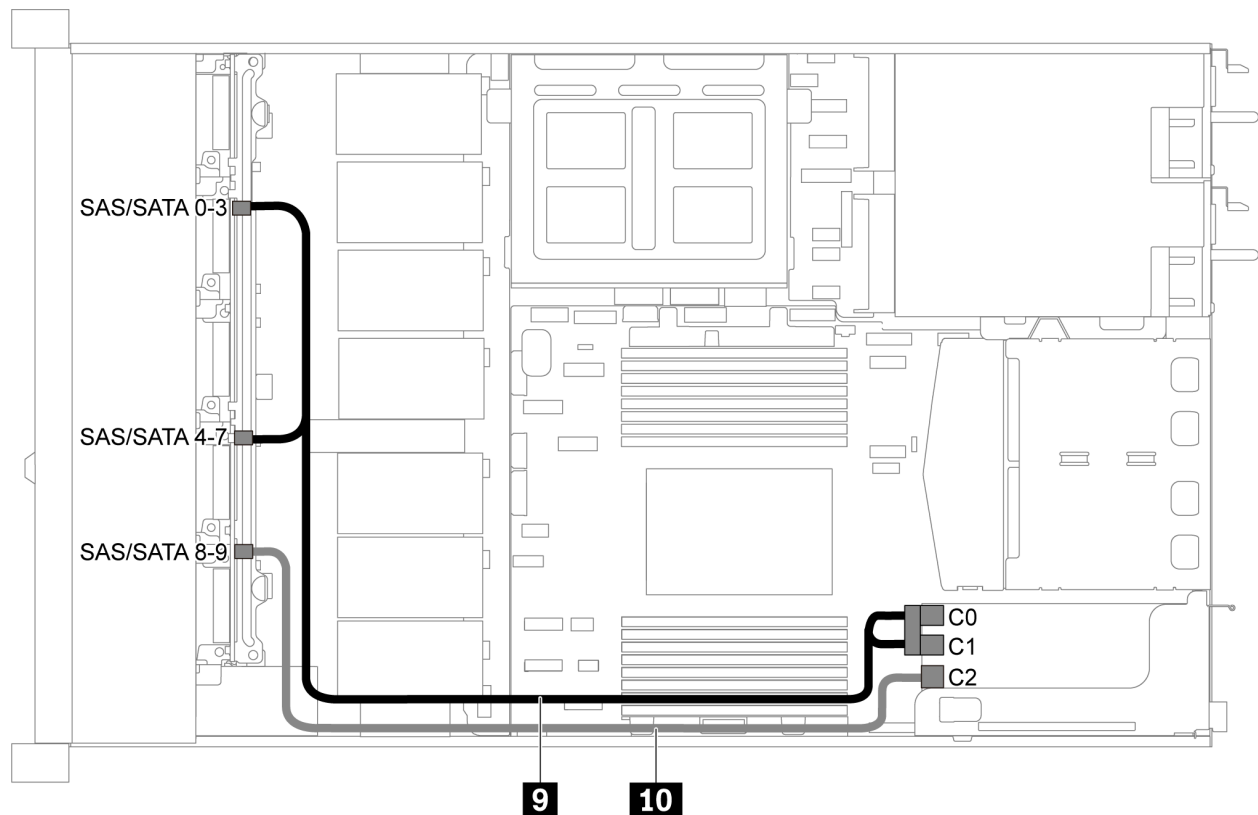


Figure 57. Cable routing for server model with ten 2.5-inch SAS/SATA/NVMe drives, rear SAS/SATA drive assembly, middle NVMe drive assembly and one 16i RAID/HBA adapter-2

**Note:** When a Gen 4 RAID/HBA adapter is installed, ensure that you use the corresponding Gen 4 cable:

**ThinkSystem SR635 2.5" SAS/SATA/AnyBay 10-Bay X40 RAID Cable Kit**

Cable	From	To
<b>9</b> SAS signal cable for front backplane	SAS/SATA 0–3 and SAS/SATA 4–7 connectors on the front backplane	The RAID/HBA adapter in PCIe slot 1 <ul style="list-style-type: none"> <li>Gen 3: C0C1</li> <li>Gen 4: C0</li> </ul>
<b>10</b> SAS signal cable for front backplane	SAS/SATA 8–9 connector on the front backplane	The RAID/HBA adapter in PCIe slot 1 <ul style="list-style-type: none"> <li>Gen 3: C2</li> <li>Gen 4: C1</li> </ul>

## Ten 2.5-inch SAS/SATA/NVMe drives, middle NVMe drive assembly and one 16i RAID/HBA 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 configuration.

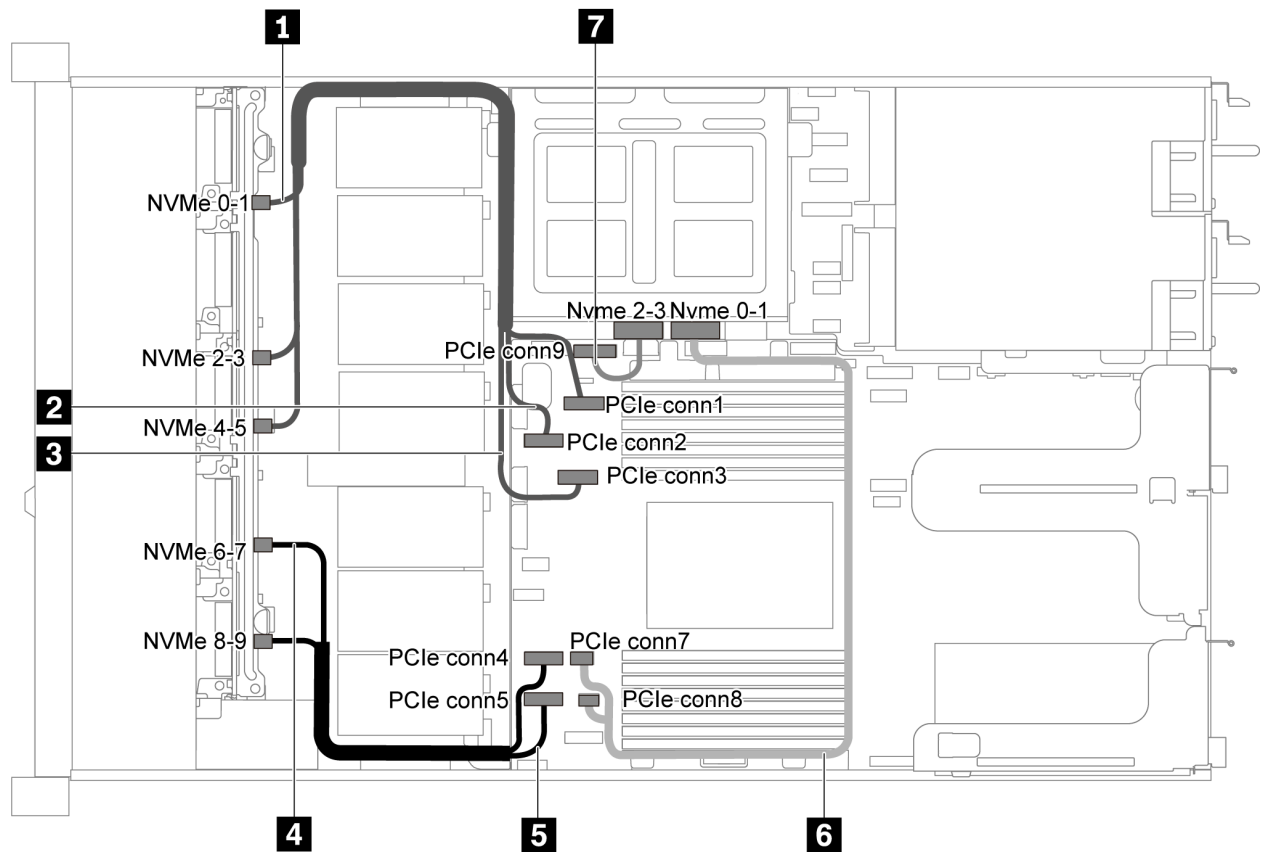


Figure 58. Cable routing for server model with ten 2.5-inch SAS/SATA/NVMe drives, middle NVMe drive assembly and one 16i RAID/HBA adapter-1

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

Cable	From	To
<b>6</b> NVMe signal cable for middle backplane	NVMe 0–1 connector on the middle backplane	PCIe connector 7 on the system board
<b>7</b> NVMe signal cable for middle backplane	NVMe 2–3 connector on the middle backplane	PCIe connector 9 on the system board

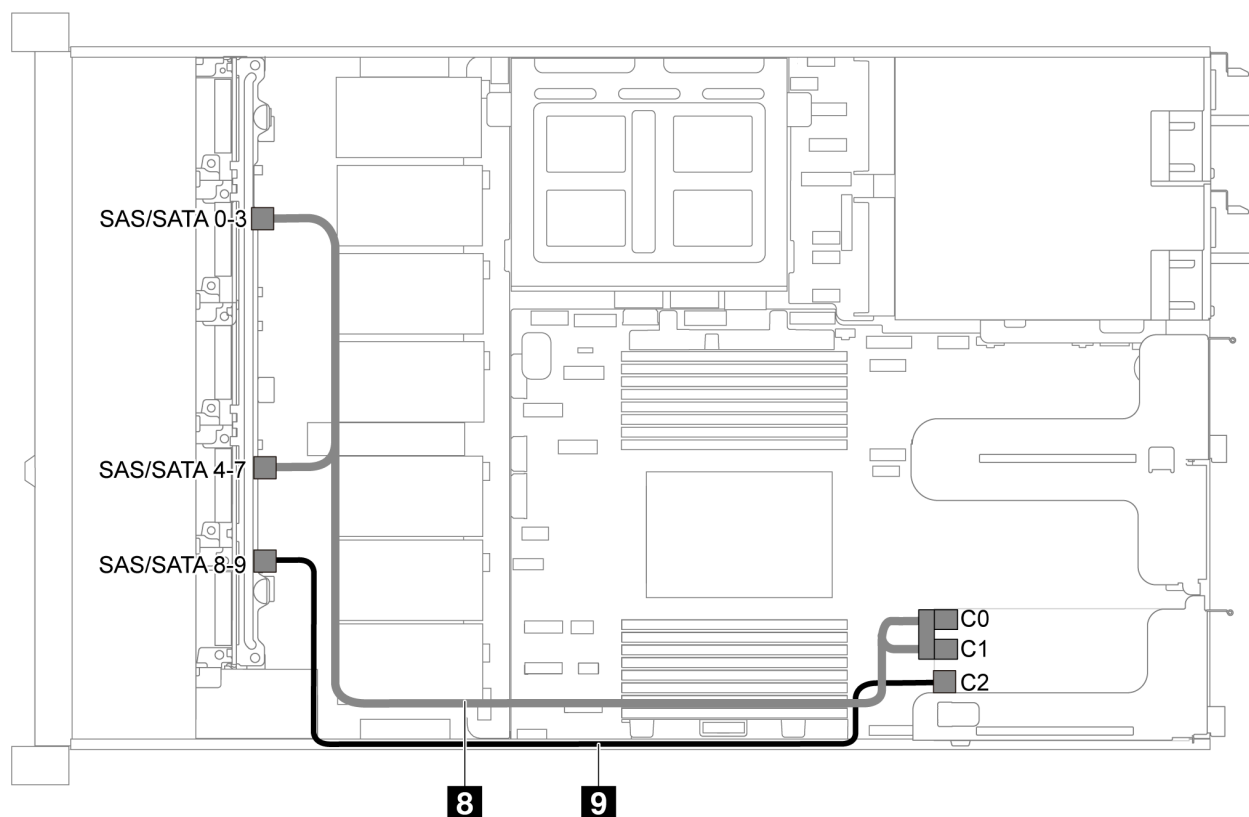


Figure 59. Cable routing for server model with ten 2.5-inch SAS/SATA/NVMe drives, middle NVMe drive assembly and one 16i RAID/HBA adapter-2

**Note:** When a Gen 4 RAID/HBA adapter is installed, ensure that you use the corresponding Gen 4 cable:

#### ThinkSystem SR635 2.5" SAS/SATA/AnyBay 10-Bay X40 RAID Cable Kit

Cable	From	To
<b>8</b> SAS signal cable for front backplane	SAS/SATA 0–3 and SAS/SATA 4–7 connectors on the front backplane	The RAID/HBA adapter in PCIe slot 1 <ul style="list-style-type: none"> <li>Gen 3: C0C1</li> <li>Gen 4: C0</li> </ul>
<b>9</b> SAS signal cable for front backplane	SAS/SATA 8–9 connector on the front backplane	The RAID/HBA adapter in PCIe slot 1 <ul style="list-style-type: none"> <li>Gen 3: C2</li> <li>Gen 4: C1</li> </ul>

## M.2 module cable routing

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

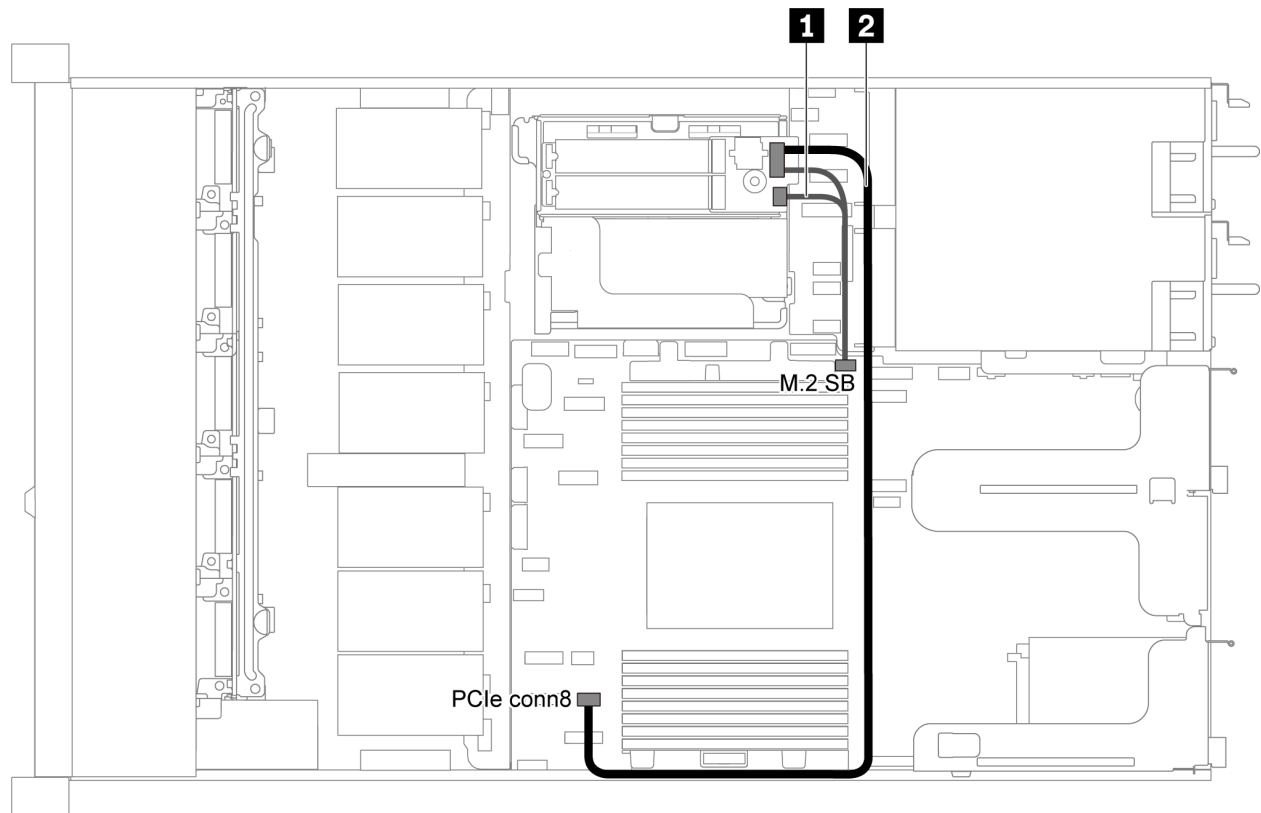


Figure 60. Cable routing for server model with M.2 module

Cable	From	To
<b>1</b>	M.2 sideband connectors on the M.2 module	M.2 sideband connector on the system board
<b>2</b>	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.

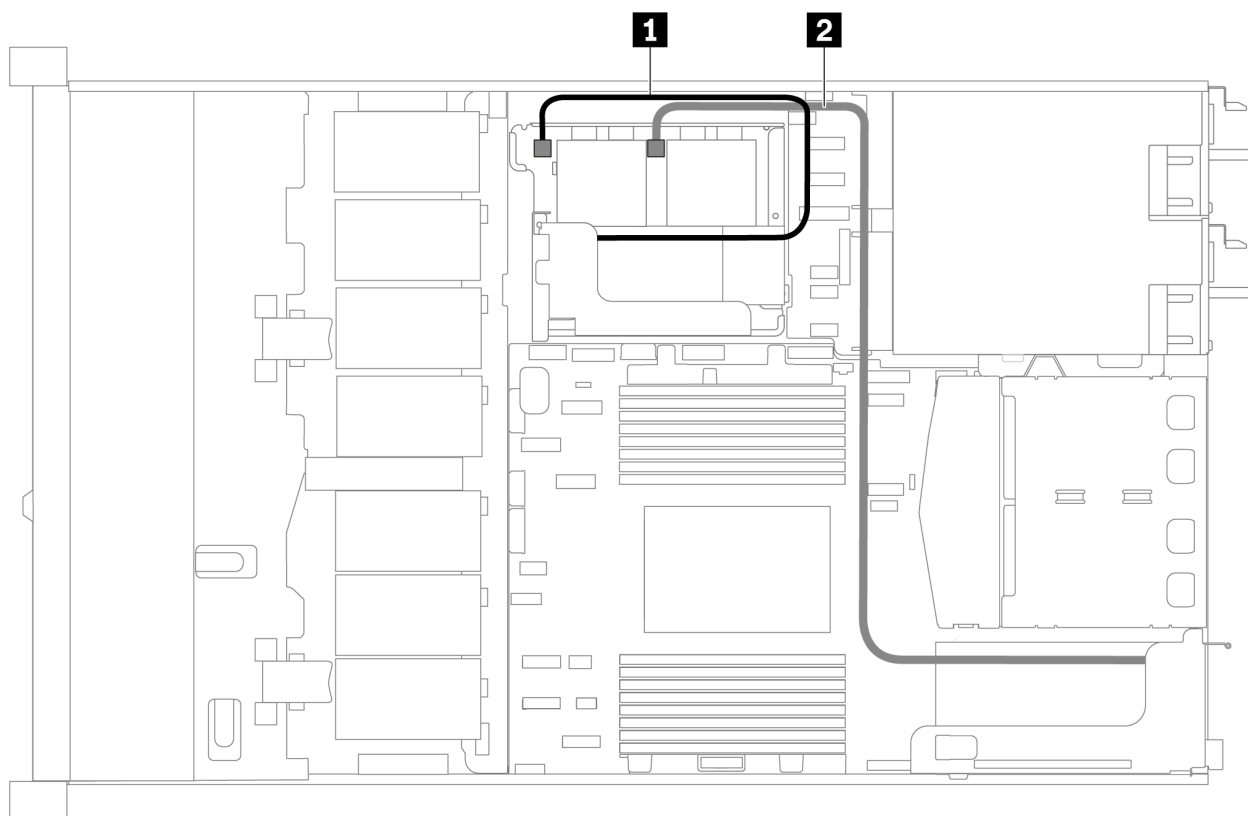


Figure 61. Cable routing for server model with two super capacitors

From	To
<b>1</b> Super capacitor connector	Super capacitor connector on the RAID adapter installed in the internal riser kit
<b>2</b> 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

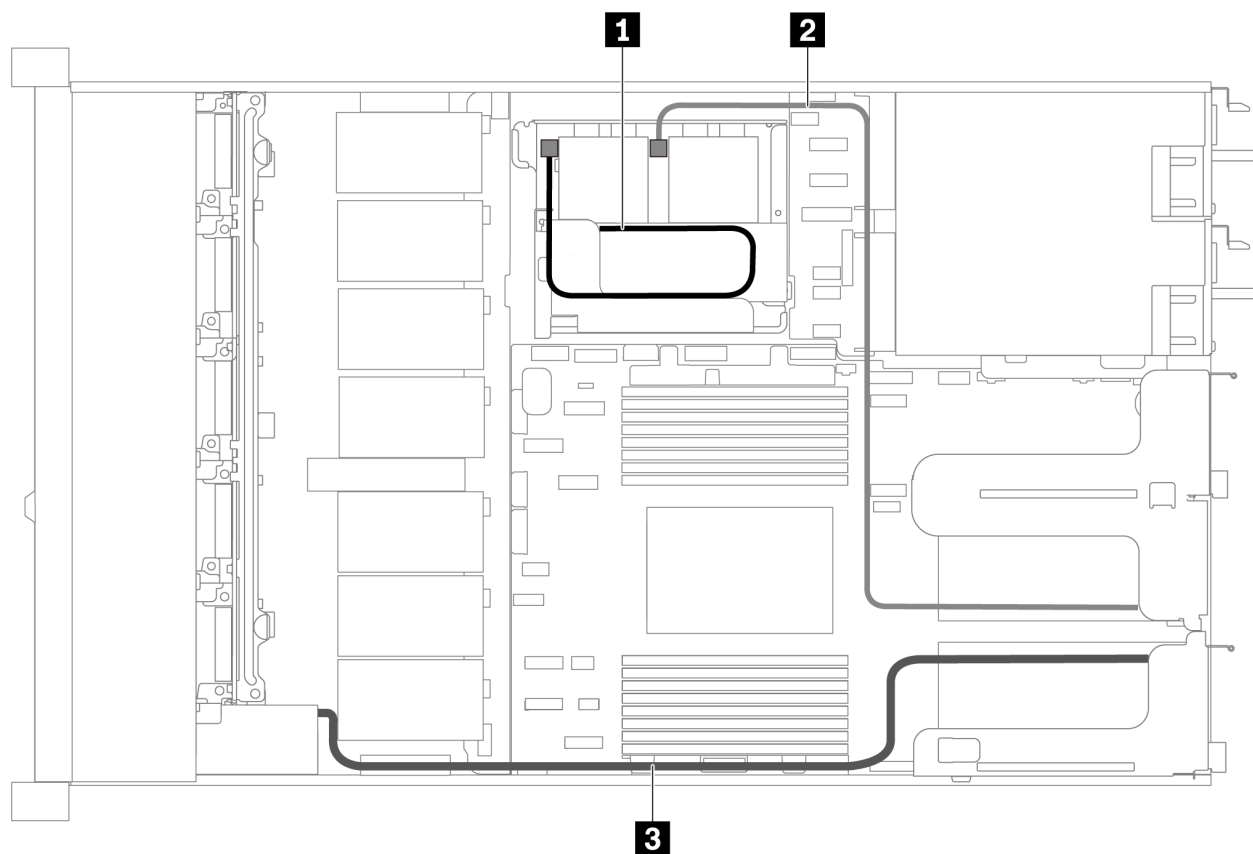


Figure 62. Cable routing for server model with three super capacitors

From	To
<b>1</b> Super capacitor connector	Super capacitor connector on the RAID adapter installed in the internal riser kit
<b>2</b> Super capacitor connector	Super capacitor connector on the RAID adapter installed in the PCIe slot 2
<b>3</b> 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.



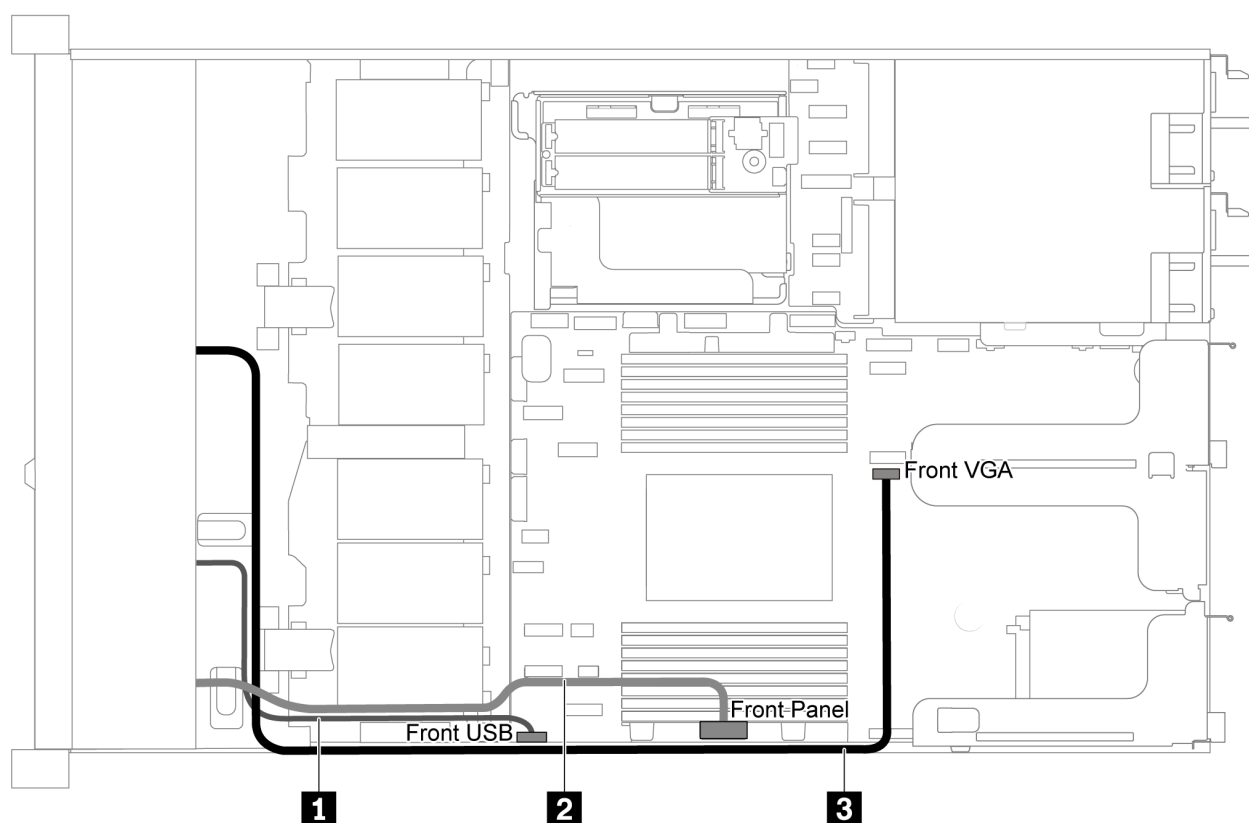


Figure 63. VGA/USB/Front panel connector cable routing for server model with four 3.5-inch drive bays

Cable	To
<b>1</b> USB cable from the front of server	Front USB connector on the system board
<b>2</b> Front panel cable from the front of server	Front Panel connector on the system board
<b>3</b> 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.

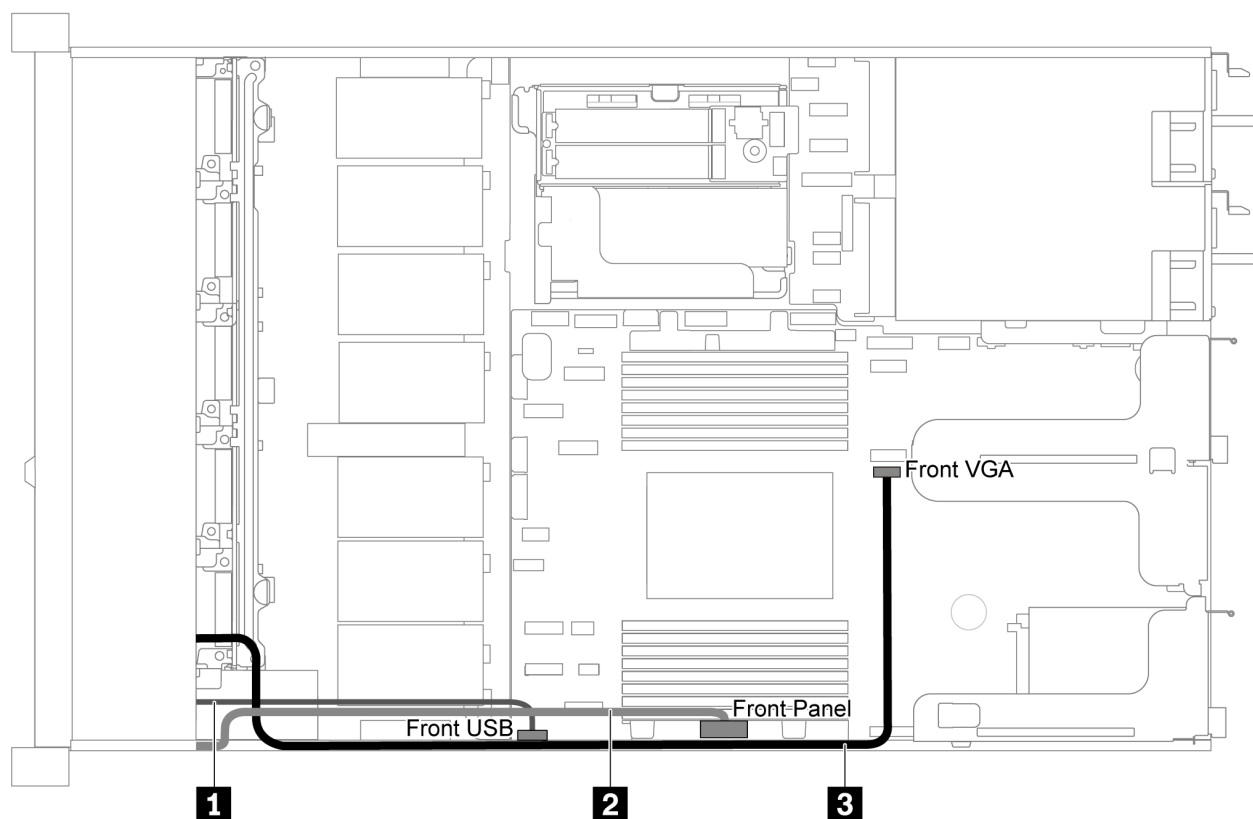


Figure 64. VGA/USB/Front panel connector cable routing for server model with eight/ten 2.5-inch drive bays

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

## Intrusion switch cable routing

Use the section to understand the cable routing for the intrusion switch.

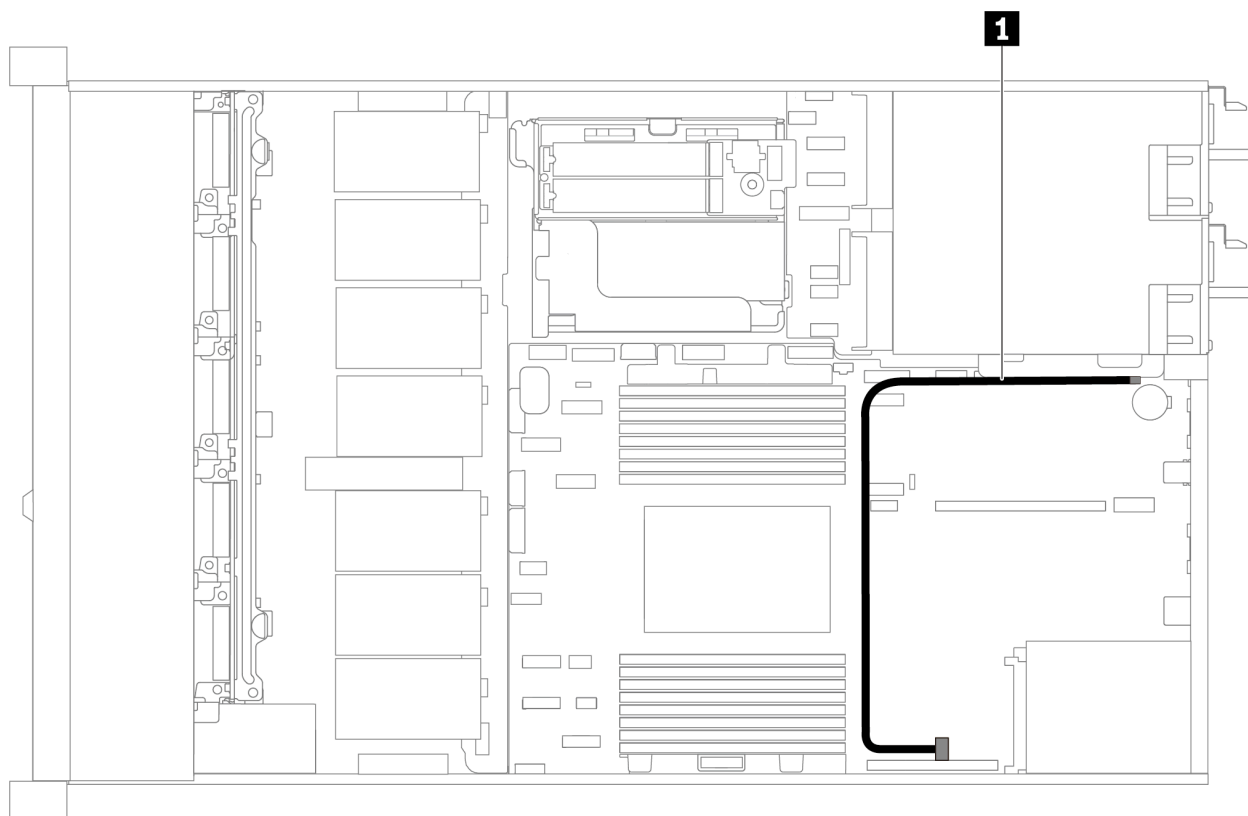


Figure 65. Cable routing for server model with intrusion switch

Cable	To
1 Intrusion switch cable from the riser bracket	Intrusion switch connector on the system board

## 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 66 “Server components” on page 76](#):

<https://datacentersupport.lenovo.com/products/servers/thinksystem/sr635/7y98/parts>

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

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

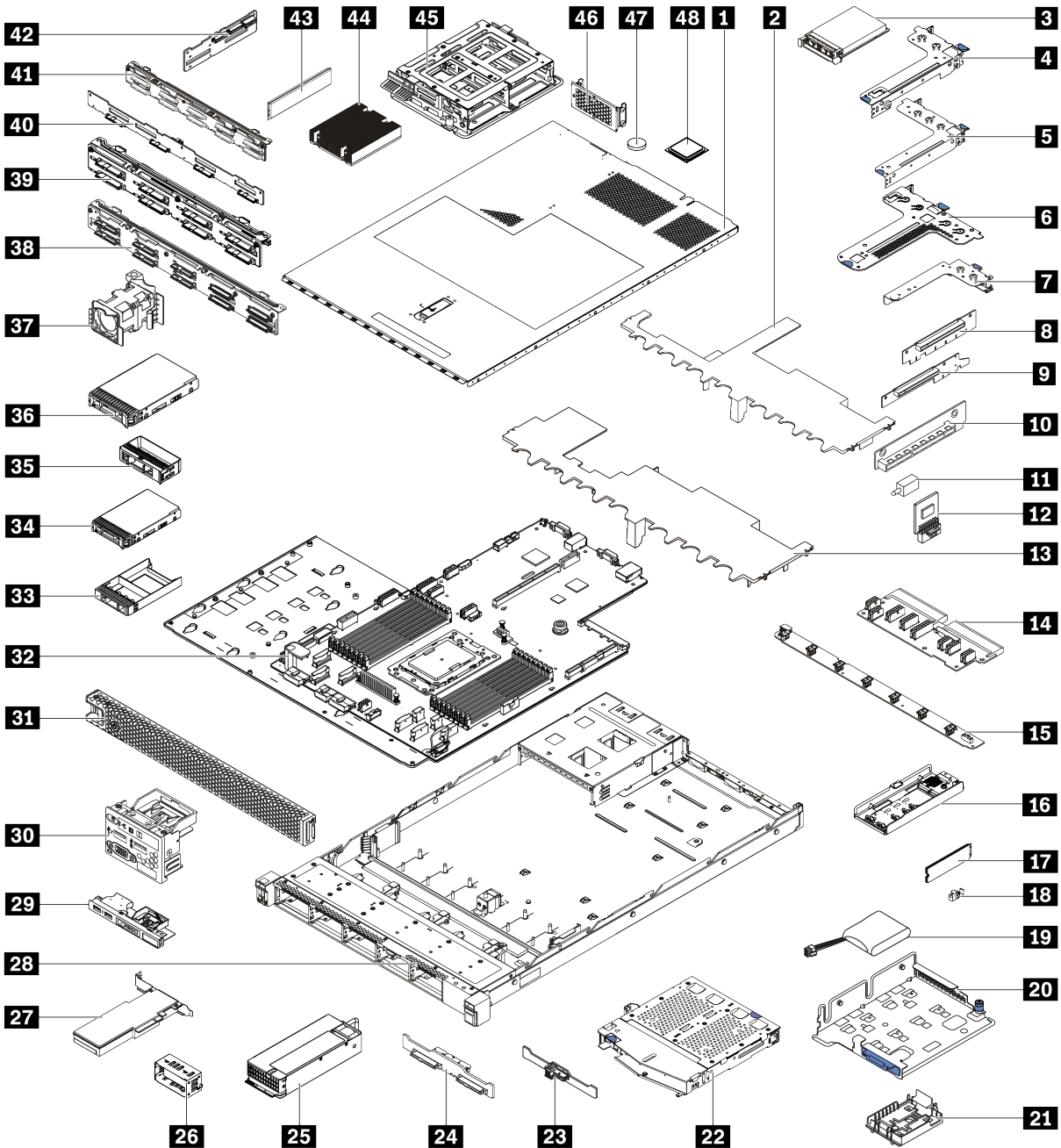


Figure 66. Server components

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 (CRU):** You may install a Tier 2 CRU yourself or request Lenovo to install it, at no additional charge, under the type of warranty service that is designated for your server.
- **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 list

Index	Description	Tier 1 CRU	Tier 2 CRU	FRU	Consumable and Structural parts
For more information about ordering the parts shown in Figure 66 “Server components” on page 76: <a href="https://datacentersupport.lenovo.com/products/servers/thinksystem/sr635/7y98/parts">https://datacentersupport.lenovo.com/products/servers/thinksystem/sr635/7y98/parts</a>					
<b>1</b>	Top cover	✓			
<b>2</b>	Air baffle for middle drive cage				✓
<b>3</b>	OCP 3.0 Ethernet adapter	✓			
<b>4</b>	Riser bracket (low profile)	✓			
<b>5</b>	Riser bracket (full-height, full-length)	✓			
<b>6</b>	Riser bracket (low profile + low profile)	✓			
<b>7</b>	Internal riser bracket (low profile)	✓			
<b>8 9 10</b>	Riser card	✓			
<b>11</b>	Intrusion switch	✓			
<b>12</b>	TPM adapter (For Chinese Mainland only)			✓	
<b>13</b>	Standard air baffle				✓
<b>14</b>	PIB board			✓	
<b>15</b>	Fan board			✓	
<b>16</b>	M.2 bracket	✓			
<b>17</b>	M.2 drive	✓			
<b>18</b>	M.2 retainer clip	✓			
<b>19</b>	RAID super capacitor	✓			
<b>20</b>	M.2/riser support bracket	✓			
<b>21</b>	RAID super capacitor holder	✓			
<b>22</b>	Rear hot-swap drive cage	✓			
<b>23</b>	Rear SAS/SATA backplane	✓			
<b>24</b>	Rear NVMe backplane	✓			
<b>25</b>	Power supply	✓			
<b>26</b>	Power supply filler	✓			
<b>27</b>	PCIe adapter	✓			
<b>28</b>	Chassis			✓	
<b>29</b>	Front I/O assembly, server models with four 3.5-inch drive bays	✓			
<b>30</b>	Front I/O assembly, server models with eight or ten 2.5-inch drive bays	✓			

Table 13. Parts list (continued)

Index	Description	Tier 1 CRU	Tier 2 CRU	FRU	Consumable and Structural parts
<b>31</b>	Security bezel	√			
<b>32</b>	System board			√	
<b>33</b>	Filler, 2.5-inch drive				√
<b>34</b>	Storage drive, 2.5-inch, hot-swap	√			
<b>35</b>	Filler, 3.5-inch drive				√
<b>36</b>	Storage drive, 3.5-inch, hot-swap	√			
<b>37</b>	System fan	√			
<b>38</b>	Backplane, ten 2.5-inch hot-swap drives	√			
<b>39</b>	Backplane, eight 2.5-inch hot-swap drives	√			
<b>40</b>	Backplane, four 3.5-inch hot-swap drives	√			
<b>41</b>	Backplane, ten 2.5-inch AnyBay hot-swap drives	√			
<b>42</b>	Middle backplane, four 2.5-inch hot-swap drives	√			
<b>43</b>	Memory module	√			
<b>44</b>	Heat sink			√	
<b>45</b>	Internal drive cage, four 2.5-inch hot-swap drives				√
<b>46</b>	Rear wall bracket				√
<b>47</b>	CMOS battery				√
<b>48</b>	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.





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## 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:

<https://datacentersupport.lenovo.com/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 9](#).

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### 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 your safety at work.
  - A complete list of safety information for all products is available at:  
[https://pubs.lenovo.com/safety\\_documentation/](https://pubs.lenovo.com/safety_documentation/)
  - The following guidelines are available as well: [“Handling static-sensitive devices” on page 84](#) and [“Working inside the server with the power on” on page 83](#).
- 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 <https://serverproven.lenovo.com/>.
- When you install a new server, download and apply the latest firmware. This will help ensure that any known issues are addressed, and that your server is ready to work with optimal performance. Go to [ThinkSystem 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 the latest Best Recipe code level menu for cluster supported firmware and driver before you update the code.

- It is good practice to make sure that the server is working correctly before you install an optional component.
- Keep the working area clean, and place removed components on a flat and smooth surface that does not shake or tilt.
- Do not attempt to lift an object that might be too heavy for you. If you have to lift a heavy object, read the following precautions carefully:
  - Make sure that you can stand steadily without slipping.
  - Distribute the weight of the object equally between your feet.
  - Use a slow lifting force. Never move suddenly or twist when you lift a heavy object.
  - To avoid straining the muscles in your back, lift by standing or by pushing up with your leg muscles.

- Back up all important data before you make changes related to the disk drives.
- Have a small flat-blade screwdriver, a small Phillips screwdriver, and a T8 torx screwdriver available.
- To view the error LEDs on the system board and internal components, leave the power on.
- You do not have to turn off the server to remove or install hot-swap power supplies, hot-swap fans, or hot-plug USB devices. However, you must turn off the server before you perform any steps that involve removing or installing adapter cables, and you must disconnect the power source from the server before you perform any steps that involve removing or installing a riser card.
- Blue on a component indicates touch points, where you can grip to remove a component from or install it in the server, open or close a latch, and so on.
- The Red strip on the drives, adjacent to the release latch, indicates that the drive can be hot-swapped if the server and operating system support hot-swap capability. This means that you can remove or install the drive while the server is still running.

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

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

## Safety inspection checklist

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

### Notes:

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

### CAUTION:

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

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

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

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

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

- a. Go to:

<http://dcsc.lenovo.com/#/>

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

## System reliability guidelines

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.

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## 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: 2 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
  - TruDDR4 2933, quad-rank, 128 GB 3DS RDIMM
  - TruDDR4 3200, quad-rank, 128 GB 3DS RDIMM (Only 7003 series processors are supported.)

For a list of supported memory options, see: <https://serverproven.lenovo.com/>

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

- Memory modules in your server must be the same type.
- Memory modules from different vendors are supported.
- Memory modules with 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.

**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.

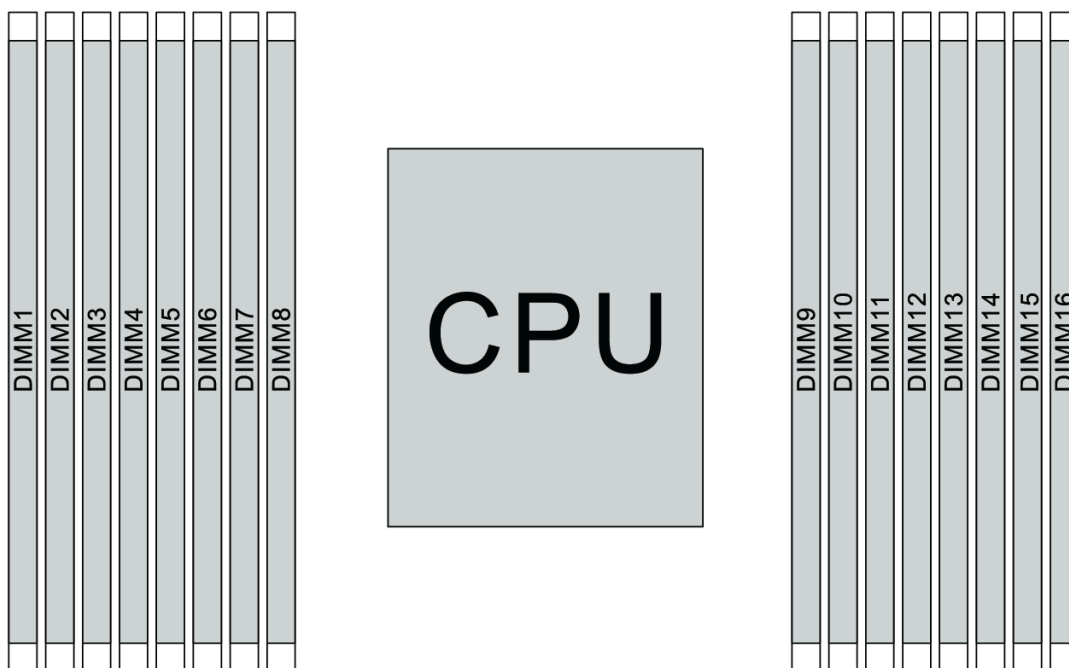


Figure 67. DIMM locations

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

Table 14. DIMM installation order (continued)

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
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

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

DIMM Qty	DIMM population order
6	1, 3, 7, 10, 14, 16
12	1, 2, 3, 4, 7, 8, 9, 10, 13, 14, 15, 16

## Technical rules

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

### Technical rules for processor and heat sink

The following lists the supported heat sink for processors of different default TDP.

Processor (default TDP)	Heat sink
120/155/180/200 watts	1U standard heat sink
225/240/280 watts	1U high-performance heat sink

**Note:** For the system to support 7203, 7203P, 7303, 7303P, 7643P, and 7663P processors, the minimum UEFI version is **cfe138f-7.10**, and the minimum XCC version is **ambt46n-6.73**.

#### Rules about 280-watt processor installation

The following are rules to be followed when the server is configured with a 280-watt processor.

- Ethernet adapters with AOC is not supported in PCIe slot 2.

- 10/25 GbE Ethernet adapters with AOC are supported in PCIe slot 1 or 3 when the ambient temperature is less than 30°C.
- 100/200 GbE Ethernet adapters are supported in PCIe slot 1 or 3 when the ambient temperature is less than 30°C.
- Fibre channel card is not supported in PCIe slot 2.

## 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	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

Configuration	Maximum GPU	Processor TDP
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 lists the technical rules for processor TDP and the supported configurations with different types of power supply.

- For 550-watt power supply:

Supported configuration	Processor TDP
4 x 3.5-inch front drive bays	120/155 watts
4 x 3.5-inch chassis without front drives and without GPU installed	120/155 watts

- For 750-watt power supply:

Supported configuration	Processor TDP
4 x 3.5-inch front drive bays	120/155/180/200/225/240/280 watts
4 x 3.5-inch front drive bays + middle NVMe drives	120/155/180/200 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	120/155/180/200/225/240 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	120/155/180/200/225/240/280 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	120/155/180/200/225/240/280 watts
4 x 3.5-inch front drive bays + middle NVMe drives	120/155/180/200/225/240/280 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	120/155/180/200/225/240/280 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	120/155/180/200/225/240/280 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	120/155/180/200/225/240/280 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	120/155/180/200/225/240/280 watts
10 x 2.5-inch chassis without front drives and without GPU installed	120/155/180/200/225/240/280 watts
4 x 3.5-inch chassis without front drives and without GPU installed	120/155/180/200/225/240/280 watts

## Technical rules for system fans

**Note:** If an OCP 3.0 Ethernet adapter is installed, when the system is powered off but still plugged in to AC power, system fans 6 and 7 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, middle drive cage, or Ethernet adapter of 100 GbE or higher is installed and the processor TDP is 120 watts or 155 watts.
- Only when standard fans are selected, can 3.5" 14TB and 12TB SAS/SATA HDD be supported.
- Performance fans are selected when a GPU adapter, rear drive cage, middle drive cage, or Ethernet adapter of 100 GbE or higher is installed, or the processor TDP is 180 watts, 200 watts, 225 watts, 240 watts, or 280 watts.
- Fan 1 is optional when no M.2 drive, internal PCIe adapter, middle drive cage, rear drive cage or GPU adapter is installed. However, if no fan 1 is installed, you must keep the location for fan 1 occupied by a fan filler to ensure proper airflow.

## Technical rules for GPU adapters

For NVIDIA Tesla T4 and NVIDIA A2, the rules of installing two and three GPUs are as follows:

For two GPUs:

- 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.
- Maximum TDP for CPU is 180 watts.

For three GPUs:

- If intrusion switch is installed, the server supports up to two GPU adapters in PCIe slot 2 and slot 3.
- 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.
- It can only be supported when servers are configured as 4 x 3.5" SAS/SATA, 8 x 2.5" SAS/SATA (6 x 2.5" SAS/SATA + 2 x HDD vacant), 6 x 2.5" SAS/SATA + 4 x 2.5" AnyBay (6 x 2.5" SAS/SATA + 4 x HDD vacant) or 10 x 2.5" AnyBay (6 x 2.5" AnyBay + 4 x HDD vacant).
  - For 8 x 2.5" SAS/SATA (6 x 2.5" SAS/SATA + 2 x HDD vacant), if HDDs are installed in slots 0-5, two 1 x 2.5" single filler should be installed on slots 6 and 7.
  - For 6 x 2.5" SAS/SATA + 4 x 2.5" AnyBay (6 x 2.5" SAS/SATA + 4 x HDD vacant), if HDDs are installed in slots 0-5, four 1 x 2.5" single filler should be installed on slots 6, 7, 8 and 9.
  - For 10 x 2.5" AnyBay (6 x 2.5" AnyBay + 4 x HDD vacant), if HDDs are installed in slots 0-5, four 1 x 2.5" single filler should be installed on slots 6, 7, 8 and 9.

The following table lists the technical rules between NVIDIA Tesla T4/NVIDIA A2 GPU adapters and processor TDP for different configurations.

Supported configuration for drives in front backplane	NVIDIA Tesla T4/ NVIDIA A2 GPU adapters	Processor TDP	Supported ambient temperature
<ul style="list-style-type: none"> <li>• 4 x 3.5-inch SAS/SATA</li> <li>• 8 x 2.5-inch SAS/SATA</li> <li>• 6 x 2.5-inch SAS/SATA + 4 x 2.5-inch AnyBay</li> <li>• 10 x 2.5-inch AnyBay</li> </ul>	2	120/155/180 watts	up to 30°C
<ul style="list-style-type: none"> <li>• 4 x 3.5-inch SAS/SATA</li> <li>• 6 x 2.5-inch SAS/SATA+ 2 vacant drive bays</li> <li>• 6 x 2.5-inch AnyBay + 4 vacant drive bays</li> </ul>	3	120 watts	up to 30°C

For NVIDIA Quadro P620, the rules of installing one to three GPUs are the same. See the following:

- If intrusion switch is installed, the server supports up to two GPU adapters in PCIe slot 2 and slot 3.
- 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.
- Maximum TDP for CPU is 225 watts.

The following table lists the technical rules between NVIDIA Quadro P620 GPU adapters and processor TDP for different configurations.

Supported configuration for drives in front backplane	NVIDIA Quadro P620 GPU adapters	Processor TDP	Supported ambient temperature
<ul style="list-style-type: none"> <li>4 x 3.5-inch SAS/SATA</li> <li>8 x 2.5-inch SAS/SATA</li> <li>6 x 2.5-inch SAS/SATA + 4 x 2.5-inch AnyBay</li> <li>10 x 2.5-inch AnyBay</li> </ul>	3	120/155/180/200/225 watts	up to 35°C

## Technical rules for drives

The following notes describe the types of drives that your server support 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:

<https://serverproven.lenovo.com/>

**Note:** VMware ESXi does not support ThinkSystem 2.5 U.3 6500 ION 30.72TB Read Intensive NVMe PCIe 4.0 x4 HS SSD.

- 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 13](#).
- 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 NVMe drives are supported.

**Note:** Only 7 mm NVMe drives are supported based on thermal consideration.

- High-performance fan should be selected, and the supported ambient temperature is up to 30°C.
- For rear drive cage:
  - Both SAS/SATA and NVMe drives are supported.

**Note:** For NVMe drives, only 7 mm NVMe drives are supported based on thermal consideration.

- High-performance fan should be selected, and the supported ambient temperature is up to 30°C.
- Supported processor TDP is 120/155 watts.
- For 6 SAS/SATA +4 anybay backplane configuration

**Note:** 2.5 or U.2 Gen4 NVMe drives (except Gen3 NVMe drives) are not supported.

## 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, 930-16e, 940-8e, 940-8i or 940-16i RAID/HBA adapter is installed, a super capacitor must be installed.
- The RAID 940 adapters can be mixed with the ThinkSystem 440-8i SAS/SATA PCIe Gen4 12Gb HBA and the ThinkSystem 440-16i SAS/SATA PCIe Gen4 12Gb HBA.
- The RAID 940/440 adapters cannot be mixed with the RAID 930/730/530/430 adapters.
- The RAID 540-8i adapter can be mixed with other x40 series RAID/HBA adapters.
- 730-8i 1G RAID adapter cannot be mixed with 530-8i, 730-8i 2G, or 930-8i RAID/HBA adapter.
- When a 730-8i 1G or 530-8i RAID/HBA 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/HBA 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.
- The HBA 430/440 adapters do not support the Self-Encrypting Drive (SED) management feature.
- If a RAID 730-8i 1 GB/2 GB adapter is installed, ThinkSystem 2.5"/ 3.5" PM1653 Read Intensive SAS 24 Gb SSDs and ThinkSystem 2.5" PM1655 Mixed Use SAS 24 Gb SSDs cannot be installed.

## 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.

## Technical rules for Ethernet adapters

The following table lists supported PCIe Ethernet adapters:

Manufacturer	Name	Port	Speed	PCIe lane	Slots supported
Broadcom	NetXtreme	2	1GbE	x8	1, 3, 2
	NetXtreme	4	1GbE	x8	1, 3, 2
	NetXtreme	2	10GbE	x8	1, 3, 2
	57414	2	10/25GbE	x8	1, 3, 2
	57454	4	10/25GbE	x16	1

Manufacturer	Name	Port	Speed	PCIe lane	Slots supported
	57508	2	100GbE	x16	1, 3, 2
	57454	4	10/25GbE	x16	1
	57454	4	10GbE	x8	1, 3, 2
Mellanox	ConnectX-4 Lx	2	10/25GbE	x8	1, 3, 2
	ConnectX-6 Dx	2	100GbE	x16	1, 3, 2
	ConnectX-6 Dx	2	50GbE	x8	1, 3, 2
	ConnectX-6 Lx	2	10/25GbE	x8	1, 3, 2
Intel	X550-T2	2	10GbE	x8	1, 3, 2
	I350-T2	2	1GbE	x8	1, 3, 2
	I350-T4	4	1GbE	x8	1, 3, 2
	I350-F1	1	1GbE	x8	1, 3, 2
	X710-DA2	2	10GbE	x8	1, 3, 2
	E810-DA2	2	10/25GbE	x8	1, 3, 2
	X710-T4L	4	10GbE	x8	1, 3, 2
	X710-T2L	2	10GbE	x8	1, 3, 2
	E810-DA4	4	10/25GbE	x16	1
Qlogic	41232	2	10/25GbE	x8	1, 3, 2
Other	4-Port 10G Base T PCIe Adapter (Ethernet) - La Paz	4	10GbE	x8	1, 3, 2

The following are rules to be followed when the server is configured with Ethernet adapters.

- When the processor default TDP is 280 watts :
  - Ethernet adapters with AOC are not supported in PCIe slot 2.
  - 10/25 GbE Ethernet adapters are supported when standard fans are installed.
  - 100/200 GbE Ethernet adapters are supported when performance fans are installed.
  - 10/25 GbE Ethernet adapters with AOC are supported in PCIe slot 1 or 3 when the ambient temperature is less than 30°C.
  - 100/200 GbE Ethernet adapters are supported in PCIe slot 1 or 3 when the ambient temperature is less than 30°C.
- When the processor default TDP is equal to or less than 225 watts:
  - 100/200 GbE Ethernet adapters are supported when performance fans are installed.
  - 100/200 GbE Ethernet adapters are supported when the ambient temperature is less than 30°C.

**Notes:** The following adapters require a full-height bracket and must be installed in a full-height slot:

- ThinkSystem Broadcom 57454 10/25GbE SFP28 4-port PCIe Ethernet Adapter
- ThinkSystem Broadcom 57454 10/25GbE SFP28 4-port PCIe Ethernet Adapter\_Refresh (V2)

## Technical rules for OCP 3.0 Ethernet adapters

The following table lists supported OCP 3.0 Ethernet adapters:


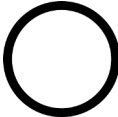

Manufacturer	Name	Port	Speed	PCIe lane
Broadcom	5719	4	1GbE	x8
	57416	2	10GbE	x8
	57414	2	10/25GbE	x8
	57454	4	10/25GbE	x16
	57454	4	10GbE	x8
	57416	2	10GbE	x8
	5720	2	1GbE	x8
Mellanox	ConnectX-4 Lx	2	10/25GbE	x8
	ConnectX-6 Lx	2	10/25GbE	x8
Intel	I350	4	1GbE	x8
	X710-T2L	2	10GbE	x8
	E810-DA2	2	10/25GbE	x8
	X710-T4L	4	1GbE	x8
	E810-DA4	4	10/25GbE	x8
Qlogic	41232	2	10/25GbE	x8
	41132	2	10GbE	x8

## Top cover replacement

Use this information to remove and install the top cover.

### Remove the top cover

Use this information to remove the top cover.

 <p><b>“Read the installation Guidelines”</b> on page 81</p>	 <p><b>“Power off the server for this task”</b> on page 12</p>	 <p><b>“ATTENTION: Static Sensitive Device</b> Ground package before opening” on page 84</p>
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**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.

### S033



#### **CAUTION:**

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

## S014



### CAUTION:

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

To remove the top cover, complete the following steps:

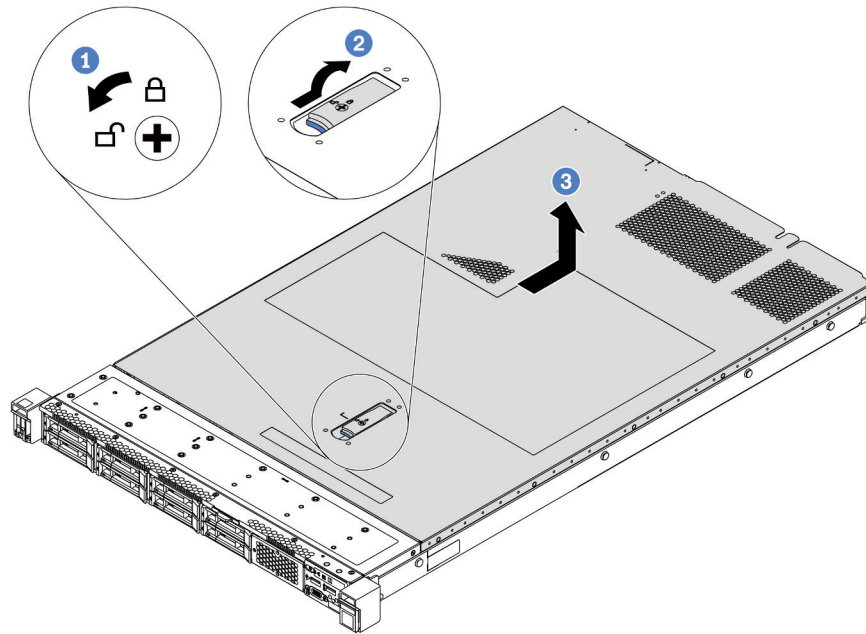


Figure 68. Top cover removal

- 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.

## After you finish


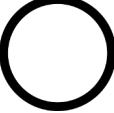

If you are instructed to return the component or optional device, follow all packaging instructions, and use any packaging materials for shipping that are supplied to you.

## Demo video

[Watch the procedure on YouTube](#)

## Install the top cover

Use this information to install the top cover.

 <p><b>“Read the installation Guidelines”</b> on page 81</p>	 <p><b>“Power off the server for this task”</b> on page 12</p>	 <p><b>“ATTENTION: Static Sensitive Device</b> Ground package before opening” on page 84</p>
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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 27.
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:

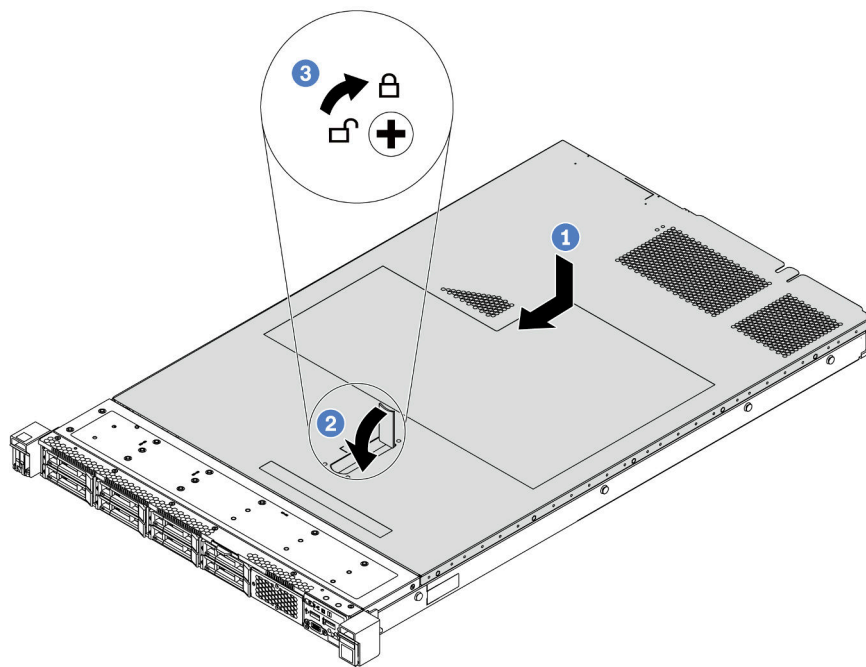


Figure 69. Top cover installation

- 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 you finish

Complete the parts replacement. See [“Complete the parts replacement” on page 202](#).

### Demo video

[Watch the procedure on YouTube](#)

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## 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



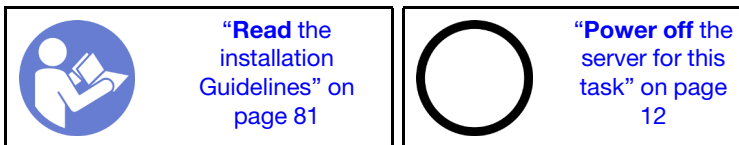
#### CAUTION:

**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 94](#).
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:

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

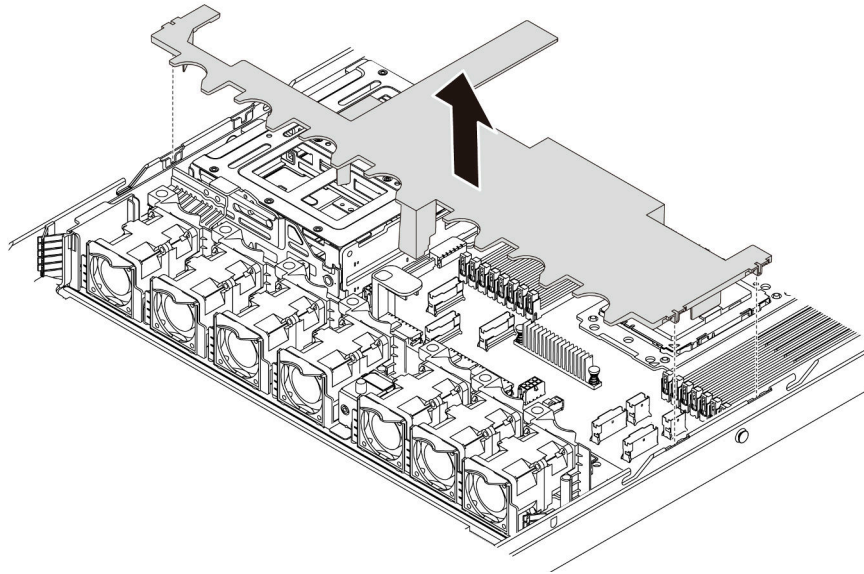


Figure 70. Air baffle removal

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.

## After you finish


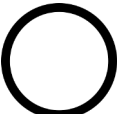
If you are instructed to return the component or optional device, follow all packaging instructions, and use any packaging materials for shipping that are supplied to you.

## Demo video

[Watch the procedure on YouTube](#)

## Install the air baffle

Use this information to install the air baffle.

	<b>“Read the installation Guidelines”</b> on page 81		<b>“Power off the server for this task”</b> on page 12
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To install the air baffle, complete the following steps:

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

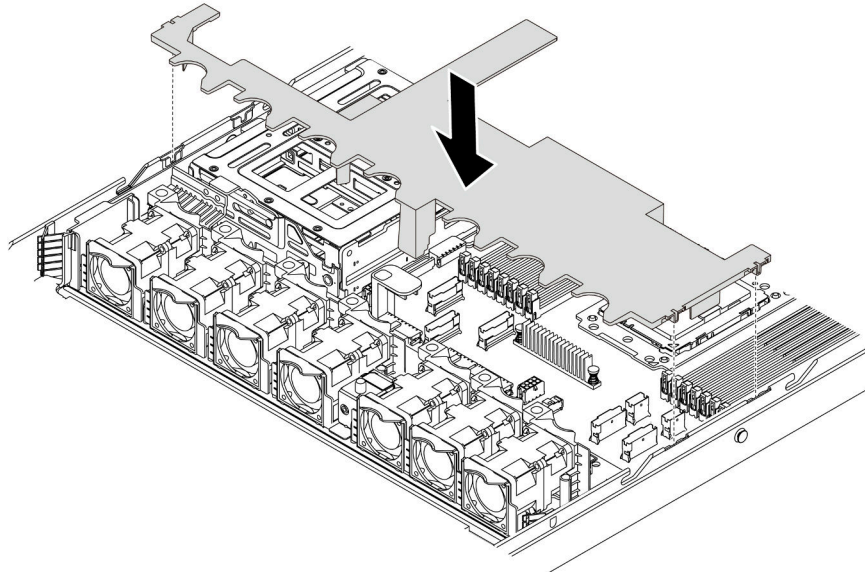


Figure 71. Air baffle installation

- 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 you finish

Complete the parts replacement. See [“Complete the parts replacement” on page 202](#).

## Demo video

[Watch the procedure on YouTube](#)

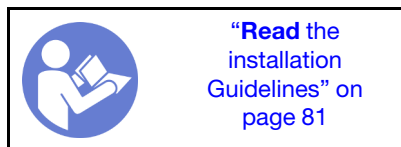
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## Rack latches replacement

Use this information to remove and install the rack latches.

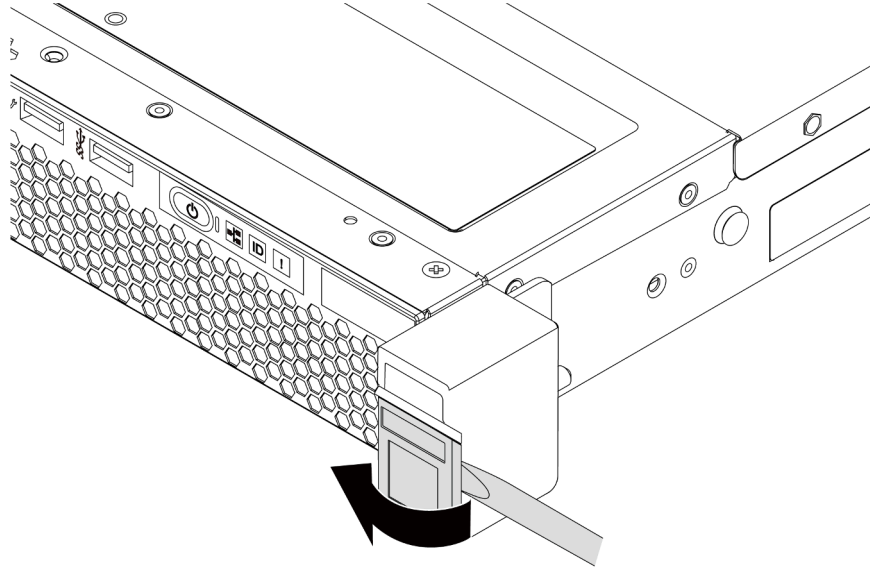
### Remove the rack latches

Use this information to remove the rack latches.



Before removing the rack latches:

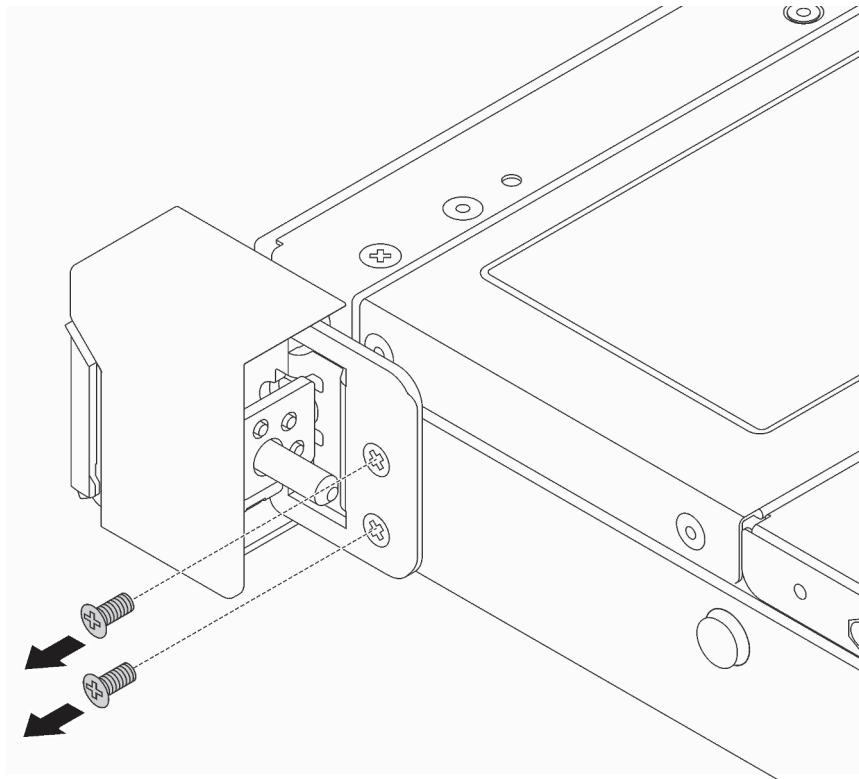
1. If the server is installed with the security bezel, remove it first. See [“Remove the security bezel” on page 103](#).
2. Use a flat-blade screwdriver to remove the ID label plate on the right rack latch and place it in a safe place.



*Figure 72. ID label plate removal*

To remove the rack latches, complete the following steps:

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



*Figure 73. Rack latch screws removal*

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

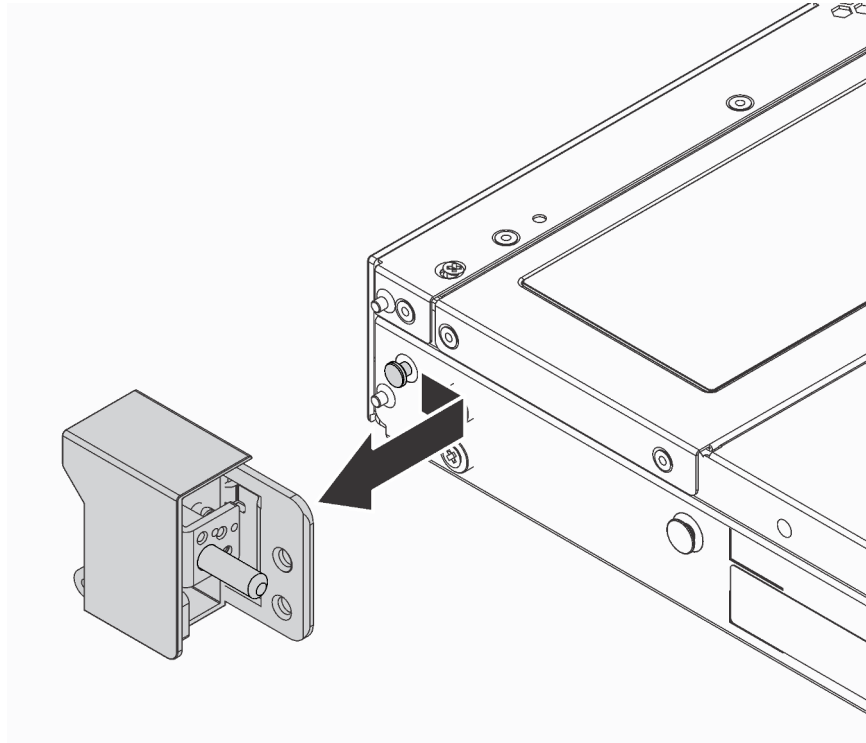


Figure 74. Rack latch removal

## After you finish

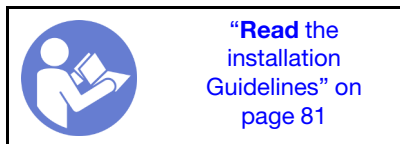
If you are instructed to return the component or optional device, follow all packaging instructions, and use any packaging materials for shipping that are supplied to you.

### Demo video

[Watch the procedure on YouTube](#)

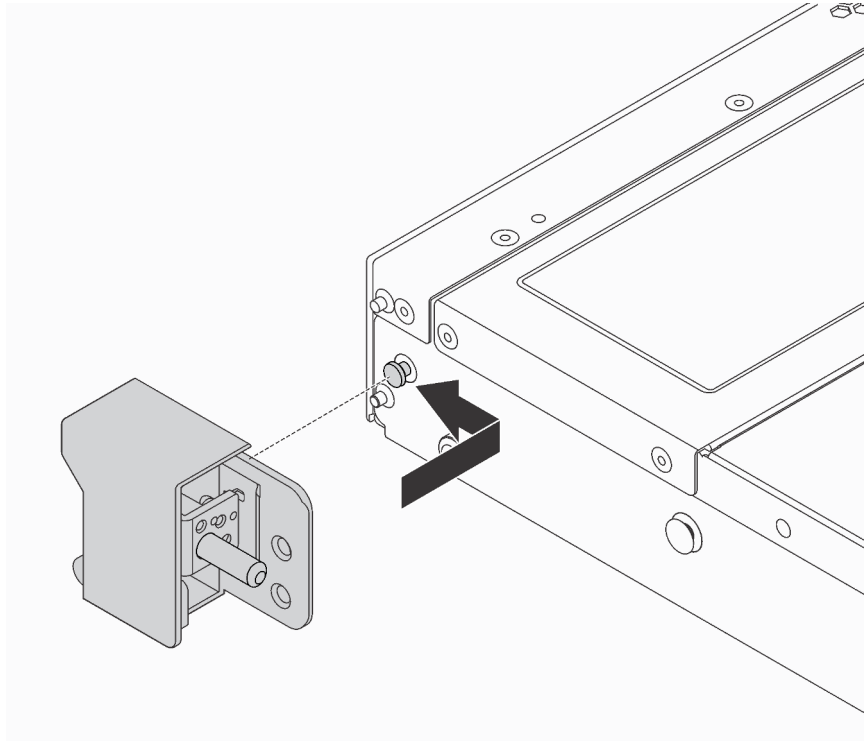
## Install the rack latches

Use this information to install the rack latches.



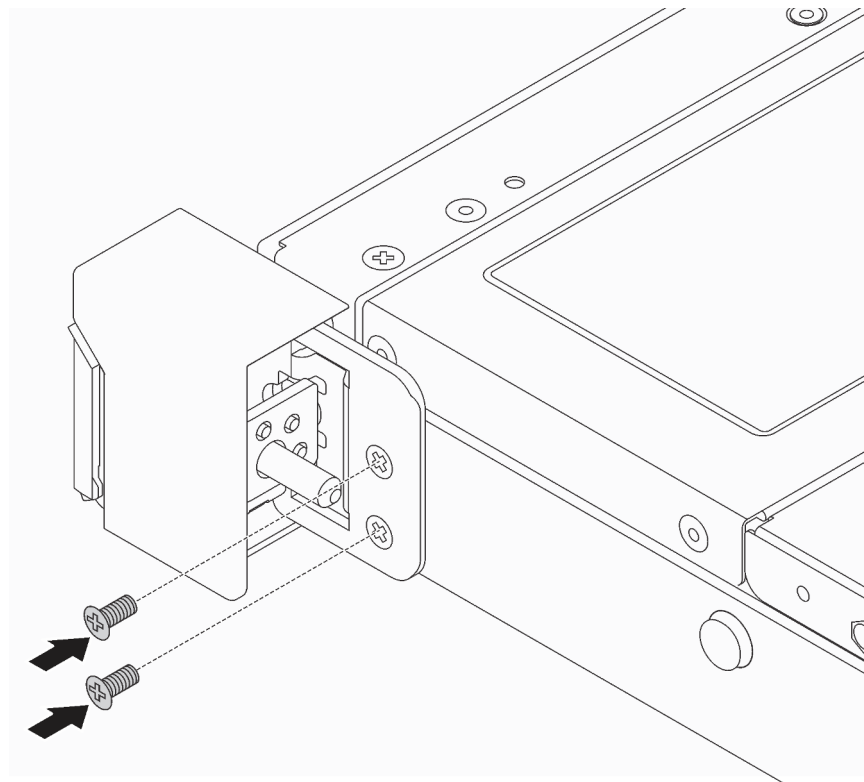
To install the rack latches, complete the following steps:

- 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 75. Rack latch installation*

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



*Figure 76. Rack latch screws installation*

## After you finish

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

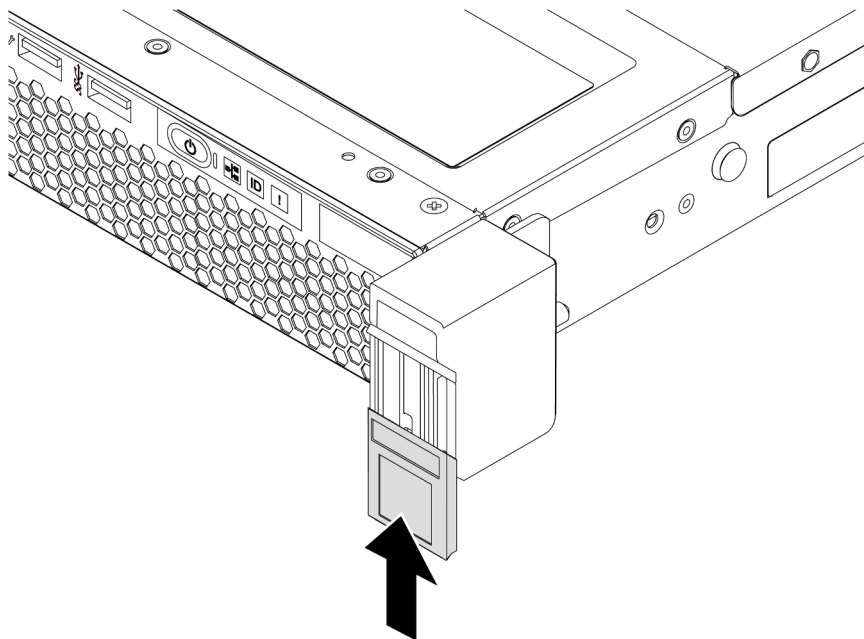


Figure 77. ID label plate installation

2. Complete the parts replacement. See [“Complete the parts replacement” on page 202](#).

## Demo video

[Watch the procedure on YouTube](#)

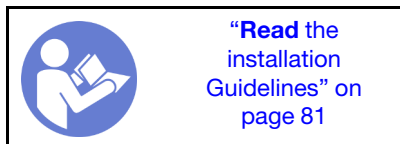
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## Security bezel replacement

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:

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

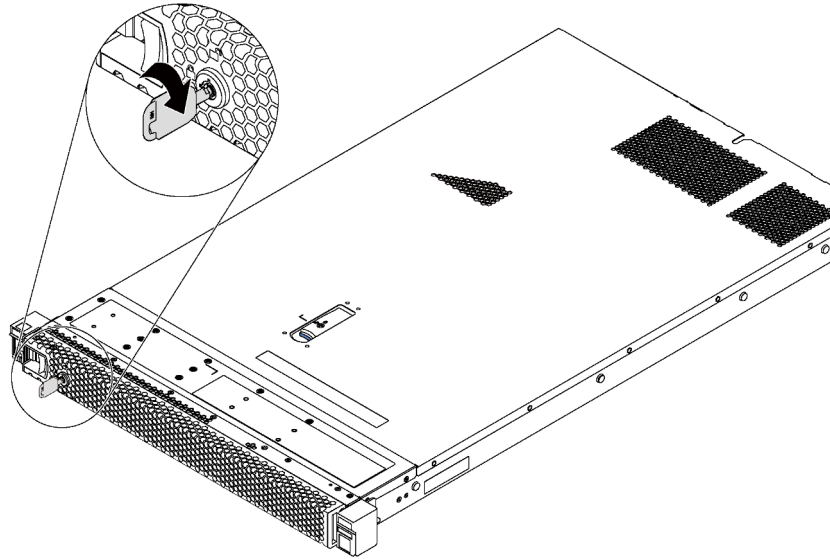


Figure 78. Security bezel unlock

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

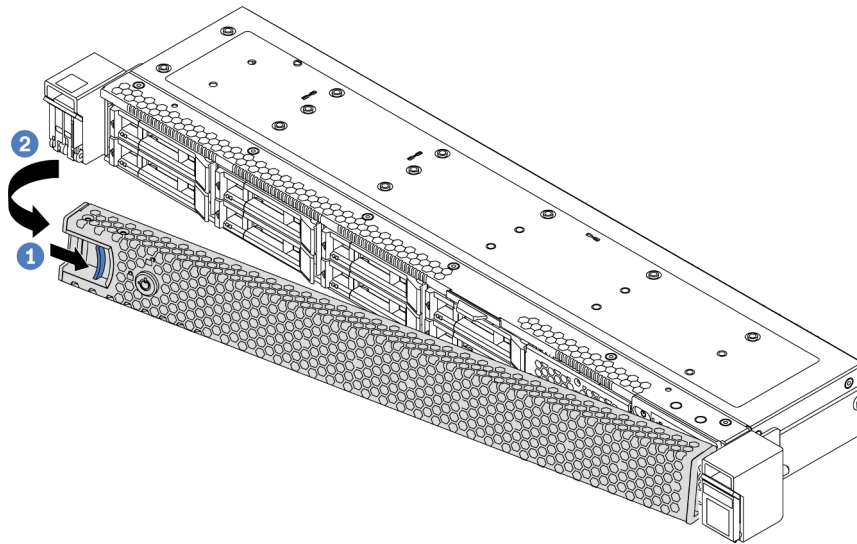


Figure 79. Security bezel removal

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

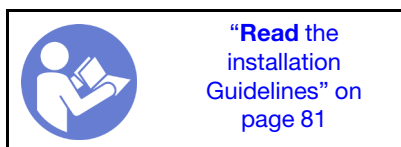
## Demo video

[Watch the procedure on YouTube](#)

## Install the security bezel

Use this information to install the security bezel.



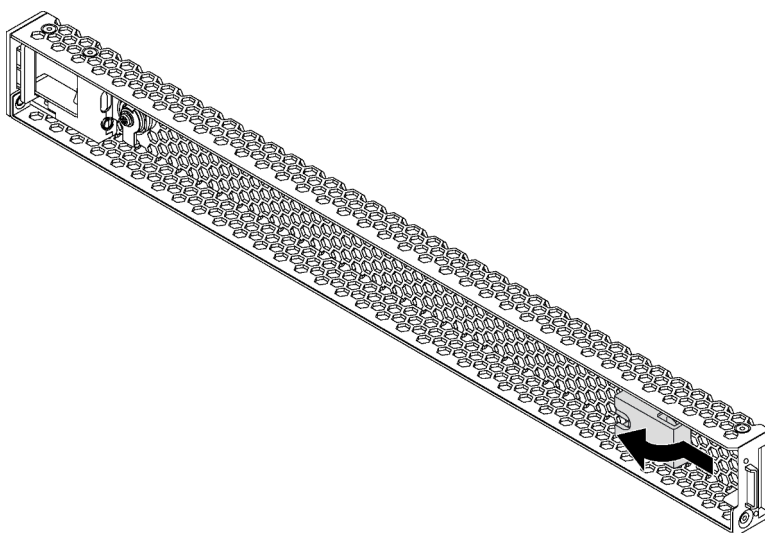


Before installing the security bezel, if you have removed the rack latches, reinstall them. See [“Install the rack latches” on page 101](#).

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.

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



*Figure 80. 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.

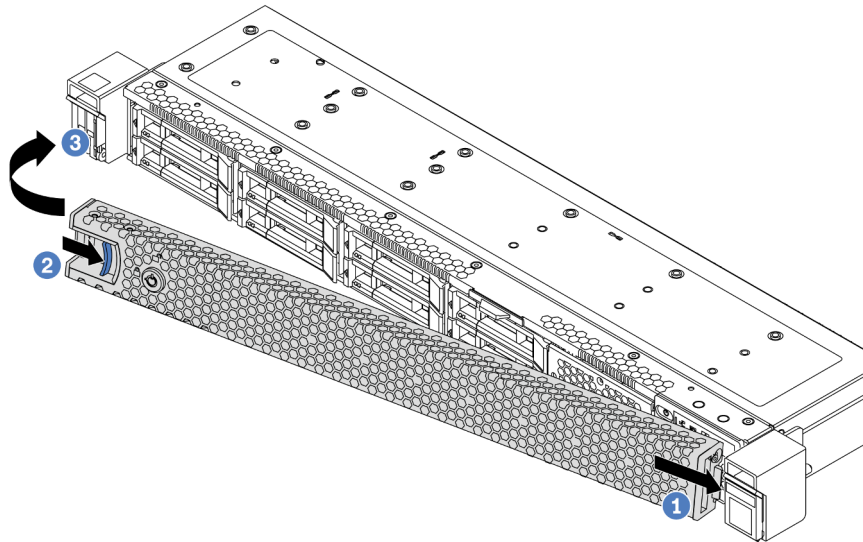


Figure 81. Security bezel installation

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

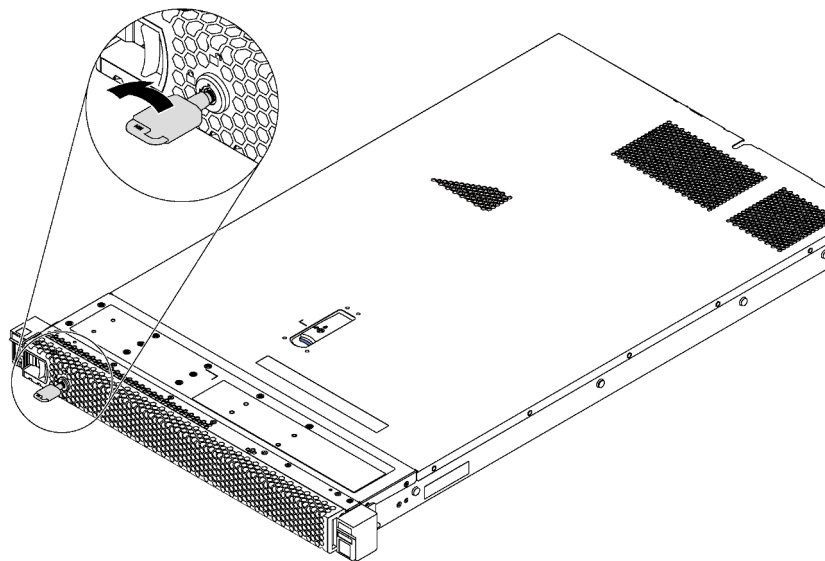


Figure 82. Security bezel lockup

## Demo video

[Watch the procedure on YouTube](#)

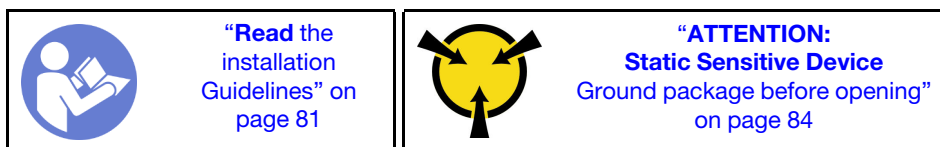
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## System fan replacement

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.



### 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

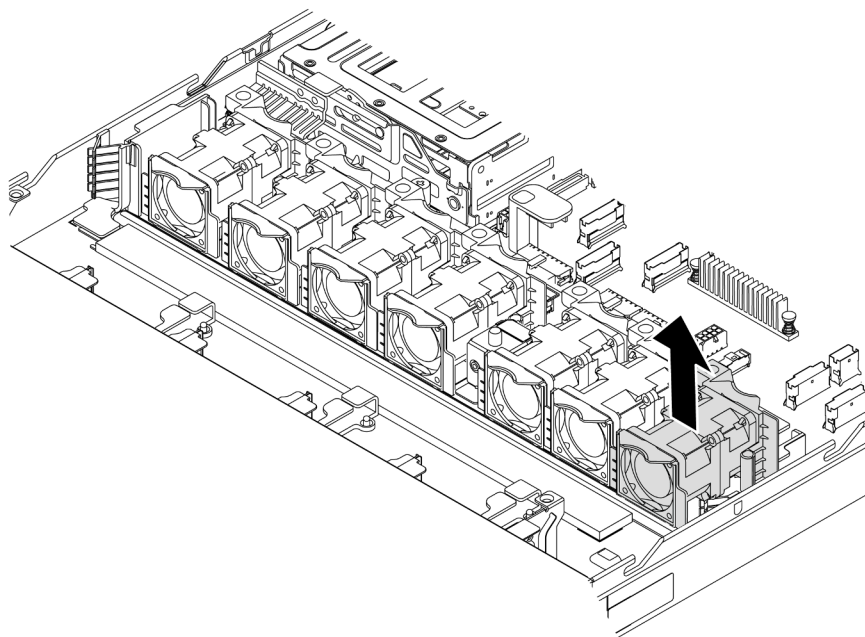


#### **CAUTION:**

**Hazardous moving fan blades nearby.**

Before removing a system fan, remove the top cover. See [“Remove the top cover” on page 94](#).

To remove a system fan, complete the following step:



*Figure 83. 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 you finish



- Install a new system fan. See [“Install a system fan” on page 108](#).
- If you are instructed to return the component or optional device, follow all packaging instructions, and use any packaging materials for shipping that are supplied to you.

## Demo video

[Watch the procedure on YouTube](#)

## 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><b>“Read the installation Guidelines” on page 81</b></p>	 <p><b>“ATTENTION: Static Sensitive Device</b> Ground package before opening” on page 84</p>
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### 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 89](#) before you install system fans.

To install a system fan, complete the following steps:

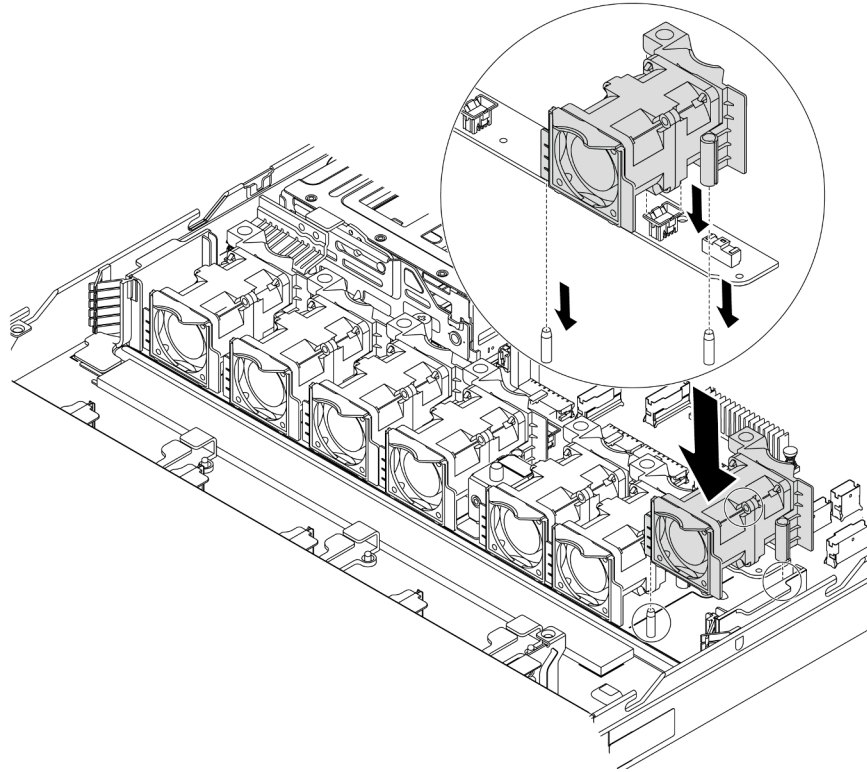


Figure 84. System fan installation

- 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 you finish

Complete the parts replacement. See [“Complete the parts replacement” on page 202](#).

## Demo video


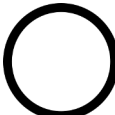

[Watch the procedure on YouTube](#)

## 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><b>“Read the installation Guidelines” on page 81</b></p>	 <p><b>“Power off the server for this task” on page 12</b></p>	 <p><b>“ATTENTION: Static Sensitive Device</b> Ground package before opening” on page 84</p>
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**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 84](#).
  - 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.
  - Do not use any metal tools (such as jigs or clamps) to handle the memory modules, because the rigid metals may damage the memory modules.
  - Do not insert memory modules while holding packages or passive components, which can cause package cracks or detachment or passive components by the high insertion force.

Before removing a memory module:

1. Remove the top cover. See [“Remove the top cover” on page 94](#).
2. If your server comes with an air baffle, remove it first. See [“Remove the air baffle” on page 97](#).

To remove a memory module, complete the following steps:

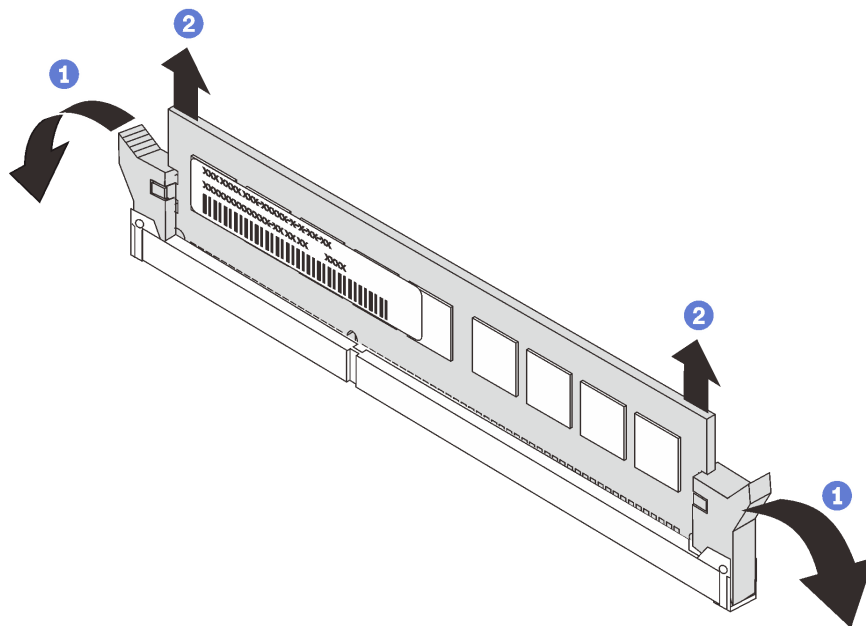


Figure 85. Memory module removal

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 you finish




- If your server is configured with a 280-watt processor, install a memory module filler or a new memory module to cover the slot. See [“Install a memory module” on page 111](#).
- If you are instructed to return the component or optional device, follow all packaging instructions, and use any packaging materials for shipping that are supplied to you.

### Demo video

[Watch the procedure on YouTube](#)

## Install a memory module

Use this information to install a memory module.

 <p><b>“Read the installation Guidelines” on page 81</b></p>	 <p><b>“Power off the server for this task” on page 12</b></p>	 <p><b>“ATTENTION: Static Sensitive Device</b> Ground package before opening” on page 84</p>
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### 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 84](#):
  - Always wear an electrostatic-discharge strap when removing or installing memory modules. Electrostatic-discharge gloves can also be used.
  - Never hold two or more memory modules together so that they do not touch each other. Do not stack memory modules directly on top of each other during storage.
  - Never touch the gold memory module connector contacts or allow these contacts to touch the outside of the memory module connector housing.
  - Handle memory modules with care: never bend, twist, or drop a memory module.
  - Do not use any metal tools (such as jigs or clamps) to handle the memory modules, because the rigid metals may damage the memory modules.
  - Do not insert memory modules while holding packages or passive components, which can cause package cracks or detachment or passive components by the high insertion force.

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 84](#). Ensure that you observe the installation rules and sequence.

To install a memory module, complete the following steps:

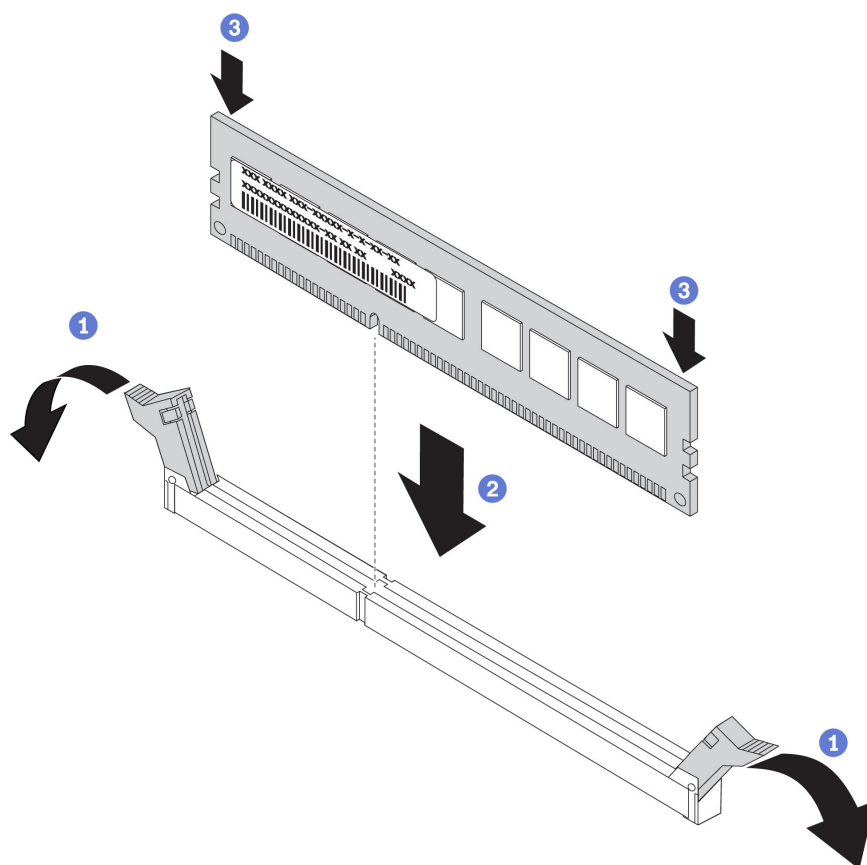


Figure 86. Memory module installation

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 gently place the memory module on the slot with both hands.

Step 3. 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 you finish

Complete the parts replacement. See [“Complete the parts replacement” on page 202](#).

## Demo video

[Watch the procedure on YouTube](#)



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## Hot-swap drive replacement

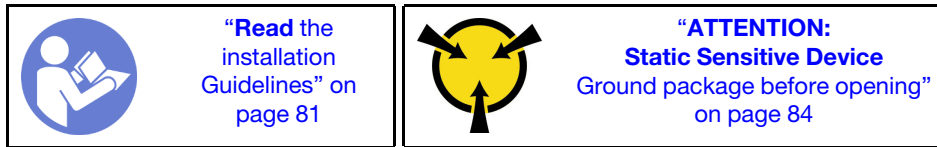
Use this information to remove and install a hot-swap drive. You can remove or install a hot-swap drive without turning off the server, which helps you avoid significant interruption to the operation of the system.

### 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 103.

**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:

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

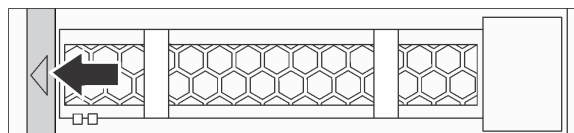


Figure 87. Opening the drive tray handle

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

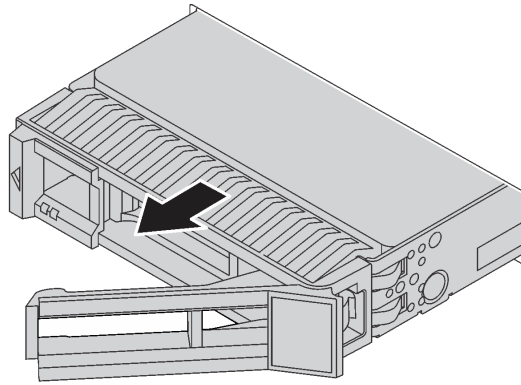


Figure 88. Hot-swap drive removal

### After you finish



- Install the drive filler or a new drive to cover the drive bay. See [“Install a hot-swap drive” on page 114](#).
- If you are instructed to return the component or optional device, follow all packaging instructions, and use any packaging materials for shipping that are supplied to you.

### Demo video

[Watch the procedure on YouTube](#)

## Install a hot-swap drive

Use this information to install a hot-swap drive.

 <p><b>“Read the installation Guidelines” on page 81</b></p>	 <p><b>“ATTENTION: Static Sensitive Device</b> Ground package before opening” on page 84</p>
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Before installing a hot-swap drive:

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

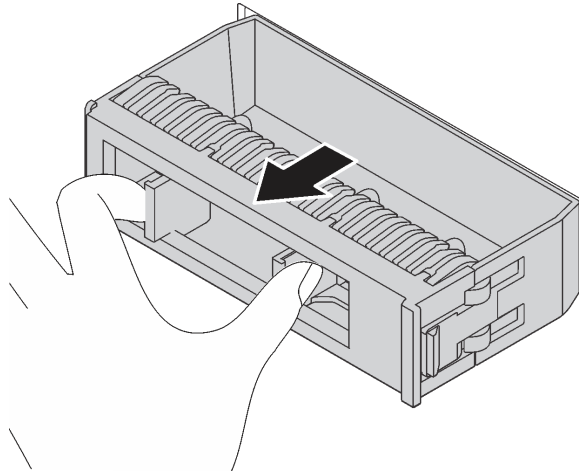


Figure 89. Drive filler removal

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 91](#) before you install the hot-swap drive.

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

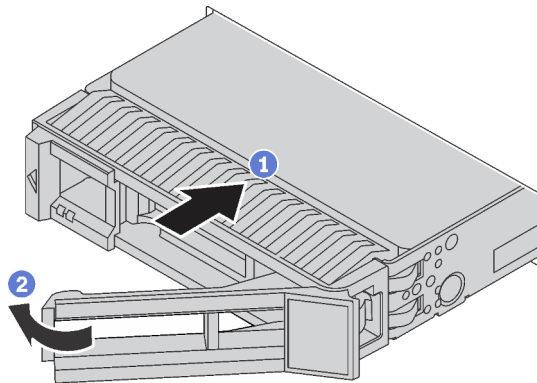


Figure 90. Hot-swap drive installation

- 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 104](#).
2. Use the Lenovo XClarity Provisioning Manager to configure the RAID if necessary. For more information, see:

## After you finish

Complete the parts replacement. See [“Complete the parts replacement” on page 202](#).

### Demo video

[Watch the procedure on YouTube](#)

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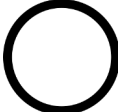

## OCP 3.0 Ethernet adapter replacement

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.

 <p><b>“Read the installation Guidelines” on page 81</b></p>	 <p><b>“Power off the server for this task” on page 12</b></p>	 <p><b>“ATTENTION: Static Sensitive Device</b> Ground package before opening” on page 84</p>
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#### CAUTION:

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

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:

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

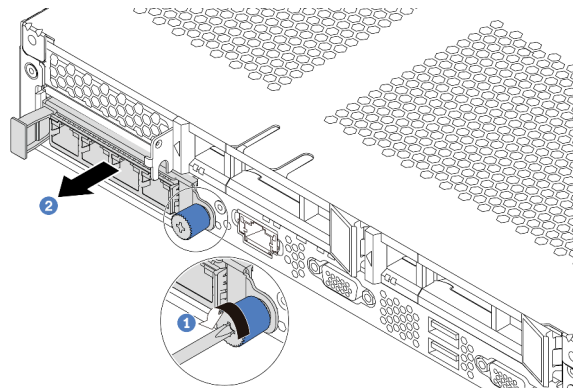


Figure 91. OCP 3.0 Ethernet adapter removal

## After you finish




If you are instructed to return the component or optional device, follow all packaging instructions, and use any packaging materials for shipping that are supplied to you.

### Demo video

[Watch the procedure on YouTube](#)

## Install the OCP 3.0 Ethernet adapter

Use this information to install the OCP 3.0 Ethernet adapter.

 <p><b>“Read the installation Guidelines”</b> on page 81</p>	 <p><b>“Power off the server for this task”</b> on page 12</p>	 <p><b>“ATTENTION: Static Sensitive Device</b> Ground package before opening” on page 84</p>
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### CAUTION:

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

**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:

- Step 1. 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.

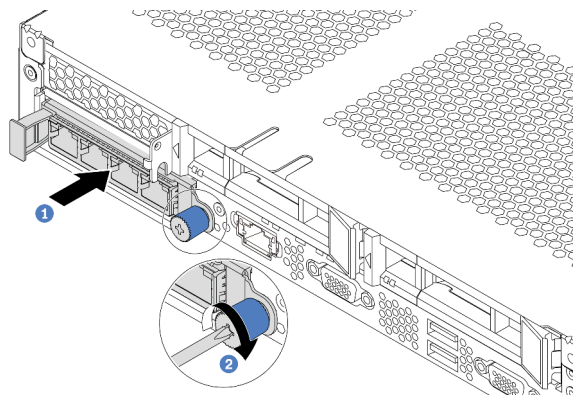


Figure 92. OCP 3.0 Ethernet adapter installation



Figure 93. OCP module (two connectors)

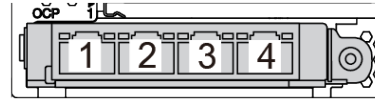


Figure 94. OCP module (four connectors)

**Notes:**

- The OCP 3.0 Ethernet adapter provides two or four extra Ethernet connectors for network connections.
- Any of the connectors (connector 1 by default) on the OCP module can function as a shared management connector.

## After you finish

Complete the parts replacement. See [“Complete the parts replacement” on page 202.](#)

### Demo video




[Watch the procedure on YouTube](#)

## 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.

 <p><b>“Read the installation Guidelines” on page 81</b></p>	 <p><b>“Power off the server for this task” on page 12</b></p>	 <p><b>“ATTENTION: Static Sensitive Device</b> Ground package before opening” on page 84</p>
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Before removing the internal riser assembly:

1. Remove the top cover. See [“Remove the top cover” on page 94.](#)
2. Disconnect the cables from the internal riser assembly.

To remove the internal riser assembly:

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

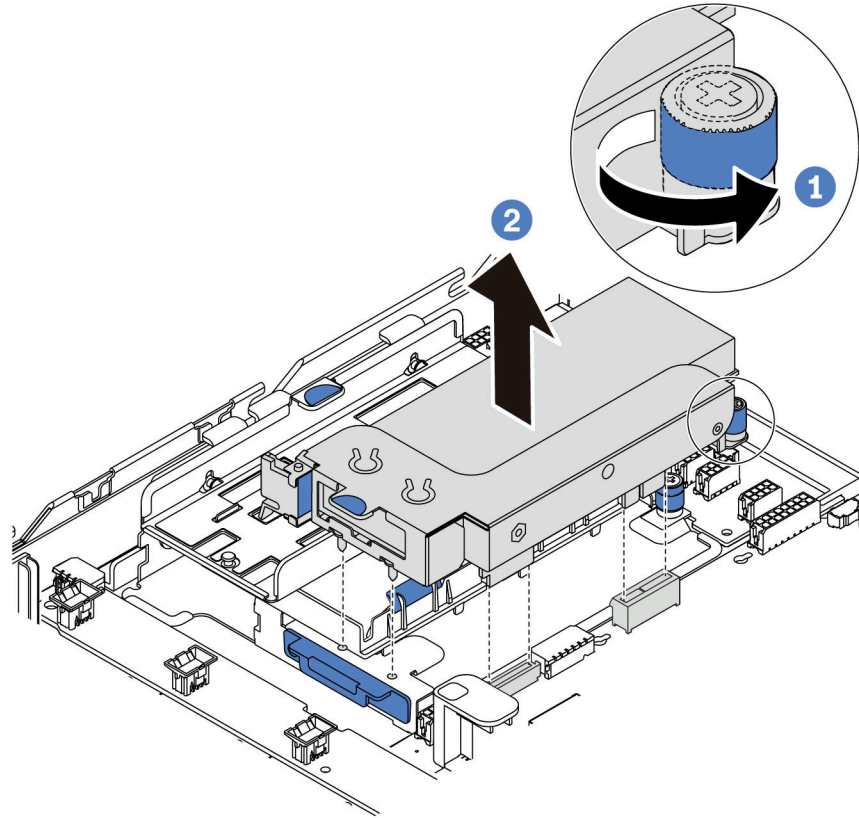


Figure 95. Internal riser assembly removal

## After you finish


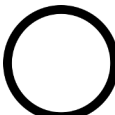

If you are instructed to return the component or optional device, follow all packaging instructions, and use any packaging materials for shipping that are supplied to you.

## Demo video

[Watch the procedure on YouTube](#)

## Install the internal riser assembly

Use this information to install the internal riser assembly.

 <p><b>“Read the installation Guidelines”</b> on page 81</p>	 <p><b>“Power off the server for this task”</b> on page 12</p>	 <p><b>“ATTENTION: Static Sensitive Device</b> Ground package before opening” on page 84</p>
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To install the internal riser assembly, complete the following steps:

- 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 170.
- 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.

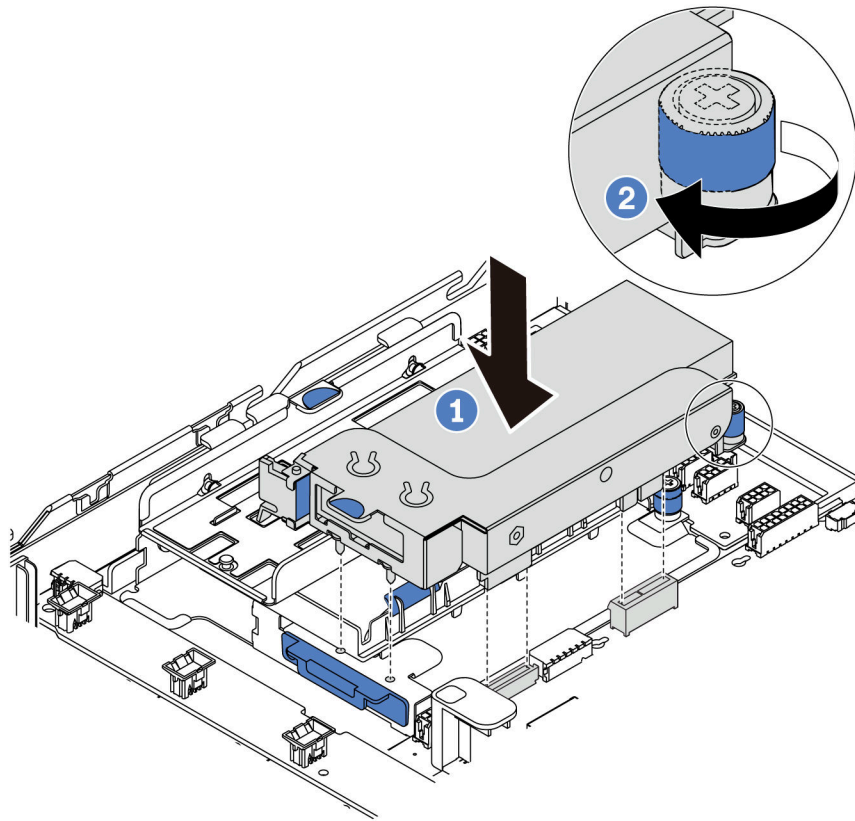


Figure 96. Internal riser assembly installation

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

### After you finish

Complete the parts replacement. See [“Complete the parts replacement” on page 202](#).

### Demo video

[Watch the procedure on YouTube](#)

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## 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:



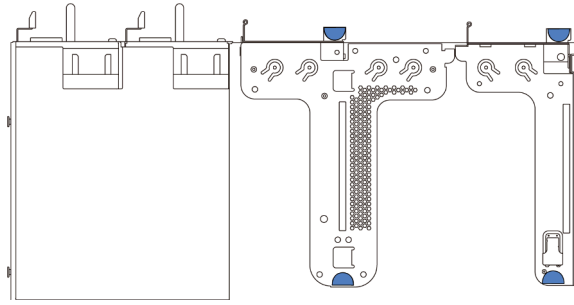


Figure 97. Configuration 1

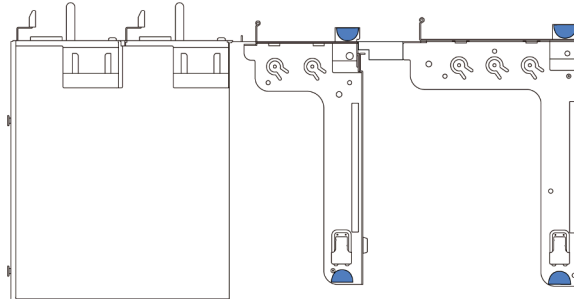


Figure 98. Configuration 2

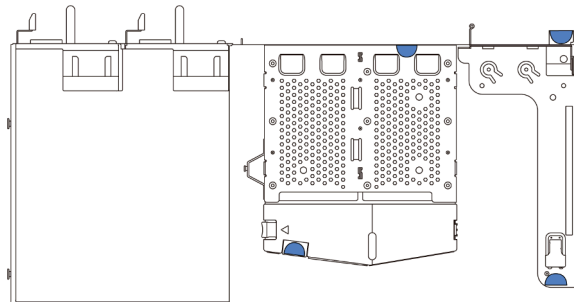





Figure 99. Configuration 3

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><b>“Read the installation Guidelines”</b> on page 81</p>	 <p><b>“Power off the server for this task”</b> on page 12</p>	 <p><b>“ATTENTION: Static Sensitive Device</b> Ground package before opening” on page 84</p>
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Before removing a riser card, remove the top cover. See [“Remove the top cover”](#) on page 94.

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.

- 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.
- Step 2. For riser 1 assembly (LP/FHFL), if there is an intrusion switch installed on it, disconnect the cable of the intrusion switch from the system board.
- Step 3. Grasp the riser assembly by its edges and carefully lift it out of the chassis.

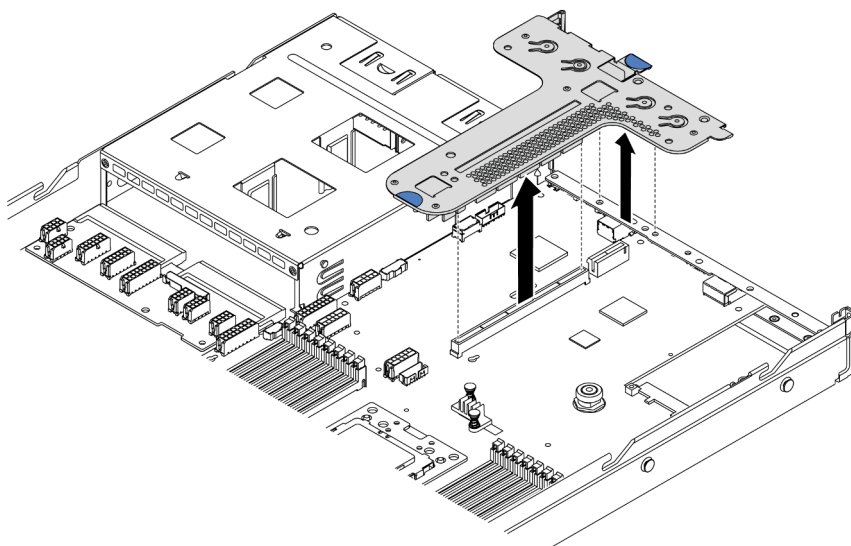


Figure 100. Riser assembly removal

- Step 4. If necessary, remove the PCIe adapters that are installed on the riser card. See [“Remove a PCIe adapter” on page 125](#).
- Step 5. If necessary, remove the intrusion switch that is installed on the riser bracket. See [“Remove an intrusion switch” on page 131](#).
- Step 6. Remove the two screws that secure the riser card to the bracket. Then, remove the riser card.

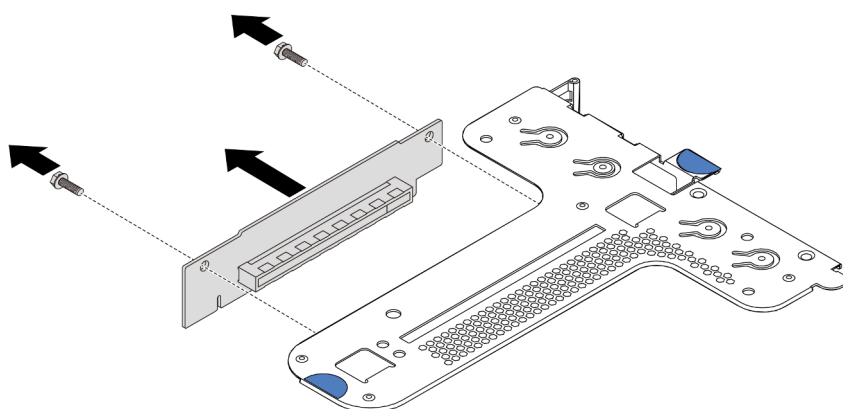


Figure 101. Riser card removal


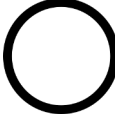

If you are instructed to return the old riser card, follow all packaging instructions and use any packaging materials that are provided.

## Demo video

[Watch the procedure on YouTube](#)

## Install a riser card

Use this information to install a riser card.

 <p><b>“Read the installation Guidelines”</b> on page 81</p>	 <p><b>“Power off the server for this task”</b> on page 12</p>	 <p><b>“ATTENTION: Static Sensitive Device</b> Ground package before opening” on page 84</p>
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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 16.

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.

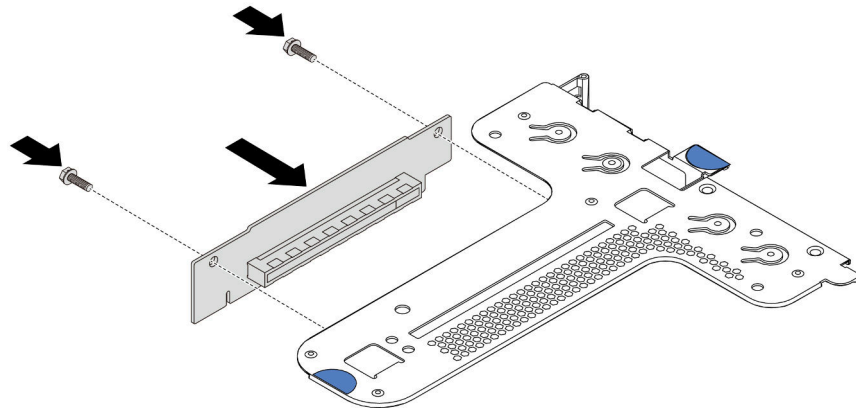


Figure 102. Riser card installation

- Step 2. If necessary, for riser 1 assembly (LP/FHFL), reinstall the intrusion switch on the riser bracket. See [“Install an intrusion switch”](#) on page 132. Then, reconnect the cable of the intrusion switch to the system board.
- Step 3. If necessary, reinstall the PCIe adapters on the new riser card. See [“Install a PCIe adapter”](#) on page 128. Then, refer to your note to reconnect any cables of 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.

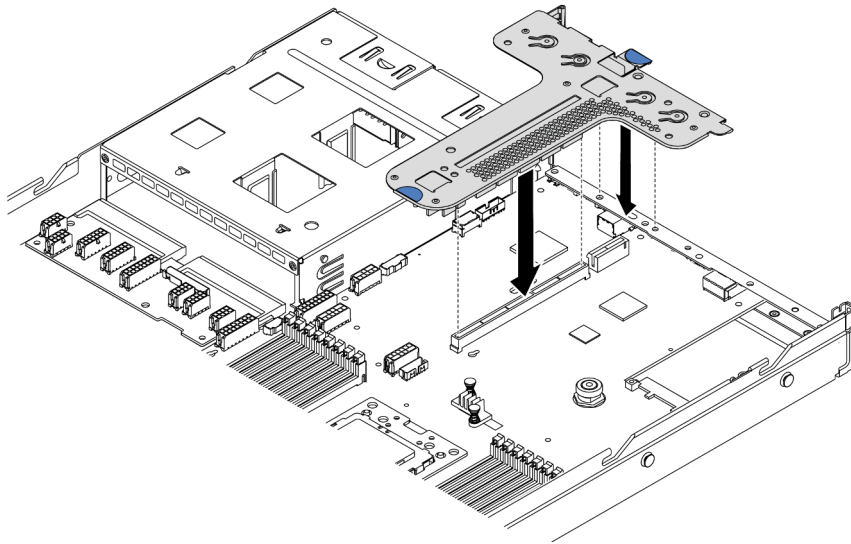


Figure 103. Riser assembly installation

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

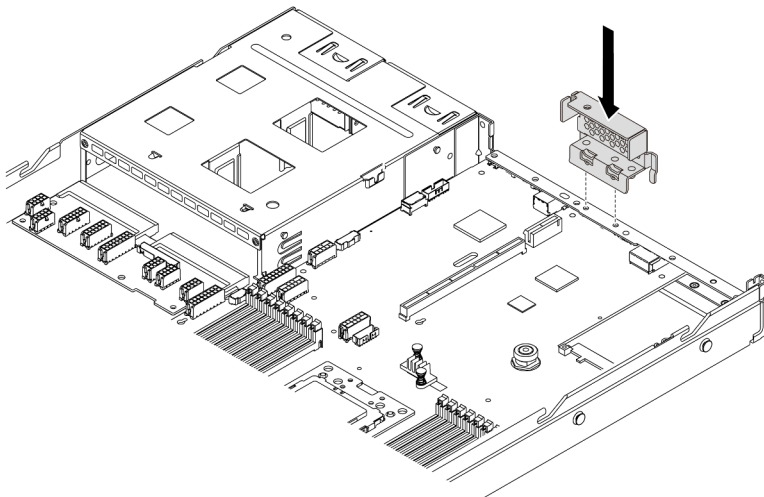


Figure 104. Rear wall bracket installation

After installing the riser card, complete the parts replacement. See [“Complete the parts replacement” on page 202](#).

### Demo video

[Watch the procedure on YouTube](#)

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## PCIe adapter replacement

Use this information to remove and install a PCIe adapter.

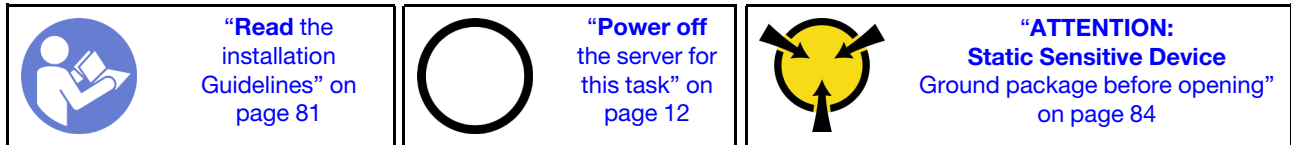
The PCIe adapter can be an Ethernet adapter, a host bus adapter (HBA), a PCIe RAID adapter, a PCIe interposer adapter, a PCIe solid-state drive, a PCIe GPU, and any other supported PCIe adapters.

**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.



Before removing a PCIe adapter:

1. Remove the top cover. See [“Remove the top cover” on page 94](#).
2. Remove the riser assembly. See [“Remove a riser card” on page 121](#).

To remove a PCIe adapter, complete the following steps:

- Step 1. Pivot the latch on the riser bracket to the open position.
- Step 2. Grasp the PCIe adapter by its edges and carefully pull it out of the PCIe adapter slot on the riser card.

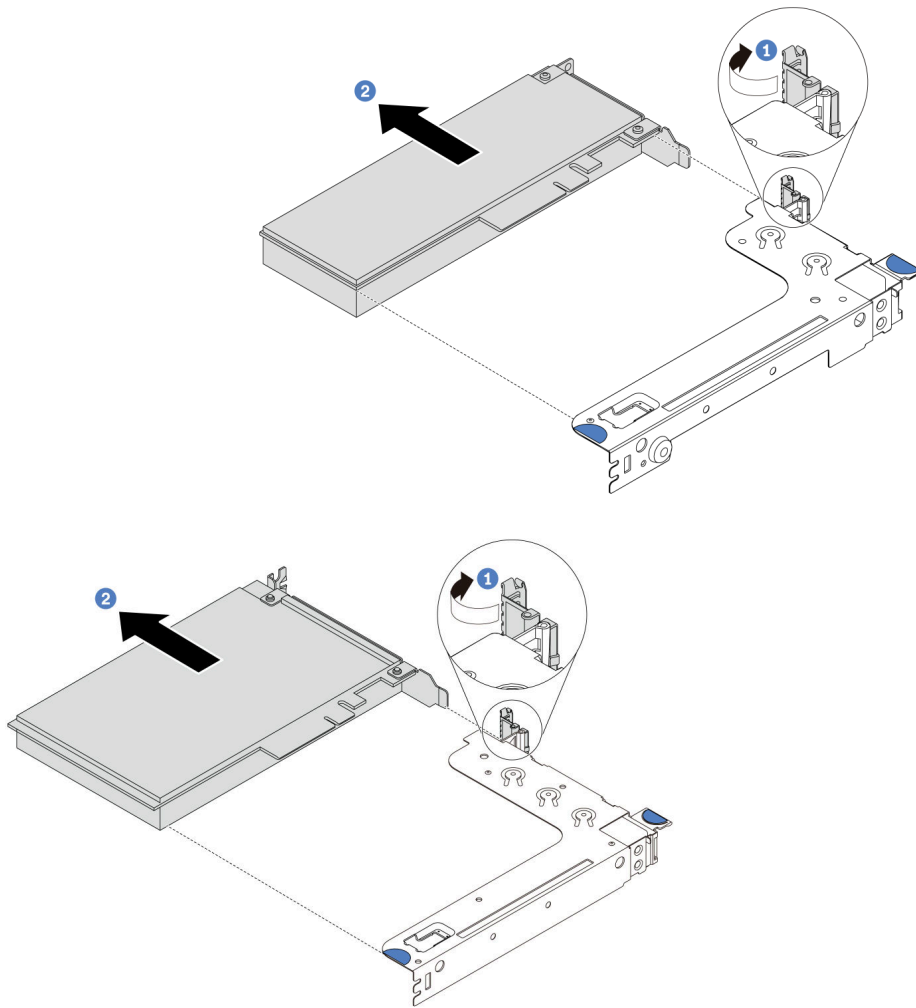


Figure 105. Riser 1 assembly (LP/FHFL) removal

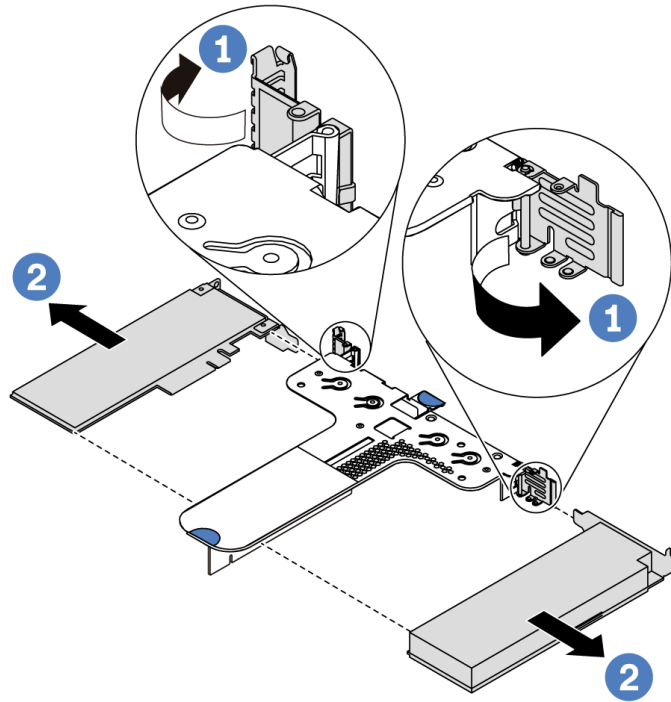


Figure 106. Riser 2 assembly (LP+LP) removal

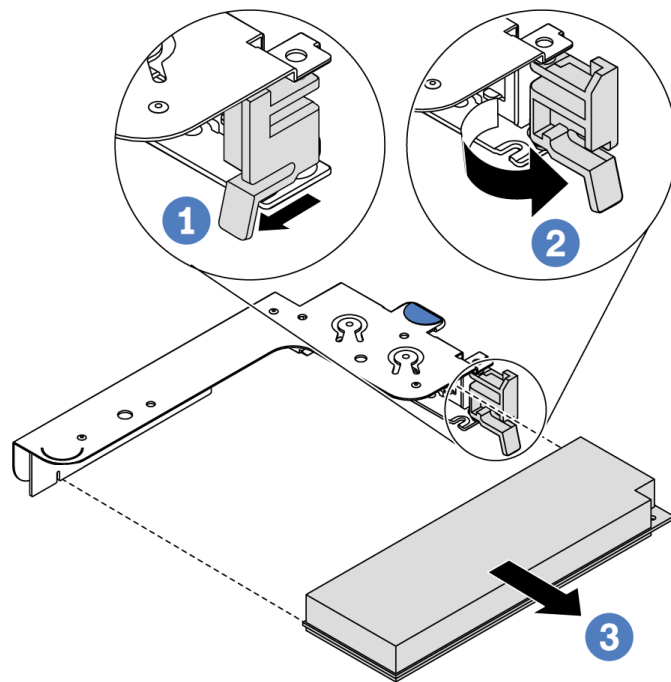


Figure 107. Internal riser assembly (LP) removal

## After you finish


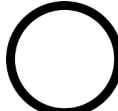

If you are instructed to return the component or optional device, follow all packaging instructions, and use any packaging materials for shipping that are supplied to you.

## Demo video

[Watch the procedure on YouTube](#)

## Install a PCIe adapter

Use this information to install a PCIe adapter.

 <p><b>“Read the installation Guidelines”</b> on page 81</p>	 <p><b>“Power off the server for this task”</b> on page 12</p>	 <p><b>“ATTENTION: Static Sensitive Device</b> Ground package before opening” on page 84</p>
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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 16](#).
3. Before installing the PCIe adapter, refer to the specific technical rules for the PCIe adapter:
  - [“Technical rules for HBA/RAID adapters” on page 92](#)
  - [“Technical rules for PCIe NVMe adapter” on page 92](#)
  - [“Technical rules for Ethernet adapters” on page 92](#)
4. If the server is installed with 280-watt processor, see [“Rules about 280-watt processor installation” on page 86](#) for PCIe adapter installation limitations.

To install a PCIe adapter, complete the following steps:

**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.
- Step 2. Pivot the latch on the riser bracket to the closed position.



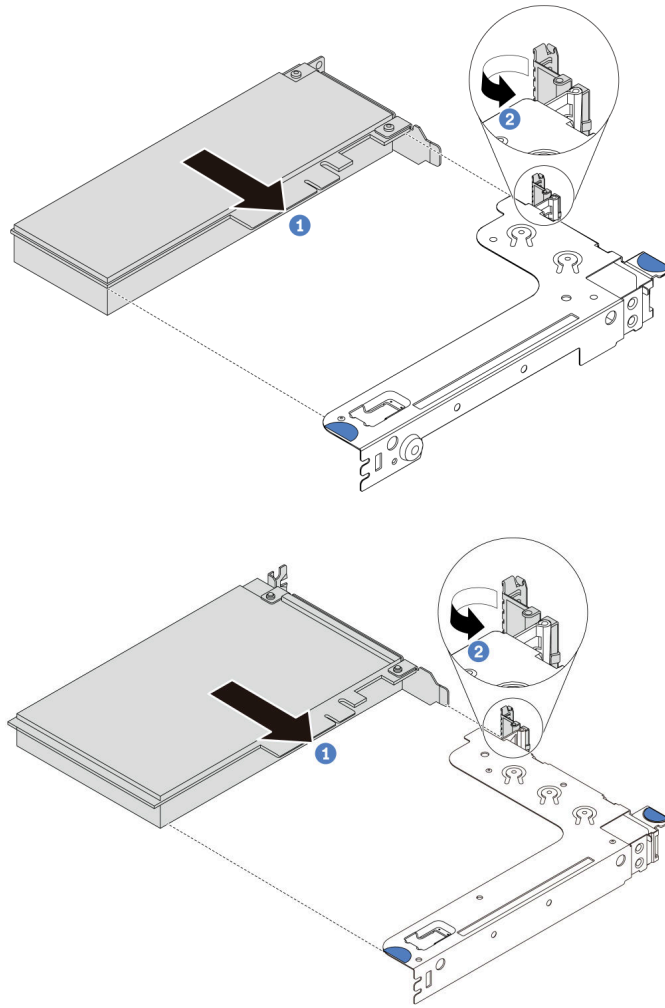


Figure 108. Riser 1 assembly (LP/FHFL) installation

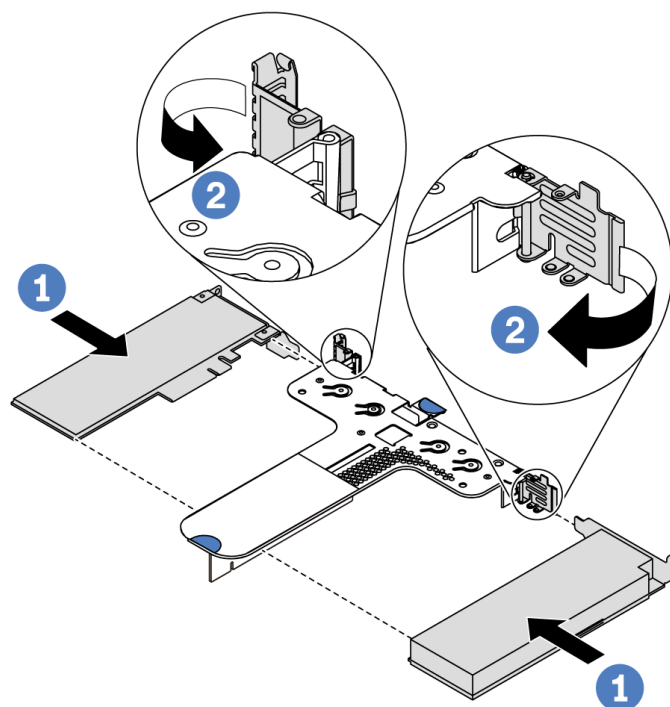


Figure 109. Riser 2 assembly (LP+LP) installation

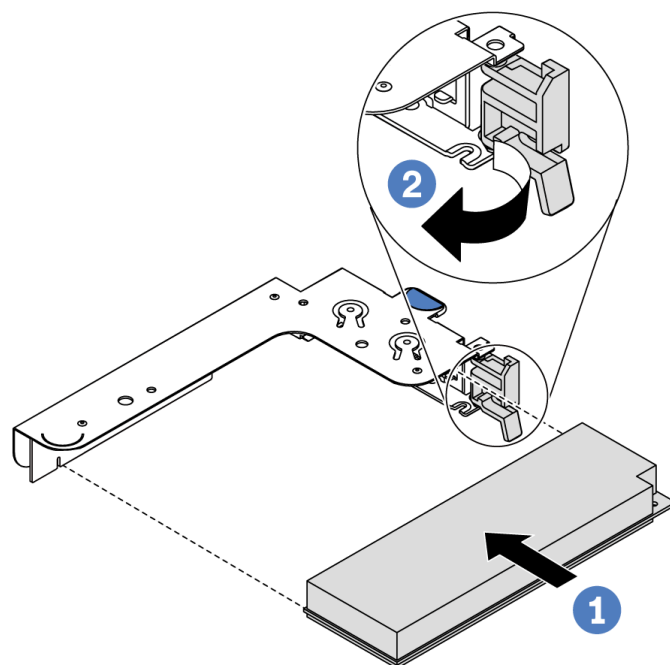


Figure 110. Internal riser assembly (LP) installation

Step 3. Connect cables to the PCIe adapter in the riser assembly. See [“Internal cable routing”](#) on page 27.

### After you finish

- Reinstall the riser assembly. See [“Install a riser card”](#) on page 123.

- Complete the parts replacement. See [“Complete the parts replacement” on page 202](#).

## Demo video

[Watch the procedure on YouTube](#)

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## Intrusion switch replacement

Use this information to remove and install an intrusion switch.

The intrusion switch informs you that the server cover is not properly installed or closed by creating an event in the system event log (SEL).

## Remove an intrusion switch

Use this information to remove an intrusion switch.

 <p><b>“Read the installation Guidelines” on page 81</b></p>	 <p><b>“Power off the server for this task” on page 12</b></p>	 <p><b>“ATTENTION: Static Sensitive Device</b> Ground package before opening” on page 84</p>
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Before removing an intrusion switch:

1. If the server is installed in a rack, extend the server from the rack.
2. Remove the top cover. See [“Remove the top cover” on page 94](#).
3. Disconnect the cable of the intrusion switch from the system board. For the location of the intrusion switch connector, refer to [“System board components” on page 22](#).
4. Remove the riser assembly. See [“Remove a riser card” on page 121](#).
5. Remove the PCIe adapter. See [“Remove a PCIe adapter” on page 125](#).

To remove an intrusion switch, complete the following steps:

**Watch the procedure.** A video of the installation and removal process is available at YouTube: <https://www.youtube.com/playlist?list=PLYV5R7hVcs-DTDY1ImpIPpJVOzo7dKq14>.

**Note:** The intrusion switch can only be installed in riser 1 assembly (LP/FHFL). The riser bracket in which the intrusion switch is installed might be different from the illustration below, but the installation method is the same. For different types of supported riser bracket, see [Figure 108 “Riser 1 assembly \(LP/FHFL\) installation” on page 129](#).

Step 1. Slide the intrusion switch as shown to remove it from the riser bracket.

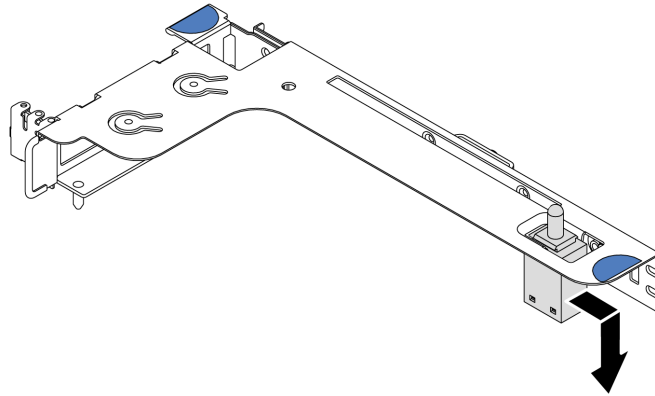


Figure 111. Intrusion switch removal

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

## Install an intrusion switch

Use this information to install an intrusion switch.

	<p><b>“Read the installation Guidelines”</b> on page 81</p>		<p><b>“Power off the server for this task”</b> on page 12</p>		<p><b>“ATTENTION: Static Sensitive Device</b> Ground package before opening” on page 84</p>
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Before installing the intrusion switch, touch the static-protective package that contains the new intrusion switch to any unpainted surface on the outside of the server. Then, take the new intrusion switch out of the package and place them on a static-protective surface.

To install an intrusion switch, complete the following steps:

**Watch the procedure.** A video of the installation and removal process is available at YouTube: <https://www.youtube.com/playlist?list=PLYV5R7hVcs-DTDY1ImpIPpJVZOzo7dKq14>.

**Note:** The intrusion switch can only be installed in riser 1 assembly (LP/FHFL). The riser bracket in which the intrusion switch is installed might be different from the illustration below, but the installation method is the same. For different types of supported riser bracket, see [Figure 108 “Riser 1 assembly \(LP/FHFL\) installation” on page 129](#).

Step 1. Insert the intrusion switch into the riser bracket and push it in the direction as shown until it is fully seated.

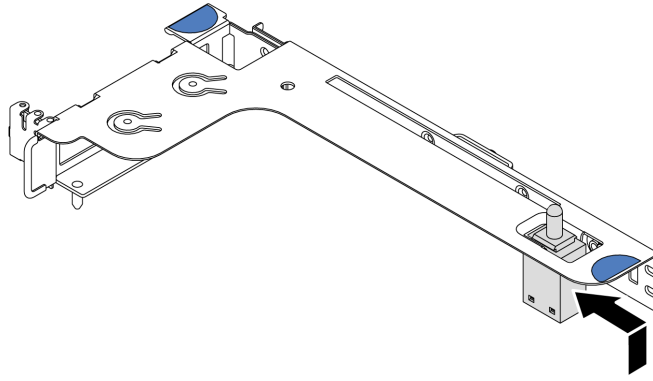


Figure 112. Intrusion switch installation

After installing the intrusion switch:




1. Reinstall the PCIe adapter. See [“Install a PCIe adapter” on page 128](#).
2. Reinstall the riser assembly. See [“Install a riser card” on page 123](#).
3. Connect the cable of the intrusion switch to the intrusion switch connector on the system board. For the cable routing of the intrusion switch, refer to [“Intrusion switch cable routing” on page 74](#).
4. Complete the parts replacement. See [“Complete the parts replacement” on page 202](#).

## 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><b>“Read the installation Guidelines” on page 81</b></p>	 <p><b>“Power off the server for this task” on page 12</b></p>	 <p><b>“ATTENTION: Static Sensitive Device</b> Ground package before opening” on page 84</p>
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#### 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 94](#).
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 121](#).

To remove a GPU adapter, complete the following steps:

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 125](#).


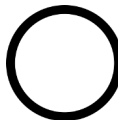

If you are instructed to return the old GPU adapter, follow all packaging instructions and use any packaging materials that are provided.

## Demo video

[Watch the procedure on YouTube](#)

## Install a GPU adapter

Use this information to install a GPU adapter.

	<b>“Read the installation Guidelines”</b> on page 81		<b>“Power off the server for this task”</b> on page 12		<b>“ATTENTION: Static Sensitive Device</b> Ground package before opening” on page 84
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### Notes:

- Only certain types of GPU adapters are supported, refer to [“Specifications” on page 2](#) for detailed information.
- GPU adapters are supported on some server models with requirements, refer to [“Technical rules for GPU adapters” on page 89](#).

To install a GPU adapter, complete the following steps:

- 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 128](#).
- Step 3. Reinstall the riser assembly. See [“Install a riser card” on page 123](#).

After installing the GPU adapter, complete the parts replacement. See [“Complete the parts replacement” on page 202](#).

## Demo video

[Watch the procedure on YouTube](#)


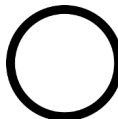

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## Backplane replacement

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.

	<b>“Read the installation Guidelines”</b> on page 81		<b>“Power off the server for this task”</b> on page 12		<b>“ATTENTION: Static Sensitive Device</b> Ground package before opening” on page 84
---	--	---	--	--	---

Before removing the backplane:

1. Remove the top cover. See [“Remove the top cover” on page 94](#).
2. Remove all the installed drives and drive fillers from the drive bays. See [“Remove a hot-swap drive” on page 113](#) and [“Install a hot-swap drive” on page 114](#).

To remove the backplane, complete the following steps:

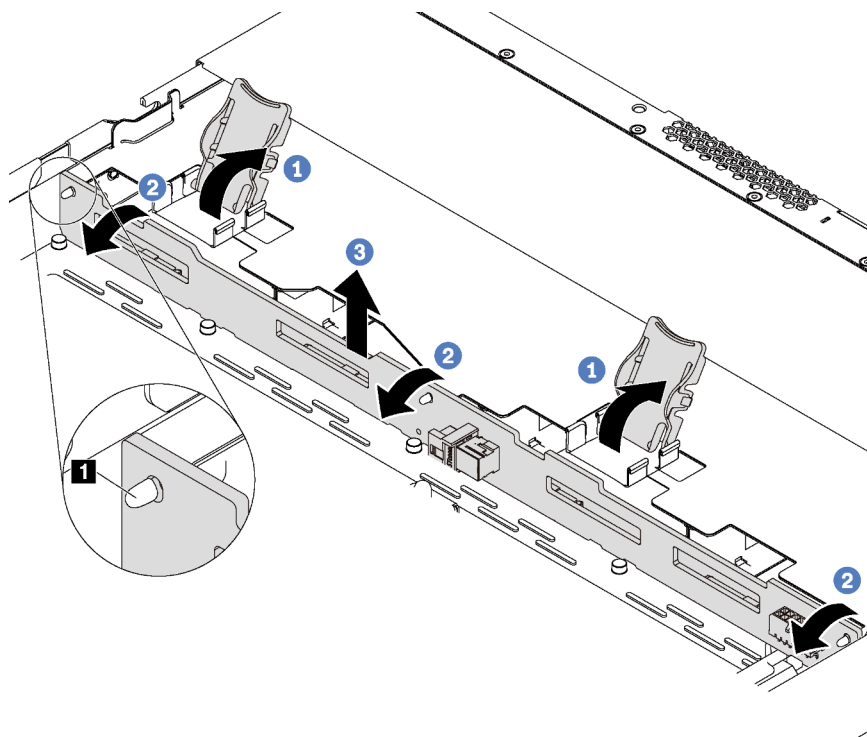


Figure 113. Removal of backplane for four 3.5-inch hot-swap drives

- 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.


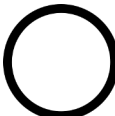

If you are instructed to return the old backplane, follow all packaging instructions and use any packaging materials that are provided.

#### Demo video

[Watch the procedure on YouTube](#)

## 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><b>“Read the installation Guidelines”</b> on page 81</p>	 <p><b>“Power off the server for this task”</b> on page 12</p>	 <p><b>“ATTENTION: Static Sensitive Device</b> Ground package before opening” on page 84</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 30.

To install the backplane, complete the following steps:

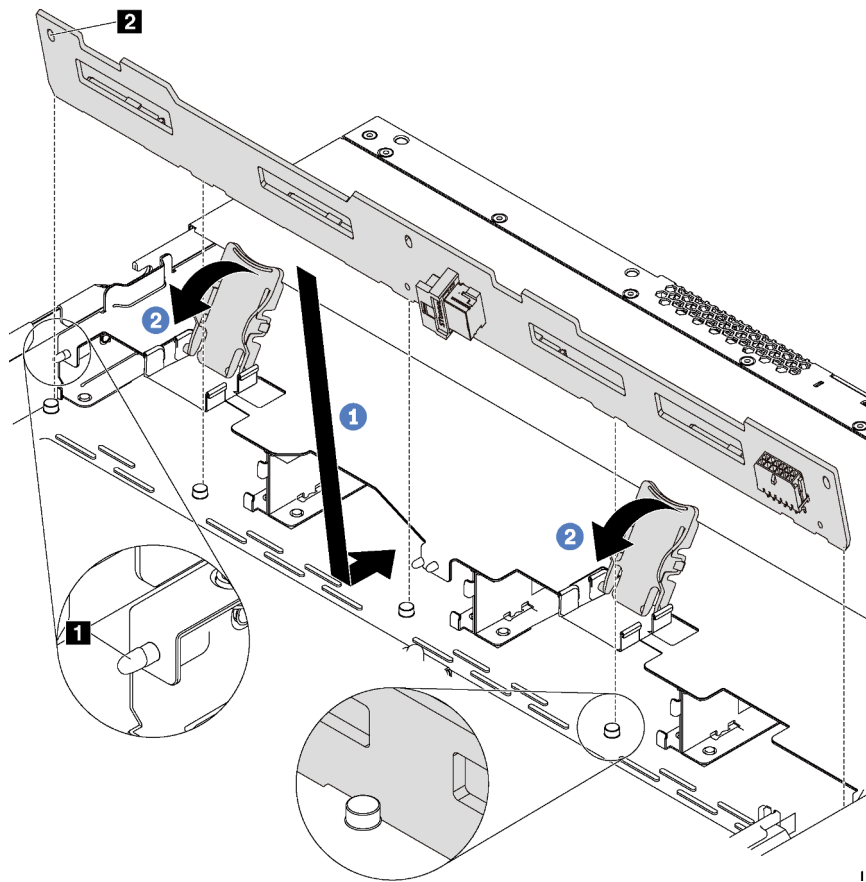


Figure 114. Installation of backplane for four 3.5-inch hot-swap drives

- 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:


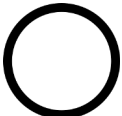

1. Reinstall all the drives and drive fillers into the drive bays. See [“Install a hot-swap drive” on page 114](#).
2. Complete the parts replacement. See [“Complete the parts replacement” on page 202](#).

#### Demo video

[Watch the procedure on YouTube](#)

## 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.

	<b>“Read the installation Guidelines” on page 81</b>		<b>“Power off the server for this task” on page 12</b>		<b>“ATTENTION: Static Sensitive Device Ground package before opening” on page 84</b>
---	--	---	--	--	--



Before removing the backplane:

1. Remove the top cover. See [“Remove the top cover” on page 94.](#)
2. Remove all the installed drives and drive fillers from the drive bays. See [“Remove a hot-swap drive” on page 113](#) and [“Install a hot-swap drive” on page 114.](#)

To remove the backplane, complete the following step:

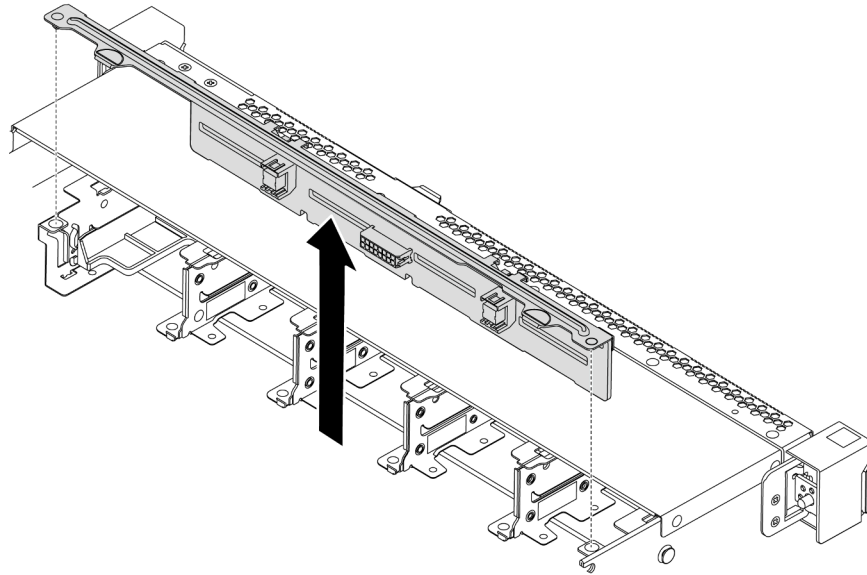


Figure 115. Removal of backplane for eight 2.5-inch hot-swap drives

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

## After you finish




If you are instructed to return the component or optional device, follow all packaging instructions, and use any packaging materials for shipping that are supplied to you.

### Demo video

[Watch the procedure on YouTube](#)

## 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.

	<b>“Read the installation Guidelines” on page 81</b>		<b>“Power off the server for this task” on page 12</b>		<b>“ATTENTION: Static Sensitive Device Ground package before opening” on page 84</b>
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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 39.](#)

To install the backplane, complete the following steps:

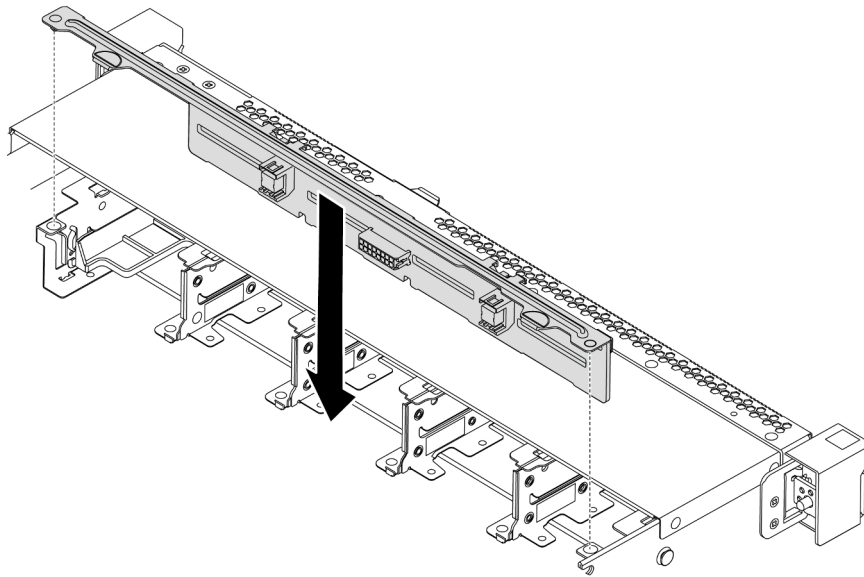


Figure 116. Installation of backplane for eight 2.5-inch hot-swap drives

- 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 you finish


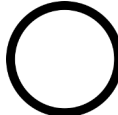

- Reinstall all the drives and drive fillers into the drive bays. See [“Install a hot-swap drive” on page 114.](#)
- Complete the parts replacement. See [“Complete the parts replacement” on page 202.](#)

### Demo video

[Watch the procedure on YouTube](#)

## 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.

	<b>“Read the installation Guidelines” on page 81</b>		<b>“Power off the server for this task” on page 12</b>		<b>“ATTENTION: Static Sensitive Device Ground package before opening” on page 84</b>
---	--	---	--	--	--

Before removing the backplane:

1. Remove the top cover. See [“Remove the top cover” on page 94.](#)
2. Remove all the installed drives and drive fillers from the drive bays. See [“Remove a hot-swap drive” on page 113](#) and [“Install a hot-swap drive” on page 114.](#)

To remove the backplane, complete the following step:

**Watch the procedure.** A video of the installation and removal process is available at YouTube: <https://www.youtube.com/playlist?list=PLYV5R7hVcs-DTDY1ImpIPpJVOzo7dKq14>.

**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.

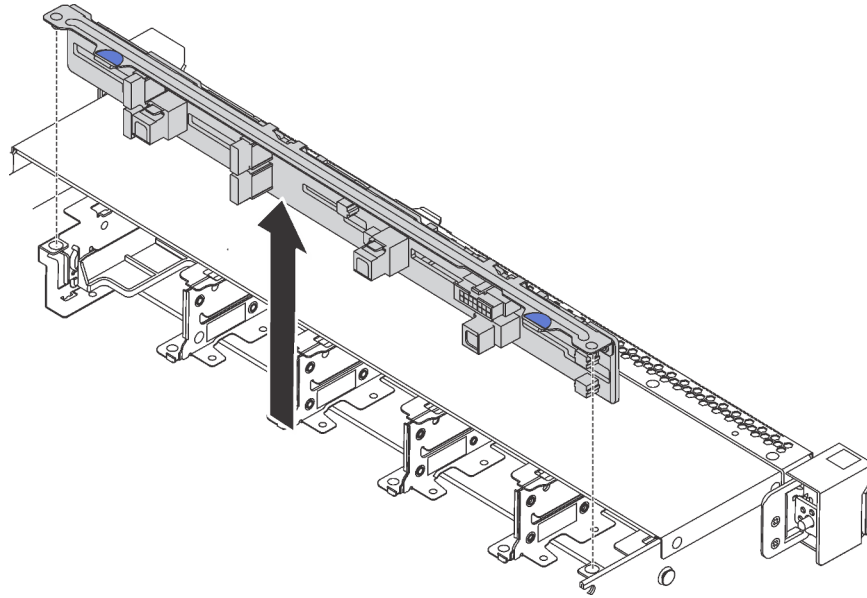


Figure 117. Removal of backplane for ten 2.5-inch hot-swap drives

Step 1. Grasp the backplane and carefully lift it out of the chassis.

Step 2. Disconnect the cables from the backplane.

## After you finish




If you are instructed to return the component or optional device, follow all packaging instructions, and use any packaging materials for shipping that are supplied to you.

## Demo video

[Watch the procedure on YouTube](#)

## 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.

	<b>"Read the installation Guidelines" on page 81</b>		<b>"Power off the server for this task" on page 12</b>		<b>"ATTENTION: Static Sensitive Device Ground package before opening" on page 84</b>
---	--	---	--	--	--

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 47](#) or [“Server model with ten 2.5-inch SAS/SATA/NVMe drives” on page 55](#).

To install the backplane, complete the following steps:

**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.

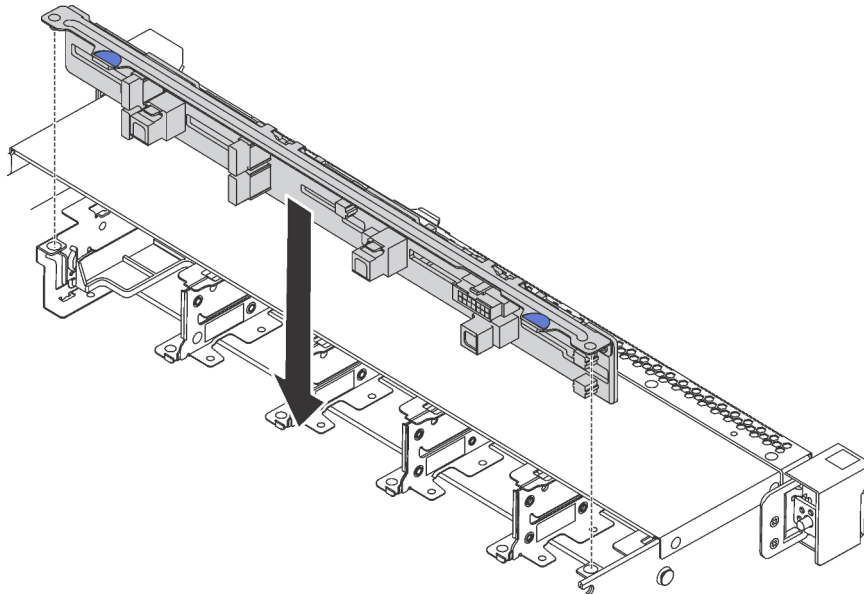


Figure 118. Installation of backplane for ten 2.5-inch hot-swap drives

- 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 you finish


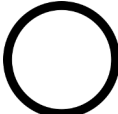

- Reinstall all the drives and drive fillers into the drive bays. See [“Install a hot-swap drive” on page 114](#).
- Complete the parts replacement. See [“Complete the parts replacement” on page 202](#).

## Demo video

[Watch the procedure on YouTube](#)

## Remove the rear backplane

Use this information to remove the rear backplane.

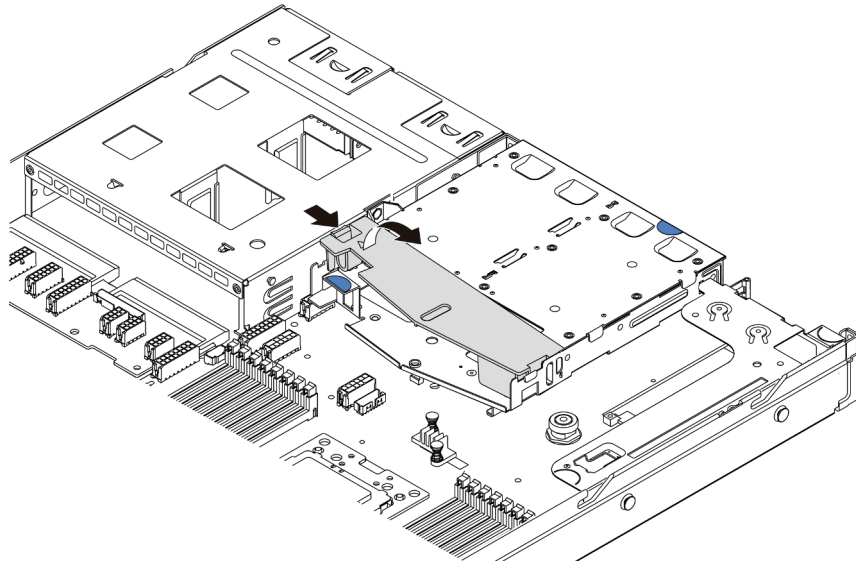
	<b>“Read the installation Guidelines” on page 81</b>		<b>“Power off the server for this task” on page 12</b>		<b>“ATTENTION: Static Sensitive Device Ground package before opening” on page 84</b>
---	--	---	--	--	--

Before removing the rear backplane:

1. Remove the top cover. See [“Remove the top cover” on page 94](#).
2. Remove the drives or drive fillers installed in the rear hot-swap drive cage. See [“Remove a hot-swap drive” on page 113](#) and [“Install a hot-swap drive” on page 114](#).

To remove the rear backplane, complete the following steps:

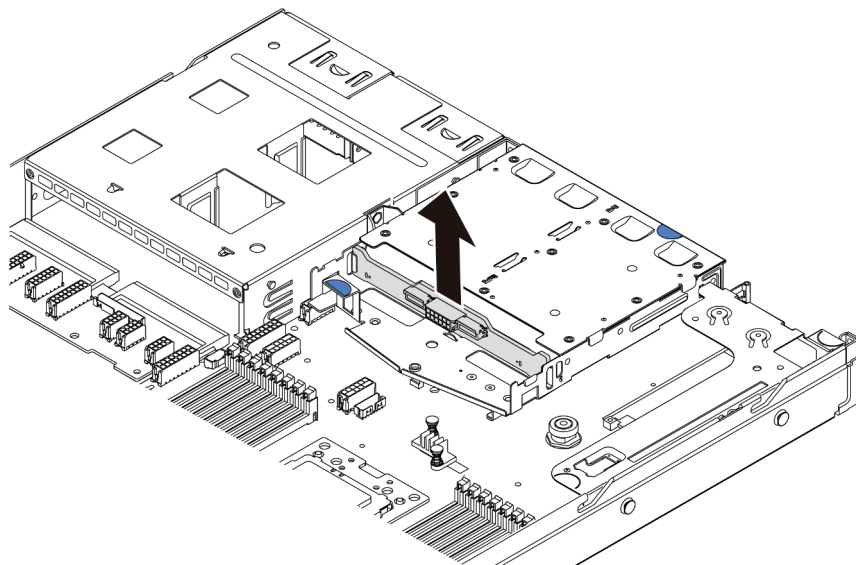
- Step 1. Gently press and hold the tab on the rear hot-swap drive cage as shown and remove the air baffle from the rear hot-swap drive cage.



*Figure 119. 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 120. 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.

### Demo video

[Watch the procedure on YouTube](#)

## Install the rear backplane

Use this information to install the rear backplane.

 <p><b>“Read the installation Guidelines”</b> on page 81</p>	 <p><b>“Power off the server for this task”</b> on page 12</p>	 <p><b>“ATTENTION: Static Sensitive Device</b> Ground package before opening” on page 84</p>
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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:

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

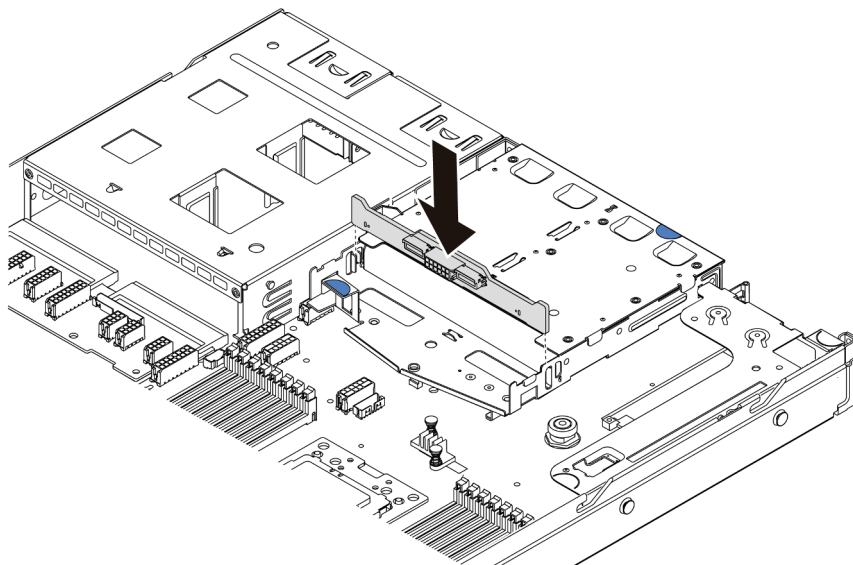


Figure 121. Rear backplane installation

- Step 2. Connect the signal cable and the power cable on the rear backplane. Refer to [“Internal cable routing”](#) on page 27.

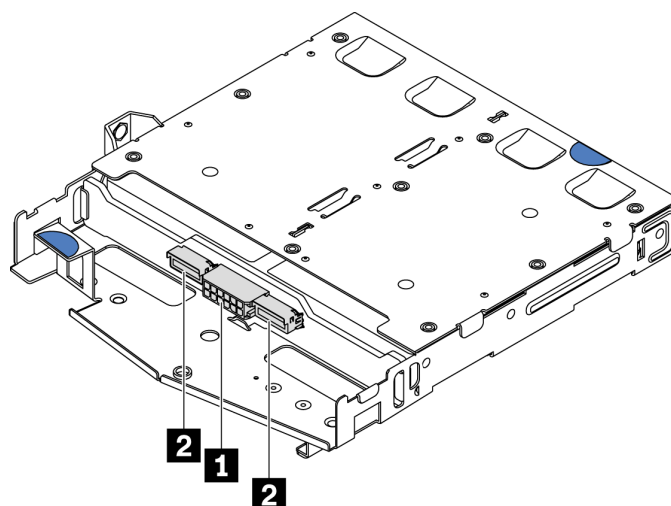


Figure 122. NVMe rear backplane connectors

<b>1</b>	Power connector
<b>2</b>	NVMe signal connector

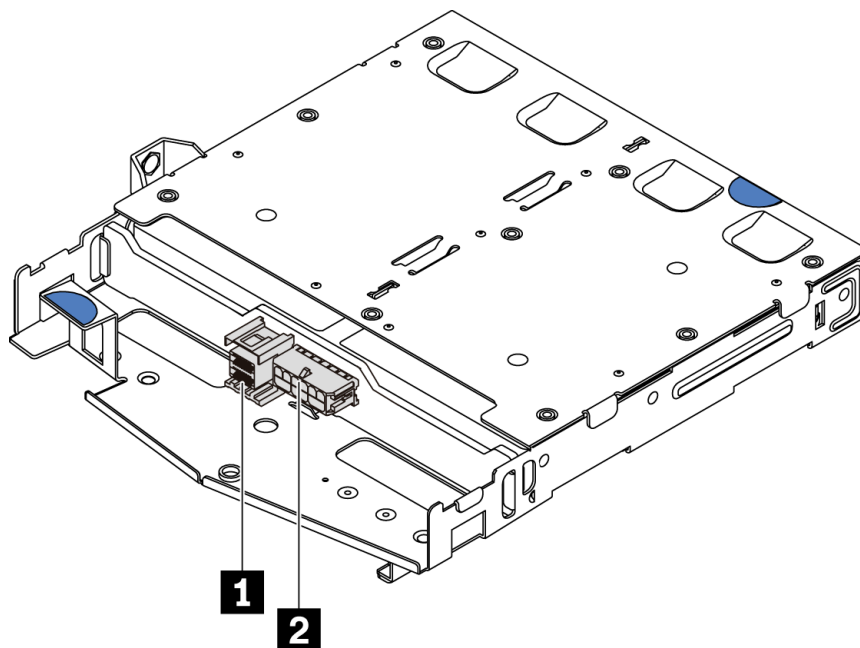


Figure 123. SAS/SATA rear backplane connectors

<b>1</b>	SAS/SATA signal connector
<b>2</b>	Power connector

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



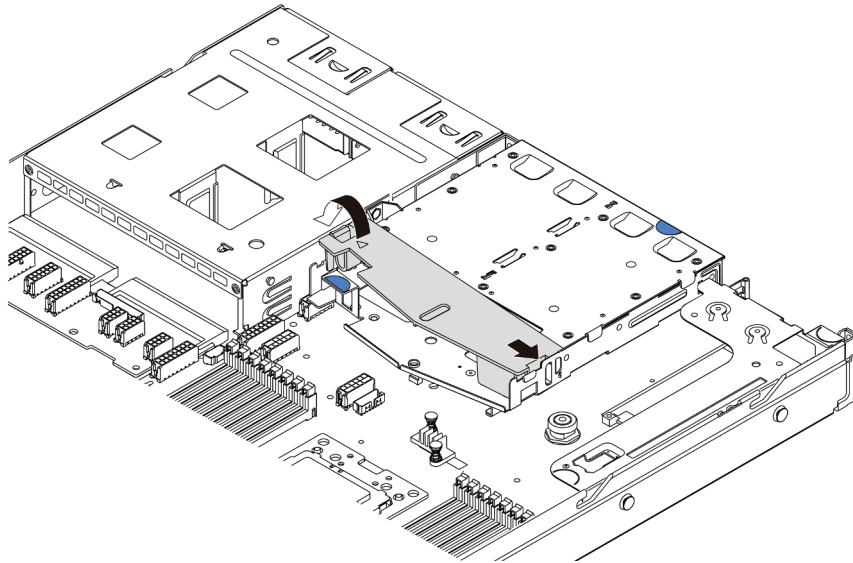


Figure 124. Air baffle installation

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 114](#).
2. Complete the parts replacement. See [“Complete the parts replacement” on page 202](#).

#### Demo video


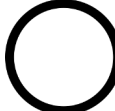

[Watch the procedure on YouTube](#)

## 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><b>“Read the installation Guidelines” on page 81</b></p>	 <p><b>“Power off the server for this task” on page 12</b></p>	 <p><b>“ATTENTION: Static Sensitive Device</b> Ground package before opening” on page 84</p>
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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 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 94](#).
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:

Step 1. Locate the CMOS battery. See [“System board components” on page 22](#).

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.

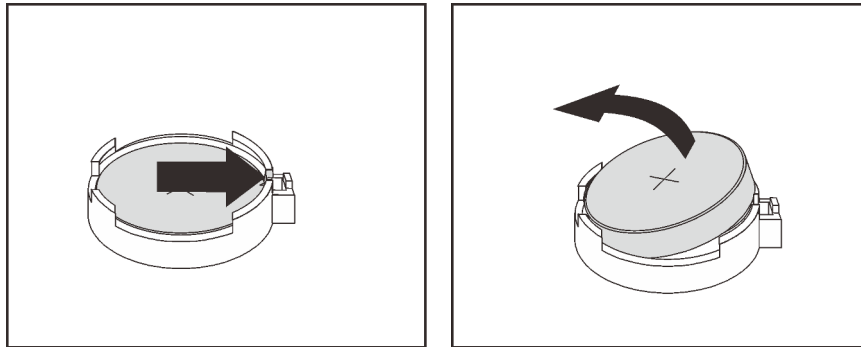


Figure 125. CMOS battery removal

## After you finish




1. Install a new one. See [“Install the CMOS battery” on page 146](#).
2. Dispose of the CMOS battery as required by local ordinances or regulations.
3. If you are instructed to return the component or optional device, follow all packaging instructions, and use any packaging materials for shipping that are supplied to you.

## Demo video

[Watch the procedure on YouTube](#)

## Install the CMOS battery

Use this information to install the CMOS battery.

 <p><b>“Read the installation Guidelines” on page 81</b></p>	 <p><b>“Power off the server for this task” on page 12</b></p>	 <p><b>“ATTENTION: Static Sensitive Device</b> Ground package before opening” on page 84</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 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:

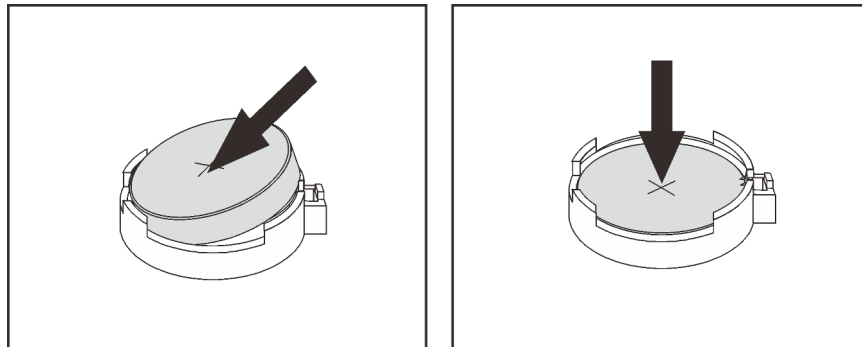


Figure 126. CMOS battery installation

- 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 you finish**

- Complete the parts replacement. See [“Complete the parts replacement” on page 202](#).
- Use the Setup utility to set the date, time, and any passwords.

## Demo video

[Watch the procedure on YouTube](#)

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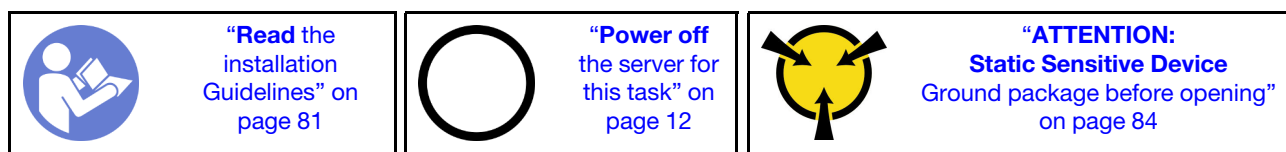
## TPM adapter replacement

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

For customers in Chinese Mainland, integrated TPM is not supported. However, customers in Chinese Mainland can install a Trusted Cryptographic Module (TCM) adapter or a 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 94.

To remove the TPM adapter, complete the following steps:

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.

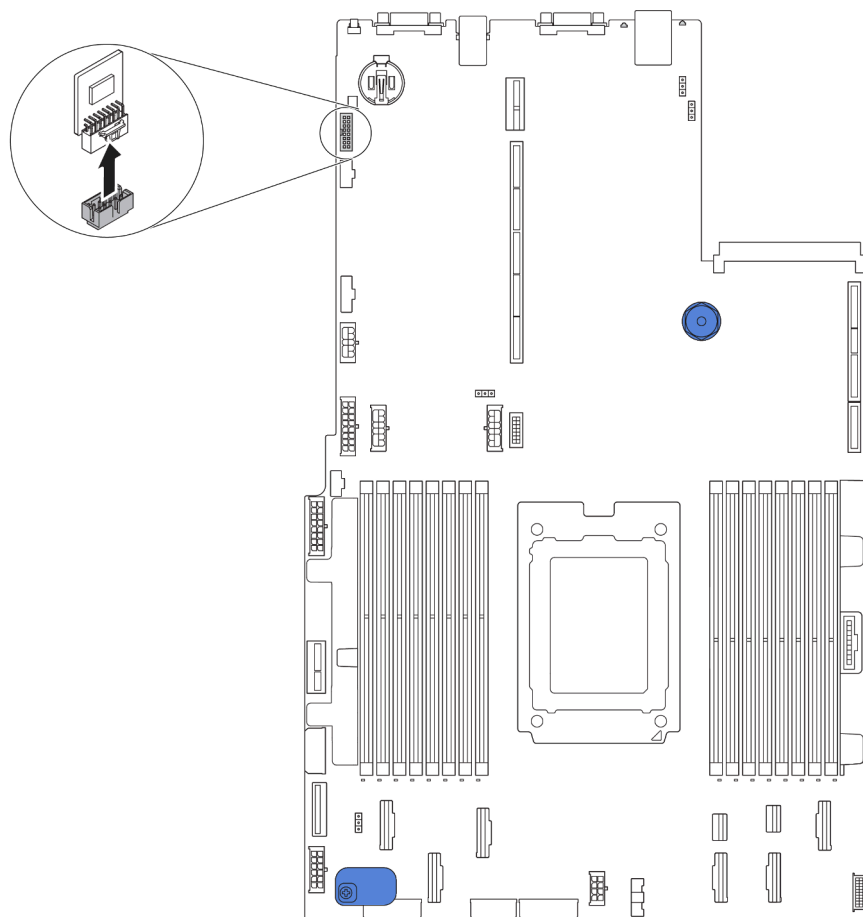

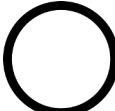



Figure 127. TPM adapter removal

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><b>“Read the installation Guidelines”</b> on page 81</p>	 <p><b>“Power off the server for this task”</b> on page 12</p>	 <p><b>“ATTENTION: Static Sensitive Device</b> Ground package before opening” on page 84</p>
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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:

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.

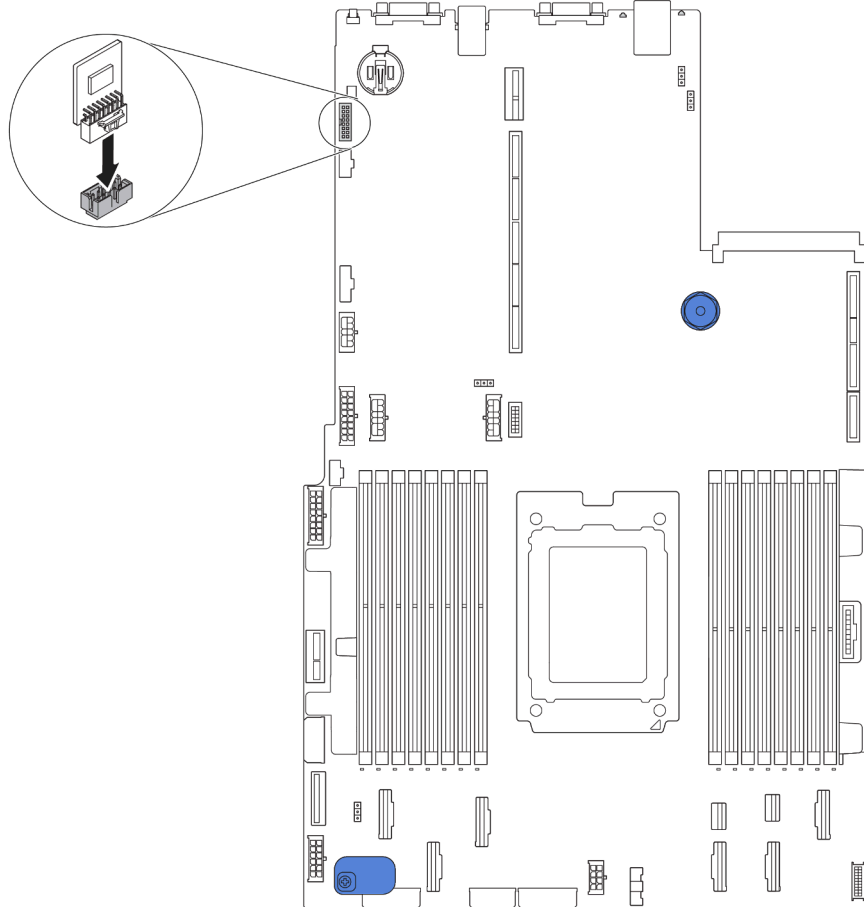


Figure 128. TPM adapter installation

After installing the TPM adapter, complete the parts replacement. See [“Complete the parts replacement” on page 202](#).

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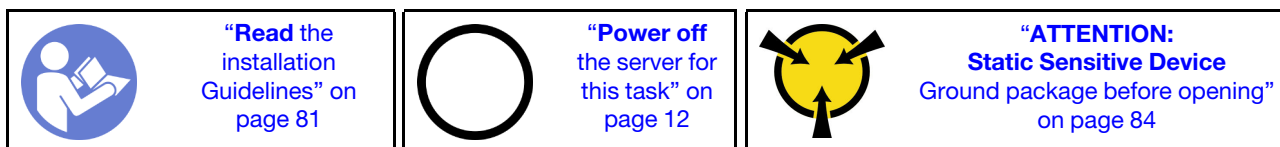
## Rear hot-swap drive cage replacement

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 94](#).
2. Remove the drives or drive fillers installed in the rear hot-swap drive cage. See [“Remove a hot-swap drive” on page 113](#) and [“Install a hot-swap drive” on page 114](#).
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:

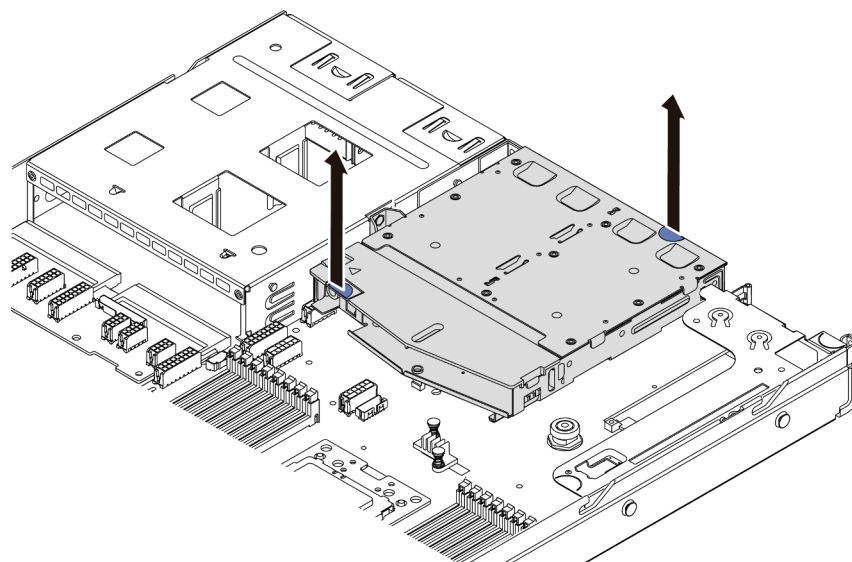


Figure 129. Rear hot-swap drive cage removal

- 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 140](#).

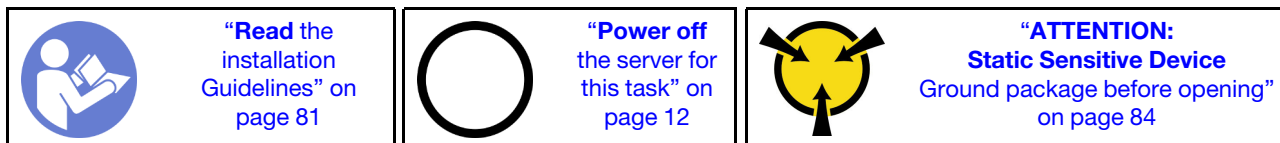
If you are instructed to return the old rear hot-swap drive cage, follow all packaging instructions and use any packaging materials that are provided.

#### Demo video

[Watch the procedure on YouTube](#)

## Install the rear hot-swap drive cage

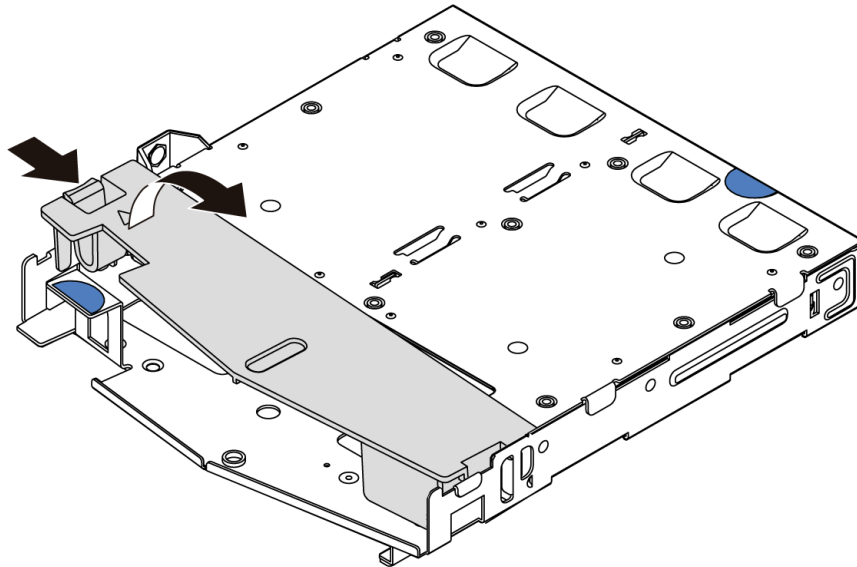
Use this information to install the rear hot-swap drive cage.



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.

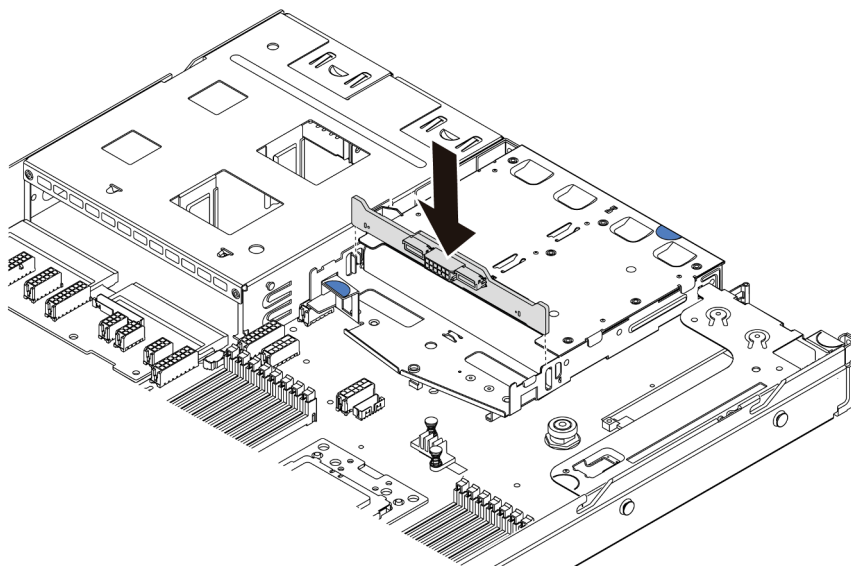
To install the rear hot-swap drive cage, complete the following steps:

- 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 130. 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 131. Rear backplane installation*



Step 3. Connect the signal cable and the power cable on the rear backplane. Refer to [“Internal cable routing” on page 27](#).

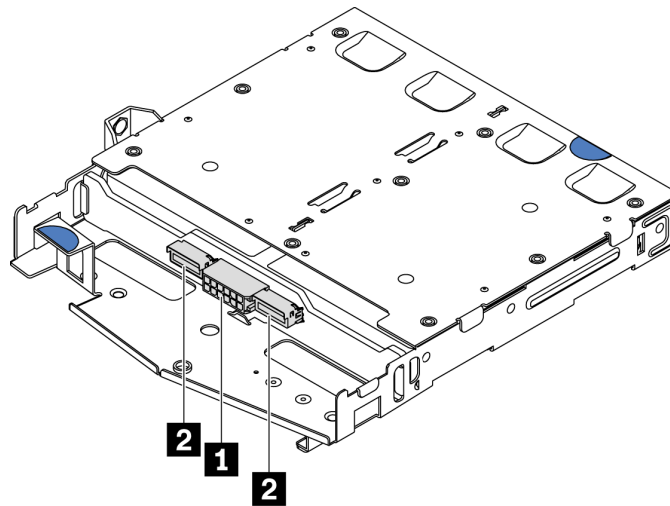


Figure 132. NVMe rear backplane connectors

<b>1</b>	Power connector
<b>2</b>	NVMe signal connector

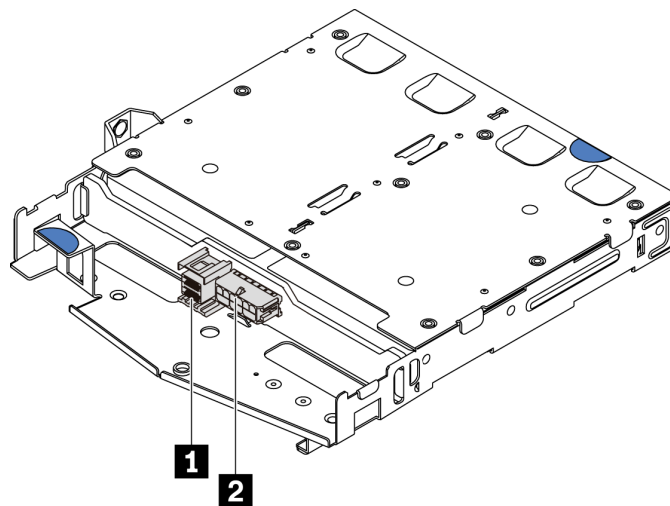


Figure 133. SAS/SATA rear backplane connectors

<b>1</b>	SAS/SATA signal connector
<b>2</b>	Power connector

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

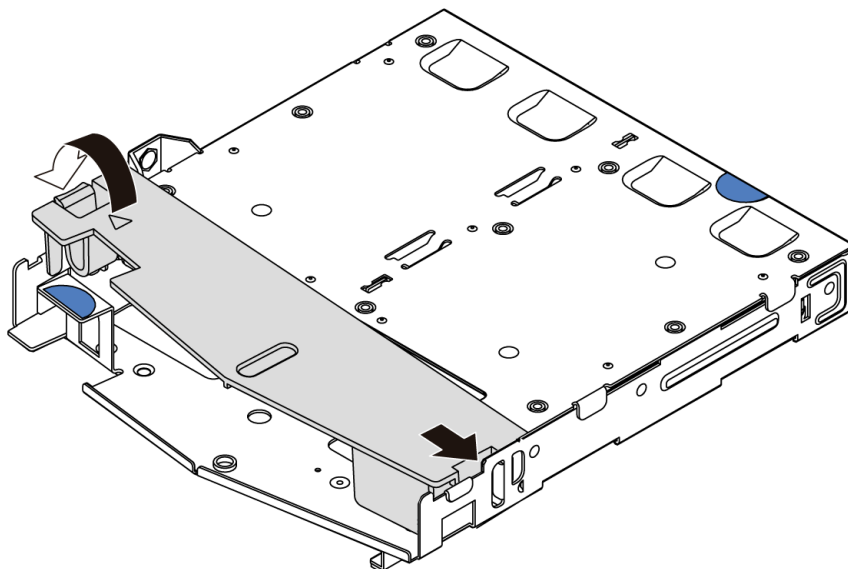


Figure 134. Air baffle installation

- 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.

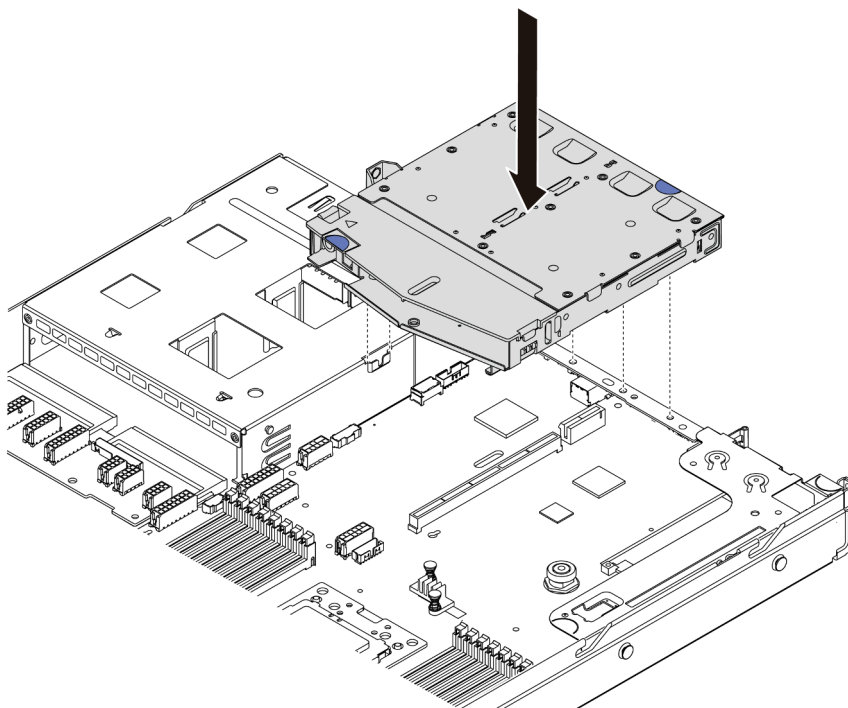


Figure 135. Rear hot-swap drive cage installation

- Step 6. Connect the signal cable and connect the power cable to the system board. See [“Internal cable routing” on page 27](#).

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 114](#).
2. Complete the parts replacement. See [“Complete the parts replacement” on page 202](#).

### Demo video

[Watch the procedure on YouTube](#)

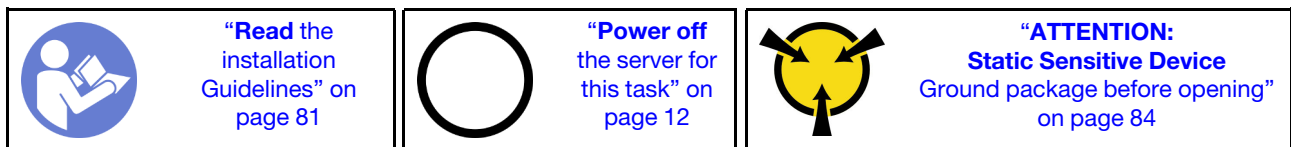
---

## 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.



Before removing the middle drive cage:

1. Remove the top cover. See [“Remove the top cover” on page 94](#).
2. Disconnect the cables from the backplane.

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

**Watch the procedure.** A video of the installation and removal process is available at YouTube: <https://www.youtube.com/playlist?list=PLYV5R7hVcs-DTDY1ImpIPpJVOzo7dKq14>.

- 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 113](#).

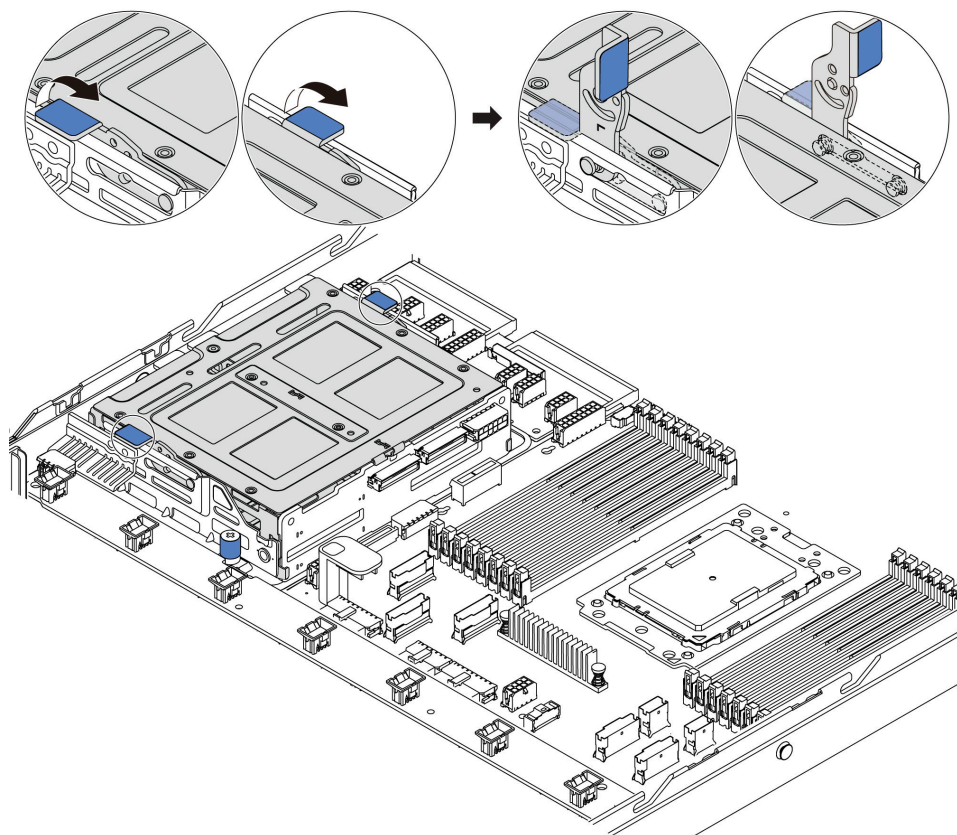


Figure 136. Internal drive removal-1

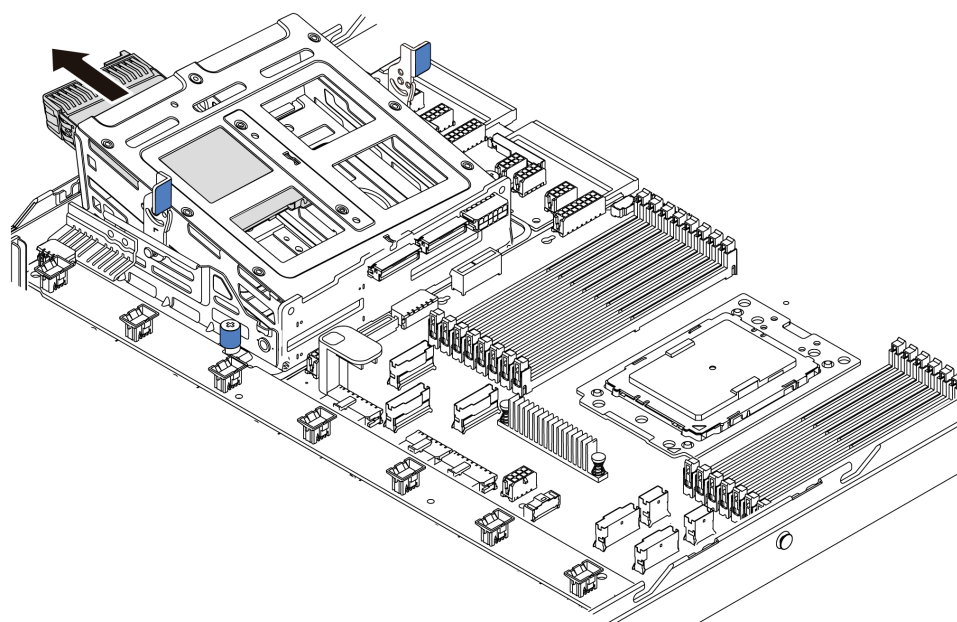


Figure 137. Internal drive removal-2

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

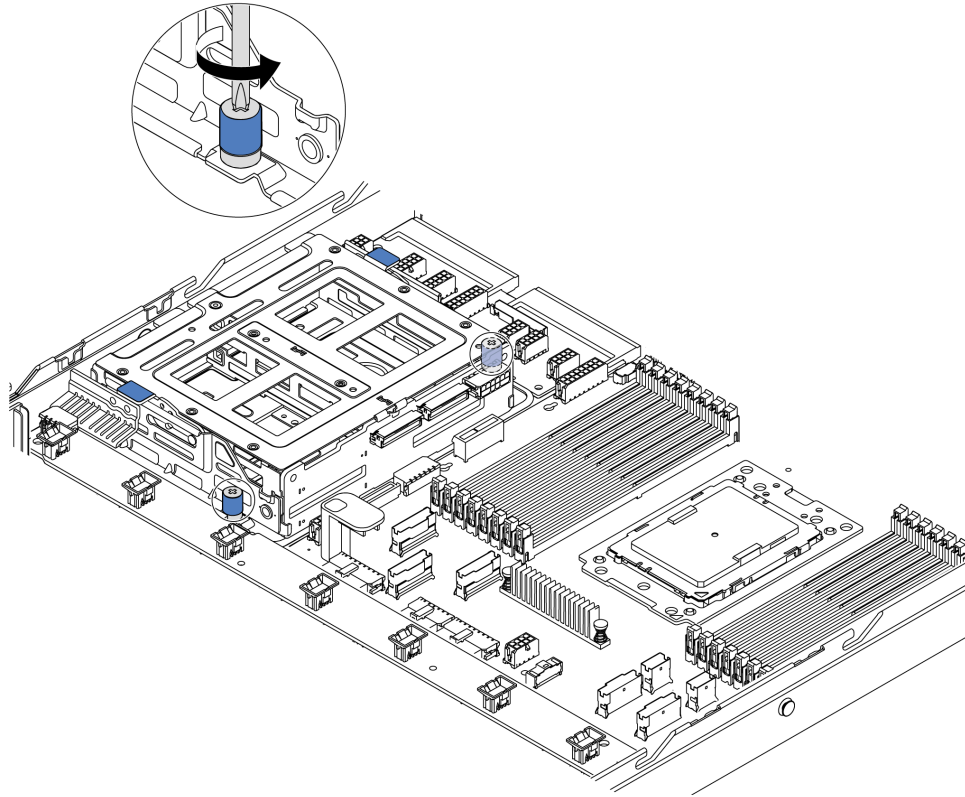


Figure 138. Middle drive cage removal-1

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

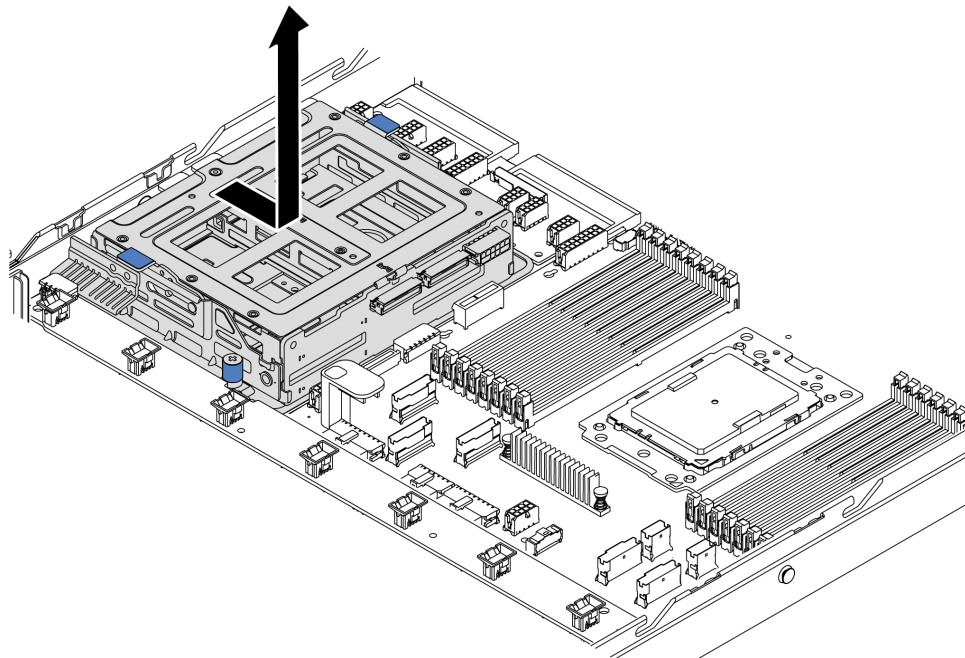


Figure 139. Middle drive cage removal-2

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.

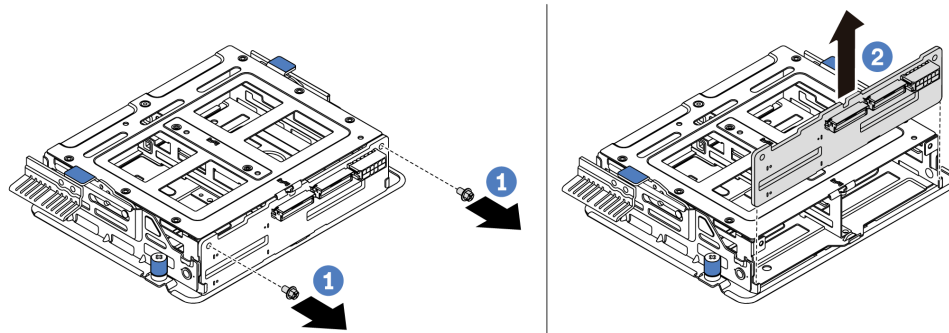





Figure 140. Internal backplane removal

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><b>“Read the installation Guidelines”</b> on page 81</p>	 <p><b>“Power off the server for this task”</b> on page 12</p>	 <p><b>“ATTENTION: Static Sensitive Device</b> Ground package before opening” on page 84</p>
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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 and removal process is available at YouTube: <https://www.youtube.com/playlist?list=PLYV5R7hVcs-DTDY1ImpIPpJVOzo7dKq14>.

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

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



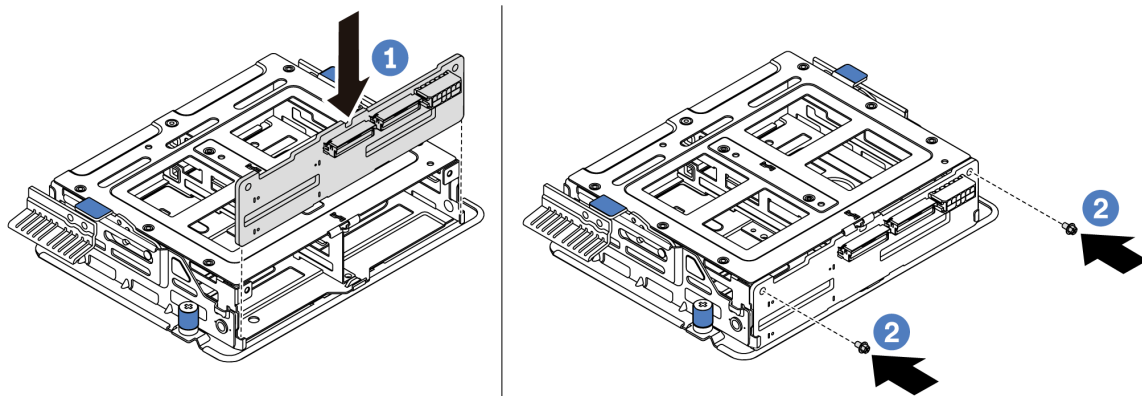


Figure 141. Internal backplane installation

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.

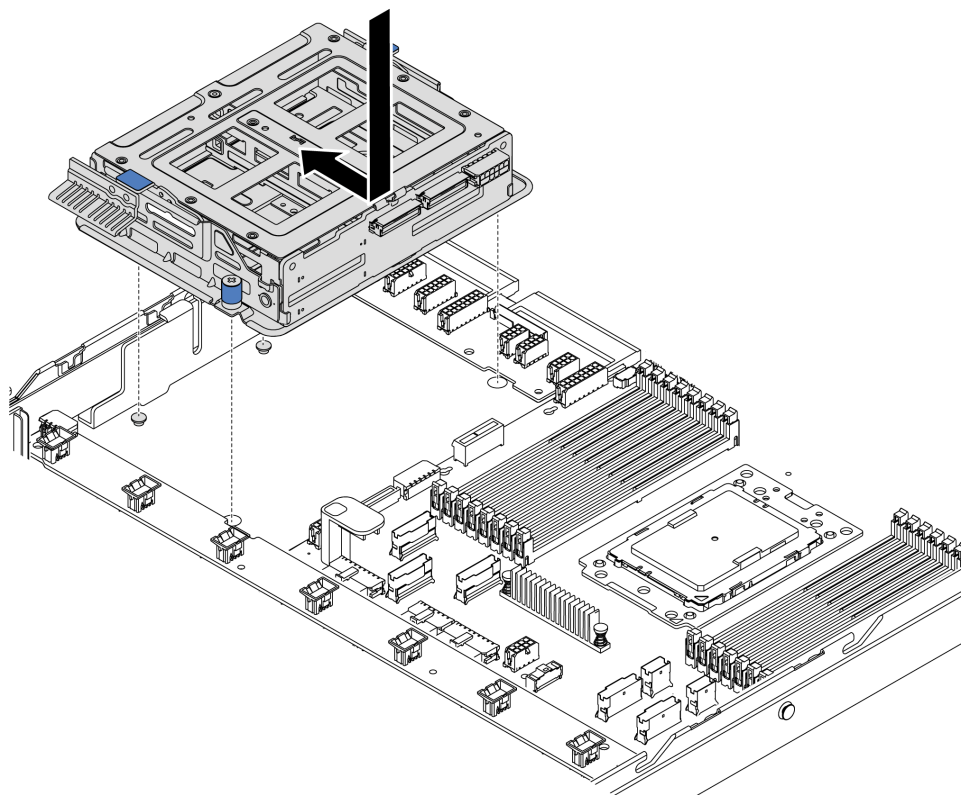


Figure 142. Middle drive cage installation-1

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

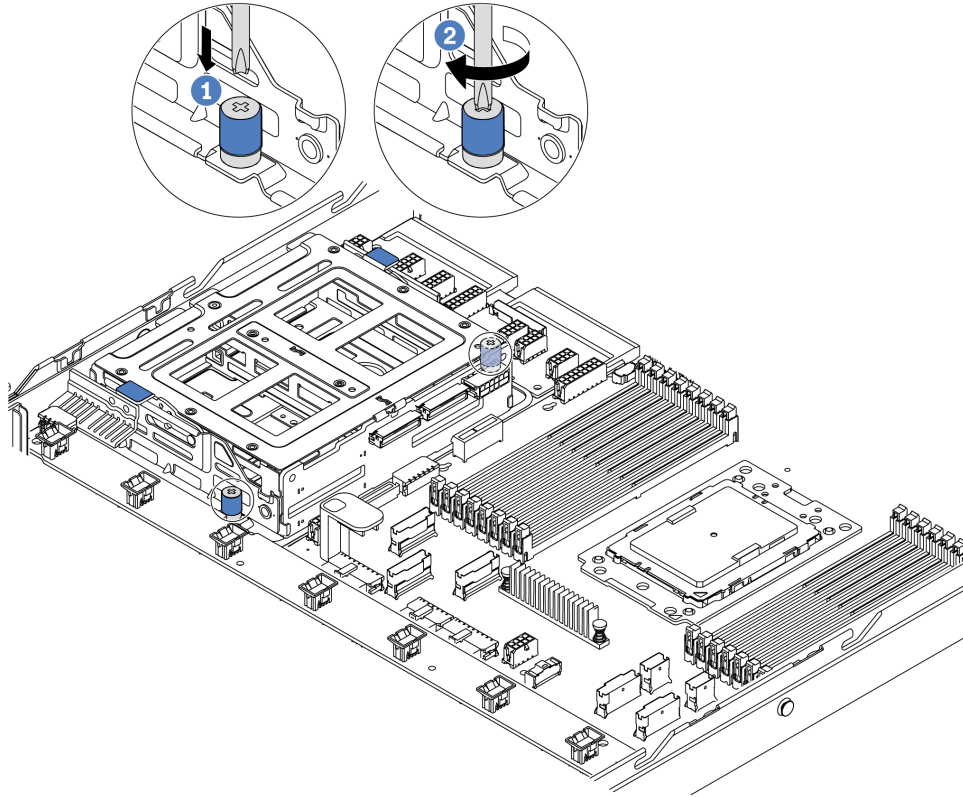


Figure 143. Middle drive cage installation-2

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

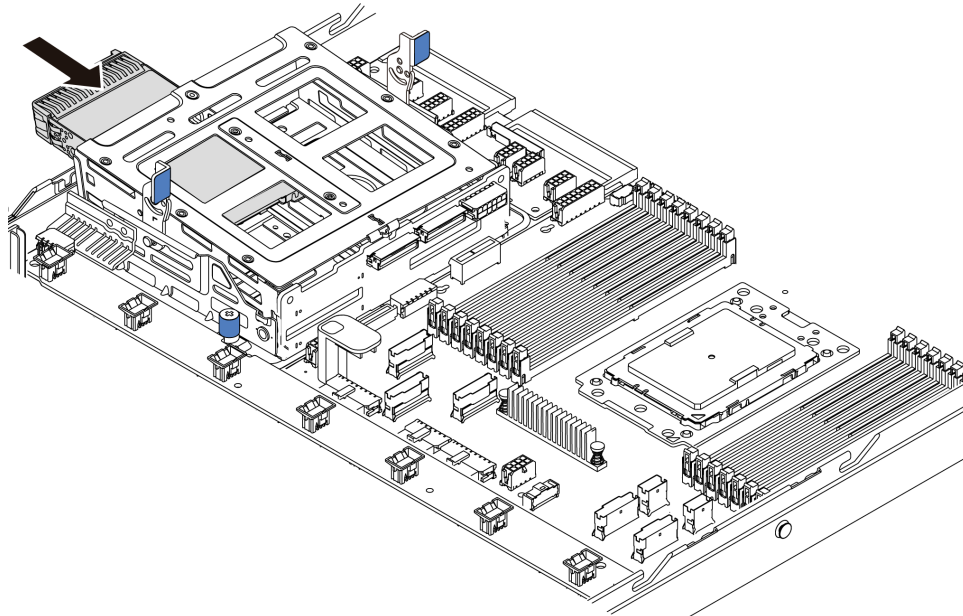


Figure 144. Internal hot-swap drive installation-1

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



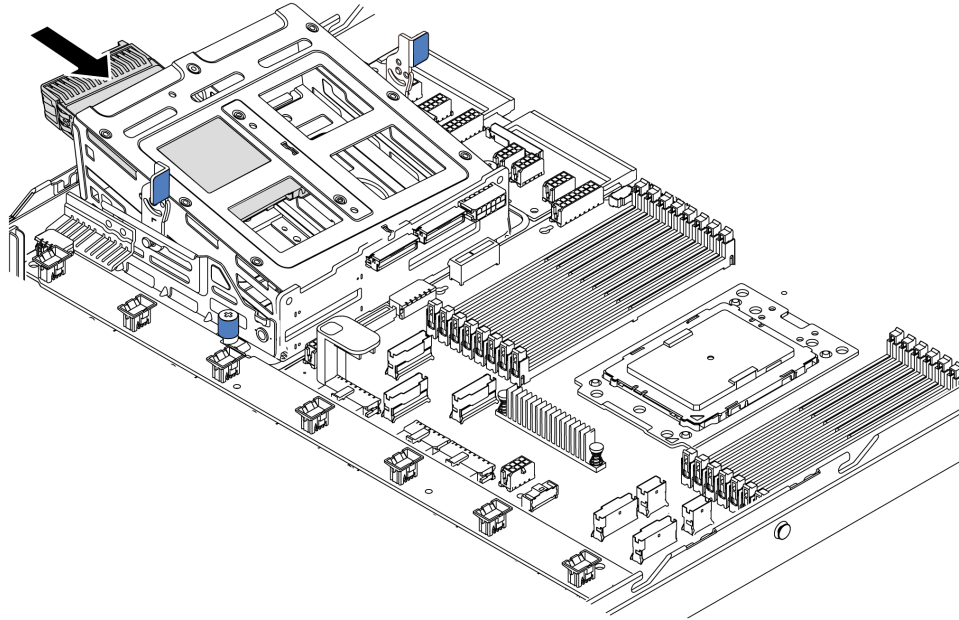


Figure 145. Internal hot-swap drive installation-2

After installing all hot-swap drives:

1. Connect the cables to the middle drive cage. See [“Internal cable routing” on page 27](#).
2. Use the Lenovo XClarity Provisioning Manager to configure the RAID if necessary. For more information, see:  
<https://pubs.lenovo.com/lxpm-overview/>
3. Complete the parts replacement. See [“Complete the parts replacement” on page 202](#).

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## 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 94](#).
2. Disconnect the M.2 cables from the M.2 backplane.

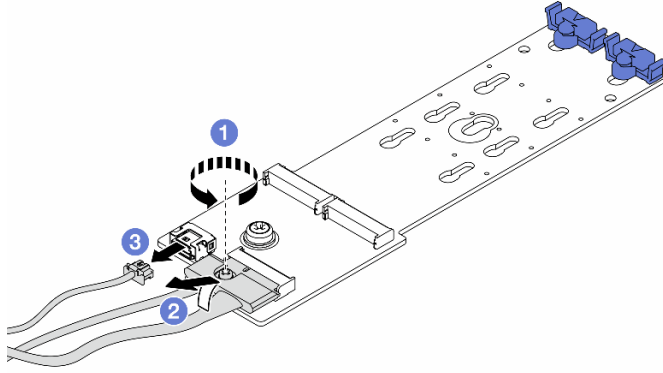


Figure 146. Disconnecting M.2 cables

- a. Loosen the screw on the signal cable.
  - b. Tilt the connector and remove it as the spring underneath releases.
  - c. Remove the power cable.
3. For easier operation, remove the internal riser assembly next to the M.2 adapter. See [“Remove the internal riser assembly” on page 118](#).

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.

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

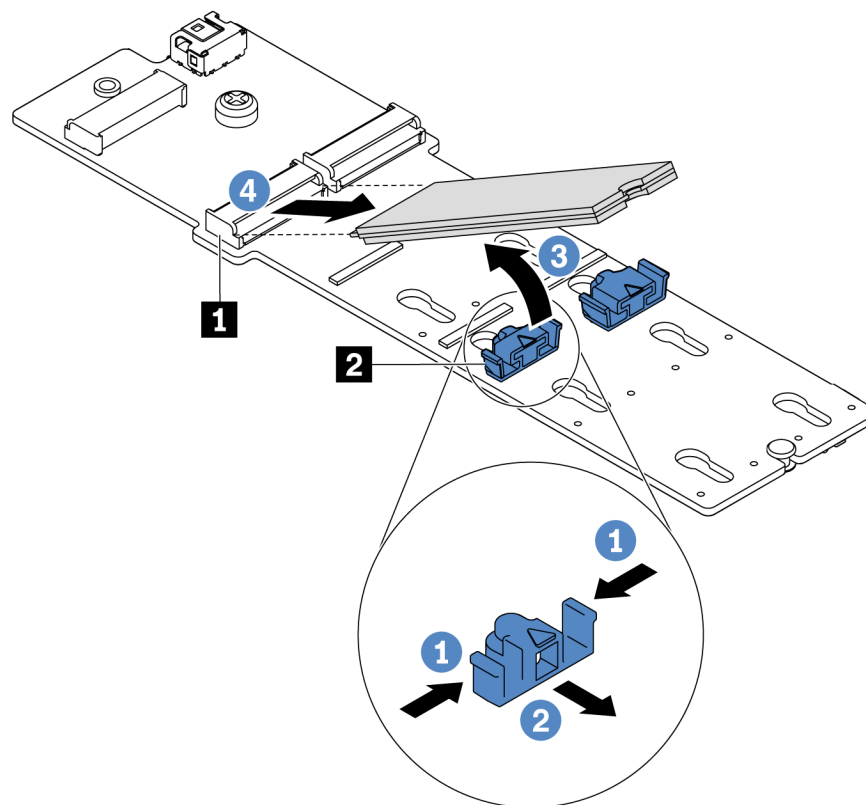
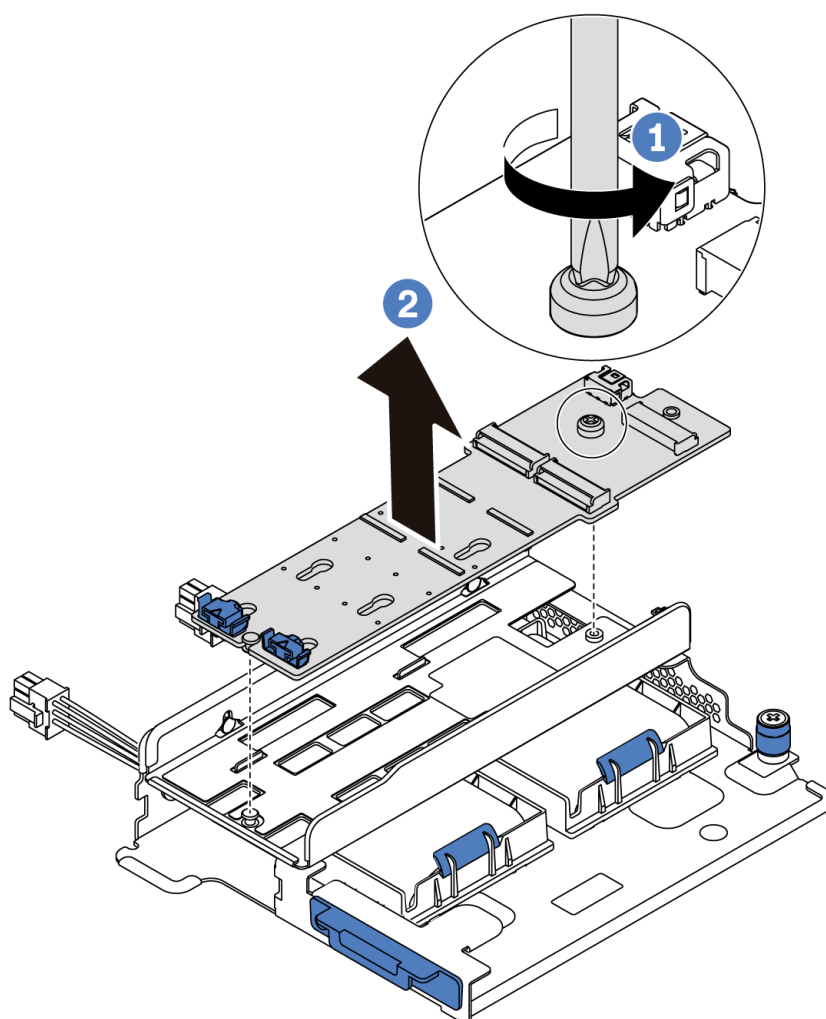


Figure 147. M.2 drive removal

- Press both sides of the retainer **2**.
- Slide the retainer backward to loosen the M.2 drive from the M.2 adapter.
- Rotate the M.2 drive away from the M.2 adapter.
- Pull the M.2 drive away from the connector **1** at an angle of approximately 30 degrees.

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



*Figure 148. M.2 adapter removal*

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

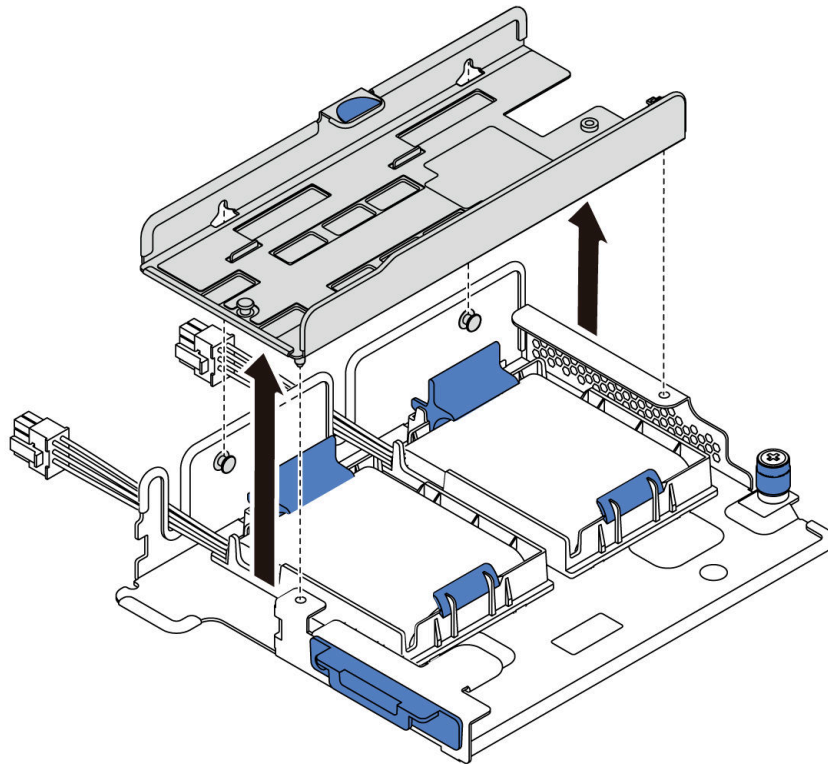


Figure 149. M.2 adapter bracket removal

## After you finish




If you are instructed to return the component or optional device, follow all packaging instructions, and use any packaging materials for shipping that are supplied to you.

## Demo video

[Watch the procedure on YouTube](#)

## Adjust the retainer on the M.2 adapter

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

 <p><b>“Read the installation Guidelines”</b> on page 81</p>	 <p><b>“Power off the server for this task”</b> on page 12</p>	 <p><b>“ATTENTION: Static Sensitive Device</b> Ground package before opening” on page 84</p>
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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.

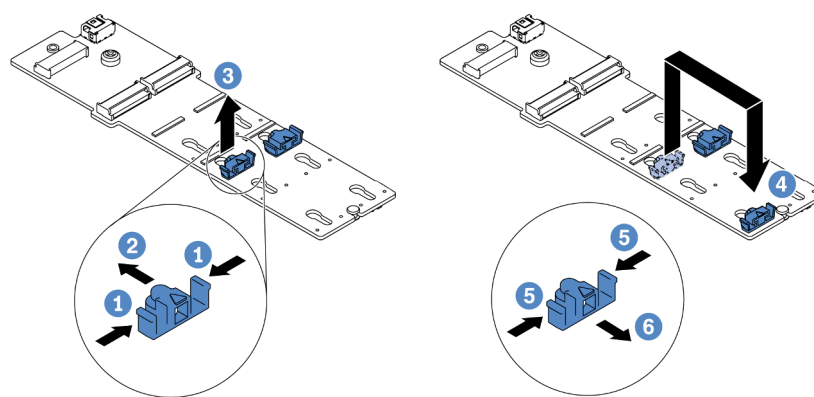


Figure 150. M.2 retainer adjustment

- 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.

#### Demo video

[Watch the procedure on YouTube](#)

## Install the M.2 adapter and M.2 drive

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

	<p><b>“Read the installation Guidelines”</b> on page 81</p>		<p><b>“Power off the server for this task”</b> on page 12</p>		<p><b>“ATTENTION: Static Sensitive Device</b> Ground package before opening” on page 84</p>
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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 165.
3. Locate the M.2 drive slot on the M.2 adapter.

**Note:** For some M.2 adapters that support two identical M.2 drives, install the M.2 drive in slot 0 first.

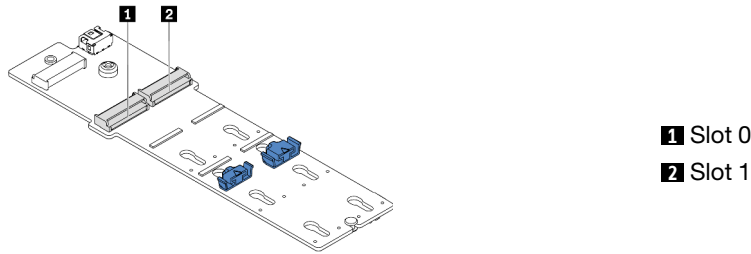


Figure 151. M.2 drive slot

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 and removal process is available at YouTube: <https://www.youtube.com/playlist?list=PLYV5R7hVcs-DTDY1ImpIPpJVOzo7dKq14>.

- 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 170.
- 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.

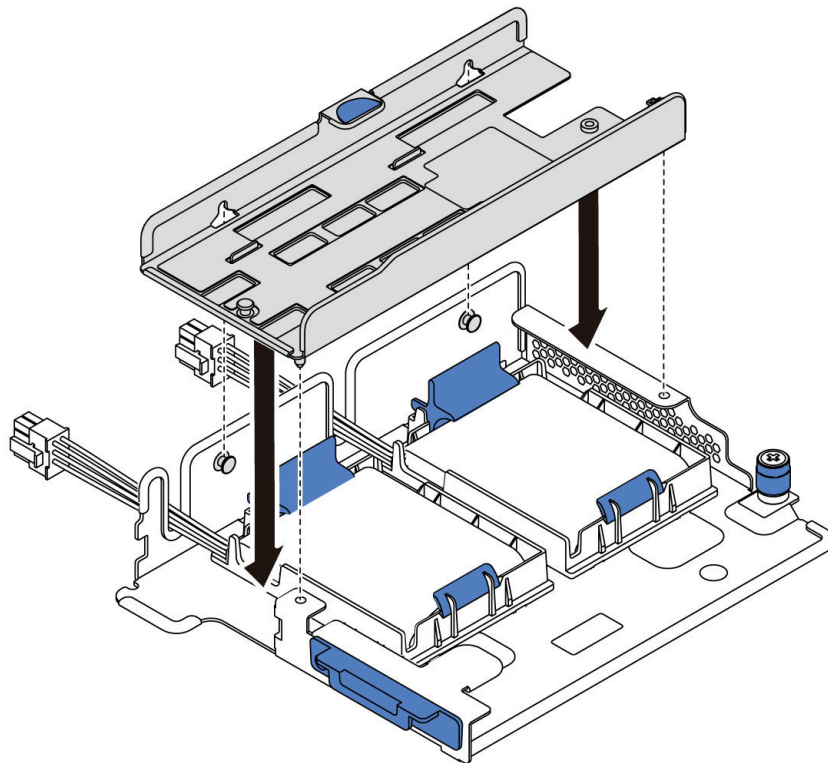


Figure 152. M.2 module bracket installation

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

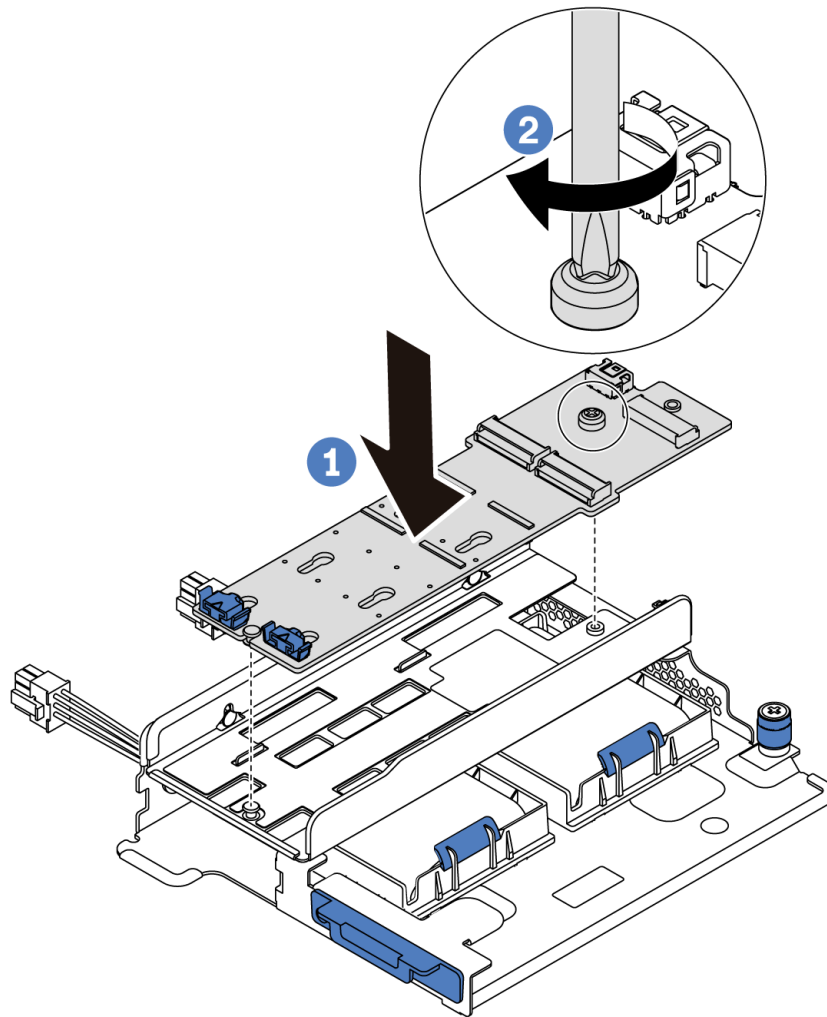


Figure 153. M.2 adapter installation

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

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



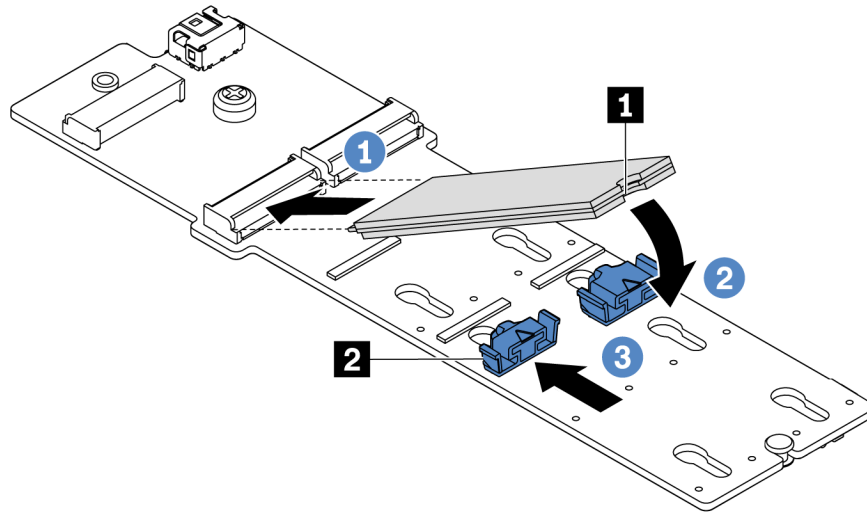


Figure 154. M.2 drive installation

- Step 5. Connect the cables to the M.2 backplane and system board. For more information about cable routing, see [“M.2 module cable routing” on page 70](#).
- Tilt the connector at an angle of 20 degrees or lower, and insert it until its bottom surface reaches the ramp.
  - Press the connector down flat.
  - Tighten the screw on the signal cable.
  - Connect the power cable.

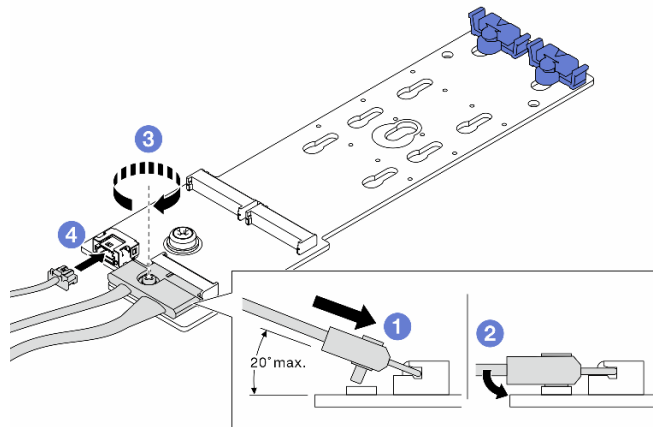


Figure 155. Connecting M.2 cables

## After you finish

- Complete the parts replacement. See [“Complete the parts replacement” on page 202](#).
- Use the Lenovo XClarity Provisioning Manager to configure the RAID. For more information, see: <https://pubs.lenovo.com/lxpm-overview/>

## Demo video

[Watch the procedure on YouTube](#)

## RAID super capacitor module replacement

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


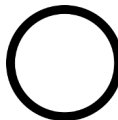

The RAID super capacitor module protects the cache memory on the installed RAID adapter. You can purchase a RAID super capacitor module from Lenovo.

For a list of supported options, see:

<https://serverproven.lenovo.com/>

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

Use this information to remove a super capacitor module.

	<b>"Read the installation Guidelines" on page 81</b>		<b>"Power off the server for this task" on page 12</b>		<b>"ATTENTION: Static Sensitive Device"</b> Ground package before opening" on page 84
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Before removing a super capacitor module:

1. Remove the top cover. See ["Remove the top cover" on page 94](#).
2. Remove the internal riser assembly. See ["Remove the internal riser assembly" on page 118](#).
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 161](#).
4. Disconnect the cable of the super capacitor module.

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

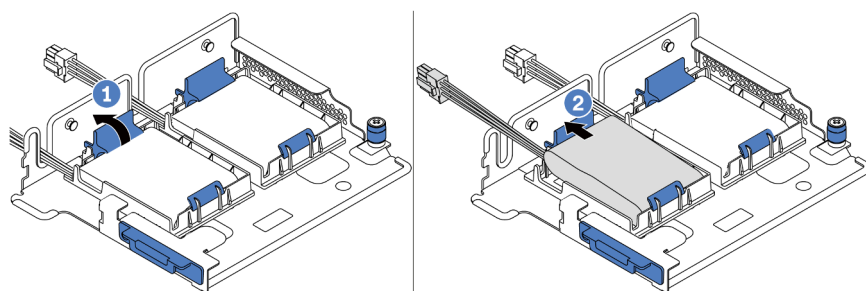


Figure 156. Super capacitor module removal

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

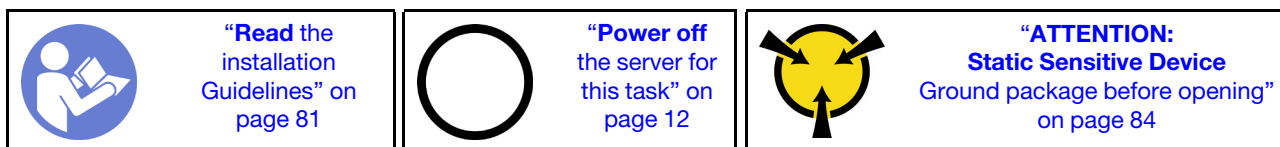
Step 2. Take the super capacitor module out of the holder.

### Demo video

[Watch the procedure on YouTube](#)

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

Use this information to install a super capacitor module.



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:

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.

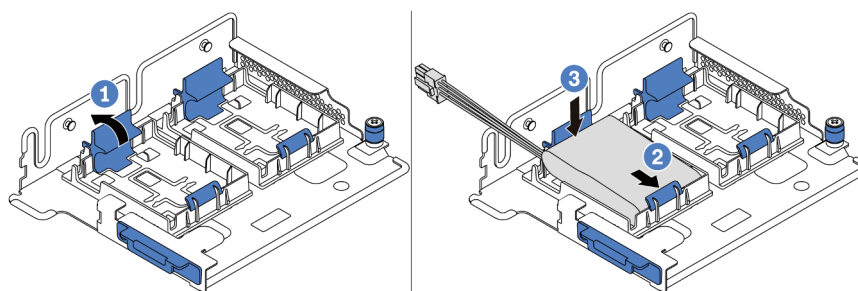


Figure 157. Super capacitor module installation

After installing the super capacitor module:

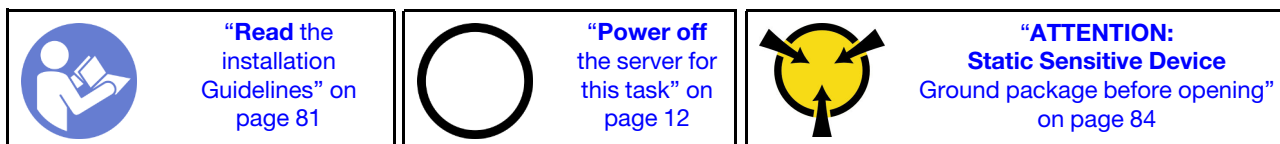
1. Connect the super capacitor module to an adapter with the extension cable that comes with the super capacitor module. See [“Super capacitor cable routing” on page 70](#).
2. Complete the parts replacement. See [“Complete the parts replacement” on page 202](#).

### Demo video

[Watch the procedure on YouTube](#)

## 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 94](#).
2. Disconnect the cable of the RAID super capacitor module.

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

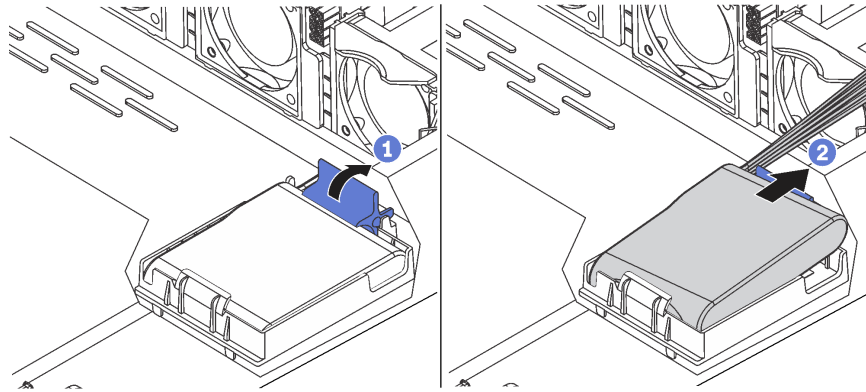


Figure 158. Removal of the RAID super capacitor module on the chassis

- 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.

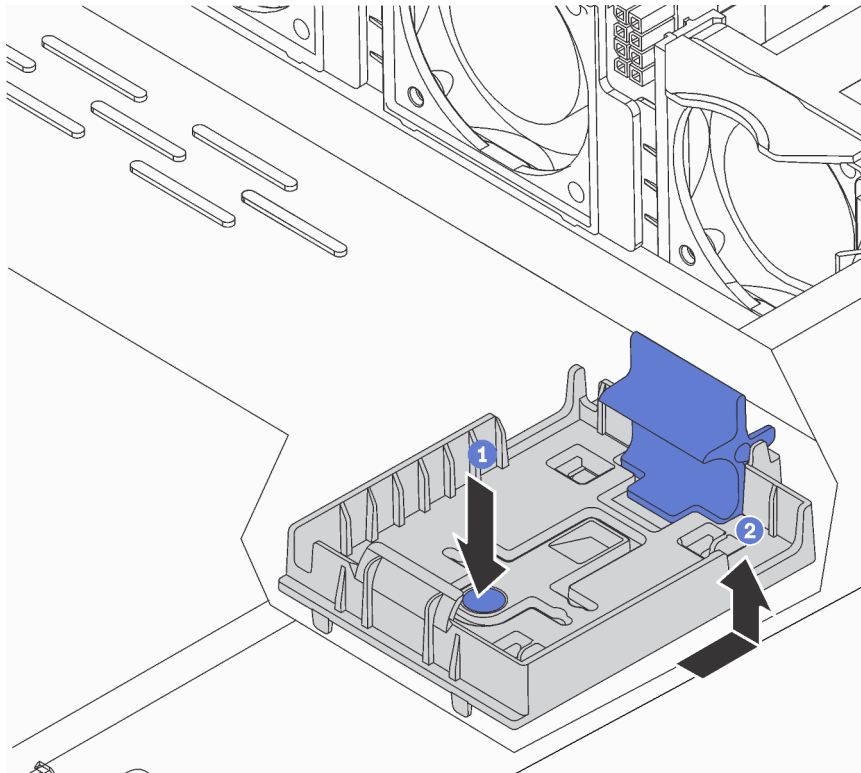


Figure 159. RAID super capacitor module holder removal

## After you finish


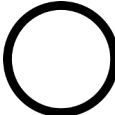

If you are instructed to return the component or optional device, follow all packaging instructions, and use any packaging materials for shipping that are supplied to you.

## Demo video

[Watch the procedure on YouTube](#)

## Install the RAID super capacitor module on the chassis

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

 <p><b>“Read the installation Guidelines”</b> on page 81</p>	 <p><b>“Power off the server for this task”</b> on page 12</p>	 <p><b>“ATTENTION: Static Sensitive Device</b> Ground package before opening” on page 84</p>
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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:

- 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.

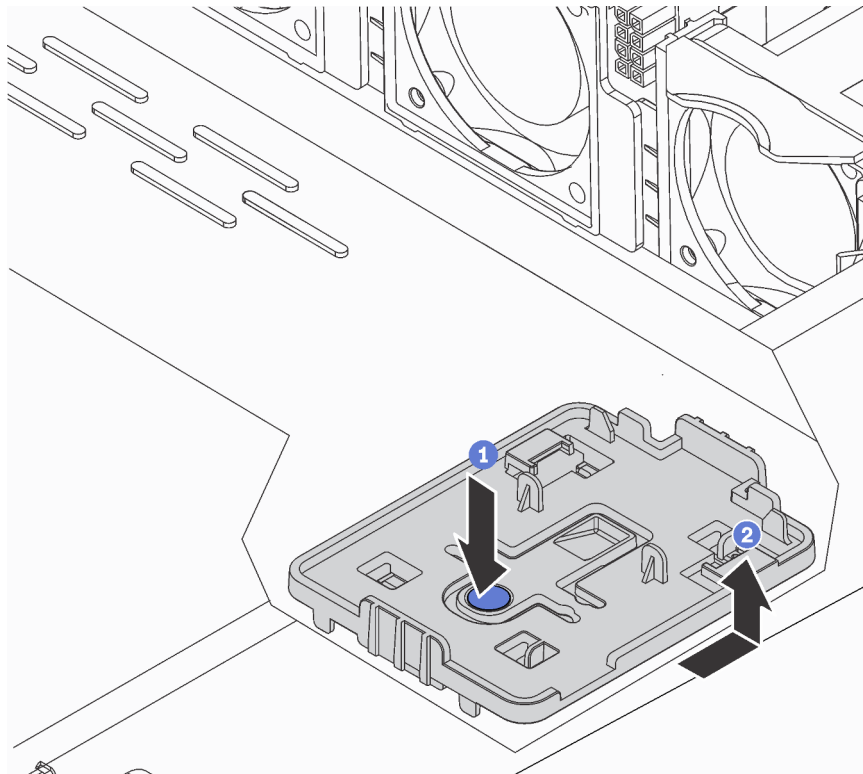


Figure 160. Tray removal

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

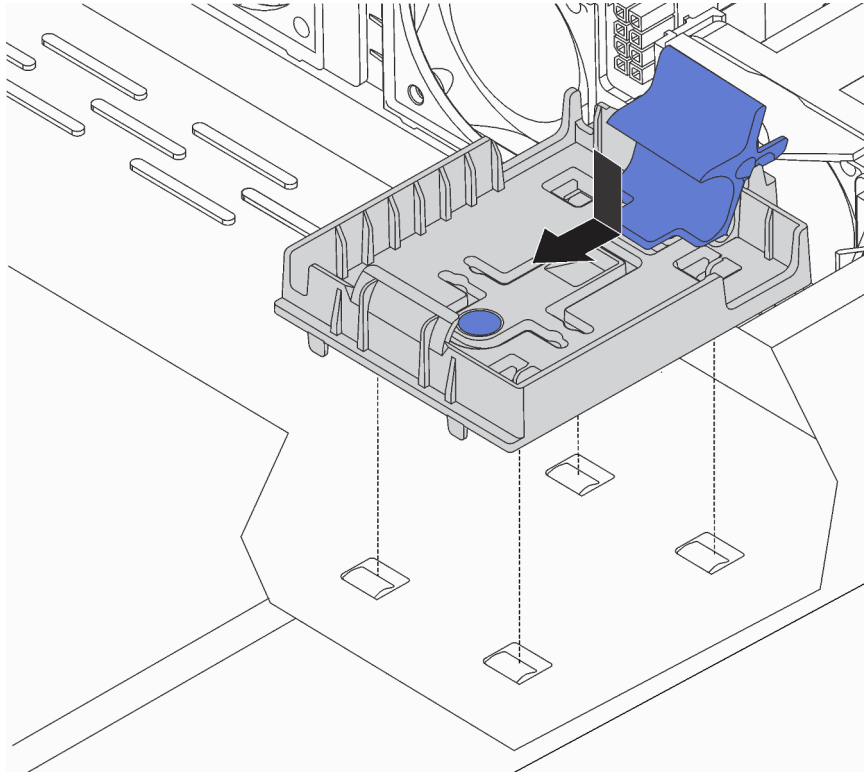


Figure 161. RAID super capacitor module holder installation

- 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.

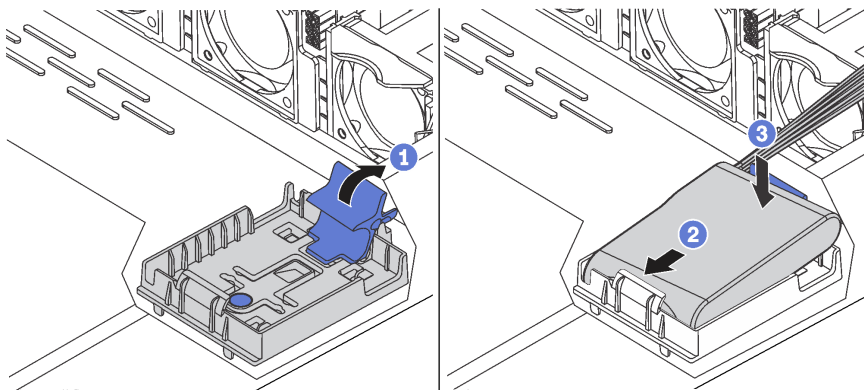


Figure 162. Installation of the RAID super capacitor module on the chassis

## After you finish

1. Connect the super capacitor module to an adapter with the extension cable that comes with the super capacitor module. See [“Super capacitor cable routing” on page 70](#).
2. Complete the parts replacement. See [“Complete the parts replacement” on page 202](#).

## Demo video


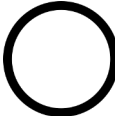

[Watch the procedure on YouTube](#)

## 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.

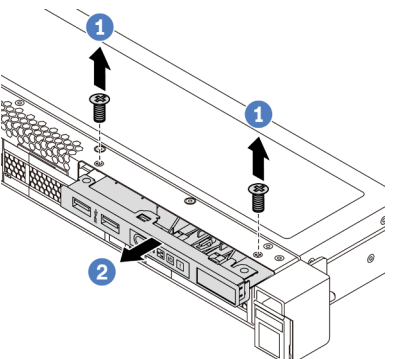
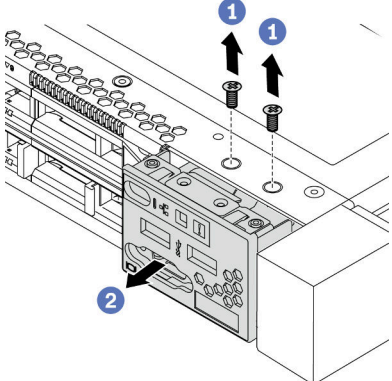
	<b>"Read the installation Guidelines" on page 81</b>		<b>"Power off the server for this task" on page 12</b>		<b>"ATTENTION: Static Sensitive Device"</b> Ground package before opening" on page 84
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Before removing the front I/O assembly:

1. Remove the top cover. See ["Remove the top cover" on page 94](#).
2. If the security bezel is installed, remove it. See ["Remove the security bezel" on page 103](#).
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:

Table 15. Front I/O assembly removal

 <p>Figure 163. Server models with four 3.5-inch drive bays</p>	 <p>Figure 164. Server models with eight/ten 2.5-inch drive bays</p>
---	---

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.

### After you finish

If you are instructed to return the component or optional device, follow all packaging instructions, and use any packaging materials for shipping that are supplied to you.


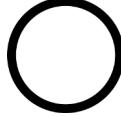

### Demo video

[Watch the procedure on YouTube](#)



## Install the front I/O assembly

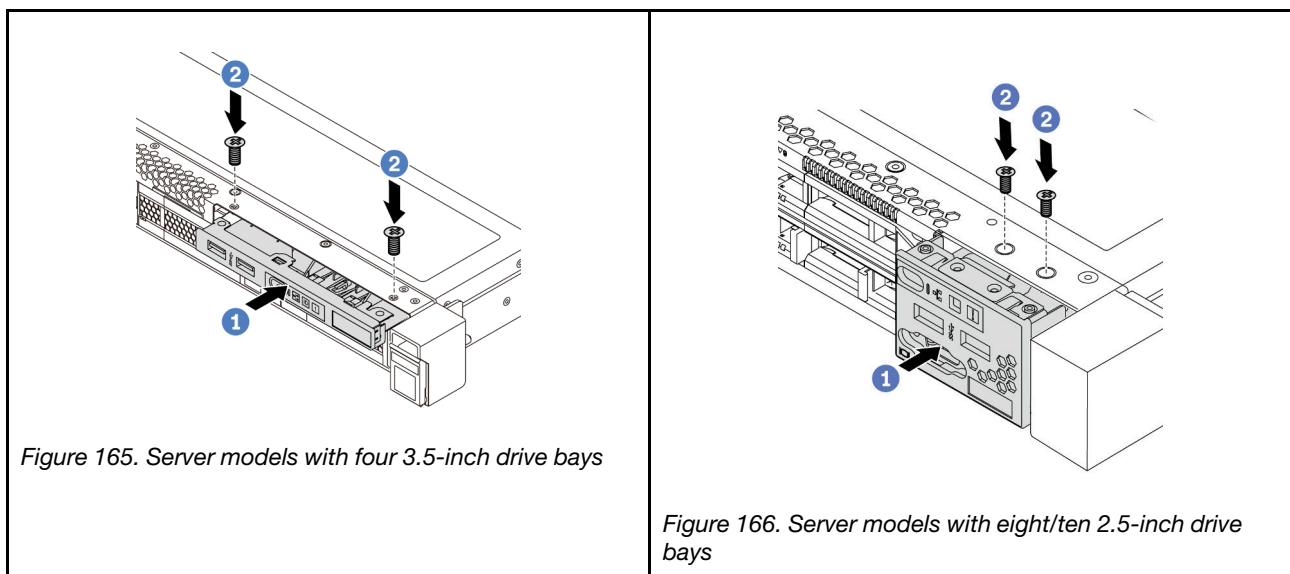
Use this information to install the front I/O assembly.

 <p><b>“Read the installation Guidelines”</b> on page 81</p>	 <p><b>“Power off the server for this task”</b> on page 12</p>	 <p><b>“ATTENTION: Static Sensitive Device</b> Ground package before opening” on page 84</p>
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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:

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 you finish

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 22](#).
2. Complete the parts replacement. See [“Complete the parts replacement” on page 202](#).

### Demo video

[Watch the procedure on YouTube](#)

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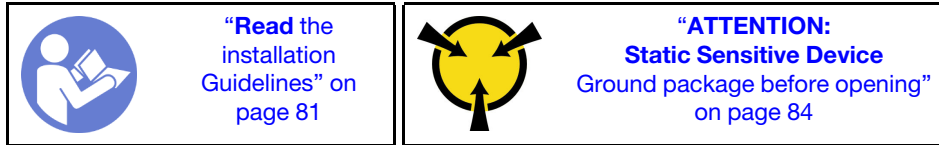
## Hot-swap power supply replacement

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.



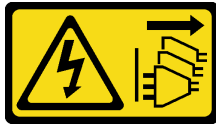
### S035



#### **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 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 any equipment that will be attached to this product to properly wired outlets .
- 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. 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. Remove power cords from outlet.
3. Remove signal cables from connectors.
4. Remove all cables from devices.



Figure 167. 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.

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

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:

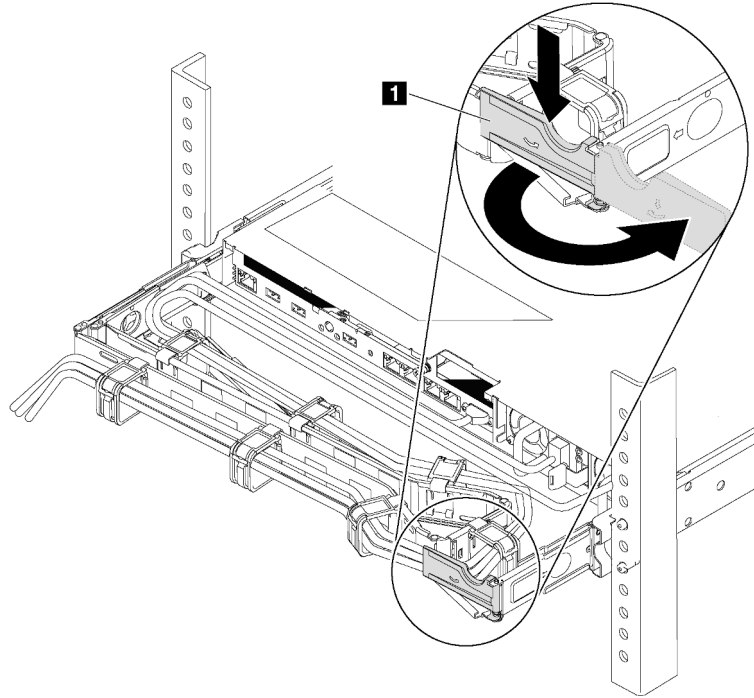


Figure 168. CMA adjustment

- 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.

- For ac power supply units, disconnect both ends of the power cord and keep it in an ESD-safe place.
- For 240 V dc power supply units, turn off the server, and then disconnect both ends of the power cord and keep it in an ESD-safe place.
- For –48V dc power input:
  1. Disconnect the power cords from the electrical outlet.
  2. Use a slotted screwdriver to loosen the captive screws on the power supply terminal block.
  3. Disconnect the power cords from the power supply unit, make the wire terminal insulated, and keep them in an ESD-safe place.

**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 20](#).

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

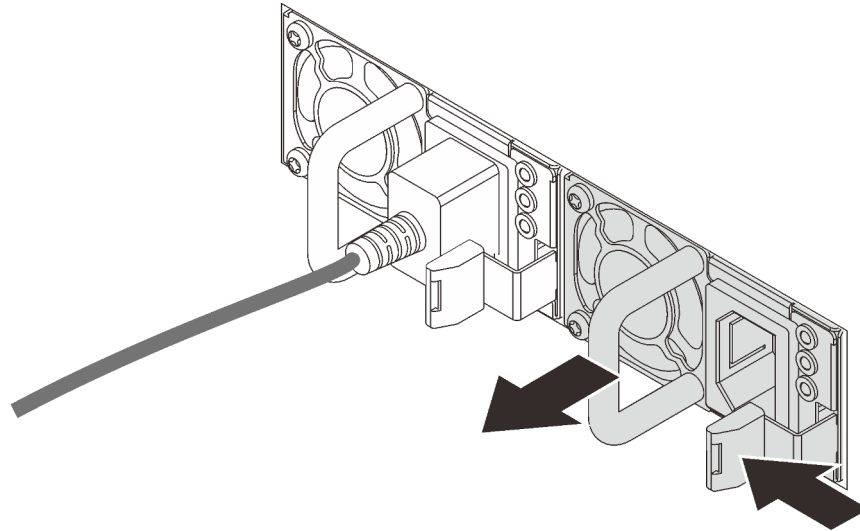


Figure 169. Hot-swap power supply removal

## After you finish

- 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 181](#).

**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.



- If you are instructed to return the component or optional device, follow all packaging instructions, and use any packaging materials for shipping that are supplied to you.

## Demo video

[Watch the procedure on YouTube](#)

## Install a hot-swap power supply

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

 <p><b>“Read the installation Guidelines” on page 81</b></p>	 <p><b>“ATTENTION: Static Sensitive Device</b> Ground package before opening” on page 84</p>
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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 <https://serverproven.lenovo.com/>

**Notes:**

- Ensure that the two power supplies installed on the server have the same wattsage.
- If you are replacing the existing power supply with a new power supply of different wattsage, attach the power rating label that comes with this option onto the existing label on the top cover near the power supply.



Figure 170. 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 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 any equipment that will be attached to this product to properly wired outlets .**
- **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. 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. 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:**

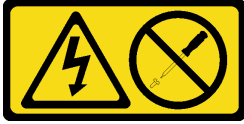
**240 V dc input (input range: 180-300 V dc) is supported in Chinese Mainland ONLY. Power supply with 240 V dc input cannot support hot plugging power cord function. Before removing the power supply with dc input, please turn off server or disconnect dc power sources at the breaker panel or by turning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

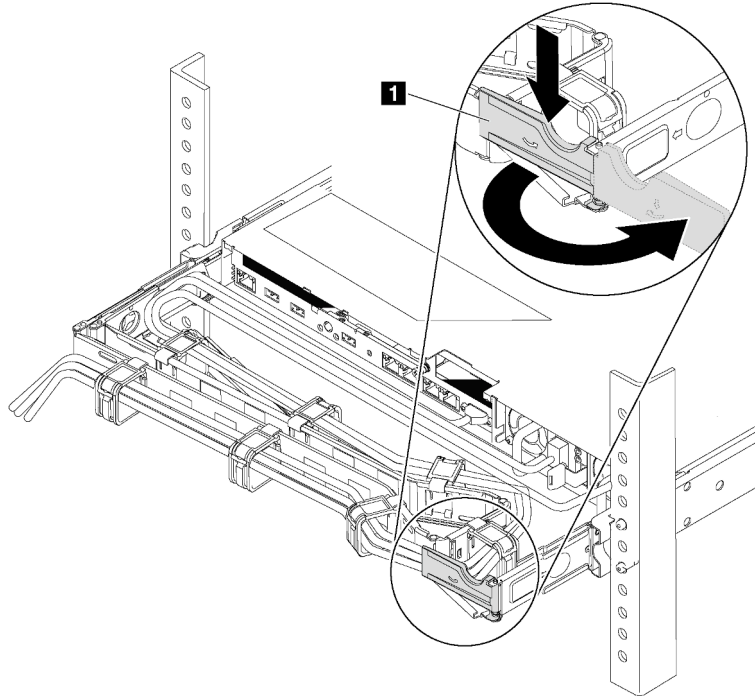
Before installing a hot-swap power supply, touch the static-protective package that contains the new hot-swap power supply to any unpainted surface on the outside of the server. Then, take the new hot-swap power supply out of the package and place it on a static-protective surface.

See [“Technical rules for power supply” on page 87](#) before you install the power supply.

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

- 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:

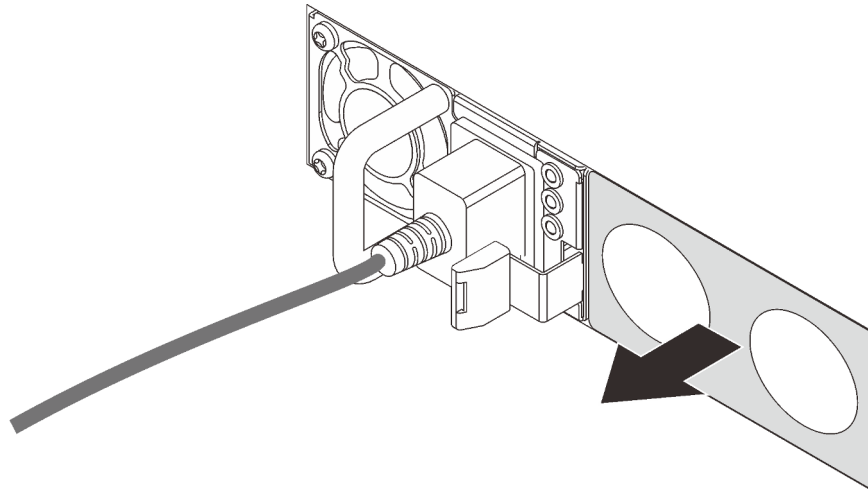




*Figure 171. CMA adjustment*

- 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 172. 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.

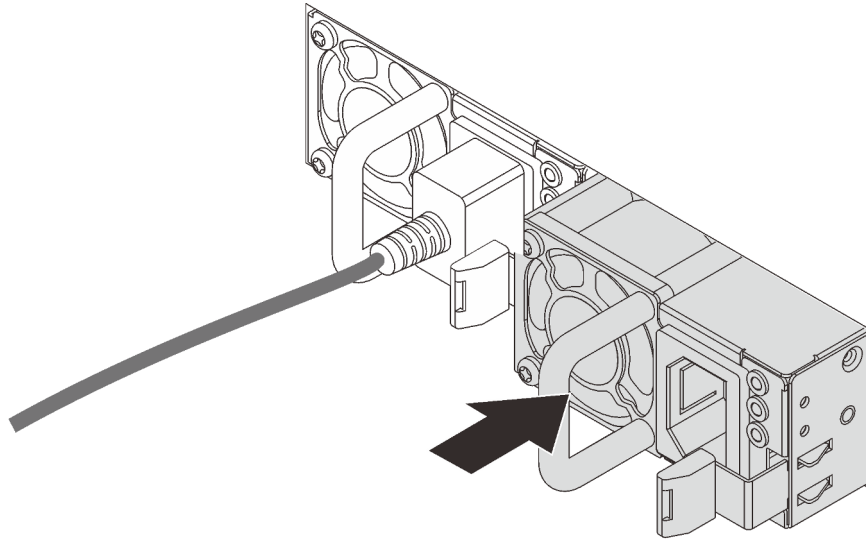


Figure 173. Hot-swap power supply installation

## After you finish

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.

## Demo video

[Watch the procedure on YouTube](#)

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## Heat sink and microprocessor replacement

Use this information to remove and install a heat sink and microprocessor.

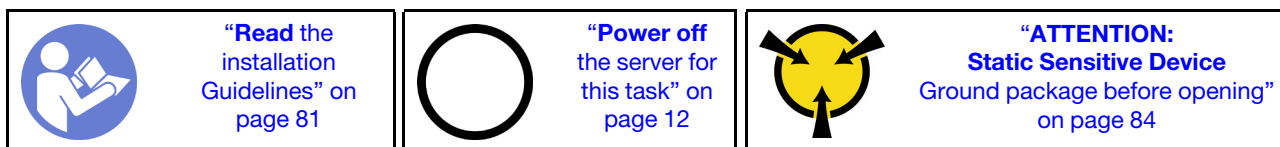
**Attention:** Before reusing a processor or heat sink, make sure you use Lenovo proven alcohol cleaning pad and thermal grease.

Depending on your configuration, refer to the specific topics to remove or install the heat sink and processor:

- [“Remove a heat sink” on page 186](#)
- [“Remove a processor” on page 188](#)
- [“Install a heat sink” on page 189](#)
- [“Install a processor” on page 188](#)

## Remove a heat sink

Use this information to remove a heat sink.



### 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 94](#).
- Remove the air baffle. See [“Remove the air baffle” on page 97](#).
- 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:

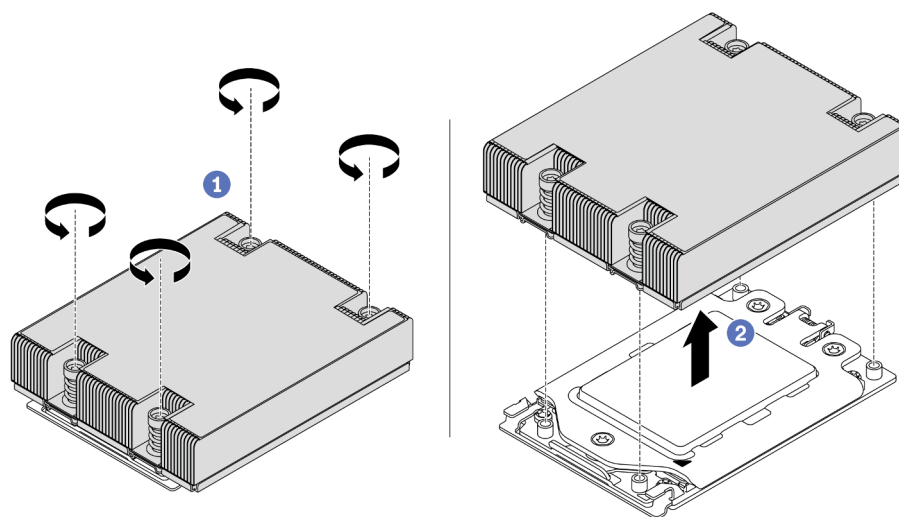


Figure 174. Removing a heat sink

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 you finish


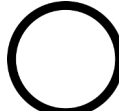

- If you are replacing a heat sink, install a new heat sink. See [“Install a heat sink” on page 189](#).
- If you are replacing a processor, remove the processor. See [“Remove a processor” on page 188](#).
- If you are instructed to return the component or optional device, follow all packaging instructions, and use any packaging materials for shipping that are supplied to you.

## Demo video

[Watch the procedure on YouTube](#)

## Remove a processor

Use this information to remove a processor.

 <p><b>“Read the installation Guidelines”</b> on page 81</p>	 <p><b>“Power off the server for this task”</b> on page 12</p>	 <p><b>“ATTENTION: Static Sensitive Device</b> Ground package before opening” on page 84</p>
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**Attention:** The system will load factory default UEFI settings when the processor is removed. Back up the UEFI setting before processor removal.

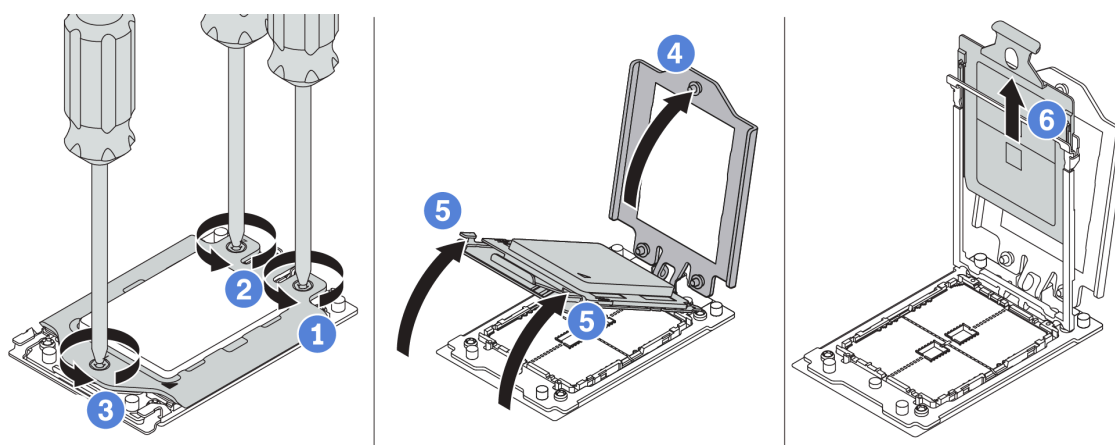


Figure 175. Removing a processor

- 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 you finish

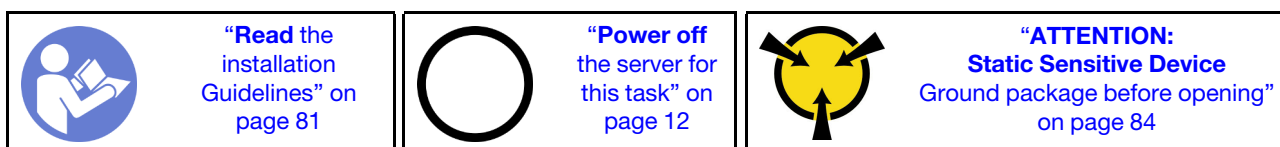
After removing the processor, install a new processor by referring to [“Install a processor”](#) on page 188.

## Demo video

[Watch the procedure on YouTube](#)

## Install a processor

Use this information to install a processor.



### Notes:

- See <https://serverproven.lenovo.com/> for a list of processors supported for your server. All processors on the system board must have the same speed, number of cores, and frequency.
- Before you install a new processor, update your system firmware to the latest level. See [“Firmware updates” on page 9](#).
- Optional devices available for your system might have specific processor requirements. See [“Technical rules” on page 86](#).

To install a processor, complete the following steps:

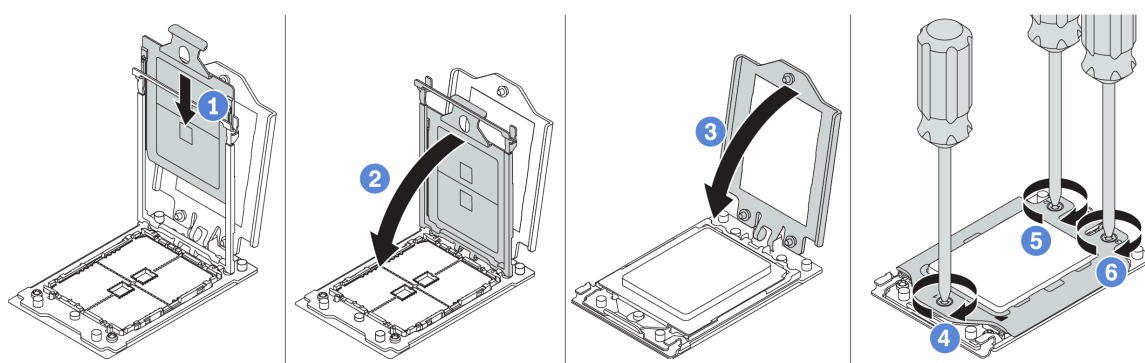


Figure 176. Installing a processor

- 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 you finish

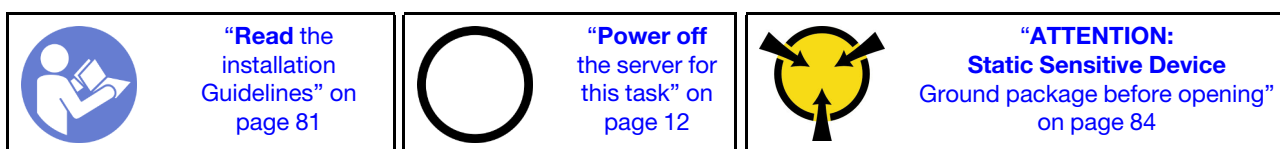
After installing a processor, install the heat sink by referring to [“Install a heat sink” on page 189](#).

### Demo video

[Watch the procedure on YouTube](#)

### Install a heat sink

Use this information to install a heat sink.



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 Lenovo proven thermal grease 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.

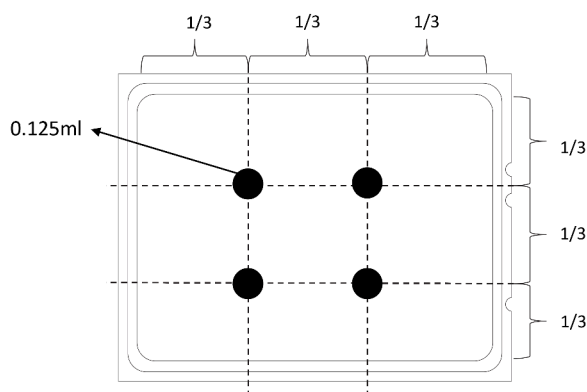


Figure 177. Applying thermal grease

- 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:

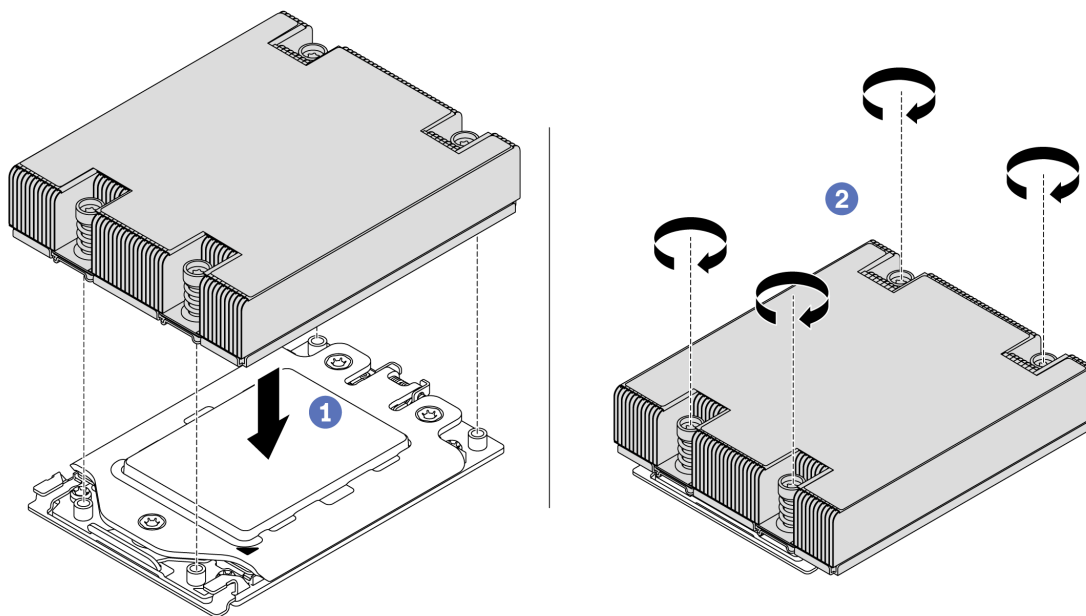


Figure 178. Installing a heat sink

- 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 you finish

1. Install the air baffle. See [“Install the air baffle” on page 98](#).
2. Install any parts that you have removed.
3. Complete the parts replacement. See [“Complete the parts replacement” on page 202](#).

## Demo video

[Watch the procedure on YouTube](#)


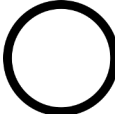

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## Fan board replacement

Use this information to remove and install the fan board.

### Remove the fan board

Use this information to remove the fan board.

 <p><b>“Read the installation Guidelines” on page 81</b></p>	 <p><b>“Power off the server for this task” on page 12</b></p>	 <p><b>“ATTENTION: Static Sensitive Device</b> Ground package before opening” on page 84</p>
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Before removing the fan board:

1. Remove the top cover. See [“Remove the top cover” on page 94](#).
2. If your server comes with an air baffle, remove it first. See [“Remove the air baffle” on page 97](#).
3. Remove system fans. See [“Remove a system fan” on page 106](#).
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:

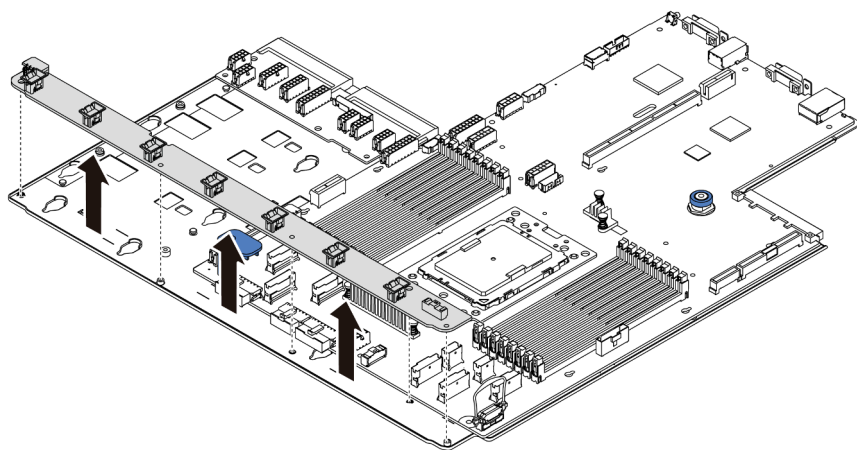


Figure 179. Fan board removal

Step 1. Remove the five screws from the fan board.

Step 2. Gently hold and lift the fan board from the system board tray.

## After you finish


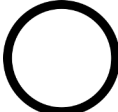

If you are instructed to return the component or optional device, follow all packaging instructions, and use any packaging materials for shipping that are supplied to you.

## Demo video

[Watch the procedure on YouTube](#)

## Install the fan board

Use this information to install the fan board.

 <p><b>“Read the installation Guidelines” on page 81</b></p>	 <p><b>“Power off the server for this task” on page 12</b></p>	 <p><b>“ATTENTION: Static Sensitive Device</b> Ground package before opening” on page 84</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:



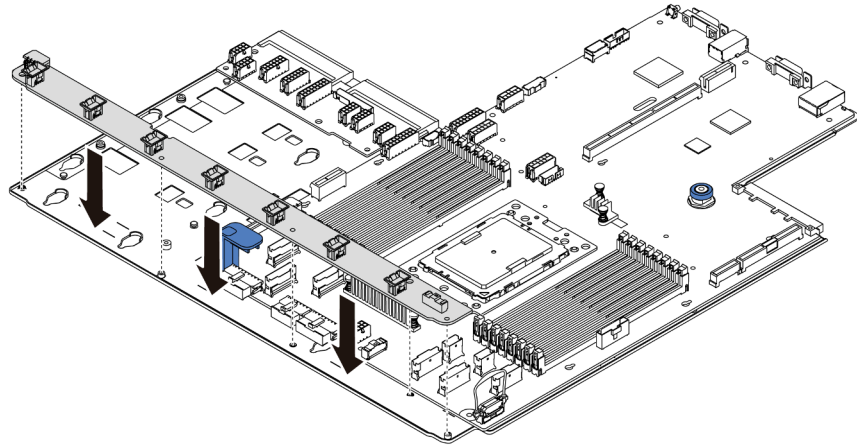


Figure 180. Fan board installation

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 you finish

1. Install the system fans. See [“Install a system fan” on page 108](#).
2. Connect the fan board power cable, and other cables you disconnected before. See [“Power/Sideband cable routing” on page 28](#).
3. Complete the parts replacement. See [“Complete the parts replacement” on page 202](#).

## Demo video

[Watch the procedure on YouTube](#)




---

## Power inverter board (PIB) 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><b>“Read the installation Guidelines” on page 81</b></p>	 <p><b>“Power off the server for this task” on page 12</b></p>	 <p><b>“ATTENTION: Static Sensitive Device</b> Ground package before opening” on page 84</p>
---	---	--

Before removing the PIB board:

1. Remove the top cover. See [“Remove the top cover” on page 94](#).
2. If your server comes with an air baffle, remove it first. See [“Remove the air baffle” on page 97](#).
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:

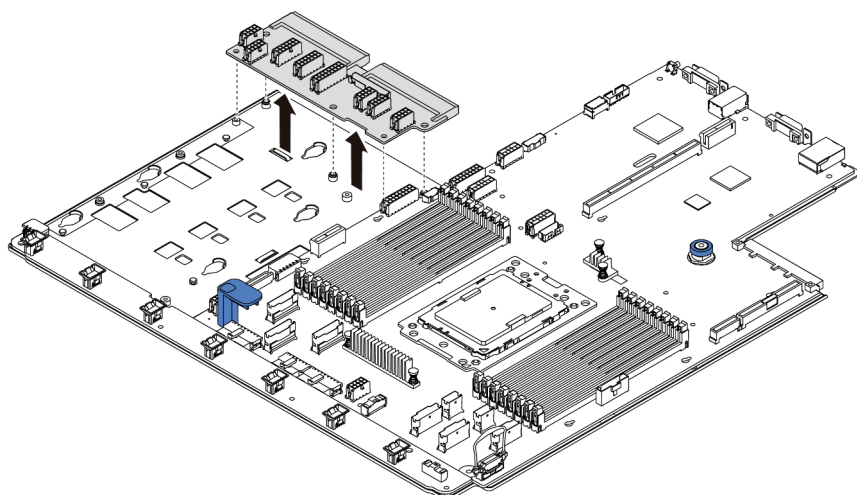


Figure 181. PIB board removal

- Step 1. Remove the five screws from the PIB board.
- Step 2. Gently hold and lift the PIB board from the system board tray.

## After you finish


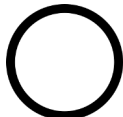

If you are instructed to return the component or optional device, follow all packaging instructions, and use any packaging materials for shipping that are supplied to you.

## Demo video

[Watch the procedure on YouTube](#)

## Install the PIB board

Use this information to install the PIB board.

 <p><b>“Read the installation Guidelines”</b> on page 81</p>	 <p><b>“Power off the server for this task”</b> on page 12</p>	 <p><b>“ATTENTION: Static Sensitive Device</b> Ground package before opening” on page 84</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:

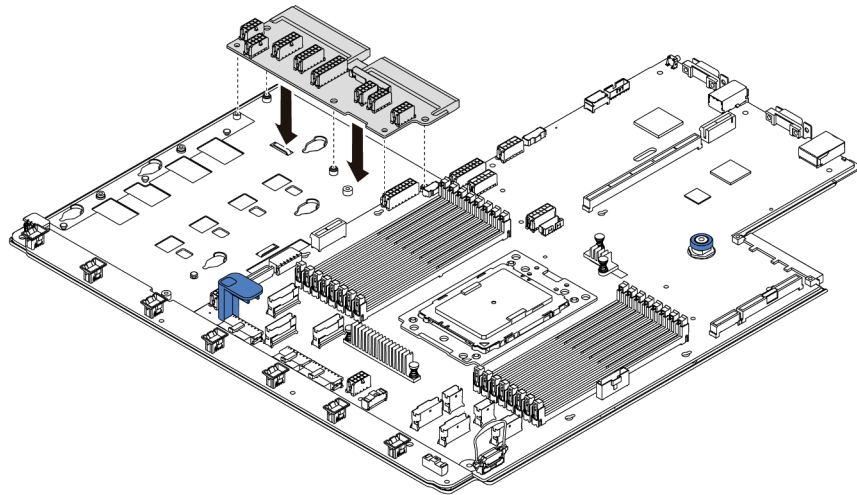


Figure 182. PIB board installation

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 you finish

1. Connect all the cables from the PIB board. See [“Power/Sideband cable routing”](#) on page 28.
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 202.

### Demo video

[Watch the procedure on YouTube](#)

---

## System board replacement (trained technician only)

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.

 <p><b>“Read the installation Guidelines”</b> on page 81</p>	 <p><b>“Power off the server for this task”</b> on page 12</p>	 <p><b>“ATTENTION: Static Sensitive Device</b> Ground package before opening” on page 84</p>
---	---	--

Before removing the system board:

1. Remove the top cover. See [“Remove the top cover” on page 94](#).
2. If your server comes with an air baffle, remove it first. See [“Remove the air baffle” on page 97](#).
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 81](#).
  - 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:

**Note:** Depending on the model, the blue lift handle on your system board might look slightly different from the illustration below.

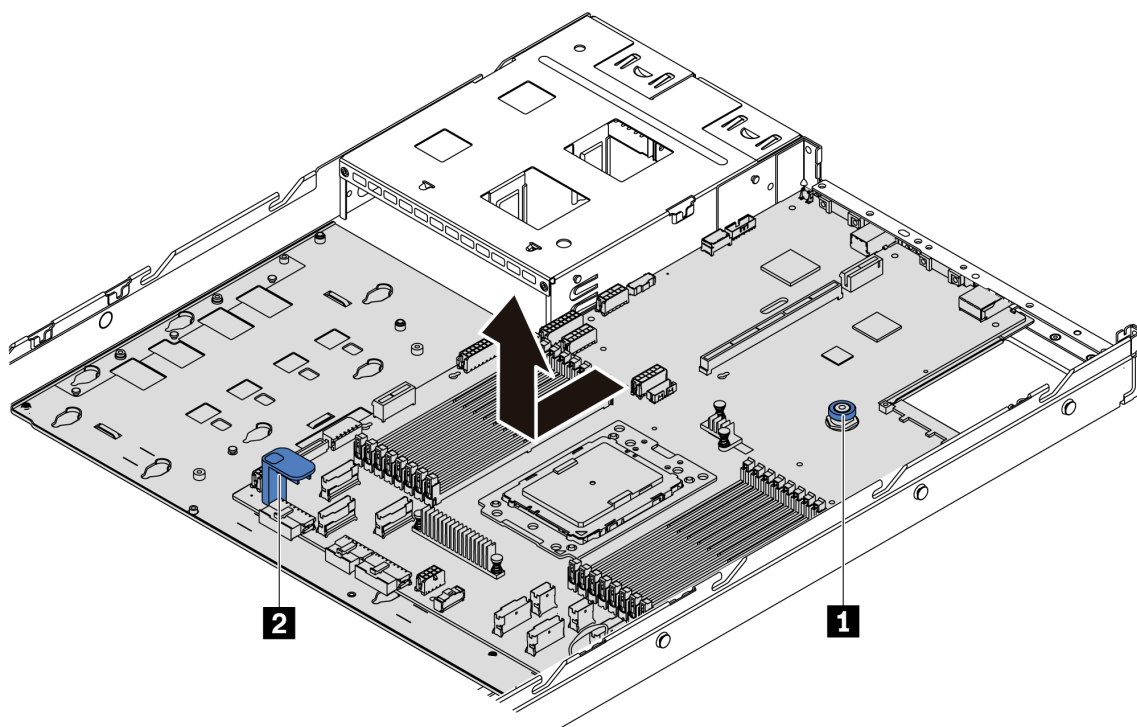


Figure 183. System board removal

- 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.

## After you finish

- If you are instructed to return the component or optional device, follow all packaging instructions, and use any packaging materials for shipping that are supplied to you.

**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.

- If you are planning to recycle the system board, follow the instructions in [“Disassembling the system board for recycle” on page 221](#) for compliance with local regulations.

## Demo video

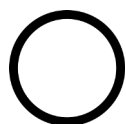
[Watch the procedure on YouTube](#)

## Install the system board

Use this information to install the system board.



**“Read the  
installation  
Guidelines” on  
page 81**



**“Power off  
the server for  
this task” on  
page 12**



**“ATTENTION:  
Static Sensitive Device  
Ground package before opening”  
on page 84**

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:

**Note:** Depending on the model, the blue lift handle on your system board might look slightly different from the illustration below.

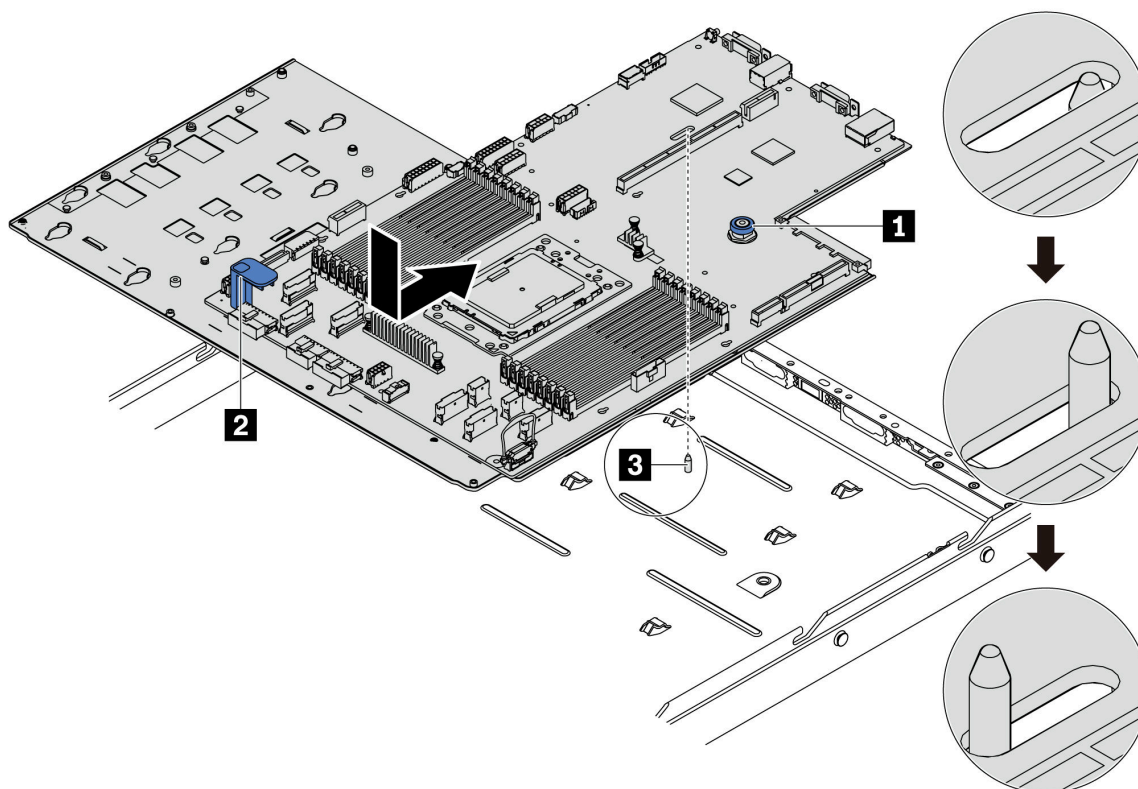


Figure 184. System board installation

- 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 you finish

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 81](#)
  - 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 VPD. See [“Update VPD” on page 199](#)
    - (Required) Machine type
    - (Required) Serial number
    - (Optional) Asset tag
    - (Optional) UUID
  4. Enable TPM. See [“Enable TPM” on page 200](#).
  5. Optionally, enable Secure Boot.

#### Demo video

[Watch the procedure on YouTube](#)

## Update the Vital Product Data (VPD)

Use this topic to update the Vital Product Data (VPD).

VPD to be updated after system board replacement:

- (Required) Machine type
- (Required) Serial number
- (Optional) Asset tag
- (Optional) UUID

#### Recommended tools:

- Lenovo XClarity Provisioning Manager
- Lenovo XClarity Essentials OneCLI commands

#### Using Lenovo XClarity Provisioning Manager

**Note:** Only when both **machine type** and **serial number** are null can they be updated. If they are not null, update cannot be realised.

#### Steps:

1. Start the server and press the key specified in the on-screen instructions. The Lenovo XClarity Provisioning Manager interface is displayed by default.
2. Choose **System Summary**. The “System Summary” tab page is displayed.
3. Click **Update VPD**, and then follow on-screen instructions to update the VPD.



## Using Lenovo XClarity Essentials OneCLI commands

- Updating **machine type**

```
onecli config set VPD.SKU <m/t_model> [access_method]
```

- Updating **serial number**

```
onecli config set VPD.SerialNumber <s/n> [access_method]
```

- Updating **asset tag**

```
onecli config set VPD.AssetId <asset_tag> [access_method]
```

- Updating **UUID**

```
onecli config set VPD.UUID <uuid_value> [access_method]
```

Variable	Description
<m/t_model>	The server machine type and model number. Type xxxxyyy, where xxxx is the machine type and yyy is the server model number.
<s/n>	The serial number on the server. Type zzzzzzz, where zzzzzzz is the serial number.
<asset_tag>	The server asset tag number. Type aaaaaaaaaaaaaaaaaaaaaaaaaaaaaa, where aaaaaaaaaaaaaaaaaaaaaaaaaaaaaa is the asset tag number.
<uuid_value>	The Universal Unique Identifier (UUID). Type the generated 16-byte hexadecimal value.
[access_method]	The access method that you select to access the target server. <ul style="list-style-type: none"><li>• Online KCS (unauthenticated and user restricted): You can directly delete [access_method] from the command.</li><li>• Online authenticated LAN: In this case, specify below LAN account information at the end of the OneCLI command:  --bmc-username &lt;user_id&gt; --bmc-password &lt;password&gt;</li><li>• Remote WAN/LAN: In this case, specify below account information and IP address at the end of the OneCLI command:  --bmc &lt;bmc_user_id&gt;:&lt;bmc_password&gt;@&lt;bmc_external_IP&gt;</li></ul> <b>Notes:</b> <ul style="list-style-type: none"><li>– &lt;bmc_user_id&gt; The BMC account name (1 of 12 accounts). The default value is USERID.</li><li>– &lt;bmc_password&gt; The BMC account password (1 of 12 accounts).</li></ul>

**Note:** In case of any problems in use, please refer to this tip: <https://datacentersupport.lenovo.com/us/en/solutions/ht512939>

## 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.

Complete the following steps to set the TPM policy.

- Step 1. Start the server and press the key according to the on-screen instructions to display the Lenovo XClarity Provisioning Manager interface.
- 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.

If the Physical Presence Policy is enabled, you can assert Physical Presence through hardware jumpers on the system board.

**Note:** If the Physical Presence Policy has been disabled: Set the hardware Physical Presence jumper on the system board to assert Physical Presence.

### 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 26](#).

## 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 201](#).

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 the key specified in the on-screen instructions 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 96](#).
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 9](#).
  - Reconfigure the disk arrays if you have installed or removed a hot-swap drive or a RAID adapter. See the Lenovo XClarity Provisioning Manager User Guide, which is available for download at: <https://pubs.lenovo.com/ixpm-overview/>

---

## 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 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*, which is available at:  
[https://thinksystem.lenovofiles.com/help/topic/7Y98/pdf\\_files.html](https://thinksystem.lenovofiles.com/help/topic/7Y98/pdf_files.html)

#### 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.

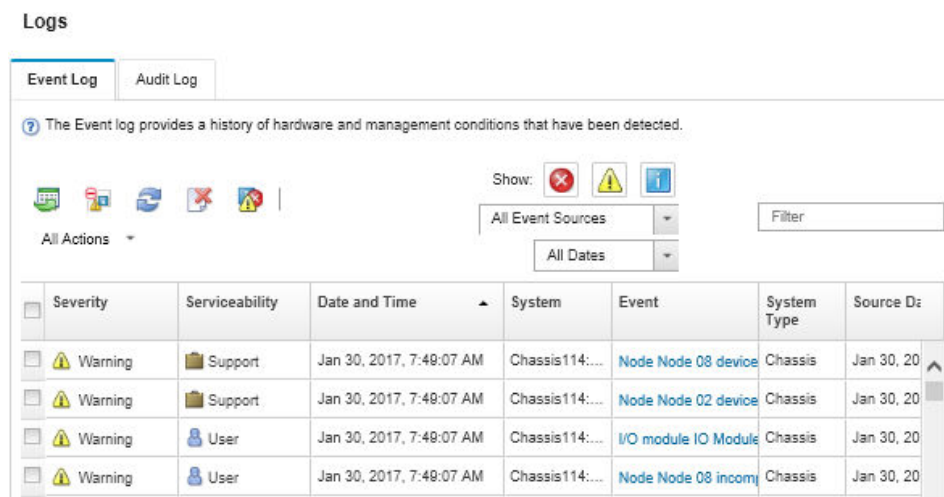


Figure 185. Lenovo XClarity Administrator event log

For more information about working with events from XClarity Administrator, see:

## 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 system management software and to system administrators and users to enable remote management and control of a server.

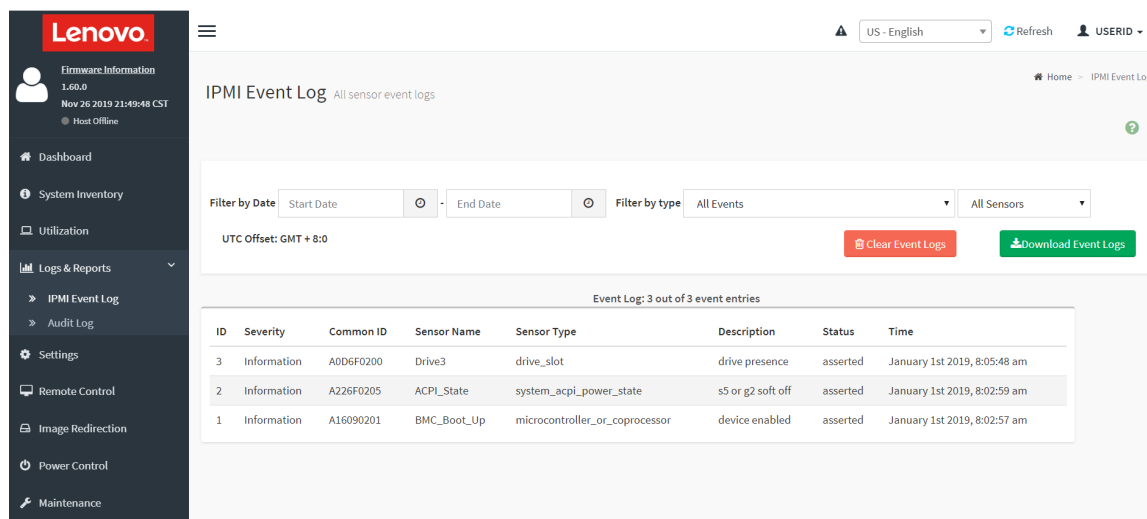


Figure 186. ThinkSystem System Manager event log

For more information about accessing the ThinkSystem System Manager event log, see:

[https://thinksystem.lenovofiles.com/help/topic/7Y00/bmc\\_user\\_guide.pdf](https://thinksystem.lenovofiles.com/help/topic/7Y00/bmc_user_guide.pdf)

---

## Light path diagnostics

Light path diagnostics is a system of LEDs on various external and internal components of the server that leads you to the failed component. When an error occurs, LEDs are lit on the front I/O assembly, the rear panel, the system board, and the failed component. By viewing the following LEDs, you can often identify the system and device status and diagnose problems.

- “Operator information panel” on page 15
- “Rear view LEDs” on page 20
- “System board LEDs” on page 23

---

## 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 if applicable, 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 2](#).

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 203](#).

- 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 2](#) 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 Network 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 203](#).

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 224](#)).

## 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 207](#)
- [“The power-control button does not work, and the reset button does work \(server does not start\)” on page 207](#)
- [“Server does not power on” on page 207](#)
- [“Server does not power off” on page 208](#)

### Embedded hypervisor is not in the boot list

Complete the following steps until the problem is solved.

1. If the server has been installed, moved, or serviced recently, or if this is the first time the embedded hypervisor is being used, make sure that the device is connected properly and that there is no physical damage to the connectors.
2. See the documentation that comes with the optional embedded hypervisor flash device for setup and configuration information.
3. Check <https://serverproven.lenovo.com/> to validate that the embedded hypervisor device is supported for the server.
4. Make sure that the embedded hypervisor device is listed in the list of available boot options. From the management controller user interface, click **Server Configuration → Boot Options**.

For information about accessing the management controller user interface, see the ThinkSystem System Manager documentation:

[https://thinksystem.lenovofiles.com/help/topic/7Y00/bmc\\_user\\_guide.pdf](https://thinksystem.lenovofiles.com/help/topic/7Y00/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 1a and 1b.
    - 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 solved.

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 208](#)
- [“Multiple rows of DIMMs in a branch identified as failing” on page 209](#)

### **Displayed system memory is less than installed physical memory**

Complete the following steps until the problem is solved.

**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:
  - No error LEDs are lit on the operator information panel.
  - No DIMM error LEDs are lit on the system board.
  - Memory mirrored channel does not account for the discrepancy.
  - The memory modules are seated correctly.
  - You have installed the correct type of memory.
  - If you changed the memory, you updated the memory configuration in the Setup utility.
  - All banks of memory are enabled. The server might have automatically disabled a memory bank when it detected a problem, or a memory bank might have been manually disabled.
  - There is no memory mismatch when the server is at the minimum memory configuration.
2. 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. When you start a solution and press the key according to the on-screen instructions, the LXPM interface is displayed by default. (For more information, see the “Startup” section in the LXPM documentation)



compatible with your server at <https://pubs.lenovo.com/lxpm-overview/>.) You can perform memory diagnostics with 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, reseal 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 209
- “Multiple hard disk drives fail” on page 210
- “Multiple hard disk drives are offline” on page 210
- “A replacement hard disk drive does not rebuild” on page 210
- “Green hard disk drive activity LED does not represent actual state of associated drive” on page 211
- “Yellow hard disk drive status LED does not represent actual state of associated drive” on page 211

### 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 the key according to the on-screen instructions, the LXPM is displayed by default. (For more information, see the “Startup” section in the LXPM documentation compatible with your server at <https://pubs.lenovo.com/lxpm-overview/>.) You can perform hard drive diagnostics from this interface. From the Diagnostic page, click **Run Diagnostic → HDD test/Disk Drive Test**.
  - If the green activity LED is flashing and the yellow status LED is flashing slowly, the drive is recognized by the controller and is rebuilding.

- If neither LED is lit or flashing, check 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 the key according to the on-screen instructions, the LXPM is displayed by default. (For more information, see the “Startup” section in the LXPM documentation compatible with your server at <https://pubs.lenovo.com/lxpm-overview/>.) You can perform hard drive diagnostics from this interface. From the Diagnostic page, click **Run Diagnostic → HDD test/Disk Drive Test**.

Based on those tests:

- If the 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 the key according to the on-screen instructions, the LXPm is displayed by default. (For more information, see the “Startup” section in the LXPm documentation compatible with your server at <https://pubs.lenovo.com/lxpm-overview/>.) You can perform hard drive diagnostics from this interface. From the Diagnostic page, click **Run Diagnostic → HDD test/Disk Drive 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.

**Note:** \*Depending on the LXPm version, you may see **HDD test** or **Disk Drive Test**.

## **Monitor and video problems**

Use this information to solve problems related to a monitor or video.

- [“Incorrect characters are displayed” on page 211](#)
- [“Screen is blank” on page 211](#)
- [“Screen goes blank when you start some application programs” on page 212](#)
- [“The monitor has screen jitter, or the screen image is wavy, unreadable, rolling, or distorted” on page 212](#)
- [“The wrong characters appear on the screen” on page 212](#)

### **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 9](#).

### **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 memory modules installed in the server are the same type.
5. 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.
6. Make sure that the correct server is controlling the monitor, if applicable.
  7. Make sure that corrupted server firmware is not affecting the video; see [“Firmware updates” on page 9](#).
  8. Observe the checkpoint LEDs on the system board; if the codes are changing, go to step 6.
  9. 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 9](#).

## **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 213](#)

- “Mouse does not work” on page 213
- “USB-device does not work” on page 213

#### **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 the key according to the on-screen instructions to display the system setup interface. (For more information, see the “Startup” section in the LXPM documentation compatible with your server at <https://pubs.lenovo.com/lxpm-overview/>.) 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 213
- “PCIe adapter is not recognized or is not functioning” on page 214
- “A Lenovo optional device that worked previously does not work now. ” on page 214
- “A Lenovo optional device that was just installed does not work” on page 214
- “A Lenovo optional device that worked previously does not work now. ” on page 214

#### **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 <https://serverproven.lenovo.com/>).
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 <https://serverproven.lenovo.com/>).
  - You followed the installation instructions that came with the device and the device is installed correctly.
  - You have not loosened any other installed devices or cables.
  - You updated the configuration information in system setup. When you start a server and press the key according to the on-screen instructions to display the Setup Utility. (For more information, see the “Startup” section in the LXPM documentation compatible with your server at <https://pubs.lenovo.com/lxpm-overview/>.) 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 215
- “Serial device does not work” on page 215

### 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 215](#)
- [“Intermittent KVM problems” on page 215](#)
- [“Intermittent unexpected reboots” on page 216](#)

### 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 the key according to the on-screen instructions to display the system setup interface. (For more information, see the “Startup” section in the LXPM documentation compatible with your server at <https://pubs.lenovo.com/lxpm-overview/>.) 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 server. 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 server.
3. Test the console breakout cable on a working server 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 uncorrectable 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 203](#) 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 216](#)
- [“Could not log in using LDAP account with SSL enabled” on page 217](#)

**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 2](#)).
  - 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 217
- “Server is unresponsive (POST is complete and operating system is running)” on page 217
- “Server is unresponsive (POST failed and cannot start System Setup)” on page 218
- “Voltage system board fault is displayed in the event logs” on page 218
- “Unusual smell” on page 219
- “Server seems to be running hot” on page 219
- “Cannot enter legacy mode after installing a new adapter” on page 219
- “Cracked parts or cracked chassis” on page 219

### **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 <https://serverproven.lenovo.com/>.

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 (POST failed and cannot 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.

You can specify the number of consecutive restart attempts in System Setup. Restart the server and press the key according to the on-screen instructions to display the LXPM system setup interface. (For more information, see the “Startup” section in the LXPM documentation compatible with your server at <https://pubs.lenovo.com/lxpm-overview/>.) Then, click **System Settings → Recovery and RAS → POST Attempts → POST Attempts Limit**. Available options are 3, 6, 9, and disable.

### **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/7Y00/bmc\\_user\\_guide.pdf](https://thinksystem.lenovofiles.com/help/topic/7Y00/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 2 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 2](#)).
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.

### Cannot enter legacy mode after installing a new adapter

Complete the following procedure to solve the problem.

1. Go to **UEFI Setup → Devices and I/O Ports → Set Option ROM Execution Order**.
2. Move the RAID adapter with operation system installed to the top of the list.
3. Select **Save**.
4. Reboot the system and auto boot to operation system.

### 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.



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## Appendix A. Hardware disassembling for recycle

Follow the instructions in this section to recycle components with compliance with local laws or regulations.

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### Disassembling the system board for recycle

Follow the instructions in this section to disassemble the system board before recycling.

Before disassembling the system board:

1. Remove the system board from the server (see [“Remove the system board” on page 196](#)).
2. Refer to local environmental, waste or disposal regulations to ensure compliance.

Complete the following steps to disassemble the system board:

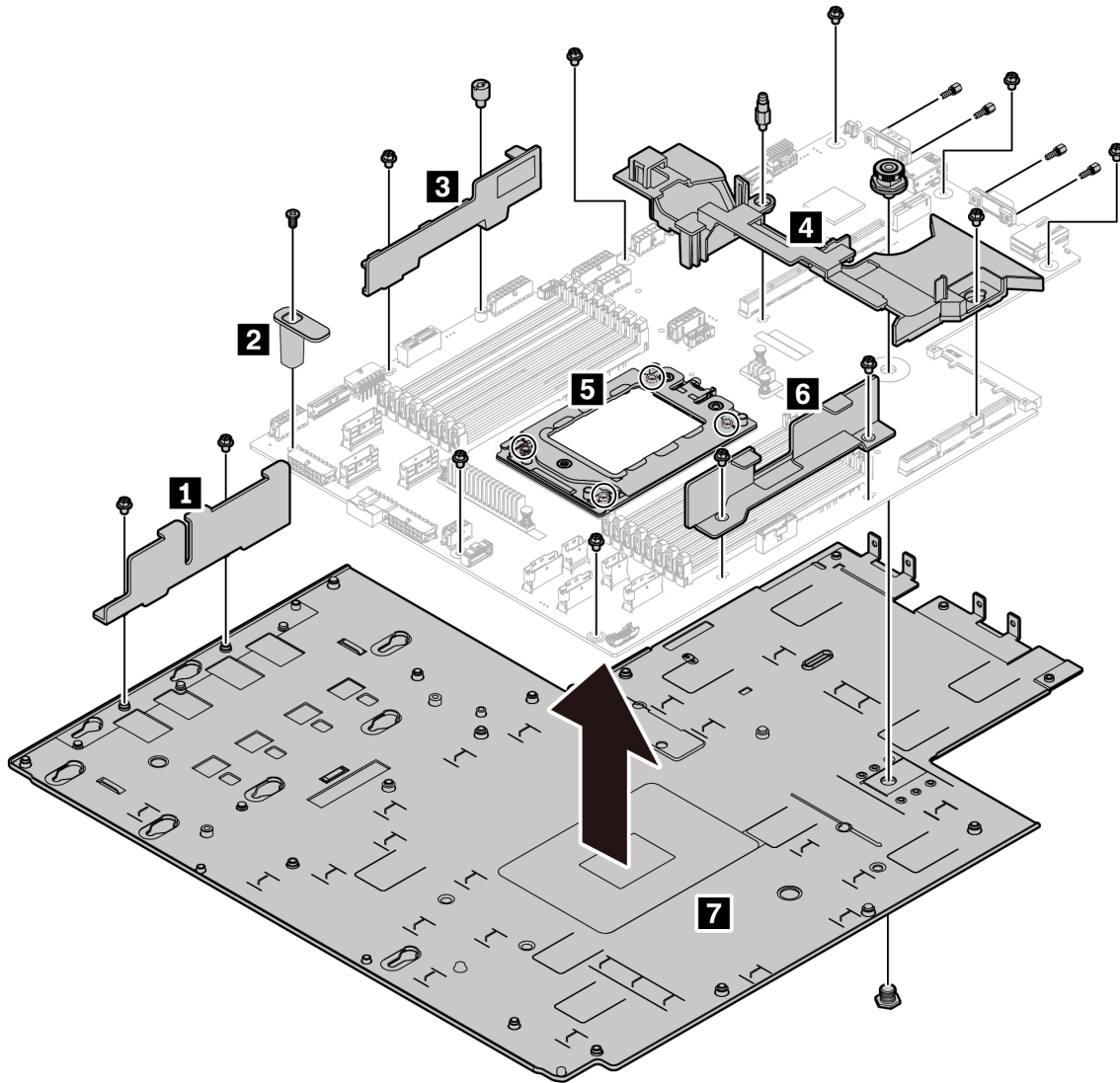


Figure 187. Disassembling the system board

Step 1. Remove the following screws as illustrated:

- 13 slotted screws (with PH2 screwdriver)
- One round standoff (with 0.5 mm flathead screwdriver)
- One guiding pin standoff (with 6 mm wrench)
- One plunger (with 11 mm and 16 mm wrench)
- Four T20 screws on the CPU socket (with T20 screwdriver)
- Four hexagon bolts on VGA and COM (RS232) connectors (with 5 mm wrench)

Step 2. Separate the components **1 2 3 4 5 6 7** from the system board.

After disassembling the system board, comply with local regulations when recycling.

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## Appendix B. 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:** IBM is Lenovo's preferred service provider for ThinkSystem.

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### 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:

You can find the product documentation for your ThinkSystem products at <https://pubs.lenovo.com/>

You can take these steps to try to solve the problem yourself:

- Check all cables to make sure that they are connected.
- Check the power switches to make sure that the system and any optional devices are turned on.
- Check for updated software, firmware, and operating-system device drivers for your Lenovo product. The Lenovo Warranty terms and conditions state that you, the owner of the Lenovo product, are responsible for maintaining and updating all software and firmware for the product (unless it is covered by an additional maintenance contract). Your service technician will request that you upgrade your software and firmware if the problem has a documented solution within a software upgrade.
- If you have installed new hardware or software in your environment, check <https://serverproven.lenovo.com/> to make sure that the hardware and software 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](https://forums.lenovo.com/t5/Datacenter-Systems/ct-p/sv_eg) to see if someone else has encountered a similar problem.

#### Gathering information needed to call Support

If you 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://support.lenovo.com/servicerequest> to submit an Electronic Service Request. Submitting an Electronic Service Request will start the process of determining a solution to your problem by making the pertinent information available to the service technicians. The Lenovo service technicians can start working on your solution as soon as you have completed and submitted an Electronic Service Request.

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## Collecting service data

To clearly identify the root cause of a server issue or at the request of Lenovo Support, you might need collect service data that can be used for further analysis. Service data includes information such as event logs and hardware inventory.

Service data can be collected through the following tools:

- **Lenovo XClarity Provisioning Manager**

Use the Collect Service Data function of Lenovo XClarity Provisioning Manager to collect system service data. You can collect existing system log data or run a new diagnostic to collect new data.

- **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/7Y00/bmc\\_user\\_guide.pdf](https://thinksystem.lenovofiles.com/help/topic/7Y00/bmc_user_guide.pdf).

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## 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/supportphonelist> for your region support details.



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## Appendix C. Notices

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## Important notes

Processor speed indicates the internal clock speed of the microprocessor; other factors also affect application performance.

CD or DVD drive speed is the variable read rate. Actual speeds vary and are often less than the possible maximum.

When referring to processor storage, real and virtual storage, or channel volume, KB stands for 1 024 bytes, MB stands for 1 048 576 bytes, and GB stands for 1 073 741 824 bytes.

When referring to hard disk drive capacity or communications volume, MB stands for 1 000 000 bytes, and GB stands for 1 000 000 000 bytes. Total user-accessible capacity can vary depending on operating environments.

Maximum internal hard disk drive capacities assume the replacement of any standard hard disk drives and population of all hard-disk-drive bays with the largest currently supported drives that are available from Lenovo.

Maximum memory might require replacement of the standard memory with an optional memory module.

Each solid-state memory cell has an intrinsic, finite number of write cycles that the cell can incur. Therefore, a solid-state device has a maximum number of write cycles that it can be subjected to, expressed as total bytes written (TBW). A device that has exceeded this limit might fail to respond to system-generated commands or might be incapable of being written to. Lenovo is not responsible for replacement of a device that has exceeded its maximum guaranteed number of program/erase cycles, as documented in the Official Published Specifications for the device.

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Some software might differ from its retail version (if available) and might not include user manuals or all program functionality.

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## 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.

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## 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:

[https://pubs.lenovo.com/important\\_notices/](https://pubs.lenovo.com/important_notices/)

## Taiwan Region BSMI RoHS declaration

單元 Unit	限用物質及其化學符號 Restricted substances and its chemical symbols					
	鉛Lead (PB)	汞Mercury (Hg)	鎘Cadmium (Cd)	六價鉻 Hexavalent chromium (Cr <sup>6+</sup> )	多溴聯苯 Polybrominated biphenyls (PBB)	多溴二苯醚 Polybrominated diphenyl ethers (PBDE)
機架	○	○	○	○	○	○
外部蓋板	○	○	○	○	○	○
機械組零件	—	○	○	○	○	○
空氣傳動設備	—	○	○	○	○	○
冷卻組零件	—	○	○	○	○	○
內存模組	—	○	○	○	○	○
處理器模組	—	○	○	○	○	○
電纜組零件	—	○	○	○	○	○
電源供應器	—	○	○	○	○	○
儲備設備	—	○	○	○	○	○
電路卡	—	○	○	○	○	○
光碟機	—	○	○	○	○	○
<p>備考1. “超出0.1 wt %” 及 “超出0.01 wt %” 係指限用物質之百分比含量超出百分比含量基準值。  Note1 : “exceeding 0.1 wt%” and “exceeding 0.01 wt%” indicate that the percentage content of the restricted substance exceeds the reference percentage value of presence condition.</p> <p>備考2. “○” 係指該項限用物質之百分比含量未超出百分比含量基準值。  Note2 : “○” indicates that the percentage content of the restricted substance does not exceed the percentage of reference value of presence.</p> <p>備考3. “—” 係指該項限用物質為排除項目。  Note3 : The “—” indicates that the restricted substance corresponds to the exemption.</p>						

## Taiwan Region import and export contact information

Contacts are available for Taiwan Region import and export information.

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



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# Index

## A

- a server model with four 3.5-inch SAS/SATA drives 30
- air baffle
  - installing 98
  - removing 97
  - replacing 97
- assert
  - physical presence 201

## B

- backplane
  - replacing 134
- backplane for eight 2.5-inch hot-swap drives
  - removing 136
  - replacing 137
- backplane for four 3.5-inch hot-swap drives
  - removing 134
  - replacing 135
- backplane for ten 2.5-inch hot-swap drives
  - removing 138
  - replacing 139

## C

- cable routing
  - intrusion switch 74
  - M.2 module 70
  - super capacitor 70
  - VGA connector 72
- CMOS battery
  - install 146
  - remove 144
  - replacing 144
- collecting service data 224
- completing
  - parts replacement 202
- contamination, particulate and gaseous 8
- cover
  - installing 96
  - removing 94
  - replacing 94
- CPU
  - installing 188
  - replacing 186
- creating a personalized support web page 223
- custom support web page 223

## D

- devices, static-sensitive
  - handling 84
- DIMM
  - replacing 109
- disassembling 221

## E

- enable
  - TPM 200
- Ethernet
  - controller

- troubleshooting 205
- Ethernet controller problems
  - solving 205

## F

- fan board
  - installing 192
  - replacing 191
- fan error LED 23
- firmware updates 9
- front I/O assembly
  - installing 176
  - removing 175
  - replacing 175

## G

- gaseous contamination 8
- Getting help 223
- GPU
  - installing 134
  - removing 133
  - replacing 133
- graphic processing unit
  - installing 134
  - removing 133
- guidelines
  - options installation 81
  - system reliability 83

## H

- handling static-sensitive devices 84
- hard disk drive
  - installing 114
  - replacing 113
- hard disk drive problems 209
- hard disk drives
  - removing 113
- hardware service and support telephone numbers 224
- heat sink
  - installing 189
  - removing 186
  - replacing 186
- Heat sink and microprocessor
  - replacing 186
- help 223
- hot-swap drive
  - installing 114
  - replacing 113
- hot-swap drives
  - removing 113
- hot-swap power supply
  - installing 181
  - remove 177
  - replacing 176

## I

- ID label 1
- important notices 226
- install

- CMOS battery 146
- installation
  - guidelines 81
- installation guidelines 81
- installing
  - air baffle 98
  - CPU 188
  - fan board 192
  - front I/O assembly 176
  - GPU 134
  - graphic processing unit 134
  - hard disk drive 114
  - heat sink 189
  - hot-swap drive 114
  - hot-swap power supply 181
  - intrusion switch 132
  - memory module 111
  - microprocessor 188
  - middle drive cage 158
  - OCP 3.0 Ethernet adapter 117
  - PCIe adapter 128
  - PIB board 194
  - processor 188–189
  - rack latches 101
  - RAID super capacitor module on the chassis 173
  - rear backplane 142
  - rear hot-swap drive cage 151
  - riser card 123
  - security bezel 104
  - system board 197
  - system fan 108
  - top cover 96
  - TPM adapter 149
- insufficient PCIe resource
  - solving 213
- intermittent problems 215
- internal cable routing 27
- internal riser assembly
  - installing 119
  - removing 118
  - replacing 118
- introduction 1
- intrusion switch
  - installing 132
  - removing 131
  - replacing 131

## J

- jumper 26

## K

- keyboard problems 212

## L

- light path diagnostics 204

## M

- M.2 adapter and M.2 drive
  - installing 166
  - replacing 161
- memory
  - problems 208
- memory module
  - removing 109
- memory module error LED 23

- memory module, install 111
- memory modules
  - removal 109
- memory modules installation rules 84
- microprocessor
  - installing 188
  - replacing 186
- middle drive cage
  - replacing 155
- monitor problems 211
- mouse problems 212

## N

- network
  - problems 216
- network access label 1
- notes, important 226
- notices 225

## O

- observable problems 217
- OCP 3.0 Ethernet adapter
  - replacing 116
- optional-device problems 213

## P

- particulate contamination 8
- parts list 75
- parts replacement, completing 202
- PCIe
  - troubleshooting 213
- PCIe adapter
  - installing 128
  - removing 125
  - replacing 124
- physical presence 201
- PIB board
  - installing 194
  - replacing 193
- power
  - problems 216
- power cords 78
- power off the server 12
- power on the server 12
- power problems 205
- problems
  - Ethernet controller 205
  - hard disk drive 209
  - intermittent 215
  - keyboard 212
  - memory 208
  - monitor 211
  - mouse 212
  - network 216
  - observable 217
  - optional devices 213
  - PCIe 213
  - power 205, 216
  - power on and power off 206
  - serial-device 214
  - software 219
  - USB device 212
  - video 211
- processor
  - installing 186, 188–189
  - removing 188
  - replacing 186

processor and memory expansion tray 221  
processor-heat-sink module  
installing 188

## R

rack latches  
installing 101  
removing 99  
replacing 99  
RAID super capacitor module  
replacing 170  
RAID super capacitor module on the chassis  
installing 173  
removing 171  
rear backplane  
installing 142  
removing 140  
rear hot-swap drive cage  
installing 151  
removing 150  
replacing 150  
Rear view 16  
recycle 221  
recycling 221  
remove  
CMOS battery 144  
fan board 191  
hot-swap power supply 177  
M.2 adapter and M.2 drive 161  
OCP 3.0 Ethernet adapter 116  
PIB board 193  
removing  
air baffle 97  
backplane for eight 2.5-inch hot-swap drives 136  
backplane for four 3.5-inch hot-swap drives 134  
backplane for ten 2.5-inch hot-swap drives 138  
front I/O assembly 175  
GPU 133  
graphic processing unit 133  
hard disk drive 113  
heat sink 186  
hot-swap drive 113  
internal riser assembly 118  
intrusion switch 131  
memory modules 109  
middle drive cage 155  
PCIe adapter 125  
processor 186, 188  
rack latches 99  
RAID super capacitor module on the chassis 171  
rear backplane 140  
rear hot-swap drive cage 150  
riser card 120  
security bezel 103  
super capacitor module 170  
system board 196  
system fan 106  
top cover 94  
TPM adapter 148  
removing, memory module 109  
replacing  
air baffle 97  
backplane 134  
backplane for eight 2.5-inch hot-swap drives 137  
backplane for four 3.5-inch hot-swap drives 135  
backplane for ten 2.5-inch hot-swap drives 139  
CMOS battery 144  
CPU 186  
DIMM 109  
fan board 191  
front I/O assembly 175  
GPU 133

graphics processing unit 133  
hard disk drive 113  
heat sink 186  
Heat sink and microprocessor 186  
hot-swap drive 113  
hot-swap power supply 176  
internal riser assembly 118  
intrusion switch 131  
M.2 adapter and M.2 drive 161  
microprocessor 186  
middle drive cage 155  
OCP 3.0 Ethernet adapter 116  
PCIe adapter 124  
PIB board 193  
processor 186  
rack latches 99  
RAID super capacitor module 170  
rear hot-swap drive cage 150  
riser card 120  
security bezel 103  
system board 195  
system fan 106  
top cover 94  
TPM adapter 148  
retainer on M.2 adapter  
adjusting 165  
riser card  
installing 123  
removing 121  
replacing 120

## S

safety v  
safety inspection checklist vi, 82  
Secure Boot 201  
security advisories 12  
security bezel  
installing 104  
removing 103  
replacing 103  
serial-device problems 214  
server model with eight 2.5-inch SAS/SATA drives 39  
server model with six 2.5-inch SAS/SATA drives and four 2.5-inch NVMe drives 47  
server model with ten 2.5-inch SAS/SATA/NVMe drives 55  
server power on or power off problems 206  
service and support  
before you call 223  
hardware 224  
software 224  
service data 224  
software 13, 15  
software problems 219  
software service and support telephone numbers 224  
solving  
Ethernet controller problems 205  
insufficient PCIe resource 213  
solving power problems 205  
static-sensitive devices  
handling 84  
super capacitor module  
installing 170  
removing 170  
support web page, custom 223  
system board 221  
installing 197  
removing 196  
replacing 195  
system board components 22  
system board LED 23  
system error LED 23  
system fan

- installing 108
- removing 106
- replacing 106
- system ID LED 23
- system power LED 23
- system reliability guidelines 83

## T

- Taiwan Region BSMI RoHS declaration 227
- Taiwan Region import and export contact information 227
- Tech Tips 11
- Technical rules for drives 91
- Technical rules for Ethernet adapters 92
- Technical rules for HBA/RAID adapters 92
- Technical rules for OCP 3.0 Ethernet adapters 94
- Technical rules for PCIe adapter 92
- Technical rules for power supply 87
- Technical rules for processors 86
- telecommunication regulatory statement 226
- telephone numbers 224
- top cover
  - installing 96
  - removing 94
  - replacing 94
- TPM 200
- TPM adapter
  - installing 149
  - removing 148
  - replacing 148
- TPM policy 201
- trademarks 226
- troubleshooting 211, 213, 219
  - by symptom 206
  - hard disk drive problems 209

- intermittent problems 215
- keyboard problems 212
- memory problems 208
- mouse problems 212
- network problems 216
- observable problems 217
- power on and power off problems 206
- power problems 216
- serial-device problems 214
- symptoms-based troubleshooting 206
- USB-device problems 212
- video 211
- Trusted Platform Module 200

## U

- UEFI Secure Boot 201
- update firmware 9
- updating
  - Update the Vital Product Data (VPD) 199
- USB-device problems 212

## V

- video problems 211

## W

- warranty 1
- working inside the server
  - power on 83





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