



ThinkSystem SR655 Maintenance Manual



Machine Types: 7Y00 and 7Z01

Note

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

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

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

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

Eighth Edition (June 2021)

© Copyright Lenovo 2019, 2021.

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

Contents

Safety v

Safety inspection checklist vi

Chapter 1. Introduction 1

Specifications 3

 Particulate contamination 7

Firmware updates 8

Tech Tips 10

Security advisories 11

Turn on the server 11

Turn off the server 11

Chapter 2. Server components 13

Front view 13

Front I/O assembly 17

Rear view 20

Rear view LEDs 24

System board components 26

System board LEDs 27

System board jumpers 30

Parts list 31

 Power cords 36

Internal cable routing 37

 VGA connector 38

 Front I/O assembly 39

 M.2 drives 41

 RAID super capacitor modules 41

 GPU adapters 45

 Intrusion switch 46

 Riser cards 46

 Backplanes 51

 Connections between the system board, PIB board, and fan board 119

Chapter 3. Hardware replacement procedures 121

Installation Guidelines 121

 Safety inspection checklist 122

 System reliability guidelines 123

 Working inside the server with the power on 123

 Handling static-sensitive devices 124

Technical rules 125

 Drive bay configurations and requirements 125

 Technical rules for processor and heat sink 127

 Technical rules for system fans 128

 Technical rules for storage controller adapters 129

 Technical rules for GPU adapters 129

 Technical rules for OCP Ethernet adapters 131

 Technical rules for PCIe Flash storage adapters 132

Security bezel replacement 133

 Remove the security bezel 133

 Install the security bezel 134

Rack latches replacement 136

 Remove the rack latches 136

 Install the rack latches 139

Top cover replacement 142

 Remove the top cover 142

 Install the top cover 144

Air baffle replacement 145

 Remove the air baffle 147

 Install the air baffle 148

RAID super capacitor module replacement 149

 Remove a super capacitor module from the air baffle 151

 Install a super capacitor module on the air baffle 152

 Remove a super capacitor module from the middle 2.5-inch drive cage 152

 Install a super capacitor module on the middle 2.5-inch drive cage 154

 Remove a super capacitor module from the internal riser kit 155

 Install a super capacitor module on the internal riser kit 156

Internal riser card replacement 158

 Remove the internal riser card 158

 Install the internal riser card 160

M.2 adapter and M.2 drive replacement 162

 Remove the M.2 adapter and M.2 drive 162

 Adjust the retainer on the M.2 adapter 165

 Install the M.2 adapter and M.2 drive 166

System fan replacement 169

 Remove a system fan 169

 Install a system fan 171

System fan cage replacement 172

 Remove the system fan cage 172

 Install the system fan cage 173

Front I/O assembly replacement 174

 Remove the front I/O assembly 174

 Install the front I/O assembly 175

Hot-swap drive replacement 176

Remove a hot-swap drive	177	Remove the TPM adapter (for Chinese Mainland only)	234
Install a hot-swap drive	179	Install the TPM adapter (for Chinese Mainland only)	235
Front backplane replacement	183	OCP 3.0 Ethernet adapter replacement	236
Remove the front 2.5-inch-drive backplane	183	Remove the OCP 3.0 Ethernet adapter	237
Install the front 2.5-inch-drive backplane	184	Install the OCP 3.0 Ethernet adapter	237
Remove the front 3.5-inch-drive backplane	186	Rear drive cage replacement	239
Install the front 3.5-inch-drive backplane	187	Remove the rear 2.5-inch drive cage	239
Middle/Rear backplane replacement	189	Install the rear 2.5-inch drive cage	240
Remove the middle or rear 2.5-inch-drive backplane	189	Remove the rear 3.5-inch drive cage	241
Install the middle or rear 2.5-inch-drive backplane	190	Install the rear 3.5-inch drive cage	242
Remove the middle or rear 3.5-inch-drive backplane	191	Hot-swap power supply replacement	244
Install the middle or rear 3.5-inch-drive backplane	192	Remove a hot-swap power supply	244
Middle drive cage replacement	193	Install a hot-swap power supply	248
Remove the middle 2.5-inch drive cage	193	Processor and heat sink replacement	253
Install the middle 2.5-inch drive cage	195	Remove a heat sink	254
Remove the middle 3.5-inch drive cage	199	Remove a processor	255
Install the middle 3.5-inch drive cage	201	Install a processor	256
Memory module replacement	204	Install a heat sink	258
Remove a memory module	204	Fan board replacement	259
Memory module installation rules	205	Remove the fan board	259
Install a memory module	207	Install the fan board	260
CMOS battery replacement	209	Power inverter board (PIB) replacement	261
Remove the CMOS battery	209	Remove the PIB board	261
Install the CMOS battery	211	Install the PIB board	262
Riser card replacement	212	System board replacement	263
Remove a riser card (8 PCIe slots)	213	Remove the system board	264
Remove a riser card (rear 2.5-inch drive cage)	214	Install the system board	266
Remove a riser card (rear 3.5-inch drive cage)	216	Update the Vital Product Data (VPD)	268
Install a riser card (8 PCIe slots)	217	Configure security settings	270
Install a riser card (rear 2.5-inch drive cage)	219	Complete the parts replacement	274
Install a riser card (rear 3.5-inch drive cage)	220		
Intrusion switch replacement	222	Chapter 4. Problem determination	275
Remove the intrusion switch	222	Event logs	275
Install the intrusion switch	223	Light path diagnostics	276
PCIe adapter replacement	225	General problem determination procedures	276
Remove a PCIe adapter	225	Resolving suspected power problems	277
Install a PCIe adapter	227	Resolving suspected Ethernet controller problems	277
GPU replacement	230	Troubleshooting by symptom	278
Remove a GPU adapter	230	Power on and power off problems	278
Install a GPU adapter	232	Memory problems	280
TPM adapter replacement (for Chinese Mainland only)	234	Hard disk drive problems	281
		Monitor and video problems	283
		Keyboard, mouse, or USB-device problems	284
		Optional-device problems	285
		Serial-device problems	286
		Intermittent problems	287

Power problems	288
Network problems	288
Observable problems	288
Software problems	291

Appendix A. Hardware disassembling for recycle293

Disassembling the system board for recycle.	293
---	-----

Appendix B. Getting help and technical assistance295

Before you call	295
Collecting service data	296

Contacting Support	296
------------------------------	-----

Appendix C. Notices.297

Trademarks	298
Important notes.	298
ASHRAE class compliance information.	299
Telecommunication regulatory statement.	299
Electronic emission notices	299
Taiwan BSMI RoHS declaration.	300
Taiwan import and export contact information	300

Index301

Safety

Before installing this product, read the Safety Information.

قبل تركيب هذا المنتج، يجب قراءة الملاحظات الأمنية

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

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

安裝本產品之前，請先閱讀「安全資訊」。

Prije instalacije ovog produkta obavezno pročitajte Sigurnosne Upute.

Před instalací tohoto produktu si přečtěte příručku bezpečnostních instrukcí.

Læs sikkerhedsforskrifterne, før du installerer dette produkt.

Lees voordat u dit product installeert eerst de veiligheidsvoorschriften.

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

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

Vor der Installation dieses Produkts die Sicherheitshinweise lesen.

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

לפני שתתקינו מוצר זה, קראו את הוראות הבטיחות.

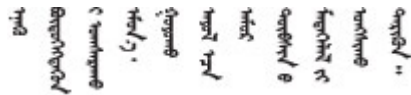
A termék telepítése előtt olvassa el a Biztonsági előírásokat!

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

製品の設置の前に、安全情報をお読みください。

본 제품을 설치하기 전에 안전 정보를 읽으십시오.

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



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

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

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

Перед установкой продукта прочтите инструкции по технике безопасности.

Pred inštaláciou tohto zariadenia si pečítajte Bezpečnostné predpisy.

Pred namestitvijo tega proizvoda preberite Varnostne informacije.

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

Läs säkerhetsinformationen innan du installerar den här produkten.

ཐོན་ཁུངས་འདི་བདེ་སྤྱོད་མ་བྱས་གོང་། གློ་རྒྱ་ཡིད་གཟབ་
བྱ་འདྲ་མིན་ཡོད་པའི་འོད་ཟེར་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.

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. In the Customize a Model pane:
 - 1) Click **Select Options/Parts for a Model**.
 - 2) Enter the machine type and model for your server.
- c. Click the Power tab to see all line cords.
 - Make sure that the insulation is not frayed or worn.
3. Check for any obvious non-Lenovo alterations. Use good judgment as to the safety of any non-Lenovo alterations.
4. Check inside the server for any obvious unsafe conditions, such as metal filings, contamination, water or other liquid, or signs of fire or smoke damage.
5. Check for worn, frayed, or pinched cables.
6. Make sure that the power-supply cover fasteners (screws or rivets) have not been removed or tampered with.

Chapter 1. Introduction

The ThinkSystem™ SR655 server is a 1-socket 2U server that features the new AMD EPYC 7002 family of processors. The server offers a broad selection of drive and slot configurations and offers high performance and expansion for various IT workloads. Combining performance and flexibility, the server is a great choice for enterprises of all sizes.

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

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

<https://datacentersupport.lenovo.com/documents/ht100742>

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.

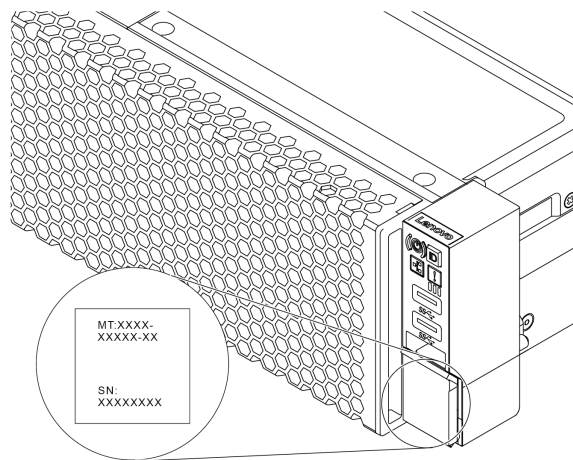


Figure 1. Location of the ID label

BMC network access label

The network access label for the baseboard management controller (BMC) is attached on the top side of the pull-out information tab. After you get the server, peel the network access label away and store it in a safe place.

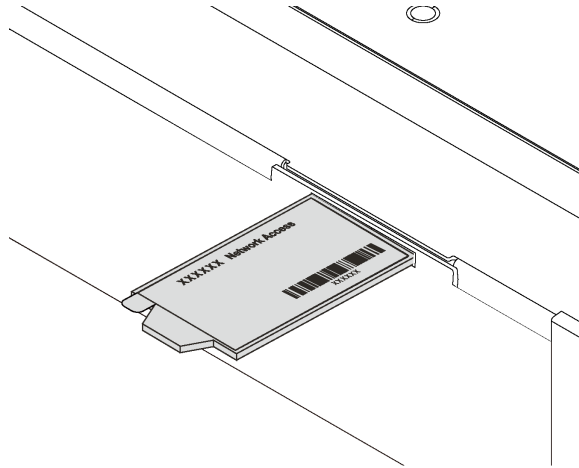


Figure 2. Location of the BMC network access label

Quick response code

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

The following illustration shows the QR code: <https://datacentersupport.lenovo.com/products/servers/thinksystem/sr655/7y00>



Figure 3. 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"> • 2U • Height: 86.5 mm (3.4 inches) • Width: <ul style="list-style-type: none"> – With rack latches: 482.0 mm (19.0 inches) – Without rack latches: 444.6 mm (17.5 inches) • Depth: 764.7 mm (30.1 inches) <p>Note: The depth is measured with rack latches installed, but without the security bezel installed.</p>
Weight	Up to 35.4 kg (78.0 lb), depending on the server configuration
Processor (depending on the model)	<ul style="list-style-type: none"> • One AMD® EPYC™ 7002 or 7003 processor • Designed for Land Grid Array (LGA) 4094 (SP3) socket • Scalable up to 64 cores • Thermal Design Power (TDP): up to 280 watts <p>For technical rules about processors, see “Technical rules for processor and heat sink” on page 127.</p> <p>For a list of supported processors, see: http://www.lenovo.com/us/en/serverproven/</p>
Memory	<ul style="list-style-type: none"> • Slots: 16 DIMM slots • Minimum: 8 GB • Maximum: 2 TB • Type (depending on the model): <ul style="list-style-type: none"> – 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 <p>Note: Operating speed and total memory capacity depend on the processor model and UEFI settings.</p> <p>For installation rules about memory modules, see “Memory module installation rules” on page 205.</p> <p>For a list of supported memory modules, see: http://www.lenovo.com/us/en/serverproven/</p>

Table 1. Server specifications (continued)

Specification	Description
Internal drives	<p>The server supports:</p> <ul style="list-style-type: none"> • Up to twenty 3.5-inch SAS/SATA drives Or up to 16 SAS/SATA drives and 4 NVMe/SAS/SATA drives (NVMe drives supported only in front drive bays 8–11) • Up to thirty-two 2.5-inch SAS/SATA/NVMe drives • Up to two internal M.2 drives <p>The supported drives vary by models. For detailed information, see “Drive bay configurations and requirements” on page 125.</p>
Expansion slots	<ul style="list-style-type: none"> • Up to nine PCIe slots: eight PCIe slots in the rear and one internal PCIe slot • One OCP 3.0 slot <p>For detailed information, see “Rear view” on page 20.</p>
Input/Output (I/O) features	<ul style="list-style-type: none"> • Front panel: <ul style="list-style-type: none"> – One VGA connector (optional) – Two USB 3.2 Gen 1 (5 Gbps) connectors • Rear panel: <ul style="list-style-type: none"> – One serial port – One VGA connector – Two USB 3.2 Gen 1 (5 Gbps) connectors – One RJ-45 BMC management connector – Two or four Ethernet connectors on the OCP 3.0 Ethernet adapter (optional)
Graphics processing unit (GPU)	<p>Your server supports the following GPUs or processing adapters:</p> <ul style="list-style-type: none"> • Half-length, low-profile, single-wide GPUs: <ul style="list-style-type: none"> – ThinkSystem NVIDIA Quadro P620 2GB PCIe Active GPU – ThinkSystem NVIDIA Tesla T4 16GB PCIe Passive GPU • Full-length, full-height, double-wide GPUs: <ul style="list-style-type: none"> – ThinkSystem NVIDIA Tesla V100 32 GB PCIe Passive GPU – ThinkSystem NVIDIA Tesla V100 16 GB PCIe Passive GPU – ThinkSystem NVIDIA Tesla V100S 32GB PCIe Passive GPU – ThinkSystem NVIDIA A100 40GB PCIe Gen4 Passive GPU <p>For technical rules for GPU, see “Technical rules for GPU adapters” on page 129.</p>

Table 1. Server specifications (continued)

Specification	Description																								
Storage controller adapters	<ul style="list-style-type: none"> An HBA 430-8i or 430-16i SAS/SATA adapter that supports JBOD mode but does not support RAID A RAID 530-8i PCIe adapter that supports JBOD mode and RAID levels 0, 1, 5, 10, and 50 A RAID 730-8i 1G Cache PCIe adapter that supports JBOD mode and RAID levels 0, 1, 5, 10, and 50 A RAID 730-8i 2G Flash PCIe adapter that supports JBOD mode and RAID levels 0, 1, 5, 6, 10, 50, and 60 A RAID 930-8i, 930-16i, or 930-24i Flash PCIe adapter that supports JBOD mode and RAID levels 0, 1, 5, 6, 10, 50, and 60 A RAID 930-8e Flash PCIe adapter that supports JBOD mode and RAID levels 0, 1, 5, 6, 10, 50, and 60 ThinkSystem 810-4P or 1610-4P NVMe switch adapter for NVMe drive support <p>For technical rules for storage controller adapters, see “Technical rules for storage controller adapters” on page 129.</p>																								
System fans	<ul style="list-style-type: none"> Up to six hot-swap system fans (N+1 redundancy, one redundant fan) Two types of fans supported: <ul style="list-style-type: none"> ThinkSystem SR655 2U fan module (standard fan) ThinkSystem SR655 performance fan module (speed of 29000 RPM) <p>For technical rules for system fans, see “Technical rules for system fans” on page 128.</p>																								
Electrical input	<p>The server supports up to two hot-swap power supplies for redundancy.</p> <p><i>Table 2. Electrical input for power supplies</i></p> <table border="1"> <thead> <tr> <th>Power supply</th> <th>100–127 V ac (50–60 Hz)</th> <th>200–240 V ac (50–60 Hz)</th> <th>240 V dc*</th> </tr> </thead> <tbody> <tr> <td>550-watt 80 PLUS Platinum</td> <td>Yes</td> <td>Yes</td> <td>Yes</td> </tr> <tr> <td>750-watt 80 PLUS Platinum</td> <td>Yes</td> <td>Yes</td> <td>Yes</td> </tr> <tr> <td>750-watt 80 PLUS Titanium</td> <td>No</td> <td>Yes</td> <td>Yes</td> </tr> <tr> <td>1100-watt 80 PLUS Platinum</td> <td>Yes</td> <td>Yes</td> <td>Yes</td> </tr> <tr> <td>1600-watt 80 PLUS Platinum</td> <td>No</td> <td>Yes</td> <td>Yes</td> </tr> </tbody> </table> <p>CAUTION: 240 V dc input (input range: 180-300 V dc) is supported in Chinese Mainland ONLY. Power supply with 240 V dc input cannot support hot plugging power cord function. Before removing the power supply with dc input, please turn off server or disconnect dc power sources at the breaker panel or by turning off the power source. Then, remove the power cord.</p>	Power supply	100–127 V ac (50–60 Hz)	200–240 V ac (50–60 Hz)	240 V dc*	550-watt 80 PLUS Platinum	Yes	Yes	Yes	750-watt 80 PLUS Platinum	Yes	Yes	Yes	750-watt 80 PLUS Titanium	No	Yes	Yes	1100-watt 80 PLUS Platinum	Yes	Yes	Yes	1600-watt 80 PLUS Platinum	No	Yes	Yes
Power supply	100–127 V ac (50–60 Hz)	200–240 V ac (50–60 Hz)	240 V dc*																						
550-watt 80 PLUS Platinum	Yes	Yes	Yes																						
750-watt 80 PLUS Platinum	Yes	Yes	Yes																						
750-watt 80 PLUS Titanium	No	Yes	Yes																						
1100-watt 80 PLUS Platinum	Yes	Yes	Yes																						
1600-watt 80 PLUS Platinum	No	Yes	Yes																						

Table 1. Server specifications (continued)

Specification	Description																																																												
Minimal configuration for debugging	<ul style="list-style-type: none"> • One processor • One DIMM in slot 1 • One power supply • One HDD or M.2 drive (if OS is needed for debugging) • System fans: <ul style="list-style-type: none"> – Six system fans if an M.2 drive is installed – Five system fans (fan 2 to fan 6) if no M.2 drive is installed 																																																												
Acoustical noise emissions	<p>The declared acoustic noise levels are based on below configurations, which may change depending on configurations and conditions:</p> <table border="1"> <thead> <tr> <th>Config.</th> <th>Typical</th> <th>Storage rich</th> <th>GPU rich</th> </tr> </thead> <tbody> <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>16 x 32GB</td> <td>16 x 64 GB</td> <td>16 x 64 GB</td> </tr> <tr> <td>Ethernet</td> <td>10 GbE BASE-T 2-port PCIe</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 1600 W</td> </tr> <tr> <td>RAID</td> <td>930-16i RAID</td> <td>930-24i RAID</td> <td>930-8i RAID</td> </tr> <tr> <td>Drive</td> <td>16 x 2.5" HDD</td> <td>20 x 3.5" HDD</td> <td>8 x 2.5" HDD</td> </tr> <tr> <td>GPU</td> <td>NA</td> <td>NA</td> <td>3 x V100 GPU</td> </tr> </tbody> </table> <p>Acoustic noise levels:</p> <table border="1"> <thead> <tr> <th></th> <th>Typical</th> <th>Storage rich</th> <th>GPU rich</th> </tr> </thead> <tbody> <tr> <td colspan="4">Sound power levels (L_{WA,m})</td> </tr> <tr> <td>Idling</td> <td>6.2 Bel</td> <td>7.0 Bel</td> <td>7.0 Bel</td> </tr> <tr> <td>Operating</td> <td>6.2 Bel</td> <td>7.2 Bel</td> <td>8.5 Bel</td> </tr> <tr> <td colspan="4">Sound pressure level (L_{pA,m})</td> </tr> <tr> <td>Idling</td> <td>46 dBA</td> <td>54 dBA</td> <td>54 dBA</td> </tr> <tr> <td>Operating</td> <td>47 dBA</td> <td>56 dBA</td> <td>69 dBA</td> </tr> </tbody> </table> <p>Notes:</p> <ul style="list-style-type: none"> • These sound levels were measured in controlled acoustical environments according to procedures specified by ISO7779 and are reported in accordance with ISO 9296. • 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 	Config.	Typical	Storage rich	GPU rich	CPU	1 x 155 W	1 x 155 W	1 x 155 W	DIMM	16 x 32GB	16 x 64 GB	16 x 64 GB	Ethernet	10 GbE BASE-T 2-port PCIe	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 1600 W	RAID	930-16i RAID	930-24i RAID	930-8i RAID	Drive	16 x 2.5" HDD	20 x 3.5" HDD	8 x 2.5" HDD	GPU	NA	NA	3 x V100 GPU		Typical	Storage rich	GPU rich	Sound power levels (L _{WA,m})				Idling	6.2 Bel	7.0 Bel	7.0 Bel	Operating	6.2 Bel	7.2 Bel	8.5 Bel	Sound pressure level (L _{pA,m})				Idling	46 dBA	54 dBA	54 dBA	Operating	47 dBA	56 dBA	69 dBA
Config.	Typical	Storage rich	GPU rich																																																										
CPU	1 x 155 W	1 x 155 W	1 x 155 W																																																										
DIMM	16 x 32GB	16 x 64 GB	16 x 64 GB																																																										
Ethernet	10 GbE BASE-T 2-port PCIe	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 1600 W																																																										
RAID	930-16i RAID	930-24i RAID	930-8i RAID																																																										
Drive	16 x 2.5" HDD	20 x 3.5" HDD	8 x 2.5" HDD																																																										
GPU	NA	NA	3 x V100 GPU																																																										
	Typical	Storage rich	GPU rich																																																										
Sound power levels (L _{WA,m})																																																													
Idling	6.2 Bel	7.0 Bel	7.0 Bel																																																										
Operating	6.2 Bel	7.2 Bel	8.5 Bel																																																										
Sound pressure level (L _{pA,m})																																																													
Idling	46 dBA	54 dBA	54 dBA																																																										
Operating	47 dBA	56 dBA	69 dBA																																																										

Table 1. Server specifications (continued)

Specification	Description
	that you consult with qualified experts in this field to determine whether you are in compliance with the applicable regulations.
Environment	<p>The server is supported in the following environment:</p> <p>Note: This server is designed for standard data center environment and recommended to be placed in industrial data center.</p> <ul style="list-style-type: none"> • Air temperature: <ul style="list-style-type: none"> – 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. – Server off: 5–45°C (41–113°F) – Shipping or storage: -40–60°C (-40–140°F) • Maximum altitude: 3050 m (10 000 ft) • Relative humidity (non-condensing): <ul style="list-style-type: none"> – Operating: ASHRAE class A2: 8%–80%; maximum dew point: 21°C (70°F) – Shipping or storage: 8%–90% • Particulate contamination <p>Attention: Airborne particulates and reactive gases acting alone or in combination with other environmental factors such as humidity or temperature might pose a risk to the server. For information about the limits for particulates and gases, see “Particulate contamination” on page 7.</p> <p>Your server complies with ASHRAE class A2 specifications. Depending on the hardware configuration, some server models comply with ASHRAE class A3 and class A4 specifications, see “ASHRAE class compliance information” on page 299.</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 3. Limits for particulates and gases

Contaminant	Limits
Reactive gases	<p>Severity level G1 as per ANSI/ISA 71.04-1985¹:</p> <ul style="list-style-type: none"> The copper reactivity level shall be less than 300 Å/month (around 0.0039 µg/cm²-hour weight gain).² The silver reactivity level shall be less than 200 Å/month (around 0.0035 µg/cm²-hour weight gain).³ The reactive monitoring of gaseous corrosivity must be conducted approximately 5 cm (2 in.) in front of the rack on the air inlet side at one-quarter and three-quarter frame height off the floor or where the air velocity is much higher.
Airborne particulates	<p>Data centers must meet the cleanliness level of ISO 14644-1 class 8.</p> <p>For data centers without airside economizer, the ISO 14644-1 class 8 cleanliness might be met by choosing one of the following filtration methods:</p> <ul style="list-style-type: none"> The room air might be continuously filtered with MERV 8 filters. Air entering a data center might be filtered with MERV 11 or preferably MERV 13 filters. <p>For data centers with airside economizers, the choice of filters to achieve ISO class 8 cleanliness depends on the specific conditions present at that data center.</p> <ul style="list-style-type: none"> The deliquescent relative humidity of the particulate contamination should be more than 60% RH.⁴ Data centers must be free of zinc whiskers.⁵

¹ 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.

² The derivation of the equivalence between the rate of copper corrosion growth in the thickness of the corrosion product in Å/month and the rate of weight gain assumes that Cu₂S and Cu₂O grow in equal proportions.

³ The derivation of the equivalence between the rate of silver corrosion growth in the thickness of the corrosion product in Å/month and the rate of weight gain assumes that Ag₂S is the only corrosion product.

⁴ The deliquescent relative humidity of particulate contamination is the relative humidity at which the dust absorbs enough water to become wet and promote ionic conduction.

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

Firmware updates

Several options are available to update the firmware for the server.

You can use the tools listed here to update the most current firmware for your server and the devices that are installed in the server.

Note: Lenovo typically releases firmware in bundles called UpdateXpress System Packs (UXSPs). To ensure that all of the firmware updates are compatible, you should update all firmware at the same time. If you are updating firmware for both the BMC and UEFI, update the firmware for BMC first.

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

<http://lenovopress.com/LP0656>

Important terminology

- **In-band update.** The installation or update is performed using a tool or application within an operating system that is executing on the server's core CPU.
- **Out-of-band update.** The installation or update is performed by the BMC collecting the update and then directing the update to the target subsystem or device. Out-of-band updates have no dependency on an operating system executing on the core CPU. However, most out-of-band operations do not require the server to be in the S0 (Working) power state.
- **On-Target update.** The installation or update is initiated from an Operating System executing on the server's operating system.
- **Off-Target update.** The installation or update is initiated from a computing device interacting directly with the server's BMC.
- **UpdateXpress System Packs (UXSPs).** UXSPs are bundled updates designed and tested to provide the interdependent level of functionality, performance, and compatibility. UXSPs are server machine-type specific and are built (with firmware and device driver updates) to support specific Windows Server, Red Hat Enterprise Linux (RHEL) and SUSE Linux Enterprise Server (SLES) operating system distributions. Machine-type-specific firmware-only UXSPs are also available.

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

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

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

Tool	In-band update	Out-of-band update	On-target update	Off-target update	Graphical user interface	Command-line interface	Supports UXSPs
Lenovo XClarity Provisioning Manager Lite V2 Limited to core system firmware only.	√			√	√		
Lenovo ThinkSystem System Manager Supports core system firmware and most advanced I/O option firmware updates		√		√	√	√	
Lenovo XClarity Essentials Bootable Media Creator Supports core system firmware and I/O firmware updates. You can update the Microsoft Windows operating system, but device drivers are not included on the bootable image	√				√	√	√
Lenovo XClarity Administrator Supports core system firmware and I/O firmware updates	√ ¹	√ ²		√	√		

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/sr655/7Y00/downloads>

- **Lenovo XClarity Provisioning Manager Lite V2**

From Lenovo XClarity Provisioning Manager Lite V2, you can update the BMC firmware, the UEFI firmware, and the Lenovo XClarity Provisioning Manager Lite V2 software.

Specific details about Lenovo XClarity Provisioning Manager Lite V2 are available at:

https://sysmgt.lenovofiles.com/help/topic/lxpm_frontend/lxpm_lite_v2_about.html

Note: By default, the Lenovo XClarity Provisioning Manager Lite V2 Graphical User Interface is displayed when you press F11. If your server starts with the text-based system setup, you can bring up the Graphical User Interface from the text-based system setup interface.

- **Lenovo ThinkSystem System Manager**

From Lenovo 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 Lenovo ThinkSystem System Manager for a specific server.

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

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.

Specific details about updating firmware using Lenovo XClarity Administrator are available at:

https://sysmgt.lenovofiles.com/help/topic/com.lenovo.lxca.doc/update_fw.html

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 **Documentation** from the navigation pane.

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

Security advisories

Lenovo is committed to developing products and services that adhere to the highest security standards in order to protect our customers and their data. When potential vulnerabilities are reported, it is the responsibility of the Lenovo Product Security Incident Response Team (PSIRT) to investigate and provide information to our customers so they may put mitigation plans in place as we work toward providing solutions.

The list of current advisories is available at the following location:

https://datacentersupport.lenovo.com/product_security/home

Turn 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 Lenovo ThinkSystem System Manager.

For information about powering off the server, see “Turn off the server” on page 11.

Turn off the server

The server remains in a standby state when it is connected to a power source, allowing the Lenovo ThinkSystem System Manager to respond to remote power-on requests. To remove all power from the server (power status LED off), you must disconnect all power cables.

To place the server in a standby state (power status LED flashes once per second):

Note: The Lenovo 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 Lenovo ThinkSystem System Manager. For information about powering on the server, see “Turn on the server” on page 11.

Chapter 2. Server components

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

Front view

The front view of the server varies by model.

- “Front views of server models with 2.5-inch drive bays” on page 13
- “Front views of server models with 3.5-inch drive bays” on page 15

Note: Your server might look different from the illustrations in this topic.

Front views of server models with 2.5-inch drive bays

The following illustrations show the front views of server models with 2.5-inch drive bays.

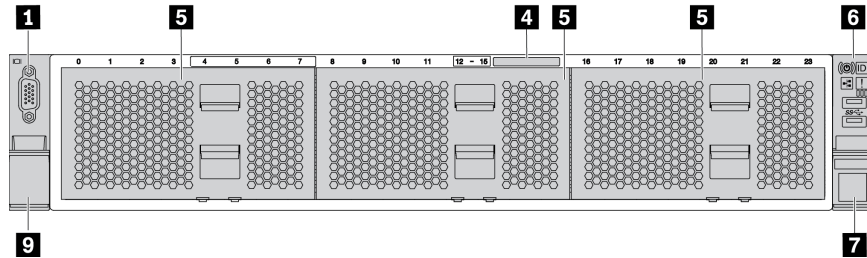


Figure 4. Server model without a backplane

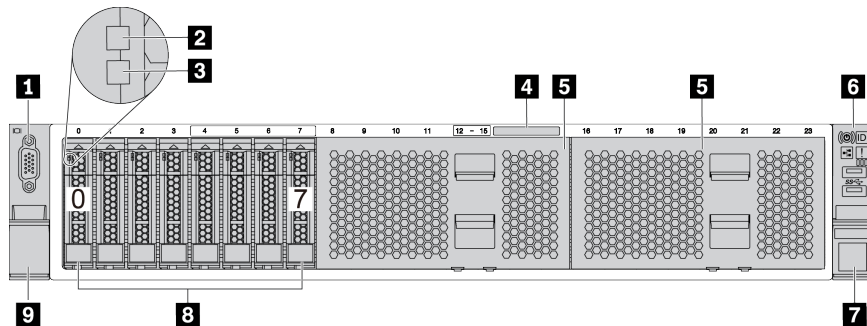


Figure 5. Server model with eight 2.5-inch drive bays

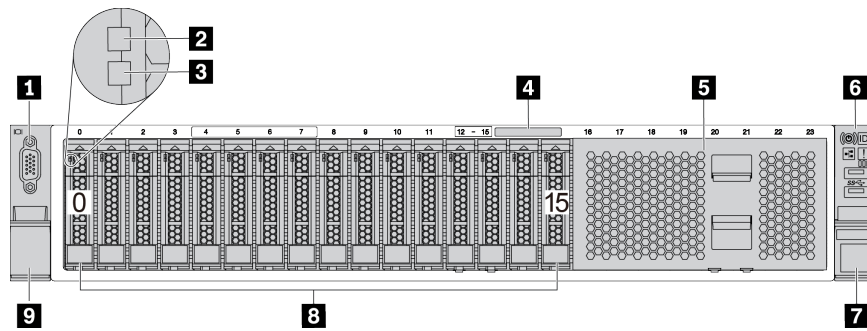


Figure 6. Server model with sixteen 2.5-inch drive bays

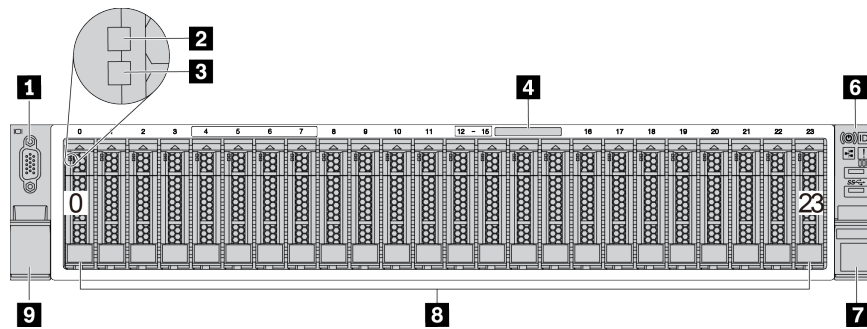


Figure 7. Server model with twenty-four 2.5-inch drive bays

Table 4. Components on the front of server models with 2.5-inch drive bays

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

1 VGA connector (optional)

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

2 Drive activity LED

3 Drive status LED

Each hot-swap drive has two LEDs.

Drive LED	Status	Description
Drive activity LED	Solid green	The drive is powered but not active.
	Blinking green	The drive is active.
Drive status LED	Solid yellow	The drive has an error.

Drive LED	Status	Description
	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.

4 Pull-out information tab

A label on the tab shows the network information (MAC address and other data) to remotely access the service processor.

5 Drive bay filler

The drive bay filler is used to cover vacant drive bays.

6 Front I/O assembly

For information about the controls, connectors, and status LEDs on the front I/O assembly, see “Front I/O assembly” on page 17.

7 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.

8 Drive bays

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.

Front views of server models with 3.5-inch drive bays

The following illustrations show the front views of server models with 3.5-inch drive bays.

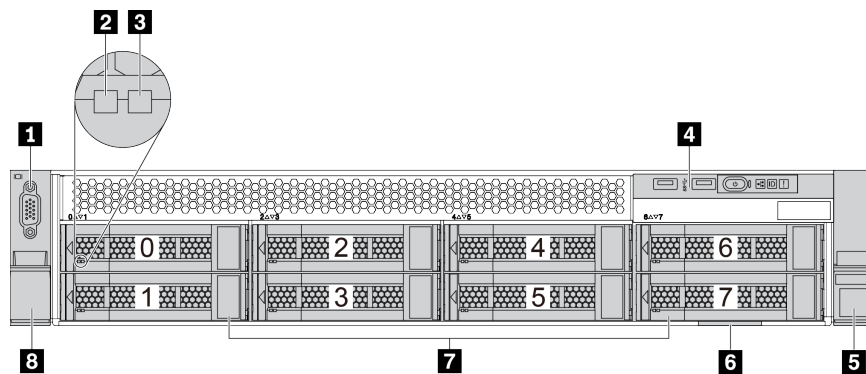


Figure 8. Server model with eight 3.5-inch drive bays

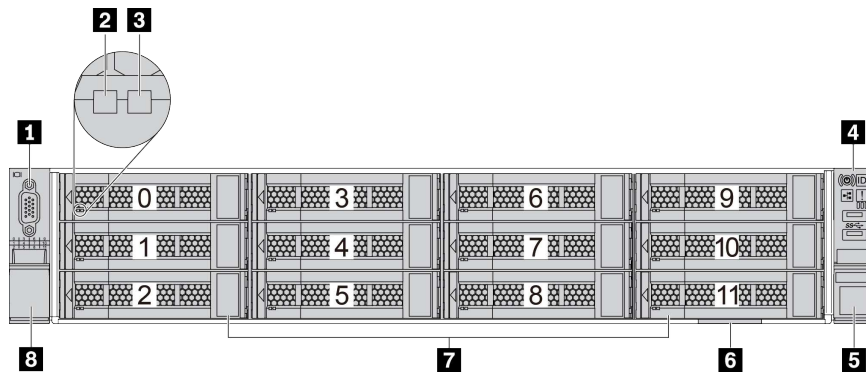


Figure 9. Server model with twelve 3.5-inch drive bays

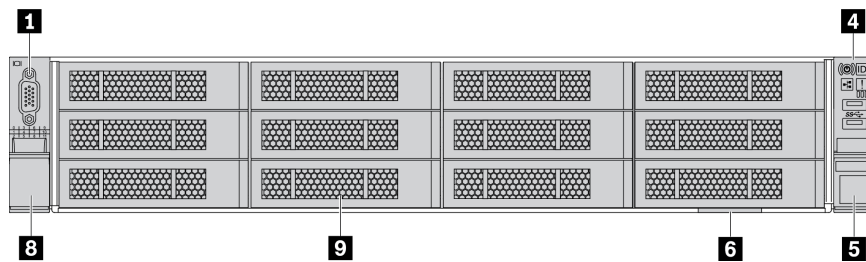


Figure 10. Server model without a backplane

Table 5. Components on the front of server models with 3.5-inch drive bays

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

1 VGA connector (optional)

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

2 Drive activity LED

3 Drive status LED

Each hot-swap drive has two LEDs.

Drive LED	Status	Description
Drive activity LED	Solid green	The drive is powered but not active.
	Blinking green	The drive is active.
Drive status LED	Solid yellow	The drive has an error.

Drive LED	Status	Description
	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.

4 Front I/O assembly

For information about the controls, connectors, and status LEDs on the front I/O assembly, see “Front I/O assembly” on page 17.

5 8 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 Pull-out information tab

A label on the tab shows the network information (MAC address and other data) to remotely access the service processor.

7 Drive bays

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.

9 Drive bay filler

The drive bay filler is used to cover vacant drive bays.

Front I/O assembly

The front I/O assembly of the server provides controls, connectors, and LEDs. The front I/O assembly varies by model.

The following illustrations show the front I/O assemblies for different server models. To locate the front I/O assembly, see “Front view” on page 13.

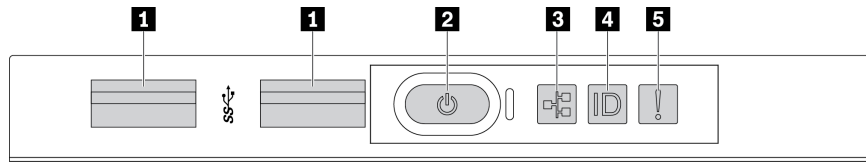


Figure 11. Front I/O assembly for server model with eight 3.5-inch drive bays

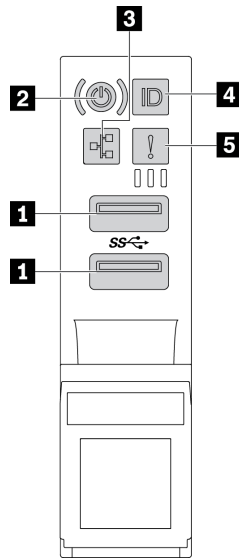


Figure 12. Front I/O assembly for server models with 2.5-inch drive bays or twelve 3.5-inch drive bays

Table 6. Components on the front I/O assembly

Callout	Callout
1 USB 3.1 connectors	2 Power button with power status LED
3 Network activity LED (for OCP 3.0 Ethernet adapter)	4 System ID button with system ID LED
5 System error LED	

1 USB 3.1 connectors

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

2 Power button with power status LED

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

Status	Color	Description
Solid on	Green	The server is on and running.
Slow blinking (about one flash per second)	Green	The server is off and is ready to be powered on (standby state).
Off	None	There is no ac power applied to the server.

3 Network activity LED

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

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

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

4 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.

5 System error LED

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

Status	Color	Description	Action
On	Yellow	An error has been detected on the server. Causes might include but not limited to the following errors: <ul style="list-style-type: none"> • A fan failure • A memory error • A storage failure • A PCIe device failure • A power supply failure • A CPU error • A system board error 	Check the event log to determine the exact cause of the error. Alternatively, follow the light path diagnostics to determine if additional LEDs are lit that will direct you to identify the cause of the error. For information about light path diagnostics, see "Light path diagnostics" on page 276.
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.

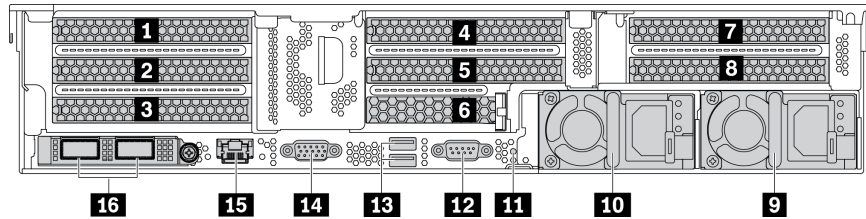


Figure 13. Rear view of server models with eight PCIe slots

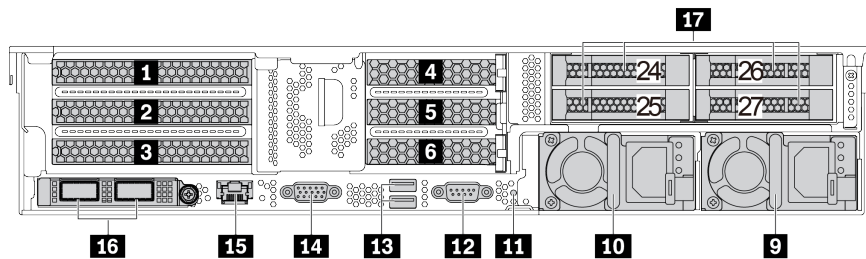


Figure 14. Rear view of server models with 2.5-inch rear drive bays and six PCIe slots

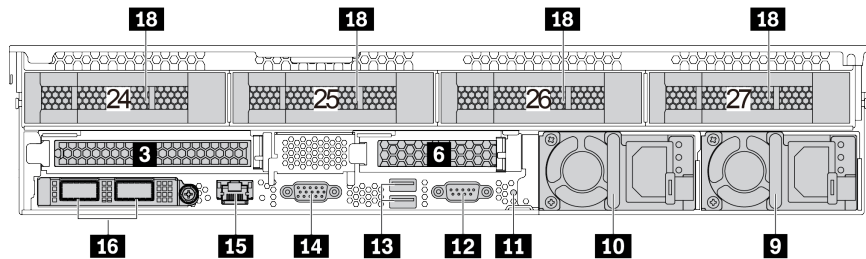


Figure 15. Rear view of server models with 3.5-inch rear drive bays and two PCIe slots

Table 7. Components on the rear of the server

Callout	Callout
1 PCIe slot 1 (on riser 1)	2 PCIe slot 2 (on riser 1)
3 PCIe slot 3 (on riser 1)	4 PCIe slot 4 (on riser 2)
5 PCIe slot 5 (on riser 2)	6 PCIe slot 6 (on riser 2)
7 PCIe slot 7 (on riser 3)	8 PCIe slot 8 (on riser 3)
9 Power supply 2	10 Power supply 1
11 NMI button	12 Serial port
13 USB 3.2 Gen 1 (5 Gbps) connectors (2)	14 VGA connector
15 BMC management network connector	16 Ethernet connectors on the OCP 3.0 Ethernet adapter (optional)
17 2.5-inch rear drive bays (4)	18 3.5-inch rear drive bays (4)

1 2 3 4 5 6 7 8 PCIe slots

You can find the PCIe slot numbers on the rear of the chassis.

PCIe slots 1, 2, and 3 on riser 1:

There are four types of riser cards that can be installed in riser 1 slot.

FHFL: full-height, full-length; FHHL: full-height, half-length

Riser card 1	PCIe slots
Type 1*	<ul style="list-style-type: none">Slot 1: PCIe x16, FHFLSlot 2: PCIe x16, FHFLSlot 3: not available
Type 2*	<ul style="list-style-type: none">Slot 1: PCIe x16, FHFLSlot 2: PCIe x16 (x8, x4, x1), FHFLSlot 3: PCIe x16 (x8, x4, x1), FHHL
Type 3	<ul style="list-style-type: none">Slot 1: PCIe x16, FHFLSlot 2: not availableSlot 3: not available
Type 4	<ul style="list-style-type: none">Slot 3: PCIe x16, FHHL <p>Note: This riser card is for configuration with 3.5-inch rear bays.</p>

Notes:

- Riser card 1 of Type 1 or Type 2 needs to be connected to the system board. For detailed cable routing, see “Riser cards” on page 46.

PCIe slots 4, 5, and 6 on riser 2:

There are three types of riser cards that can be installed in riser 2 slot.

FHFL: full-height, full-length; LP: low-profile

Riser card 2	PCIe slots
Type 1	<ul style="list-style-type: none">Slot 4: PCIe x16, FHFL or LPSlot 5: PCIe x16, FHFL or LPSlot 6: not available
Type 2	<ul style="list-style-type: none">Slot 4: PCIe x16, FHFL or LPSlot 5: PCIe x16 (x8, x4, x1), FHFL or LPSlot 6: PCIe x16 (x8, x4, x1), LP
Type 3	<ul style="list-style-type: none">Slot 6: PCIe x16, LP <p>Note: This riser card is for configuration with 3.5-inch rear bays.</p>

PCIe slots 7 and 8 on riser 3:

The server supports riser 3 if no rear bay is installed. The following two types of riser cards are supported:

FHFL: full-height, full-length

Riser card 3	PCIe slots
Type 1	<ul style="list-style-type: none"> Slot 7: PCIe x16 (x8, x4, x1), FHFL Slot 8: PCIe x16 (x8, x4, x1), FHFL
Type 2	<ul style="list-style-type: none"> Slot 7: PCIe x16, FHFL Slot 8: PCIe x16, FHFL

Notes:

- Riser card 3 of Type 1 or Type 2 needs to be connected to the system board. For detailed cable routing, see “Riser cards” on page 46.

9 10 Power supplies

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 status LEDs, see “Rear view LEDs” on page 24.

11 NMI button

Press this button to force a nonmaskable interrupt (NMI) to the processor. By this way, you can blue screen the server and take a memory dump. You might have to use a pen or the end of a straightened paper clip to press the button.

12 Serial port

Used to attach a device that requires serial connection for data transferring.

13 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 keyboard, a mouse, or a USB storage device.

14 VGA connector

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

15 BMC management network connector

Used to attach an Ethernet cable to manage the system using Lenovo ThinkSystem System Manager.

16 Ethernet connectors on the OCP 3.0 Ethernet adapter (optional)

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

One of the Ethernet connectors on the OCP 3.0 Ethernet adapter can also function as a management connector using the shared management capability. If the shared management connector fails, traffic can automatically switch over to another connector on the adapter.

17 2.5-inch rear drive bays (4)

Used to install up to four 2.5-inch hot-swap drives on the rear of the server. The 2.5-inch rear drive bays are available on some models.

The number of the installed drives in your server varies by model. 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.

13 3.5-inch rear drive bays (4)

Used to install up to four 3.5-inch hot-swap drives on the rear of the server. The 3.5-inch rear drive bays are available on some models.

The number of the installed drives in your server varies by model. 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 LEDs

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

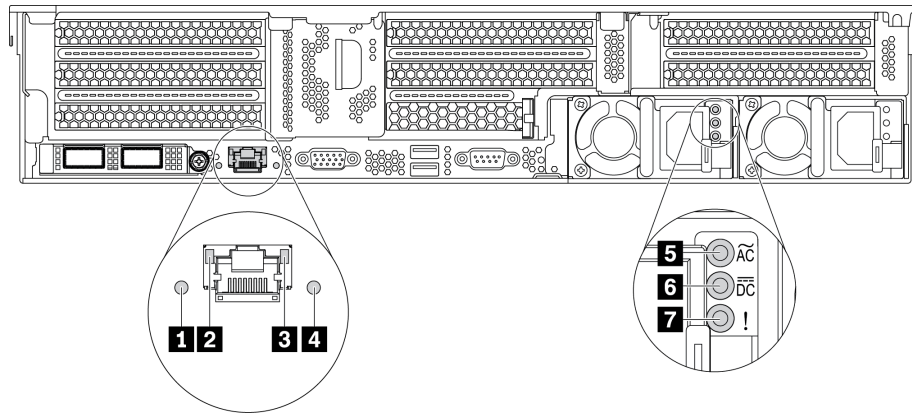


Figure 16. Rear view LEDs of the server

Table 8. LEDs on the rear of the server

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

1 System error LED

The system error LED provides basic diagnostic functions for your server. If the system error LED is lit, one or more LEDs elsewhere in the server might also be lit to direct you to the source of the error. For more information, see “Front I/O assembly” on page 17.

2 3 Ethernet status LEDs

The BMC management connector has two status LEDs.

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

4 System 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.

5 Power input LED

6 Power output LED

7 Power supply error LED

Each hot-swap power supply has three status LEDs.

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

System board components

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

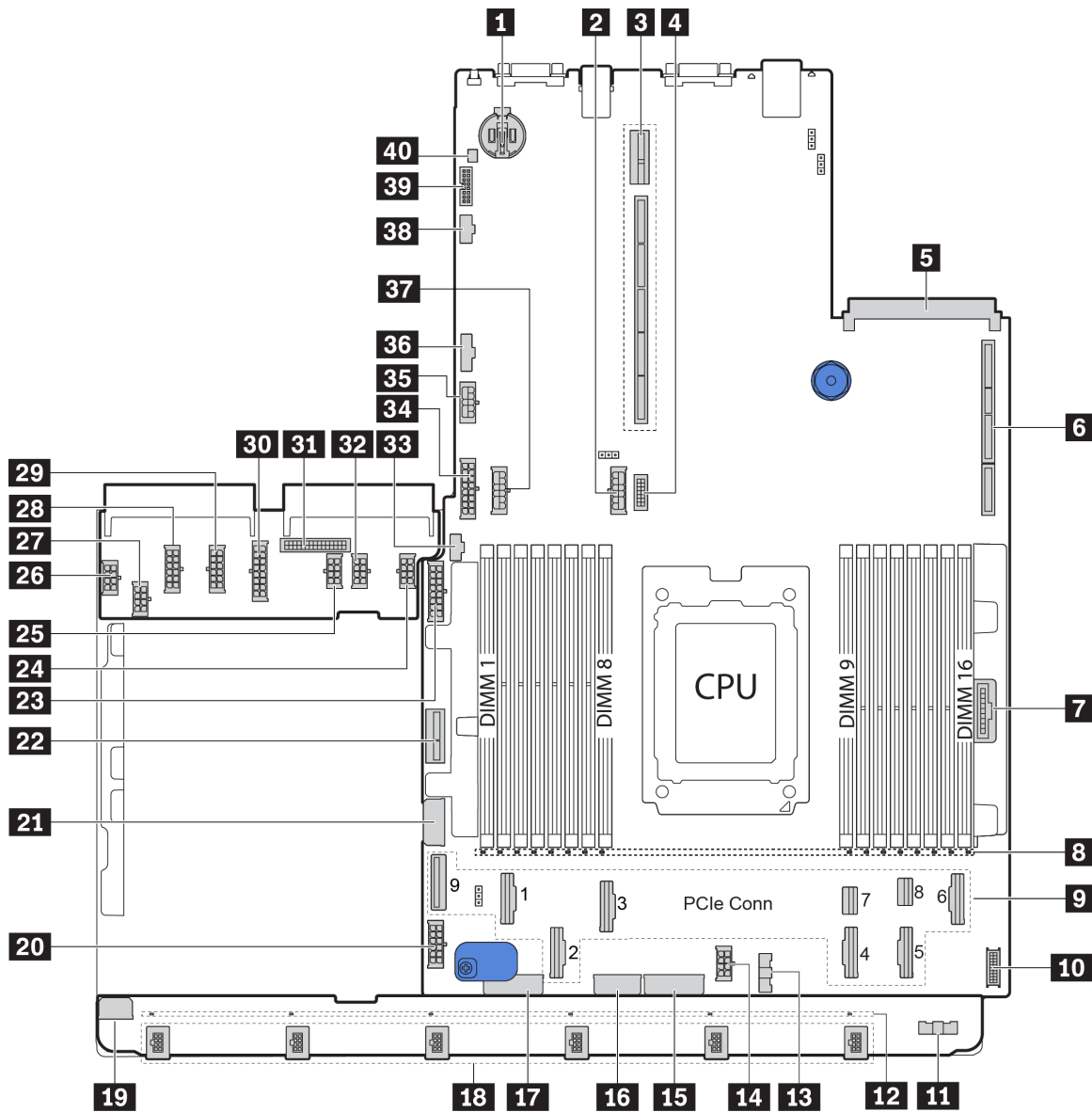


Figure 17. System board components

1 CMOS battery	2 Rear backplane power connector
3 Riser 2 slot	4 Front VGA connector
5 OCP Ethernet adapter slot	6 Riser 1 slot
7 Front panel connector	8 DIMM 1-16 error LEDs
9 PCIe connectors*	10 Front USB connector
11 Fan board sideband connector (connect to 13)	12 Fan 1-6 error LEDs

13 Fan board sideband connector (connect to 11)	14 CPU power connector (connect to 27)
15 Front backplane power connector*	16 System power connector 3 (connect to 28)
17 Front backplane power connector*	18 Fan 1-6 connectors
19 Fan board power connector (connect to 26)	20 System board power connector 2 (connect to 29)
21 Middle 2.5-inch-drive backplane 1 power connector	22 Internal riser power connector
23 Front 2.5-inch-drive backplane 1 power connector	24 GPU power connector 1
25 GPU power connector 3	26 Fan board power connector (connect to 19)
27 CPU power connector (connect to 14)	28 System power connector 3 (connect to 16)
29 System power connector 2 (connect to 20)	30 System power connector 1 (connect to 34)
31 PIB sideband connector (connect to 36)	32 GPU power connector 2
33 M.2 sideband connector	34 System power connector 1 (connect to 30)
35 Riser 3 power connector	36 PIB sideband connector (connect to 31)
37 Middle backplane power connector*	38 Riser 3 sideband connector
39 TPM adapter connector (for Chinese Mainland only)	40 Intrusion switch connector

Notes:

- **9**: The PCIe connectors are connected to NVMe backplanes, M.2 adapter, riser cards, or SAS/SATA backplanes. For detailed information, see “Internal cable routing” on page 37.
- **15**:
 - Front 2.5-inch-drive backplane 3 power connector when three front 2.5-inch-drive backplanes are installed.
 - Front 3.5-inch-drive backplane power connector 2 when the 12 x 3.5-inch-drive backplane is installed.
- **17**:
 - Front 2.5-inch-drive backplane 2 power connector when two front 2.5-inch-drive backplanes are installed.
 - Front 3.5-inch-drive backplane power connector 1 when the 12 x 3.5-inch-drive backplane or 8 x 3.5-inch-drive backplane is installed.
- **37**:
 - Middle 2.5-inch-drive backplane 2 power connector when the middle 2.5-inch-drive cage is installed.
 - Middle 3.5-inch-drive backplane power connector when the middle 3.5-inch-drive cage is installed.

System board LEDs

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

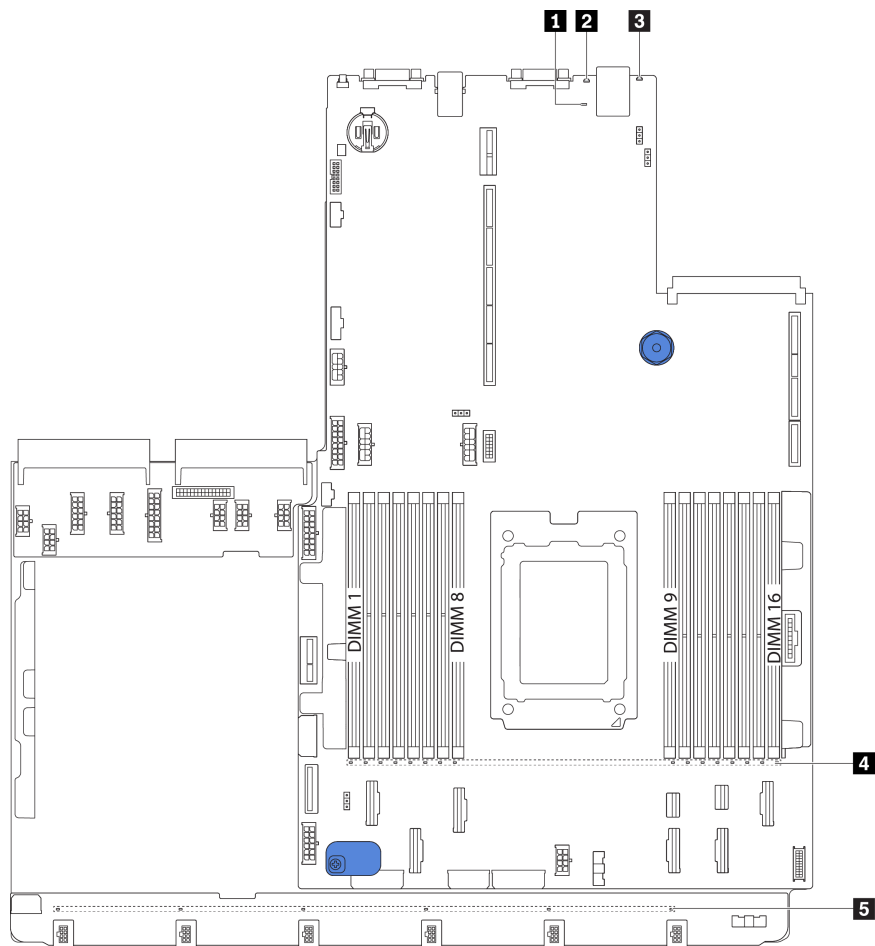


Figure 18. System board LEDs

Table 9. LEDs on the system board

Callout	Callout
1 BMC heart beat LED	2 System ID LED
3 System error LED	4 DIMM error LEDs (16)
5 Fan error LEDs (6)	

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 “Front I/O assembly” on page 17.

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:
 - http://thinksystem.lenovofiles.com/help/topic/safety_documentation/pdf_files.html
 - “Handling static-sensitive devices” on page 124
- Any system-board switch or jumper block that is not shown in the illustrations in this document are reserved.

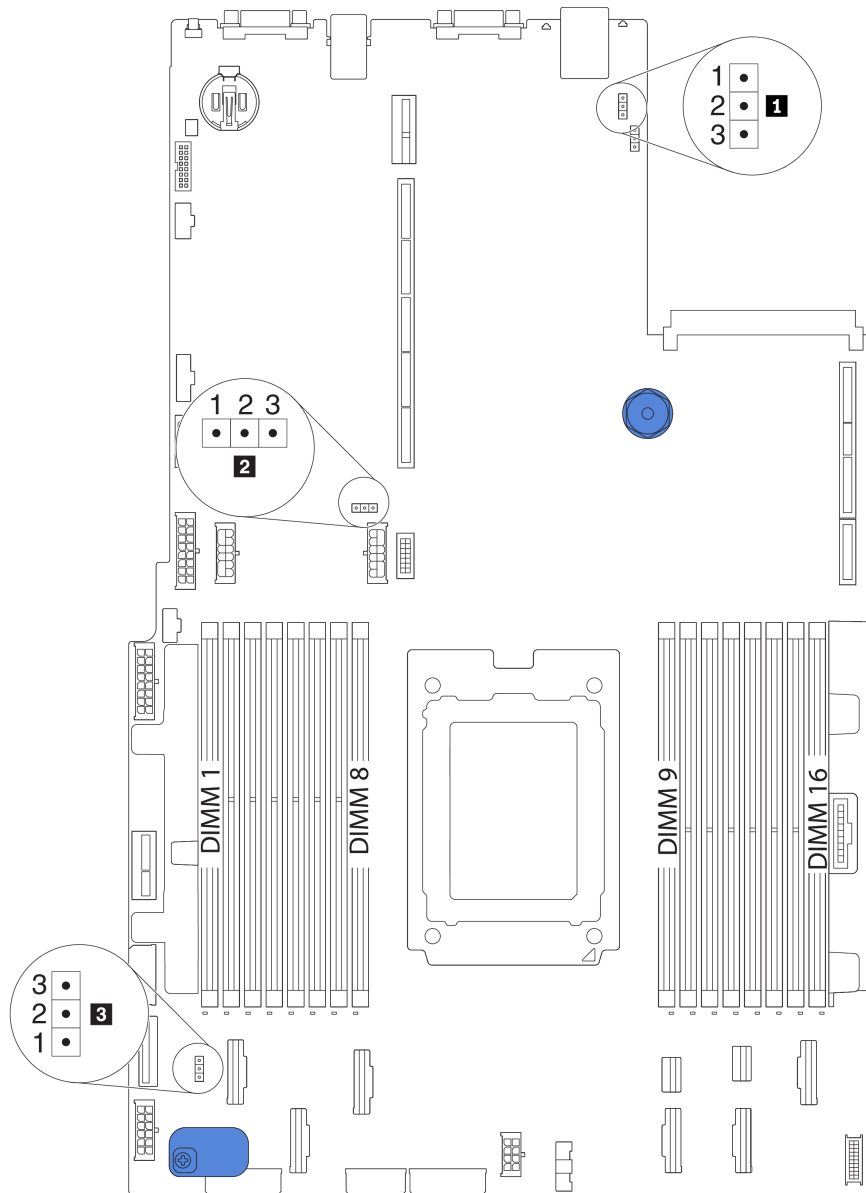


Figure 19. System board jumpers

Table 10. Jumper description

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

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

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 20 “Server components” on page 32:

<http://datacentersupport.lenovo.com/us/en/products/servers/thinksystem/sr655/7y00/parts>

Note: Depending on the model, your server might look slightly different from the illustration. Some parts are available only on some models.

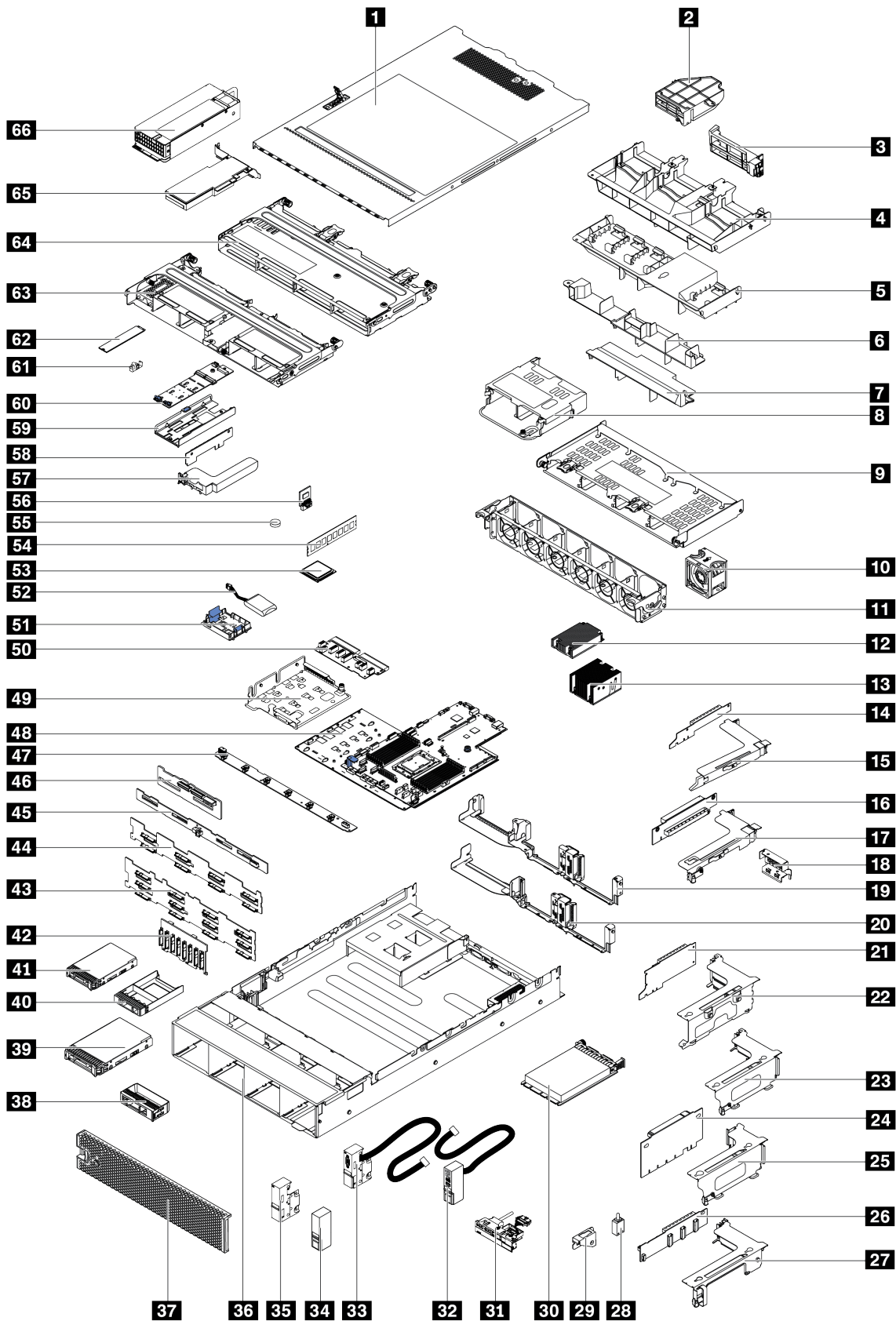


Figure 20. Server components

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 11. 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 20 “Server components” on page 32: http://datacentersupport.lenovo.com/us/en/products/servers/thinksystem/sr655/7y00/parts					
1	Top cover	√			
2	Add-on GPU air baffle, single-wide				√
3	Add-on GPU air baffle, double-wide				√
4	Air baffle for GPU				√
5	Standard air baffle				√
6	Air baffle for middle 2.5-inch drive cage				√
7	Air baffle for middle 3.5-inch drive cage				√
8	Rear 2.5-inch drive cage				√
9	Rear 3.5-inch drive cage				√
10	Fan module	√			
11	Fan cage				√
12	1U processor heat sink			√	
13	2U processor heat sink			√	
14	x16 PCIe riser card 1 (1U)	√			
15	Riser 1 bracket, FH	√			
16	x16 PCIe riser card 2 (1U)	√			
17	Riser 2 bracket, LP	√			
18	Rear wall bracket, 2 x PCIe slots with 3.5-inch drive cage				√
19	Rear wall bracket, 8 x PCIe slots	√			
20	Rear wall bracket, 6 x PCIe slots with 2.5-inch drive cage	√			
21	x16/x8/x8 PCIe riser card 1	√			

Table 11. Parts list (continued)

Index	Description	Tier 1 CRU	Tier 2 CRU	FRU	Consumable and Structural parts
21	x16/x16 PCIe riser card 1	√			
21	x16 PCIe riser card 1	√			
22	Riser 1 bracket, 3FH	√			
23	Riser 2 bracket, 2FH+1LP	√			
24	x16/x16 PCIe riser card 2	√			
24	x16/x8/x8 PCIe riser card 2	√			
25	Riser 2 bracket, 3LP	√			
26	x16/x16 riser card 3	√			
26	x8/x8 PCIe riser card 3	√			
27	Riser 3 bracket, 2FH	√			
28	Intrusion switch	√			
29	Intrusion switch bracket	√			
30	OCP 3.0 Ethernet adapter	√			
31	Front I/O assembly, 8 x 3.5-inch front drive bays	√			
32	Right rack latch, with front I/O assembly				√
33	Left rack latch, with VGA connector	√			
34	Right rack latch, without front I/O assembly				√
35	Left rack latch, without VGA connector	√			
36	Chassis			√	
37	Security bezel	√			
38	Filler, 3.5-inch drive				√
39	Storage drive, 3.5-inch, hot-swap	√			
40	Filler, 2.5-inch drive				√
41	Storage drive, 2.5-inch, hot-swap	√			
42	Backplane, 8 x 2.5-inch hot-swap drives	√			
43	Backplane, 12 x 3.5-inch hot-swap drives	√			
44	Backplane, 8 x 3.5-inch hot-swap drives	√			
45	Backplane, 4 x 3.5 hot-swap drives	√			
46	Backplane, 4 x 2.5 hot-swap drives	√			
47	Fan board			√	
48	System board			√	

Table 11. Parts list (continued)

Index	Description	Tier 1 CRU	Tier 2 CRU	FRU	Consumable and Structural parts
49	M.2/riser support bracket	√			
50	PIB board			√	
51	RAID super capacitor holder	√			
52	RAID super capacitor module	√			
53	Processor			√	
54	Memory module	√			
55	CMOS battery	√			
56	TPM module (for Chinese Mainland only)			√	
57	Internal riser bracket	√			
58	Internal riser card	√			
59	M.2 bracket	√			
60	M.2 adapter	√			
61	M.2 retainer clip	√			
62	M.2 drive	√			
63	Middle 2.5-inch drive cage				√
64	Middle 3.5-inch drive cage				√
65	PCIe adapter	√			
66	Power supply	√			

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.

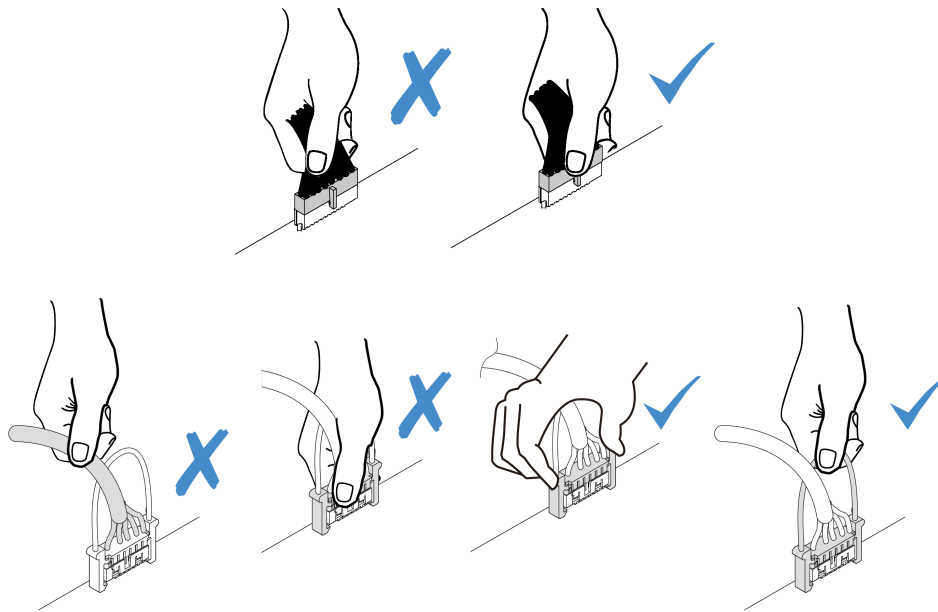
Internal cable routing

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

To connect cables, observe the following guidelines:

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

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



VGA connector

Use the section to understand the cable routing for the VGA connector on the left rack latch.

Note: The VGA connector is available on some models.

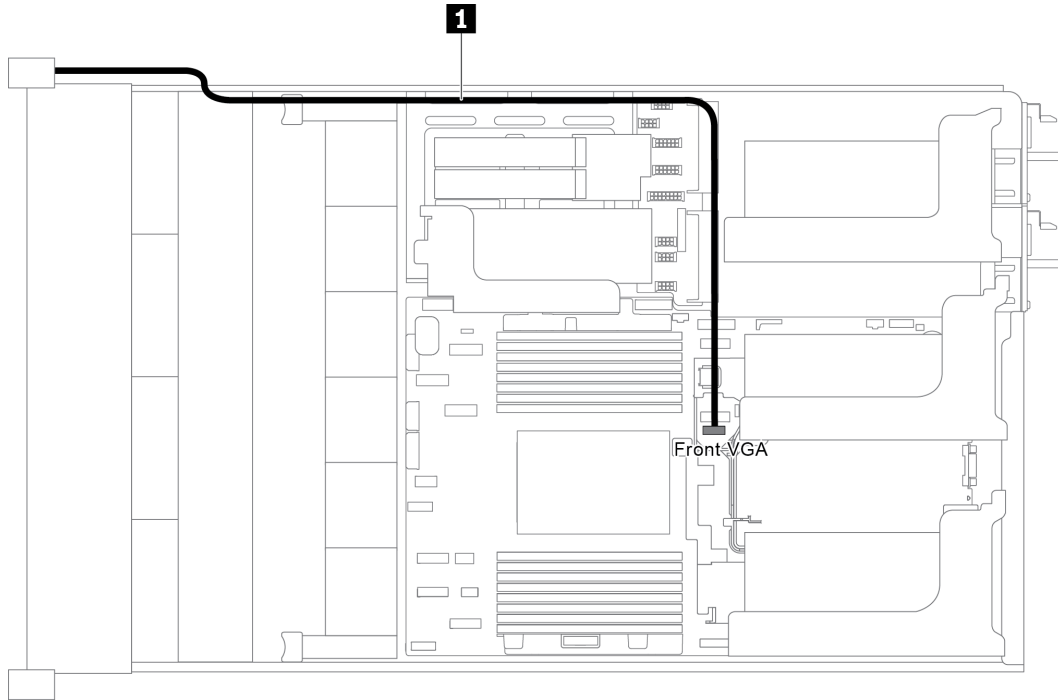


Figure 21. VGA connector cable routing

From	To
VGA cable on the left rack latch	Front VGA connector on the system board

Front I/O assembly

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

- “Front I/O assembly on the chassis” on page 39
- “Front I/O assembly on the right rack latch” on page 40

Front I/O assembly on the chassis

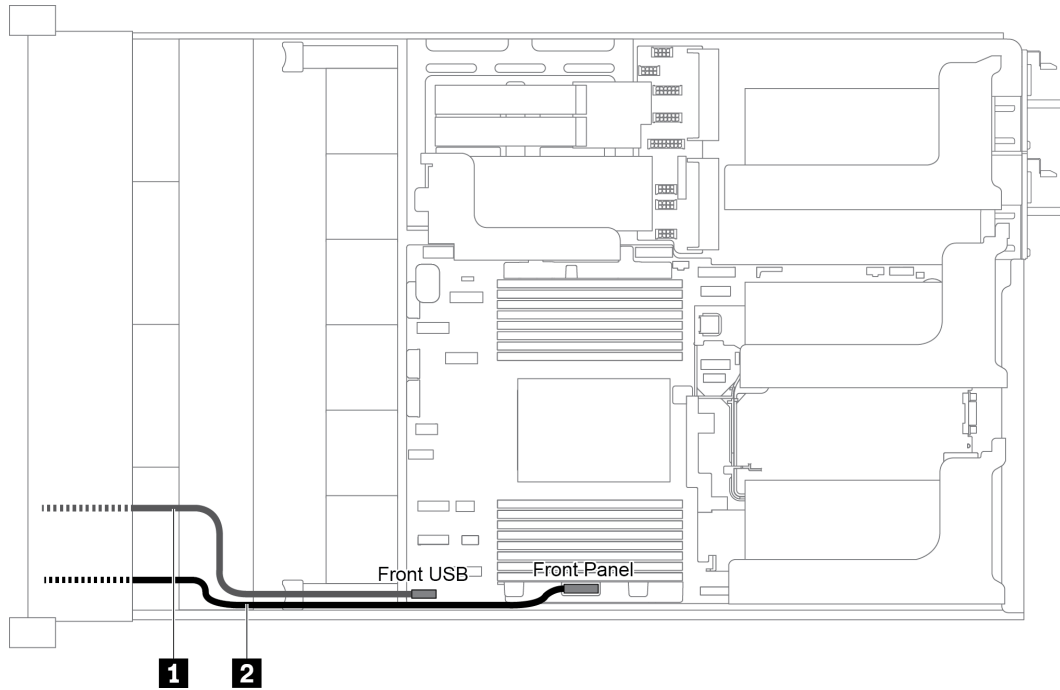


Figure 22. Cable routing for the front I/O assembly on the chassis

From	To
1 Front USB cable	Front USB connector on the system board
2 Front panel cable	Front panel connector on the system board

Front I/O assembly on the right rack latch

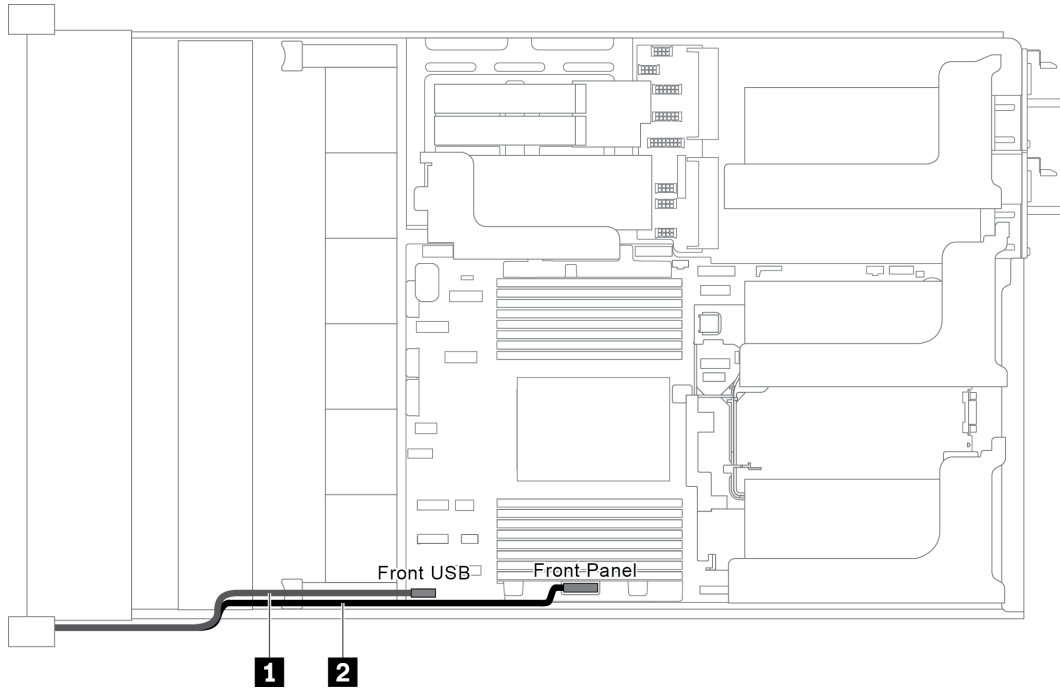


Figure 23. Cable routing for the front I/O assembly on the right rack latch

From	To
Front-I/O-assembly cable	Front USB connector and front panel connector on the system board

M.2 drives

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

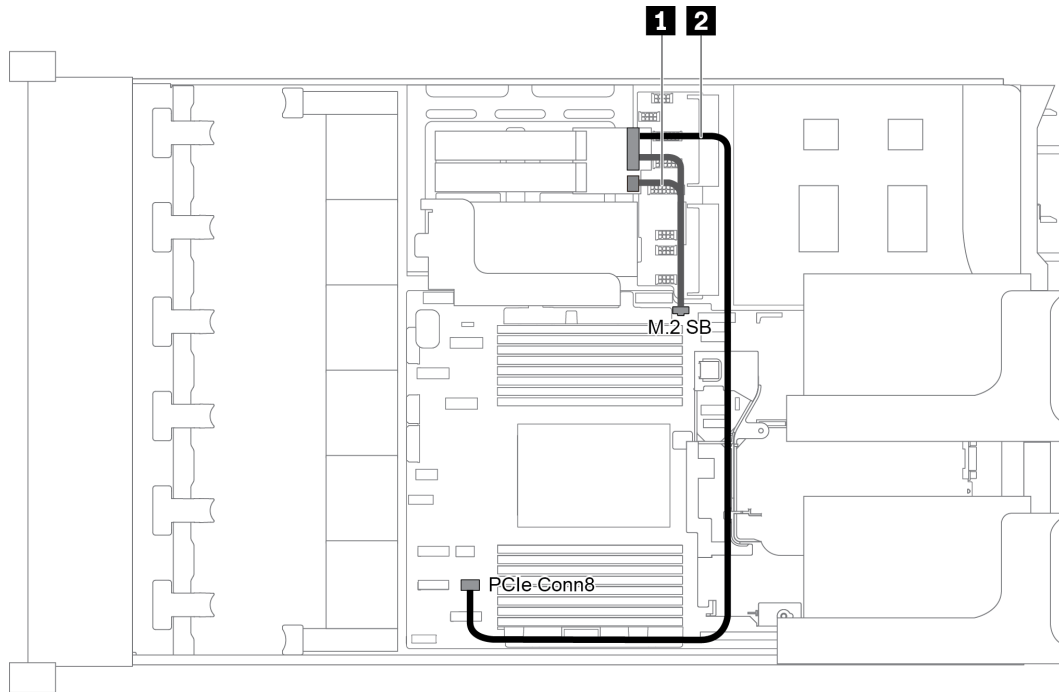


Figure 24. Cable routing for M.2 drives

From	To
1 M.2 sideband cable	M.2 sideband connector on the system board
2 Power cable	PCIe connector 8 on the system board

RAID super capacitor modules

This section provides cable routing information for RAID super capacitor modules.

The cable routing depends on the locations of RAID super capacitor modules:

- “Cable routing for RAID super capacitor modules on the standard air baffle” on page 42
- “Cable routing for RAID super capacitor modules on the middle drive cage” on page 43
- “Cable routing for RAID super capacitor modules on the internal riser kit” on page 44

Note: An extension cable is provided for each RAID super capacitor module for connection.

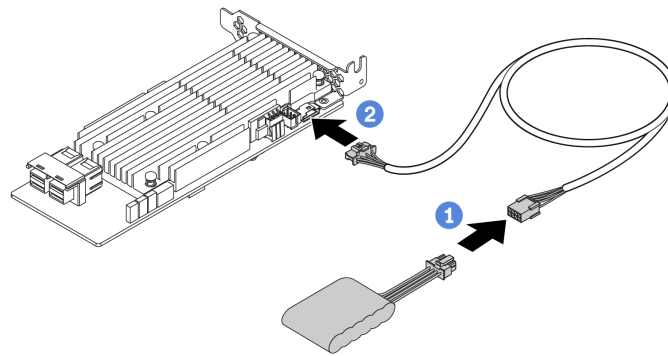


Figure 25. Connecting the RAID super capacitor module to the RAID adapter

Cable routing for RAID super capacitor modules on the standard air baffle

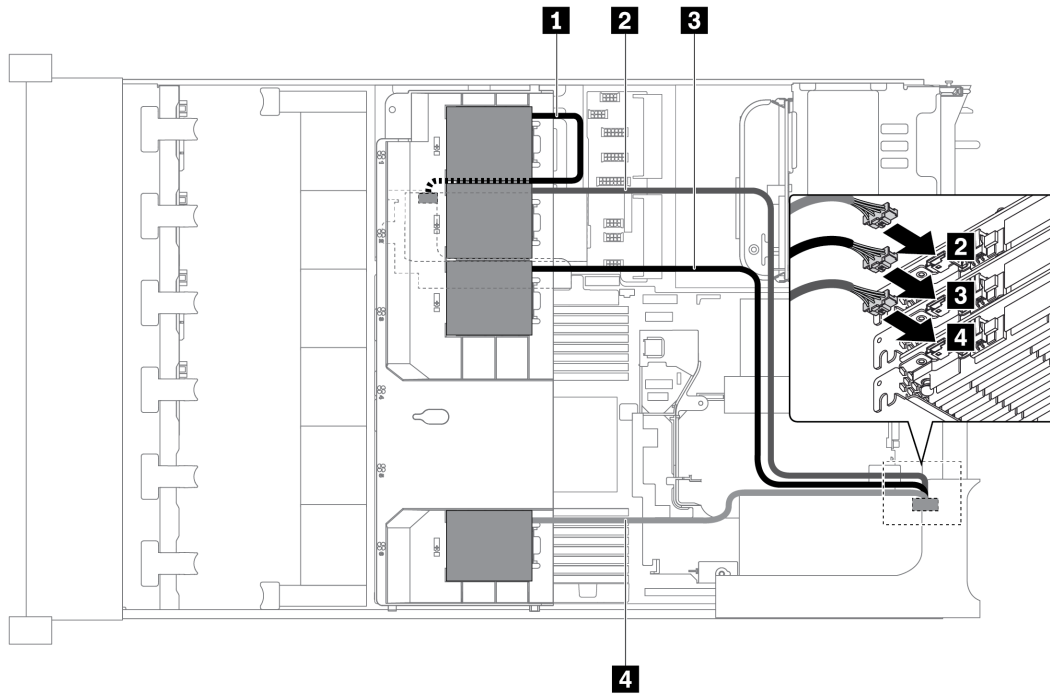


Figure 26. Cable routing for RAID super capacitor modules on the standard air baffle

From	To
1 Super capacitor 1 cable	Super capacitor connector on the RAID adapter on the internal riser card
2 Super capacitor 2 cable	Super capacitor connector on the RAID adapter in slot 1 on riser card 1
3 Super capacitor 3 cable	Super capacitor connector on the RAID adapter in slot 2 on riser card 1
4 Super capacitor 4 cable	Super capacitor connector on the RAID adapter in slot 3 on riser card 1

Cable routing for RAID super capacitor modules on the middle drive cage

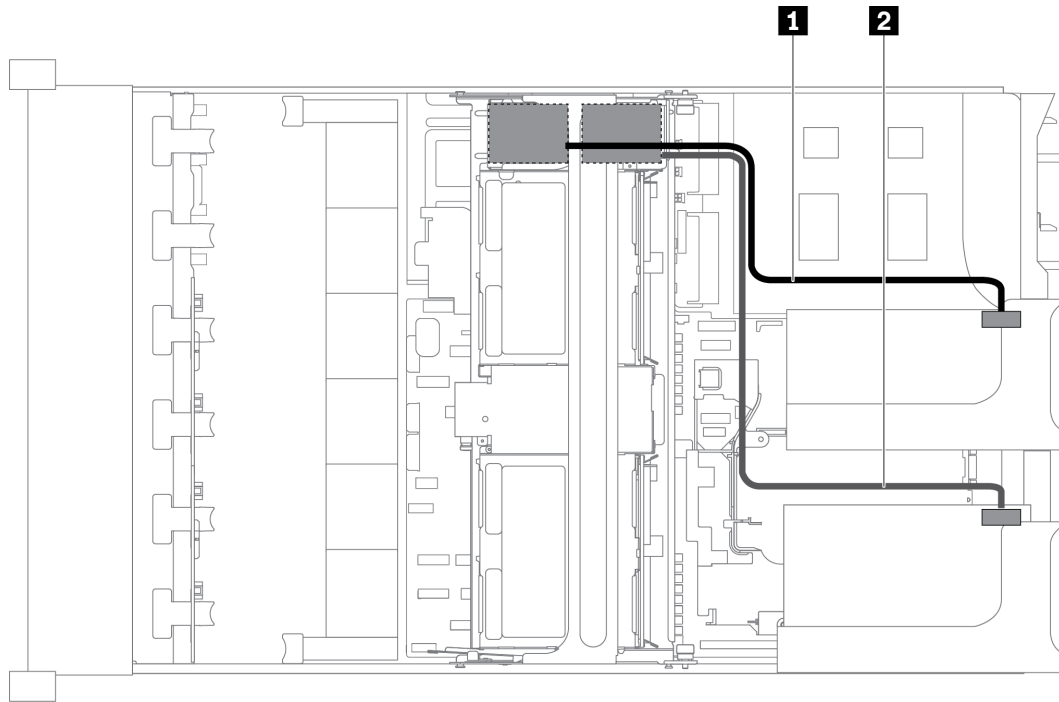


Figure 27. Cable routing for RAID super capacitor modules on the middle drive cage

From	To
1 Super capacitor 1 cable	Super capacitor connector on the RAID adapter on riser card 1
2 Super capacitor 2 cable	Super capacitor connector on the RAID adapter on riser card 2

Cable routing for RAID super capacitor modules on the internal riser kit

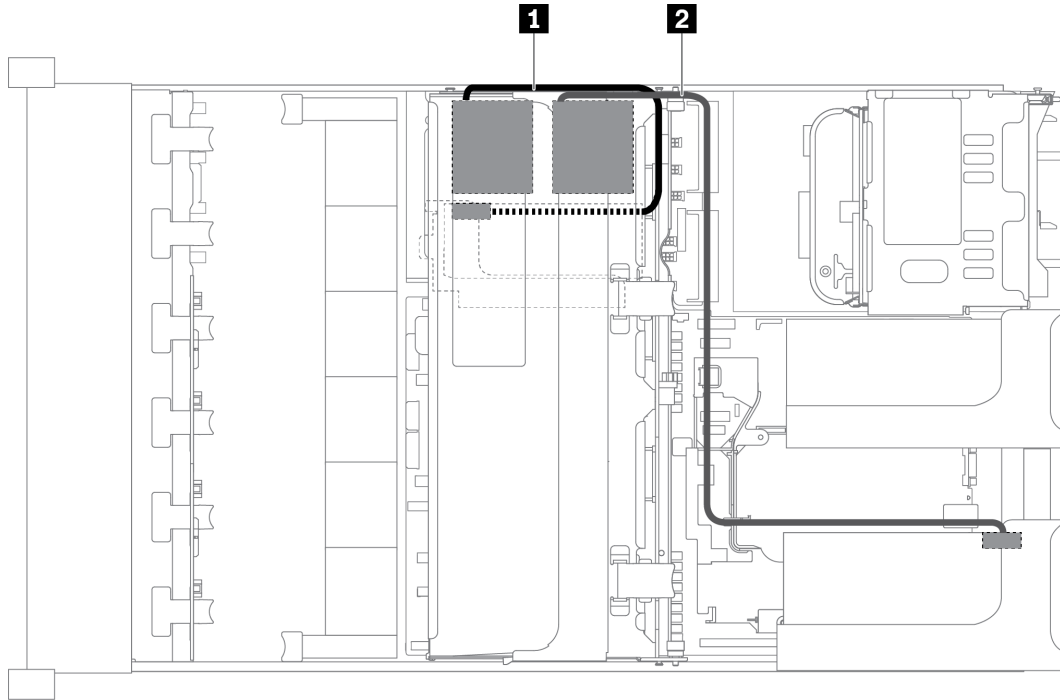


Figure 28. Cable routing for RAID super capacitor modules on the internal riser kit

From	To
1 Super capacitor 1 cable	Super capacitor connector on the RAID adapter on the internal riser card
2 Super capacitor 2 cable	Super capacitor connector on the RAID adapter on riser card 1

GPU adapters

This section provides cable routing information for the GPU adapter.

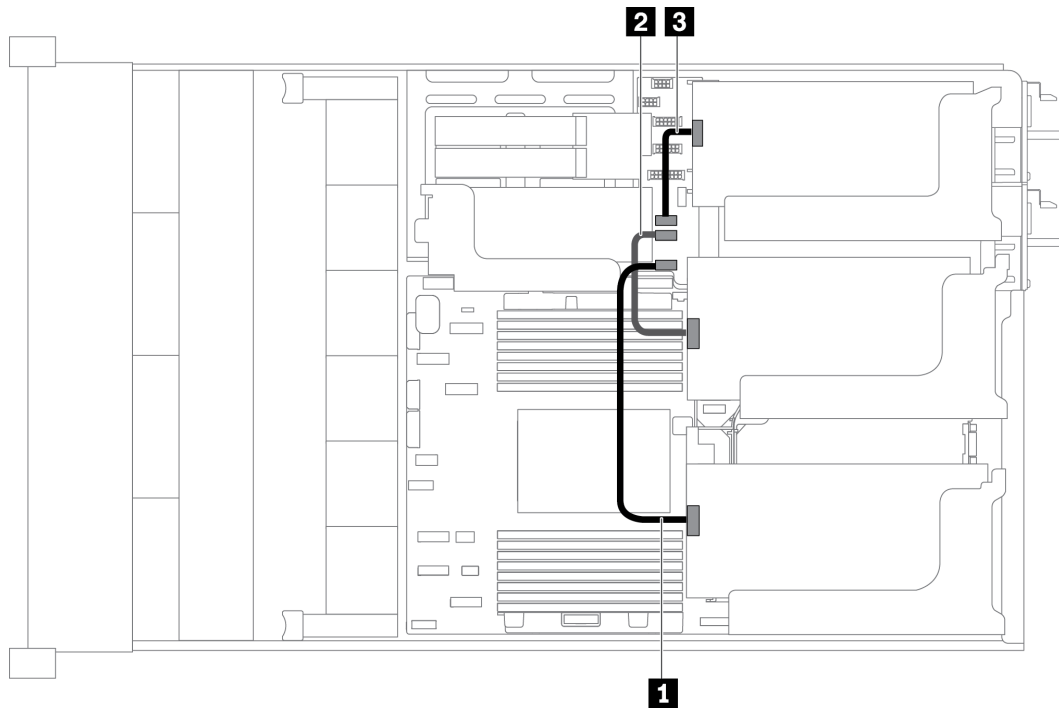


Figure 29. Cable routing for GPU adapter

From	To
1 GPU adapter on riser 1	GPU 1 power connector on the system board
2 GPU adapter on riser 2	GPU 2 power connector on the system board
3 GPU adapter on riser 3	GPU 3 power connector on the system board

Intrusion switch

Use the section to understand the cable routing for the intrusion switch on the riser 2 bracket.

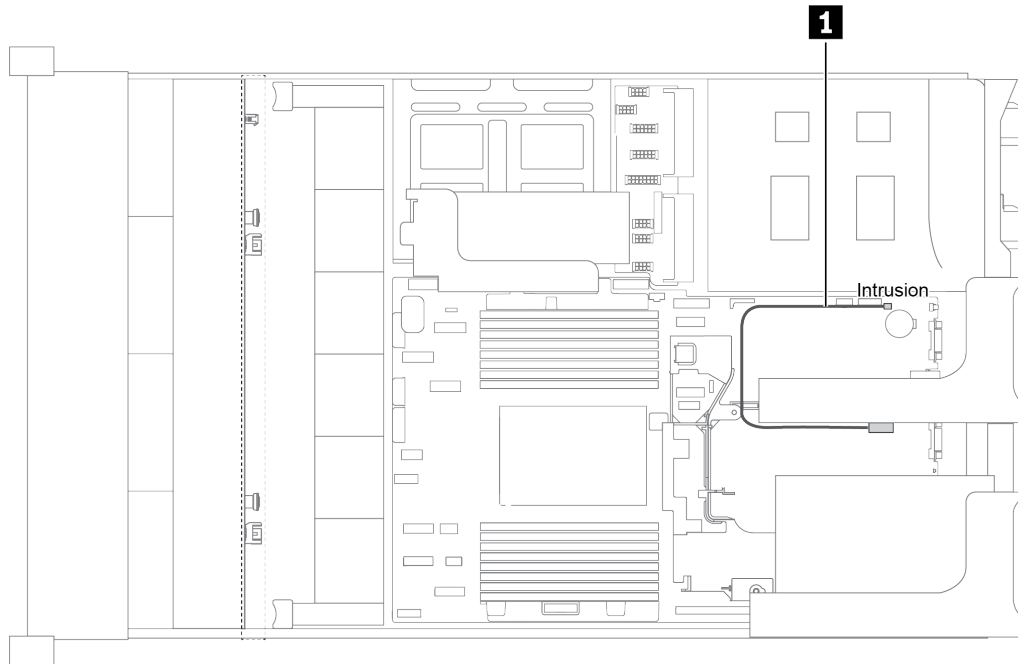


Figure 30. Intrusion switch cable routing

Cable	To
1 Intrusion switch cable from the riser 2 bracket	Intrusion switch connector on the system board

Riser cards

This section provides cable routing information for riser cards.

The server supports up to four riser cards: riser card 1, riser card 2, riser card 3, and internal riser card. Among which, the following riser cards need cable connections:

- x16/x16 PCIe riser card 1: “Riser card 1 cable connections” on page 47
- x16/x8/x8 PCIe riser card 1: “Riser card 1 cable connections” on page 47
- x8/x8 PCIe riser card 3: “Riser card 3 (x8/x8 PCIe) cable connection” on page 48
- x16/x16 PCIe riser card 3: “Riser card 3 (x16/x16 PCIe) cable connection” on page 49
- Riser 3 power and sideband connection: “Riser card 3 power and sideband connection” on page 50

The riser card types vary by server model. For detailed information, see “Rear view” on page 20.

Riser card 1 cable connections

Note: The cable connections for x16/x16 PCIe riser card 1 and x16/x8/x8 PCIe riser card 1 are the same.

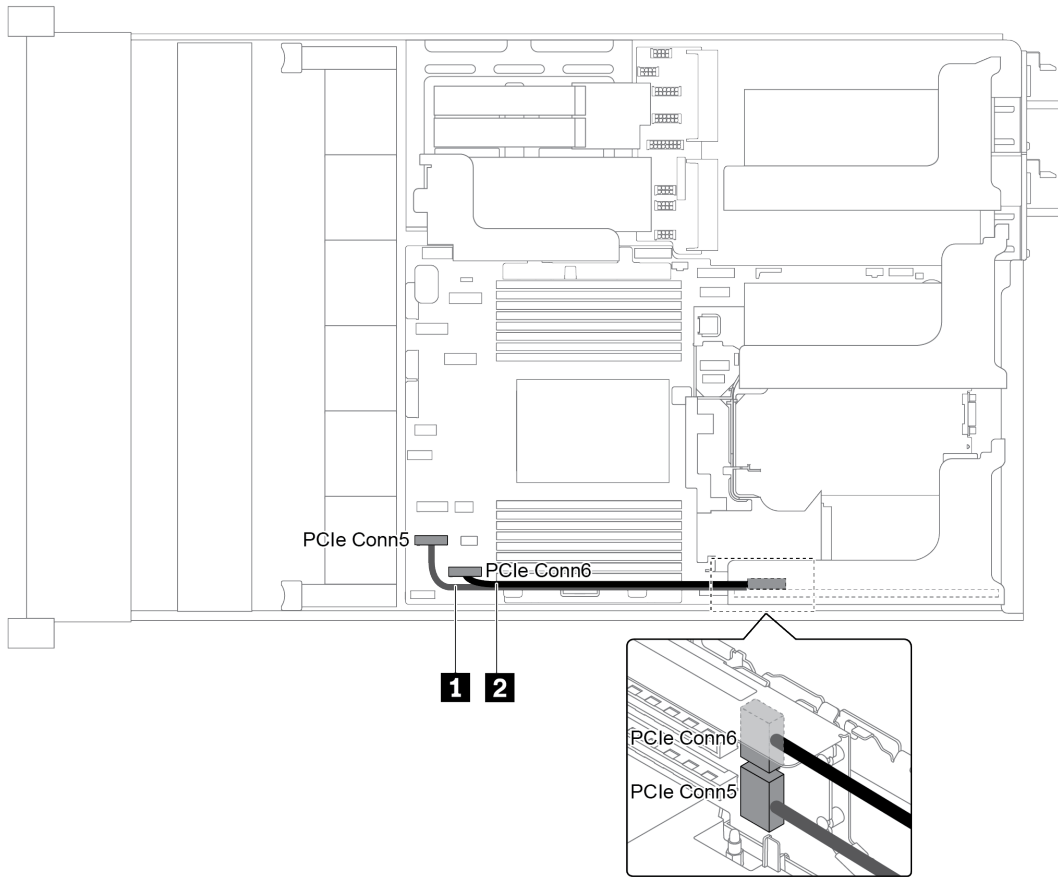


Figure 31. Cable routing for riser card 1

Cable	From	To
1 Signal cable	PCIe connector 5 on the riser card	PCIe connector 5 on the system board
2 Signal cable	PCIe connector 6 on the riser card	PCIe connector 6 on the system board

Note: x16/x16 or x16/x8/x8 PCIe riser card 1 is not supported if three 8x 2.5-inch front drive backplanes are connected to onboard PCIe connectors.

Riser card 3 (x8/x8 PCIe) cable connection

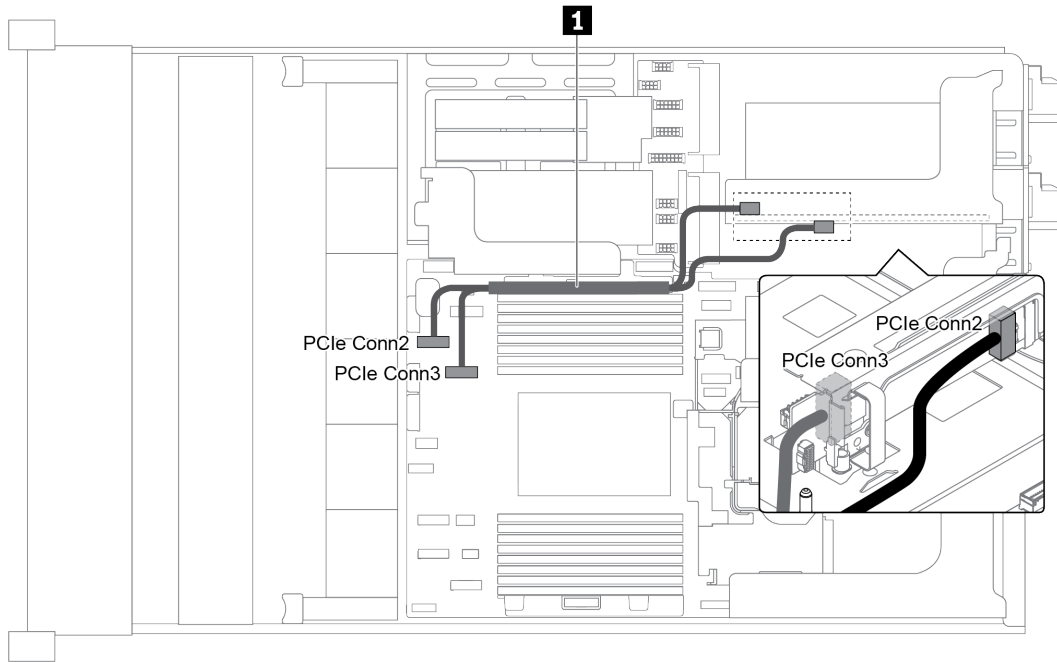


Figure 32. Cable routing for riser card 3 (x8/x8 PCIe)

Cable	From	To
1 Signal cable	PCIe connector 2 on the riser card	PCIe connector 2 on the system board
	PCIe connector 3 on the riser card	PCIe connector 3 on the system board

Note: x8/x8 PCIe riser card 3 is not supported if the server has a 12 x 3.5-inch AnyBay backplane or 8 x 2.5-inch NVMe backplane installed.

Riser card 3 (x16/x16 PCIe) cable connection

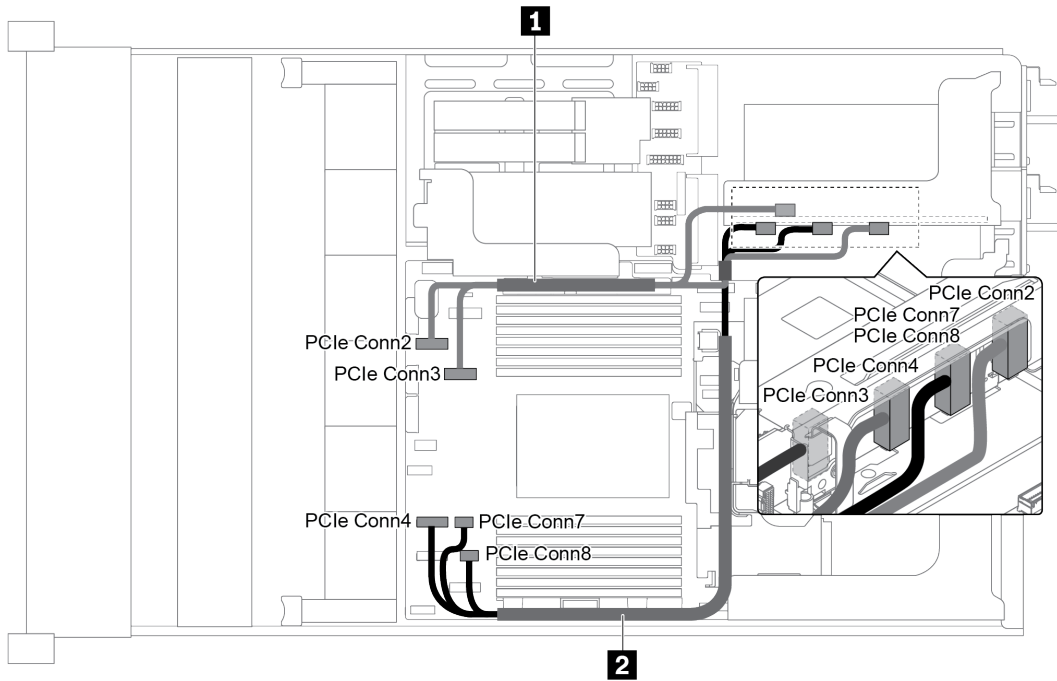


Figure 33. Cable routing for riser card 3 (x16/x16 PCIe)

Cable	From	To
1 Signal cable	PCIe connector 2 on the riser card	PCIe connector 2 on the system board
	PCIe connector 3 on the riser card	PCIe connector 3 on the system board
2 Signal cable	PCIe connector 7-8 on the riser card	PCIe connectors 7 and 8 on the system board
	PCIe connector 4 on the riser card	PCIe connector 4 on the system board

Note: x16/x16 PCIe riser card 3 is not supported if the server has a 12 x 3.5-inch AnyBay backplane, 12 x 3.5-inch SAS/SATA front backplane (on board), 8 x 3.5-inch SAS/SATA front backplane (on board), 8 x 2.5-inch NVMe backplane, or M.2 drive installed.

Riser card 3 power and sideband connection

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

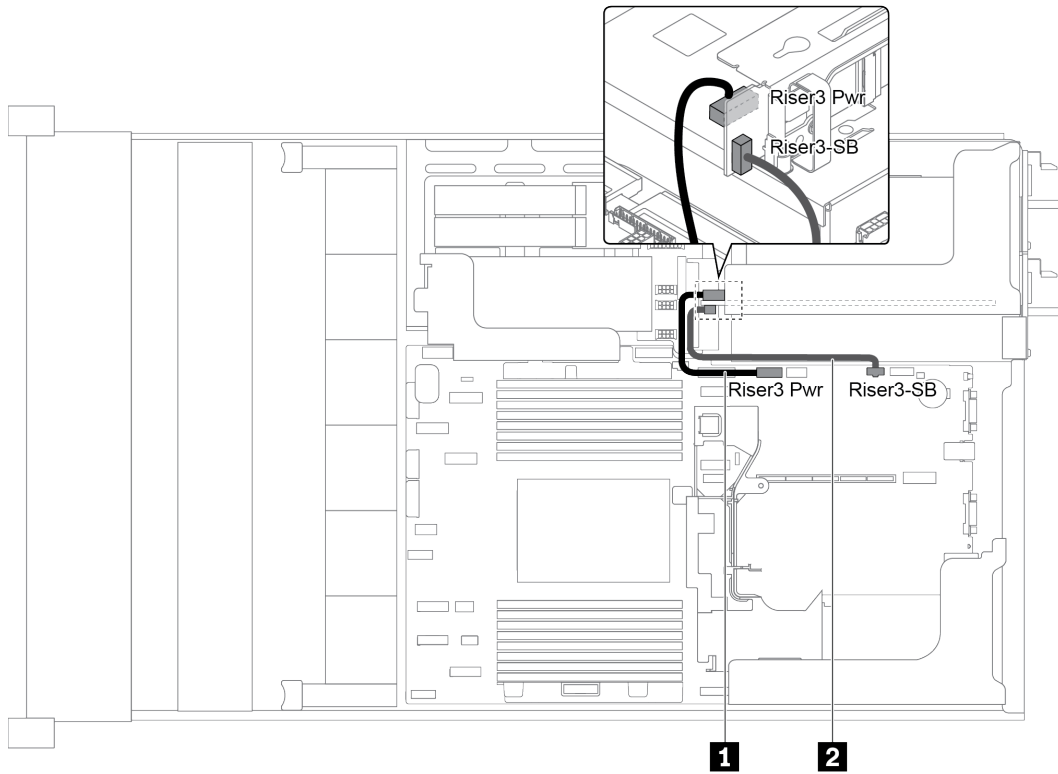


Figure 34. Riser card 3 power and sideband connection

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

Backplanes

Use the section to understand the cable routing for backplanes.

Cable routing for backplanes depends on the server model and backplanes installed. Refer to the specific model for cable routing information for your server:

- “Backplane power connections” on page 52
- “Server model with 8 x 3.5-inch front drive bays (SAS/SATA)” on page 56
- “Server model with 12 x 3.5-inch front drive bays (SAS/SATA)” on page 59
- “Server model with 12 x 3.5-inch front drive bays (8 SAS/SATA + 4 AnyBay)” on page 65
- “Server model with 8 x 2.5-inch front drive bays (SAS/SATA or NVMe)” on page 72
- “Server model with 16 x 2.5-inch front drive bays (SAS/SATA)” on page 75
- “Server model with 16 x 2.5-inch front drive bays (8 SAS/SATA + 8 NVMe)” on page 81
- “Server model with 16 x 2.5-inch front drive bays (NVMe)” on page 85
- “Server model with 24 x 2.5-inch front drive bays (SAS/SATA)” on page 88
- “Server model with 24 x 2.5-inch front drive bays (16 SAS/SATA + 8 NVMe)” on page 96
- “Server model with 24 x 2.5-inch front drive bays (NVMe)” on page 108

Backplane power connections

This section provides information for backplane power connections.

- “Power connections for front 2.5-inch-drive backplanes” on page 52
- “Power connections for front 3.5-inch-drive backplanes” on page 53
- “Power connections for middle 2.5-inch-drive backplanes” on page 54
- “Power connections for the middle 3.5-inch-drive backplane” on page 55
- “Power connections for the rear backplanes” on page 56

Power connections for front 2.5-inch-drive backplanes

The server supports up to three front 2.5-inch-drive backplanes.

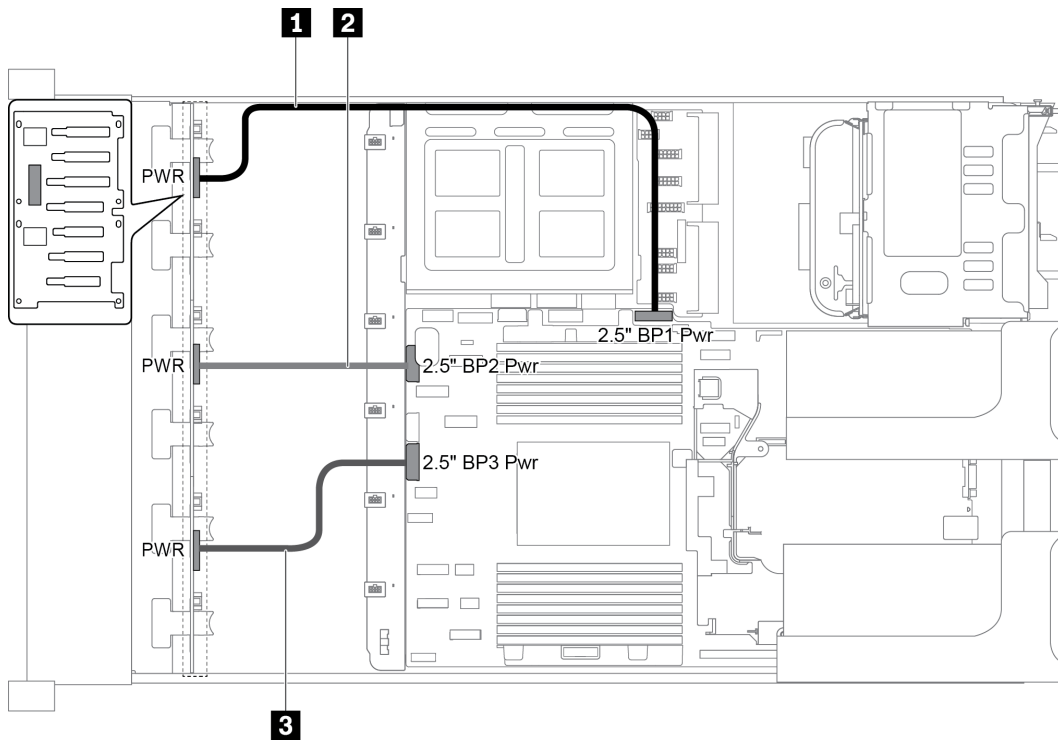


Figure 35. Power cabling for front 2.5-inch-drive backplanes

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

Power connections for front 3.5-inch-drive backplanes

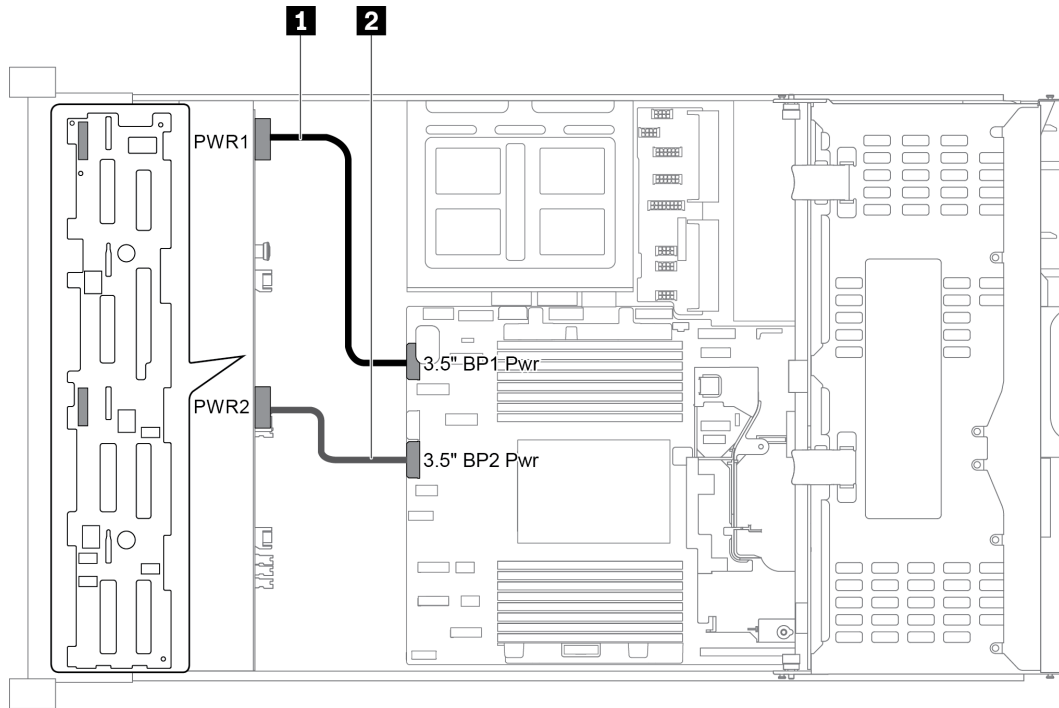


Figure 36. Power cabling for front 3.5-inch-drive backplanes

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

Power connections for middle 2.5-inch-drive backplanes

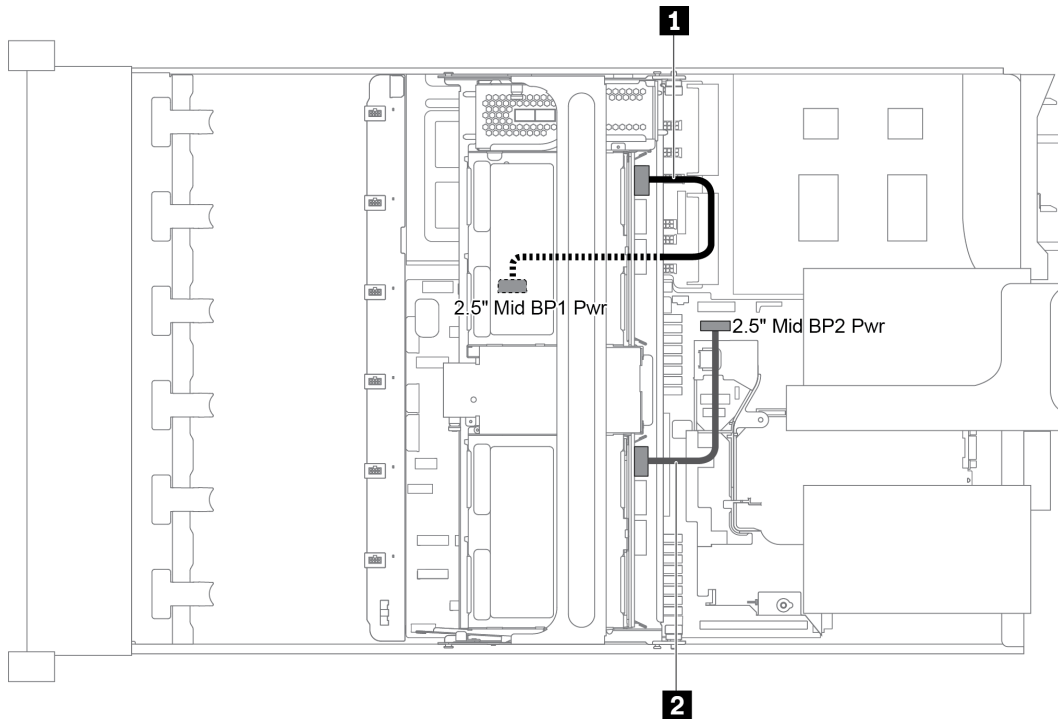


Figure 37. Power cabling for middle 2.5-inch-drive backplanes

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

Note: The middle backplane 1 power connector (2.5" Mid BP1 Pwr) is under the middle drive cage.

Power connections for the middle 3.5-inch-drive backplane

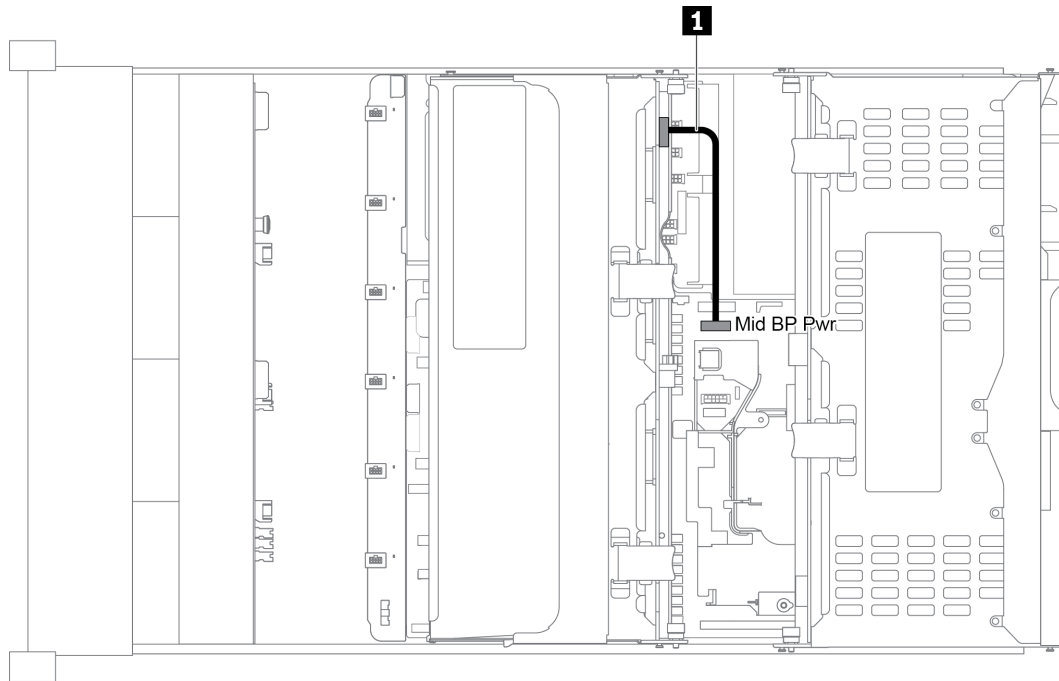


Figure 38. Power cabling for the middle 3.5-inch-drive backplane

From	To
1 Power connector on the backplane	Middle backplane power connector on the system board

Power connections for the rear backplanes

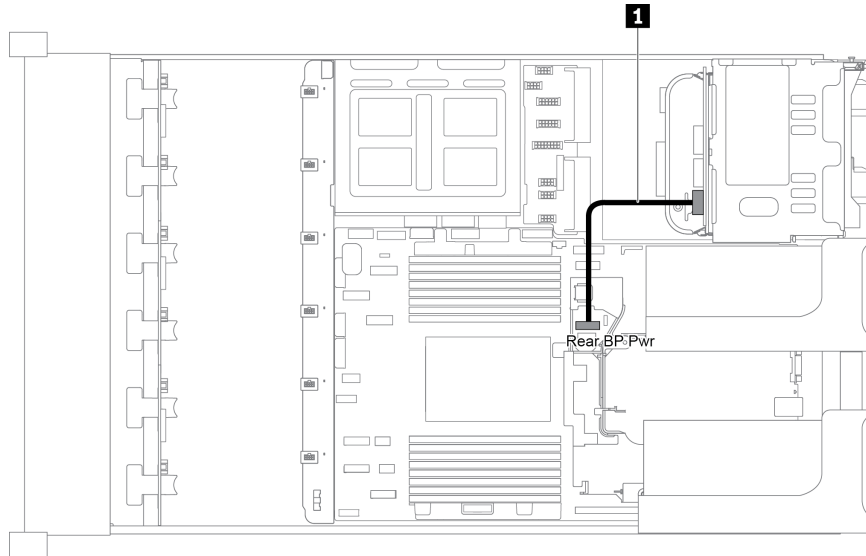


Figure 39. Power cabling for the rear 2.5-inch-drive backplane

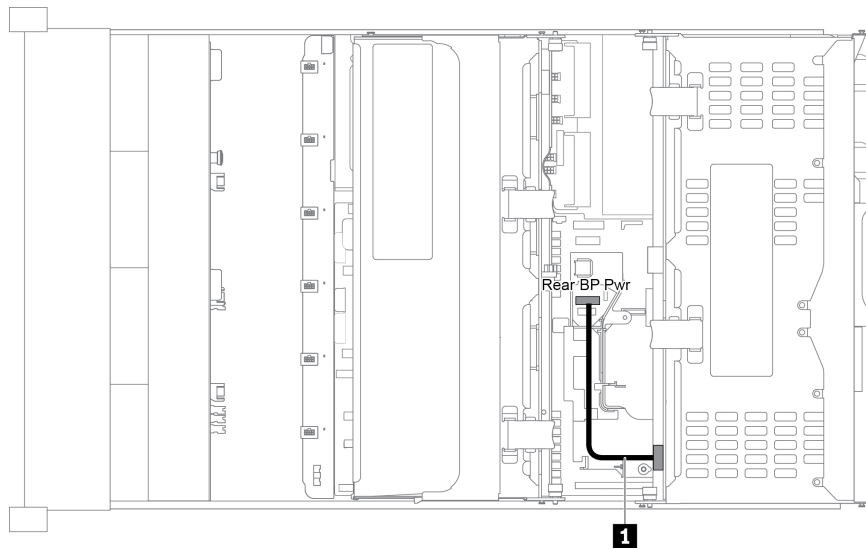


Figure 40. Power cabling for the rear 3.5-inch-drive backplane

From	To
1 Power connector on the backplane	Rear backplane power connector on the system board

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

This section provides cable routing information for the server model with one 8 x 3.5-inch SAS/SATA front backplane.

- “Configuration 1: one 8 x 3.5 SAS/SATA front backplane” on page 57
- “Configuration 2: one 8 x 3.5 SAS/SATA front backplane, one 8i RAID/HBA adapter” on page 58

Configuration 1: one 8 x 3.5 SAS/SATA front backplane

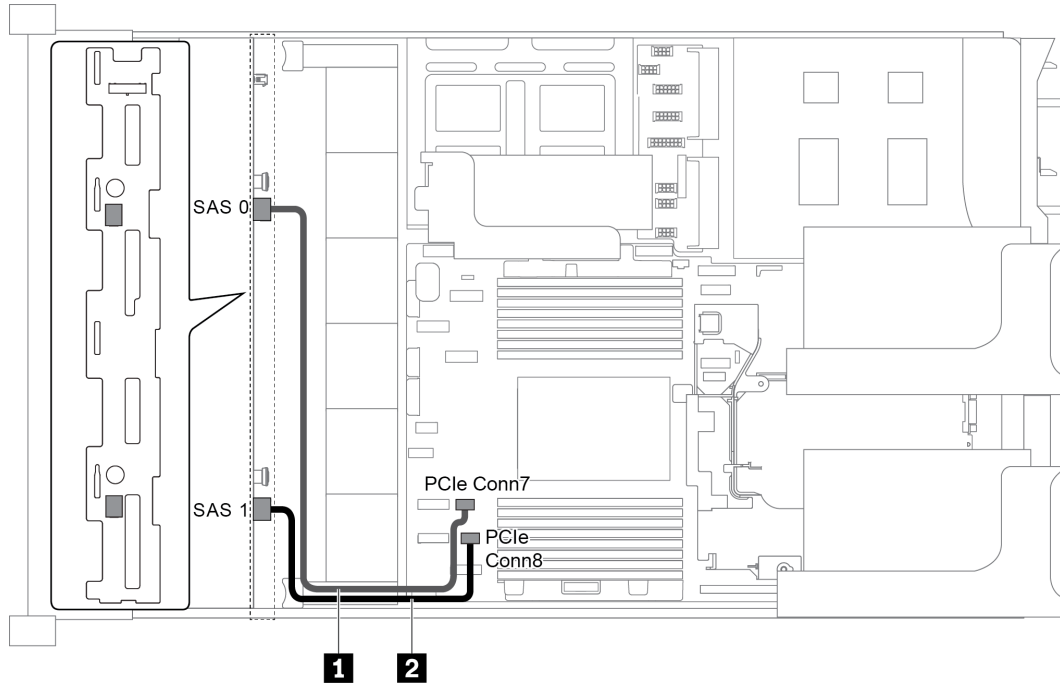


Figure 41. Cable routing for configuration with one 8 x 3.5 SAS/SATA front backplane

Cable	From	To
1 SAS signal cable	SAS 0 connector on the backplane	PCIe connector 7 on the system board
2 SAS signal cable	SAS 1 connector on the backplane	PCIe connector 8 on the system board

Notes:

- When the SAS/SATA backplane is connected to PCIe connectors on the system board, only SATA drives are supported. No SAS drives are supported.
- When the SAS/SATA backplane is connected to PCIe connectors on the system board, x16/x16 riser card 3 is not supported.

Configuration 2: one 8 x 3.5 SAS/SATA front backplane, one 8i RAID/HBA adapter

Note: The RAID/HBA adapter can be installed on the internal riser card (scenario 1), riser card 1 (scenario 2), or riser card 2 (scenario 3). The following illustration shows the cable connections for scenario 1. The cable connections are the same for scenarios 2 and 3.

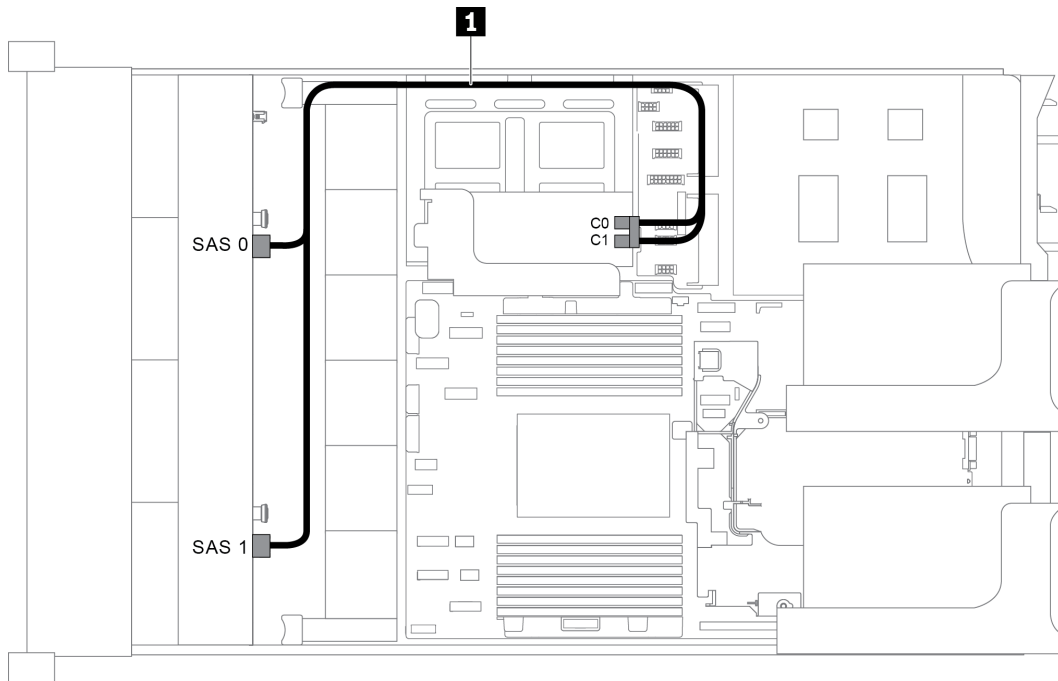


Figure 42. Cable routing for configuration with one 8 x 3.5 SAS/SATA front backplane and one 8i RAID/HBA adapter

Cable	From	To
1 SAS signal cable	SAS 0 connector on the backplane	Connector C0 on the RAID/HBA adapter
	SAS 1 connector on the backplane	Connector C1 on the RAID/HBA adapter

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

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

- “Configuration 1: one 12 x 3.5" SAS/SATA front backplane, onboard connections” on page 59
- “Configuration 2: one 12 x 3.5" SAS/SATA front backplane, one 16i RAID/HBA adapter” on page 60
- “Configuration 3: one 12 x 3.5" SAS/SATA front backplane, one rear drive cage (SAS/SATA)” on page 61
- “Configuration 4: one 12 x 3.5" SAS/SATA front backplane, one rear drive cage (SAS/SATA), one 16i RAID/HBA adapter” on page 62
- “Configuration 5: one 12 x 3.5" SAS/SATA front backplane, one rear drive cage (SAS/SATA), two RAID/HBA adapters (8i+16i)” on page 63
- “Configuration 6: one 12 x 3.5" SAS/SATA front backplane, one rear drive cage (SAS/SATA), one middle drive cage (SAS/SATA), one 24i RAID adapter” on page 64
- “Configuration 7: one 12 x 3.5" SAS/SATA front backplane, one rear drive cage (SAS/SATA), one middle drive cage (SAS/SATA), two RAID/HBA adapters (8i+16i)” on page 65

Configuration 1: one 12 x 3.5" SAS/SATA front backplane, onboard connections

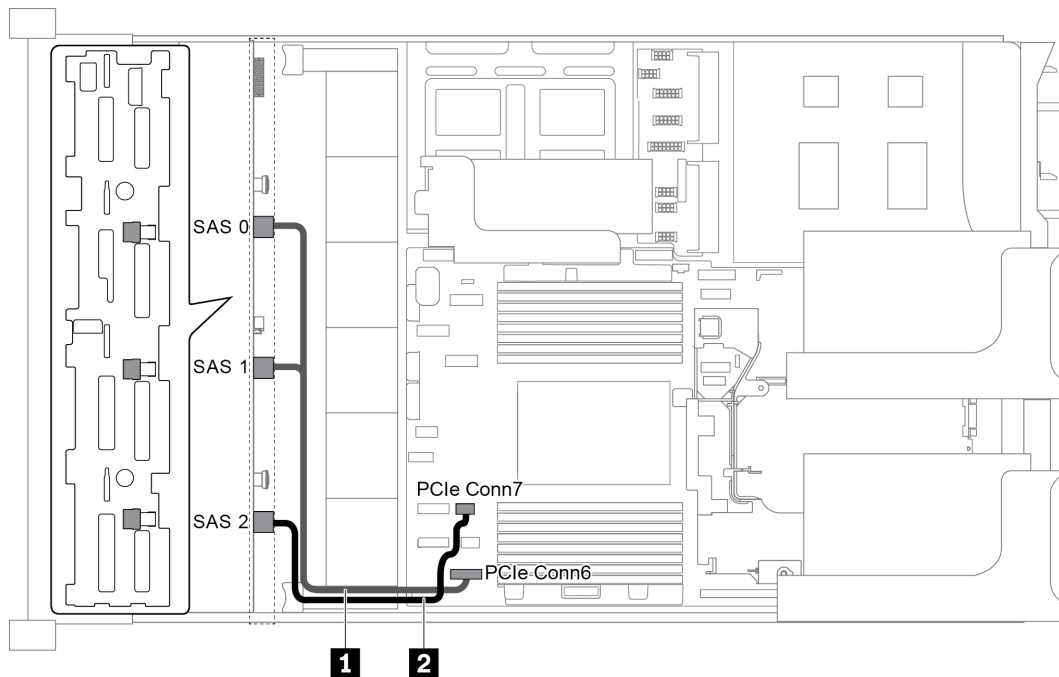


Figure 43. Cable routing for configuration with one 12 x 3.5" SAS/SATA front backplane

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

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

Configuration 2: one 12 x 3.5" SAS/SATA front backplane, one 16i RAID/HBA adapter

Note: The RAID/HBA adapter can be installed on the riser card 1 (scenario 1) or riser card 2 (scenario 2). The following illustration shows the cable connections for scenario 1. The cable connections are the same for scenario 2.

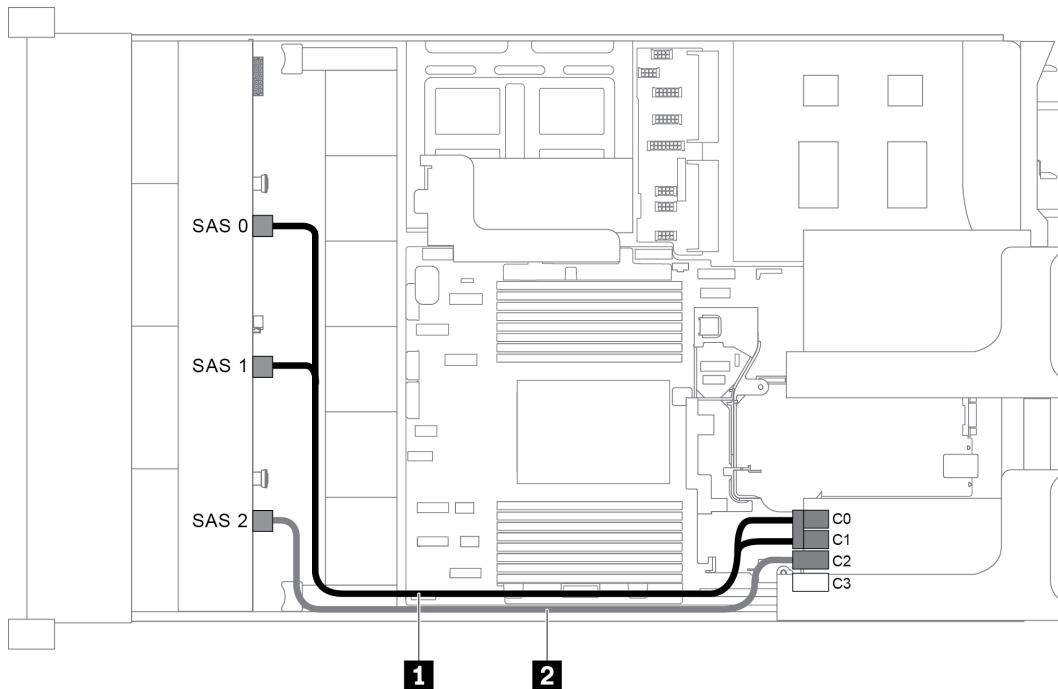


Figure 44. Cable routing for configuration with one 12 x 3.5" SAS/SATA front backplane and one 16i RAID/HBA adapter

Cable	From	To
1 SAS signal cable	SAS 0 connector on the backplane	Connector C0 on the RAID/HBA adapter
	SAS 1 connector on the backplane	Connector C1 on the RAID/HBA adapter
2 SAS signal cable	SAS 2 connector on the backplane	Connector C2 on the RAID/HBA adapter

Configuration 3: one 12 x 3.5" SAS/SATA front backplane, one rear drive cage (SAS/SATA)

Note: This configuration supports one rear 3.5-inch SAS/SATA drive cage (scenario 1) or rear 2.5-inch SAS/SATA drive cage (scenario 2). The following illustration shows the cable connections for scenario 1. The cable connections are the same for scenario 2.

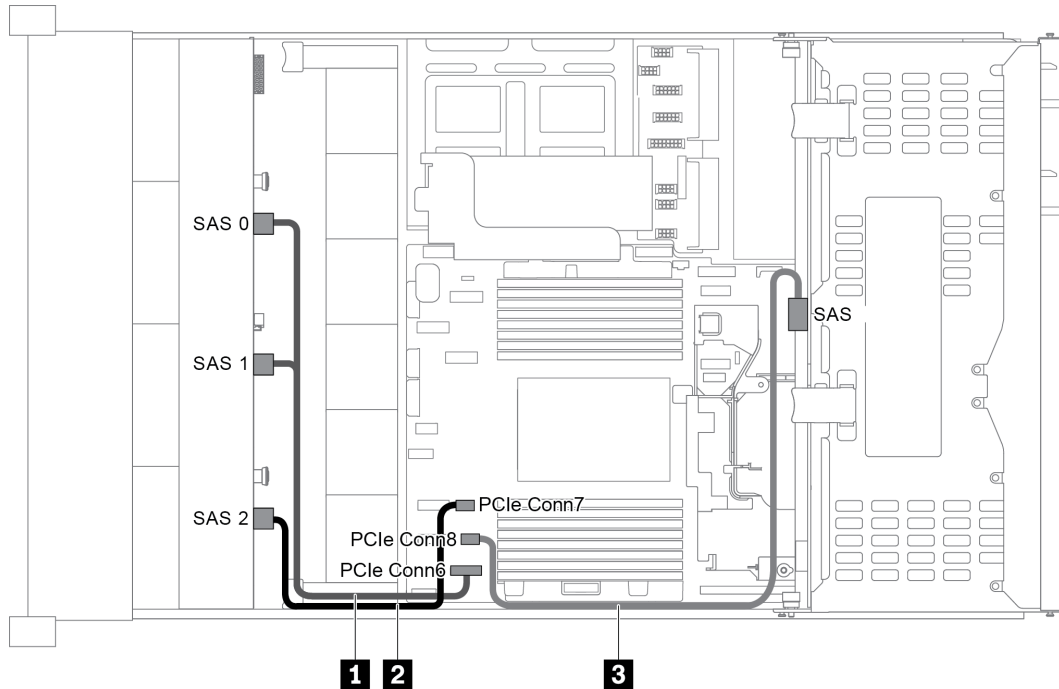


Figure 45. Cable routing for configuration with one 12 x 3.5" SAS/SATA front backplane and one rear drive cage (SAS/SATA)

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

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

Configuration 4: one 12 x 3.5" SAS/SATA front backplane, one rear drive cage (SAS/SATA), one 16i RAID/HBA adapter

Note: This configuration supports one rear 3.5-inch SAS/SATA drive cage (scenario 1) or rear 2.5-inch SAS/SATA drive cage (scenario 2). The following illustration shows the cable connections for scenario 1. The cable connections are the same for scenario 2.

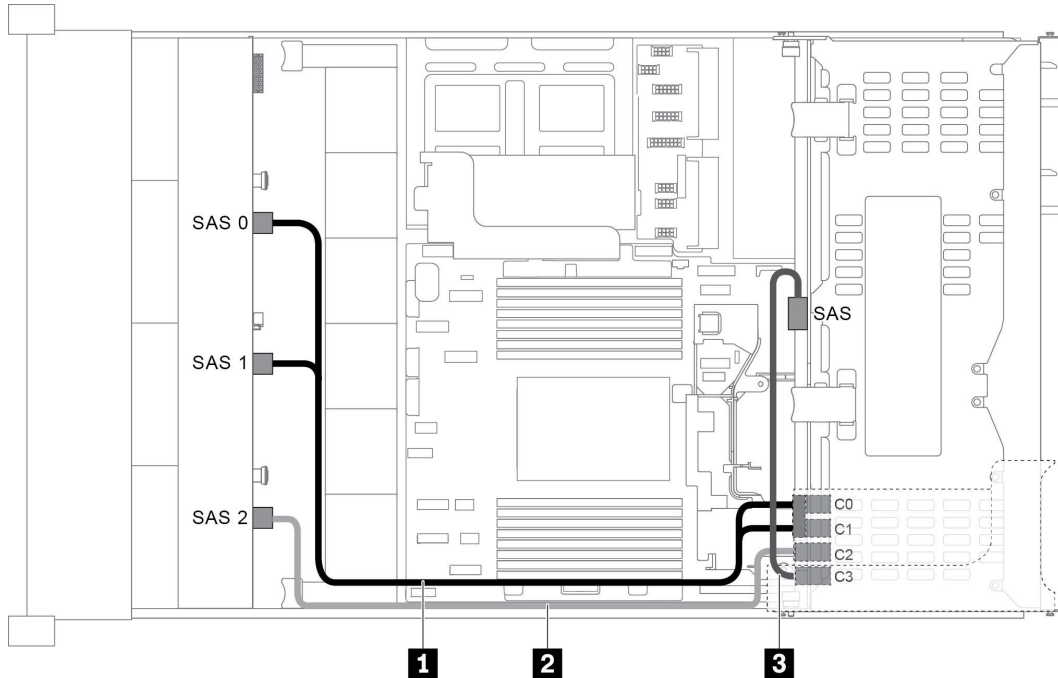


Figure 46. Cable routing for configuration with one 12 x 3.5" SAS/SATA front backplane, one rear drive cage, and one 16i RAID/HBA adapter

Cable	From	To
1 SAS signal cable	SAS 0 connector on the front backplane	Connector C0 on the RAID/HBA adapter
	SAS 1 connector on the front backplane	Connector C1 on the RAID/HBA adapter
2 SAS signal cable	SAS 2 connector on the front backplane	Connector C2 on the RAID/HBA adapter
3 SAS signal cable	SAS connector on the rear backplane	Connector C3 on the RAID/HBA adapter

Configuration 5: one 12 x 3.5" SAS/SATA front backplane, one rear drive cage (SAS/SATA), two RAID/HBA adapters (8i+16i)

Note: This configuration supports one rear 3.5-inch SAS/SATA drive cage (scenario 1) or rear 2.5-inch SAS/SATA drive cage (scenario 2). The following illustration shows the cable connections for scenario 1. The cable connections are the same for scenario 2.

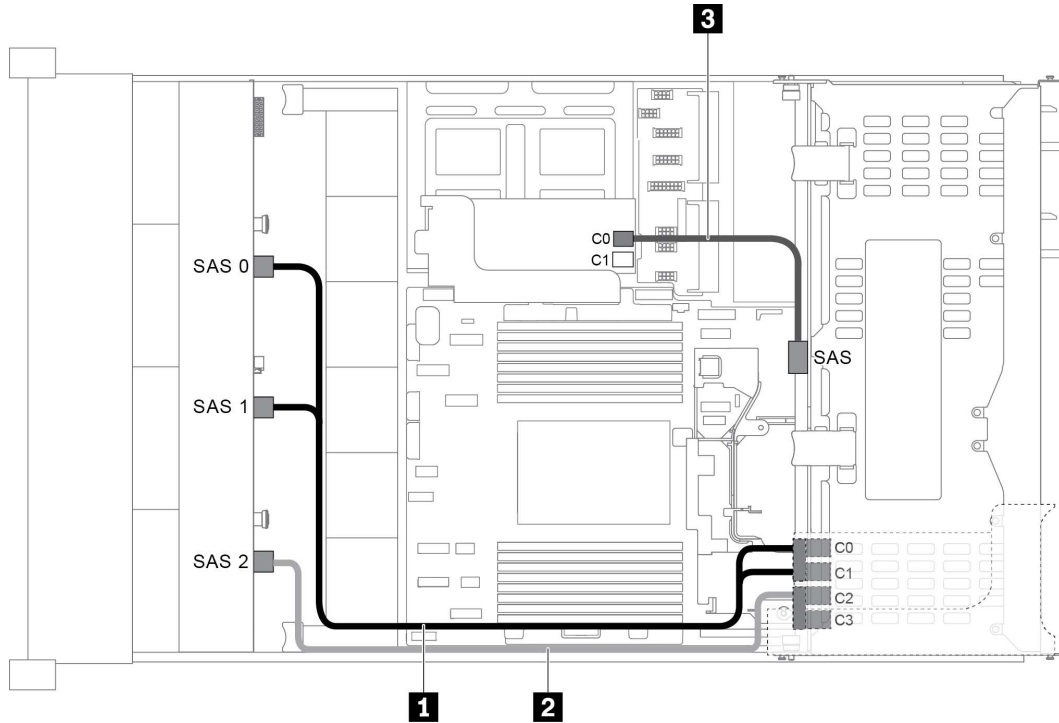


Figure 47. Cable routing for configuration with one 12 x 3.5" SAS/SATA front backplane, one drive cage, and two RAID/HBA adapters (8i+16i)

Cable	From	To
1 SAS signal cable	SAS 0 connector on the front backplane	Connector C0 on the 16i RAID/HBA adapter
	SAS 1 connector on the front backplane	Connector C1 on the 16i RAID/HBA adapter
2 SAS signal cable	SAS 2 connector on the front backplane	Connector C2 on the 16i RAID/HBA adapter
3 SAS signal cable	SAS connector on the rear backplane	Connector C0 on the 8i RAID/HBA adapter

Configuration 6: one 12 x 3.5" SAS/SATA front backplane, one rear drive cage (SAS/SATA), one middle drive cage (SAS/SATA), one 24i RAID adapter

Note: This configuration supports one middle 3.5-inch SAS/SATA drive cage and one rear 3.5-inch SAS/SATA drive cage (scenario 1) or rear 2.5-inch SAS/SATA drive cage (scenario 2). The following illustration shows the cable connections for scenario 1. The cable connections are the same for scenario 2.

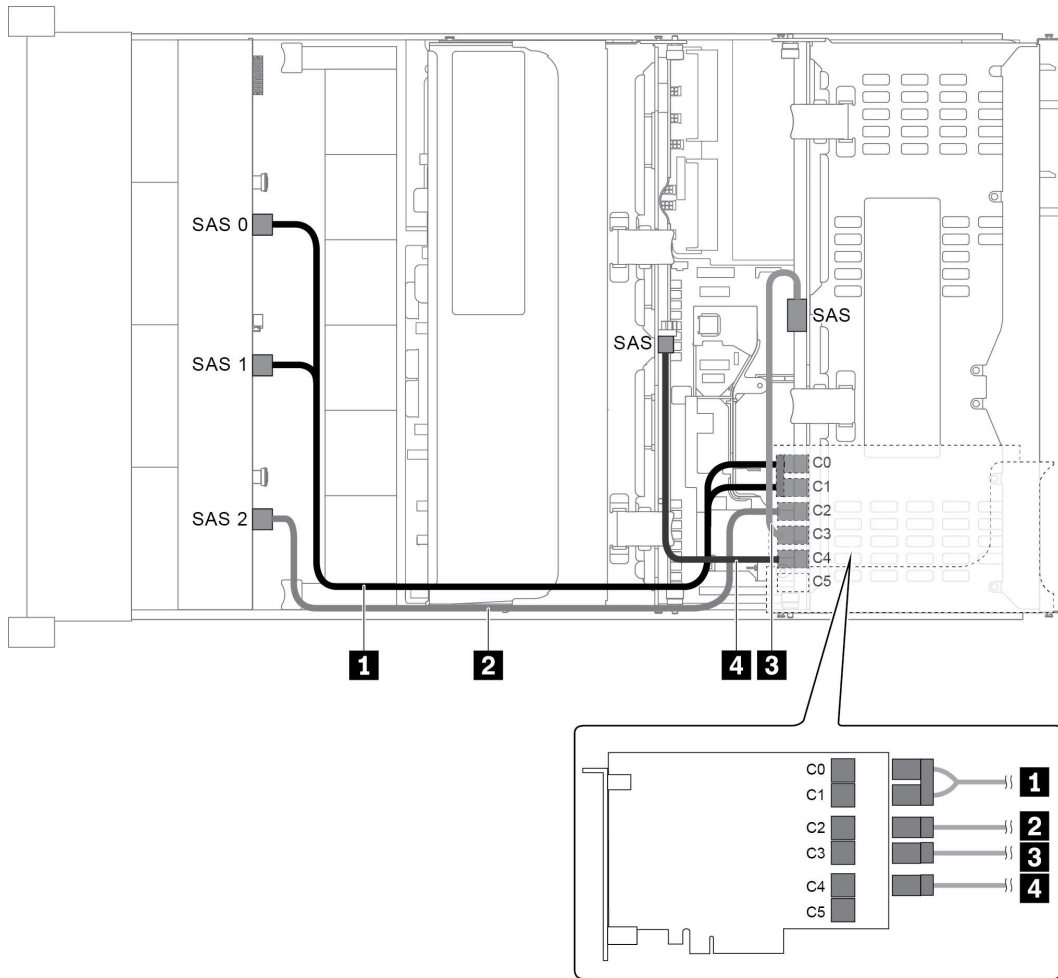


Figure 48. Cable routing for configuration with one 12 x 3.5" SAS/SATA front backplane, one rear drive cage, one middle drive cage, and one 24i RAID adapter

Cable	From	To
1 SAS signal cable	SAS 0 connector on the front backplane	Connector C0 on the 24i RAID adapter
	SAS 1 connector on the front backplane	Connector C1 on the 24i RAID adapter
2 SAS signal cable	SAS 2 connector on the front backplane	Connector C2 on the 24i RAID adapter
3 SAS signal cable	SAS connector on the rear backplane	Connector C3 on the 24i RAID adapter
4 SAS signal cable	SAS connector on the middle backplane	Connector C4 on the 24i RAID adapter

Configuration 7: one 12 x 3.5" SAS/SATA front backplane, one rear drive cage (SAS/SATA), one middle drive cage (SAS/SATA), two RAID/HBA adapters (8i+16i)

Note: This configuration supports one middle 3.5-inch SAS/SATA drive cage and one rear 3.5-inch SAS/SATA drive cage (scenario 1) or rear 2.5-inch SAS/SATA drive cage (scenario 2). The following illustration shows the cable connections for scenario 1. The cable connections are the same for scenario 2.

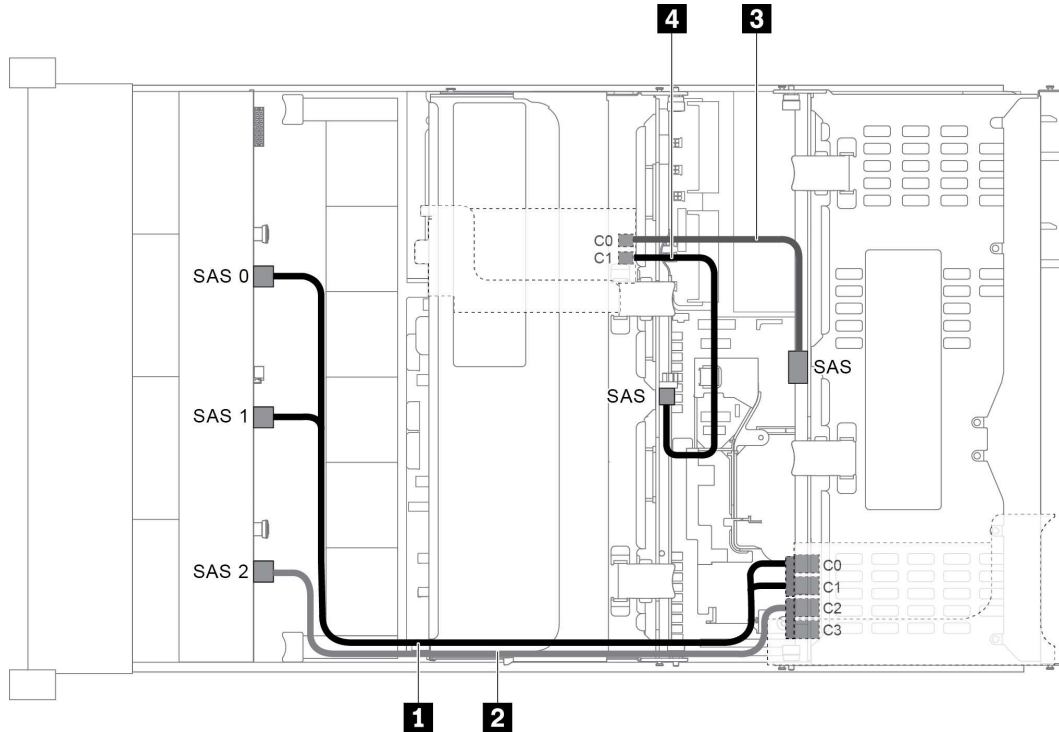


Figure 49. Cable routing for configuration with one 12 x 3.5" SAS/SATA front backplane, one rear drive cage, one middle drive cage, and two RAID/HBA adapters (8i+16i)

Cable	From	To
1 SAS signal cable	SAS 0 connector on the front backplane	Connector C0 on the 16i RAID/HBA adapter
	SAS 1 connector on the front backplane	Connector C1 on the 16i RAID/HBA adapter
2 SAS signal cable	SAS 2 connector on the front backplane	Connector C2 on the 16i RAID/HBA adapter
3 SAS signal cable	SAS connector on the rear backplane	Connector C0 on the 8i RAID/HBA adapter
4 SAS signal cable	SAS connector on the middle backplane	Connector C1 on the 8i RAID/HBA adapter

Server model with 12 x 3.5-inch front drive bays (8 SAS/SATA + 4 AnyBay)

This section provides cable routing information for the server model with one 12 x 3.5-inch AnyBay front backplane. The 12 x 3.5-inch AnyBay front backplane provides 8 SAS/SATA drive bays (bays 0–7) and 4 SAS/SATA/NVMe (called AnyBay) drive bays (bays 8–11).

- “Configuration 1: one 12 x 3.5" AnyBay front backplane, onboard connections” on page 66
- “Configuration 2: one 12 x 3.5" AnyBay front backplane, one 16i RAID/HBA adapter” on page 67
- “Configuration 3: one 12 x 3.5" AnyBay front backplane, one rear drive cage (SAS/SATA), one 16i RAID/HBA adapter” on page 68

- “Configuration 4: one 12 x 3.5" AnyBay front backplane, one rear drive cage (SAS/SATA), two RAID/HBA adapters (8i+16i)” on page 69
- “Configuration 5: one 12 x 3.5" AnyBay front backplane, one rear drive cage (SAS/SATA), one middle drive cage (SAS/SATA), one 24i RAID adapter” on page 70
- “Configuration 6: one 12 x 3.5" AnyBay front backplane, one rear drive cage (SAS/SATA), one middle drive cage (SAS/SATA), two RAID/HBA adapters (8i+16i)” on page 72

Configuration 1: one 12 x 3.5" AnyBay front backplane, onboard connections

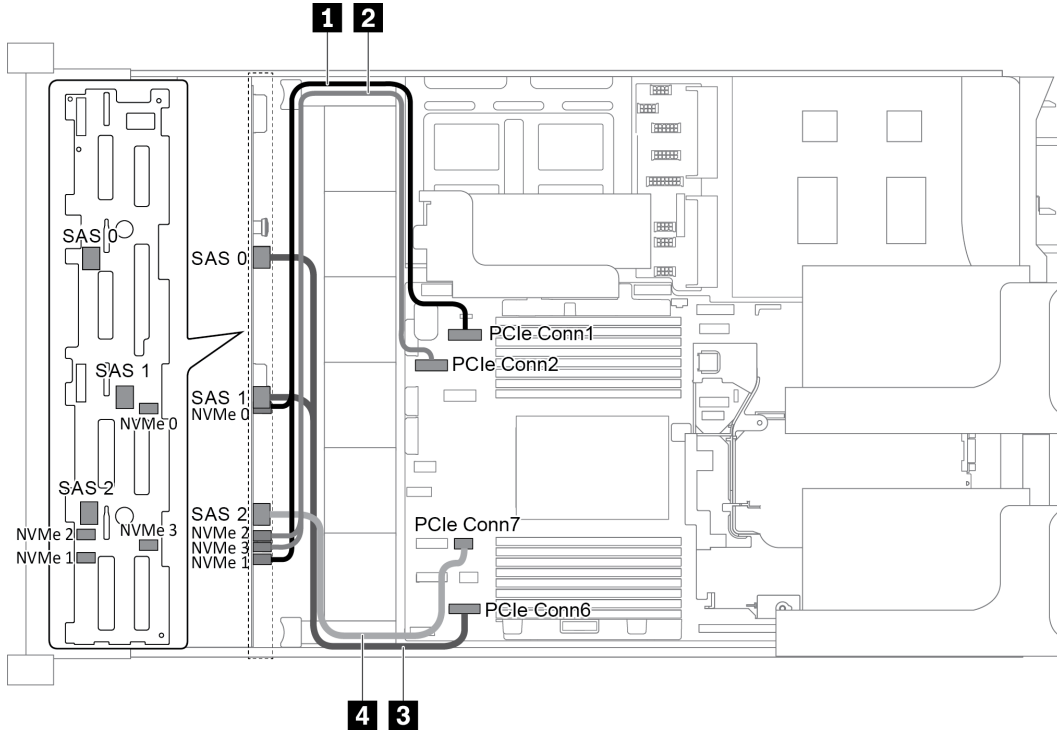


Figure 50. Cable routing for configuration with one 12 x 3.5" AnyBay front backplane

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

Note: When the 12 x 3.5-inch AnyBay backplane is connected to onboard PCIe connectors, drives 0-7 support only SATA drives, and drives 8-11 support only SATA or NVMe drives.

Configuration 2: one 12 x 3.5" AnyBay front backplane, one 16i RAID/HBA adapter

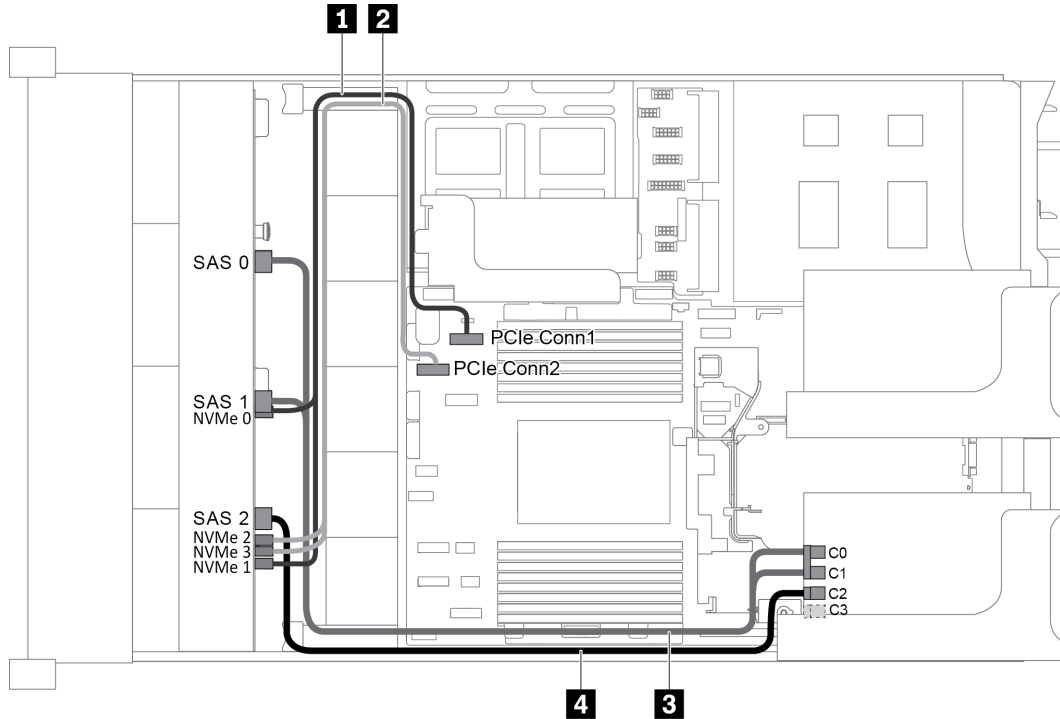


Figure 51. Cable routing for configuration with one 12 x 3.5-inch AnyBay front backplane and one 16i RAID/HBA adapter

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

Note: With a RAID or HBA adapter connected to the 12 x 3.5-inch AnyBay backplane, drives 0-7 support SATA or SAS drives, and drives 8-11 support SATA, SAS, or NVMe drives.

Configuration 3: one 12 x 3.5" AnyBay front backplane, one rear drive cage (SAS/SATA), one 16i RAID/HBA adapter

Note: This configuration supports one rear 3.5-inch SAS/SATA drive cage (scenario 1) or rear 2.5-inch SAS/SATA drive cage (scenario 2). The following illustration shows the cable connections for scenario 1. The cable connections are the same for scenario 2.

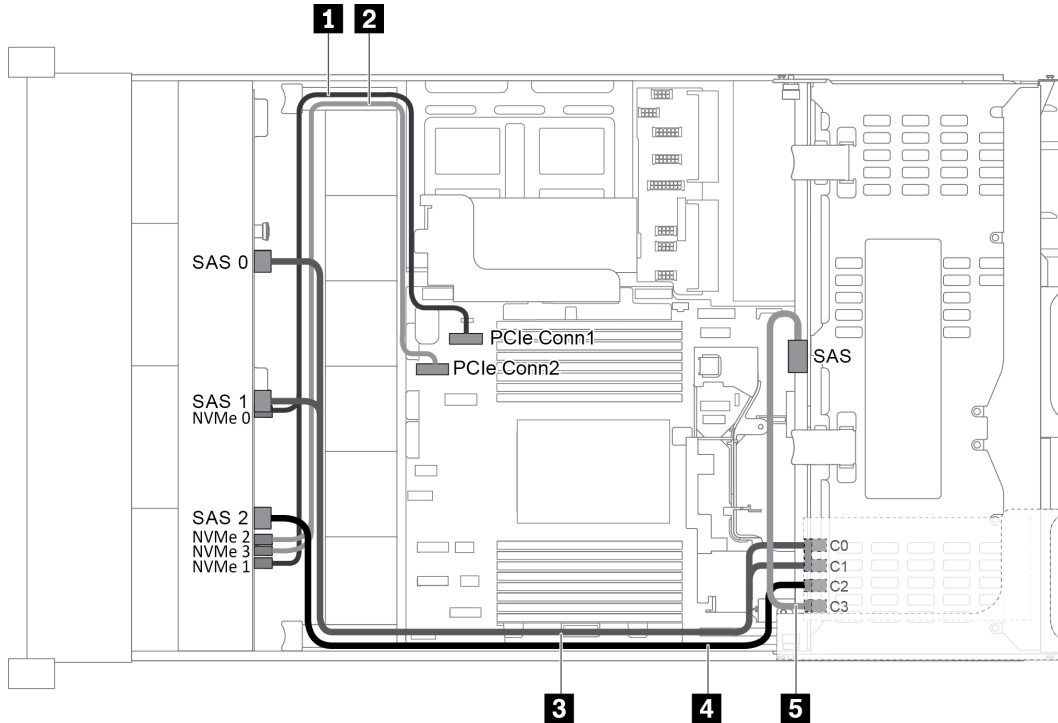


Figure 52. Cable routing for configuration with one 12 x 3.5" AnyBay front backplane, one rear drive cage, and one 16i RAID/HBA adapter

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

Note: With a RAID or HBA adapter connected to the 12 x 3.5-inch AnyBay backplane, drives 0-7 support SATA or SAS drives, and drives 8-11 support SATA, SAS, or NVMe drives.

Configuration 4: one 12 x 3.5" AnyBay front backplane, one rear drive cage (SAS/SATA), two RAID/HBA adapters (8i+16i)

Note: This configuration supports one rear 3.5-inch SAS/SATA drive cage (scenario 1) or rear 2.5-inch SAS/SATA drive cage (scenario 2). The following illustration shows the cable connections for scenario 1. The cable connections are the same for scenario 2.

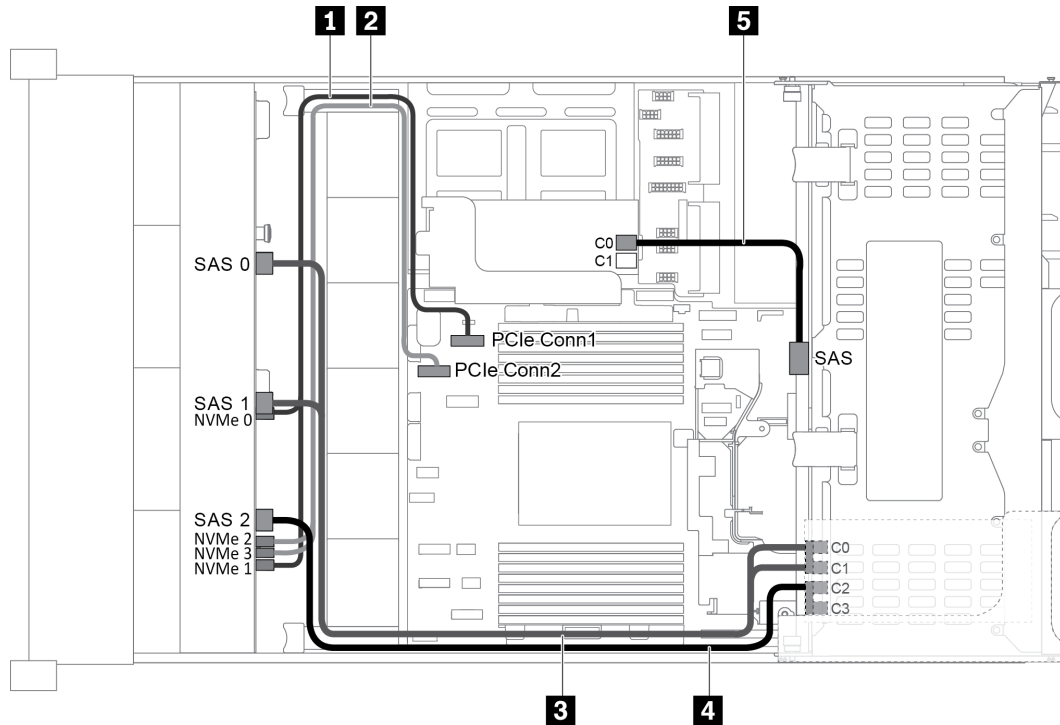


Figure 53. Cable routing for configuration with one 12 x 3.5" AnyBay front backplane, one rear drive cage, and two RAID/HBA adapters (8i+16i)

Cable	From	To
1 NVMe signal cable	NVMe 0 and NVMe 1 connectors on the front backplane	PCIe connector 1 on the system board
2 NVMe signal cable	NVMe 2 and NVMe 3 connectors on the front backplane	PCIe connector 2 on the system board
3 SAS signal cable	SAS 0 connector on the front backplane	Connector C0 on the 16i RAID/HBA adapter
	SAS 1 connector on the front backplane	Connector C1 on the 16i RAID/HBA adapter
4 SAS signal cable	SAS 2 connector on the front backplane	Connector C2 on the 16i RAID/HBA adapter
5 SAS signal cable	SAS connector on the rear backplane	Connector C0 on the 8i RAID/HBA adapter

Note: With a RAID or HBA adapter connected to the 12 x 3.5-inch AnyBay backplane, drives 0-7 support SATA or SAS drives, and drives 8-11 support SATA, SAS, or NVMe drives.

Configuration 5: one 12 x 3.5" AnyBay front backplane, one rear drive cage (SAS/SATA), one middle drive cage (SAS/SATA), one 24i RAID adapter

Note: This configuration supports one middle 3.5-inch SAS/SATA drive cage and one rear 3.5-inch SAS/SATA drive cage (scenario 1) or rear 2.5-inch SAS/SATA drive cage (scenario 2). The following illustration shows the cable connections for scenario 1. The cable connections are the same for scenario 2.

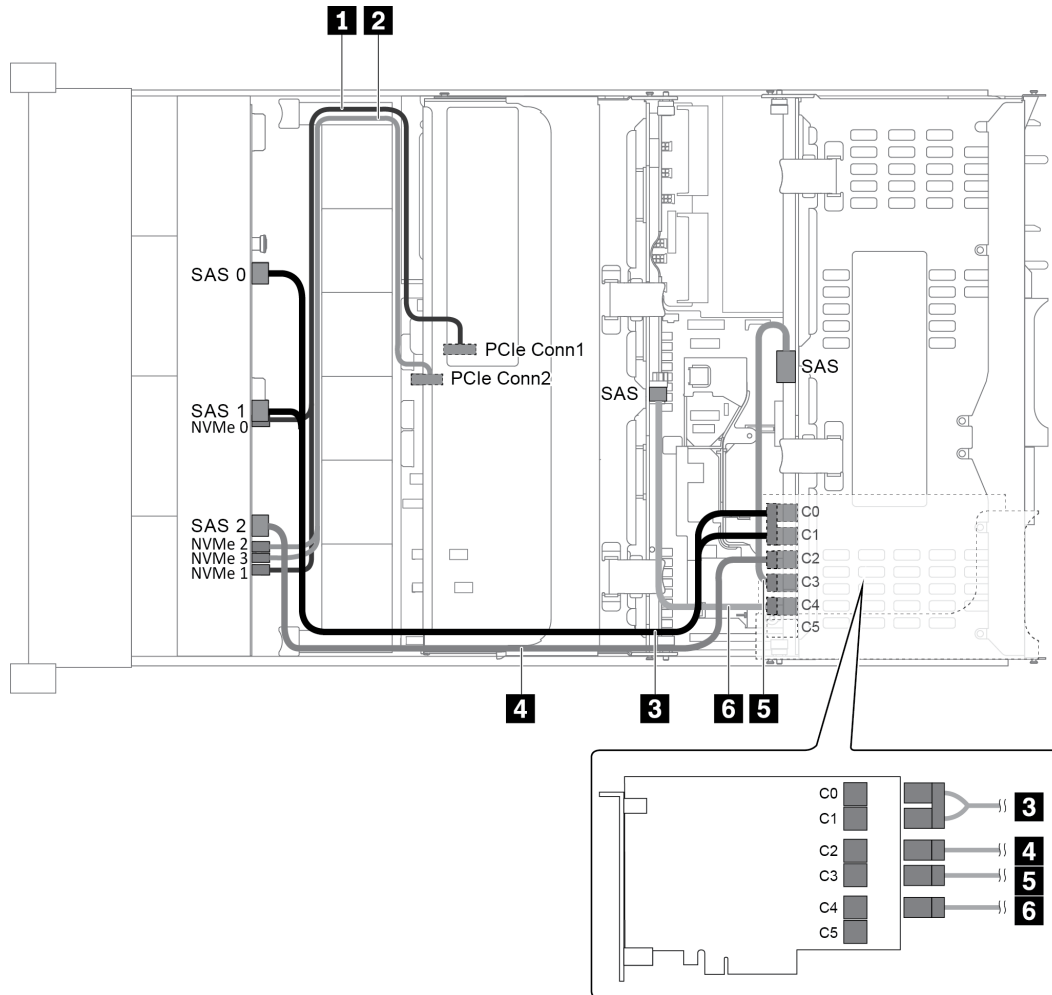


Figure 54. Cable routing for configuration with one 12 x 3.5" AnyBay front backplane, one rear drive cage, one middle drive cage, and one 24i RAID adapter

Cable	From	To
1 NVMe signal cable	NVMe 0 and NVMe 1 connectors on the front backplane	PCIe connector 1 on the system board
2 NVMe signal cable	NVMe 2 and NVMe 3 connectors on the front backplane	PCIe connector 2 on the system board
3 SAS signal cable	SAS 0 connector on the front backplane	Connector C0 on the 24i RAID adapter
	SAS 1 connector on the front backplane	Connector C1 on the 24i RAID adapter
4 SAS signal cable	SAS 2 connector on the front backplane	Connector C2 on the 24i RAID adapter

Cable	From	To
5 SAS signal cable	SAS connector on the rear backplane	Connector C3 on the 24i RAID adapter
6 SAS signal cable	SAS connector on the middle backplane	Connector C4 on the 24i RAID adapter

Note: With a RAID or HBA adapter connected to the 12 x 3.5-inch AnyBay backplane, drives 0-7 support SATA or SAS drives, and drives 8-11 support SATA, SAS, or NVMe drives.

Configuration 6: one 12 x 3.5" AnyBay front backplane, one rear drive cage (SAS/SATA), one middle drive cage (SAS/SATA), two RAID/HBA adapters (8i+16i)

Note: This configuration supports one middle 3.5-inch SAS/SATA drive cage and one rear 3.5-inch SAS/SATA drive cage (scenario 1) or rear 2.5-inch SAS/SATA drive cage (scenario 2). The following illustration shows the cable connections for scenario 1. The cable connections are the same for scenario 2.

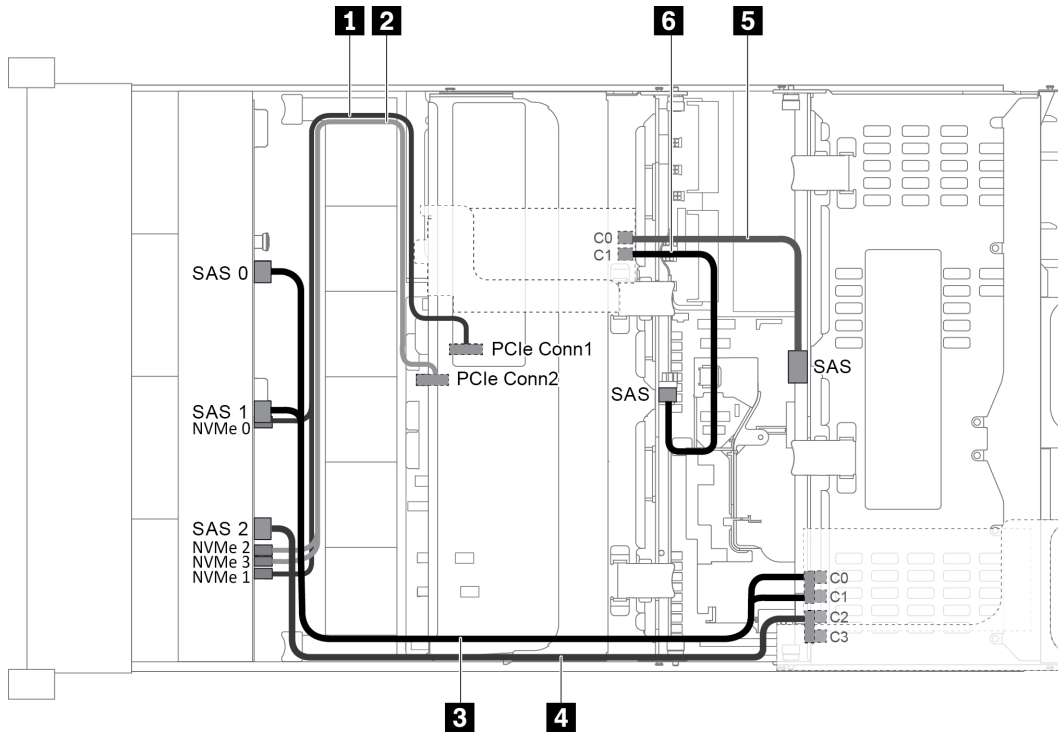


Figure 55. Cable routing for configuration with one 12 x 3.5" AnyBay front backplane, one rear drive cage, one middle drive cage, and two RAID/HBA adapters (8i+16i)

Cable	From	To
1 NVMe signal cable	NVMe 0 and NVMe 1 connectors on the front backplane	PCIe connector 1 on the system board
2 NVMe signal cable	NVMe 2 and NVMe 3 connectors on the front backplane	PCIe connector 2 on the system board
3 SAS signal cable	SAS 0 connector on the front backplane	Connector C0 on the 16i RAID/HBA adapter
	SAS 1 connector on the front backplane	Connector C1 on the 16i RAID/HBA adapter
4 SAS signal cable	SAS 2 connector on the front backplane	Connector C2 on the 16i RAID/HBA adapter
5 SAS signal cable	SAS connector on the rear backplane	Connector C0 on the 8i RAID/HBA adapter
6 SAS signal cable	SAS connector on the middle backplane	Connector C1 on the 8i RAID/HBA adapter

Note: With a RAID or HBA adapter connected to the 12 x 3.5-inch AnyBay backplane, drives 0-7 support SATA or SAS drives, and drives 8-11 support SATA, SAS, or NVMe drives.

Server model with 8 x 2.5-inch front drive bays (SAS/SATA or NVMe)

This section provides cable routing information for the server model with one 8 x 2.5-inch SAS/SATA front backplane or one 8 x 2.5-inch NVMe front backplane.

- “Configuration 1: one 8 x 2.5" SAS/SATA front backplane, one 8i RAID/HBA adapter” on page 73
- “Configuration 2: one 8 x 2.5" NVMe front backplane, onboard connections” on page 74

Configuration 1: one 8 x 2.5" SAS/SATA front backplane, one 8i RAID/HBA adapter

Note: The RAID/HBA adapter can be installed on the internal riser card (scenario 1) or riser card 1 (scenario 2). The following illustration shows the cable connections for scenario 1. The cable connections are the same for scenario 2.

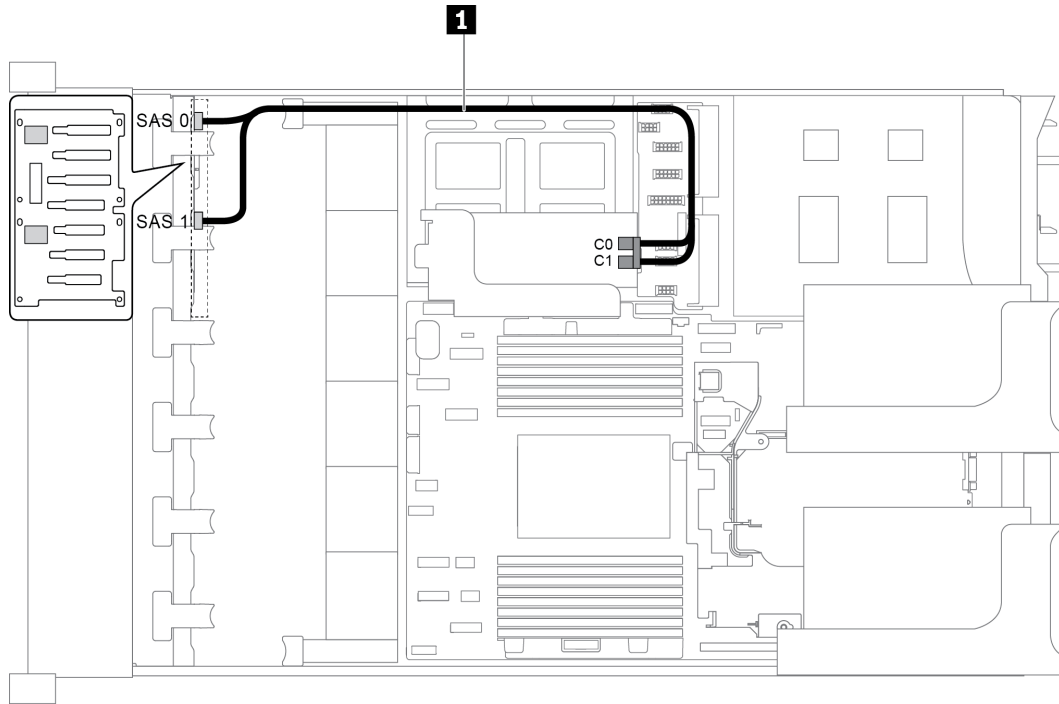


Figure 56. Cable routing for configuration with one 8 x 2.5" SAS/SATA front backplane, one 8i RAID/HBA adapter

Cable	From	To
1 SAS signal cable	SAS 0 connector on the backplane	Connector C0 on the RAID/HBA adapter
	SAS 1 connector on the backplane	Connector C1 on the RAID/HBA adapter

Configuration 2: one 8 x 2.5" NVMe front backplane, onboard connections

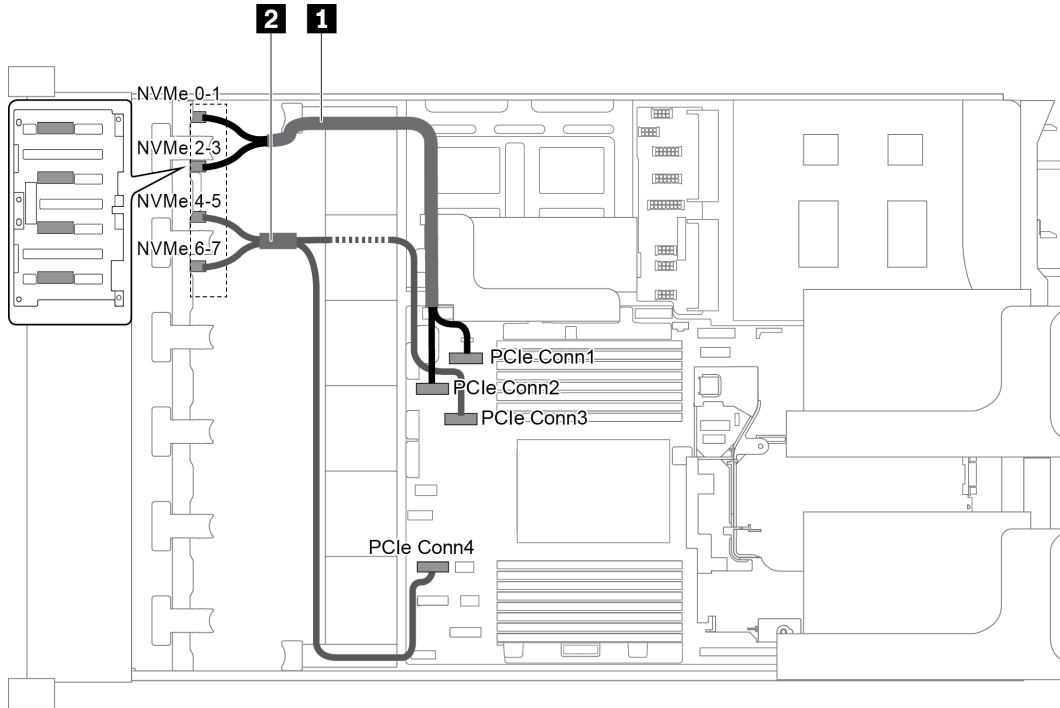


Figure 57. Cable routing for configuration with one 8 x 2.5 NVMe front backplane

Cable	From	To
1 NVMe signal cable	NVMe 0-1 connector on the backplane	PCIe connector 1 on the system board
	NVMe 2-3 connector on the backplane	PCIe connector 2 on the system board
2 NVMe signal cable	NVMe 4-5 connector on the backplane	PCIe connector 3 on the system board
	NVMe 6-7 connector on the backplane	PCIe connector 4 on the system board

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

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

- “Configuration 1: two 8 x 2.5" SAS/SATA front backplanes, onboard connections” on page 75
- “Configuration 2: two 8 x 2.5" SAS/SATA front backplanes, one 16i RAID/HBA adapter” on page 76
- “Configuration 3: two 8 x 2.5" SAS/SATA front backplanes, two 8i RAID/HBA adapters” on page 77
- “Configuration 4: two 8 x 2.5" SAS/SATA front backplanes, one rear drive cage (SAS/SATA), one 24i RAID adapter” on page 78
- “Configuration 5: two 8 x 2.5" SAS/SATA front backplanes, one rear drive cage (SAS/SATA), two RAID/HBA adapters (8i+16i)” on page 79
- “Configuration 6: two 8 x 2.5" SAS/SATA front backplanes, one rear drive cage (SAS/SATA), three 8i RAID/HBA adapters” on page 80

Configuration 1: two 8 x 2.5" SAS/SATA front backplanes, onboard connections

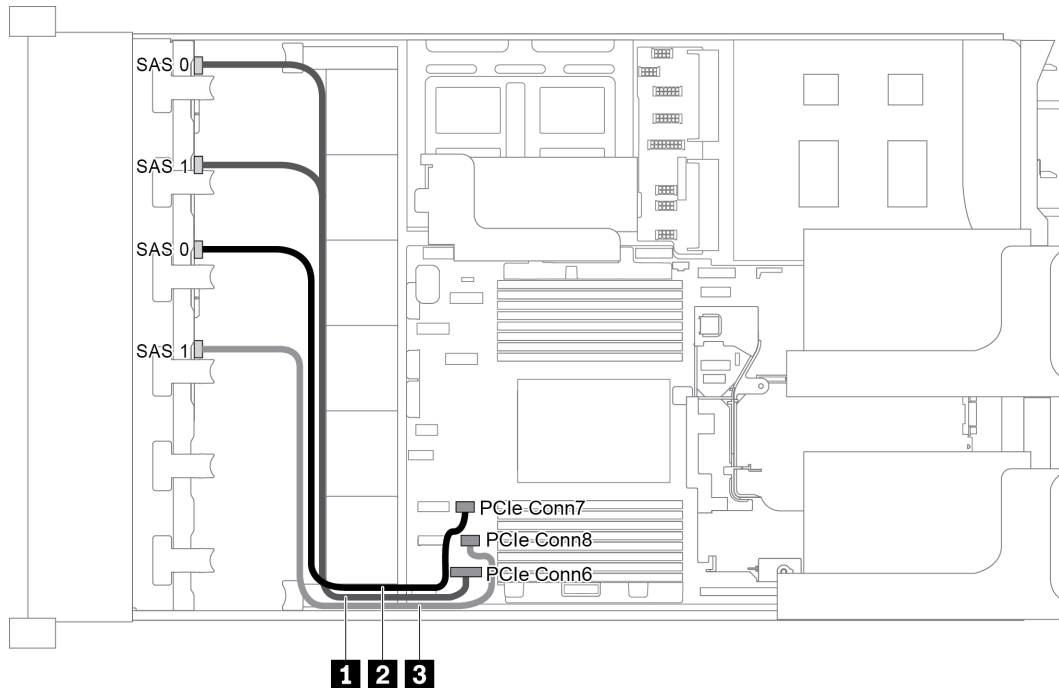


Figure 58. Cable routing for configuration with two 8 x 2.5" SAS/SATA front backplanes

Cable	From	To
1 SAS signal cable	SAS 0 and SAS 1 connectors on the backplane 1	PCIe connector 6 on the system board
2 SAS signal cable	SAS 0 connector on the backplane 2	PCIe connector 7 on the system board
3 SAS signal cable	SAS 1 connector on the backplane 2	PCIe connector 8 on the system board

Note: When the SAS/SATA backplanes are connected to PCIe connectors on the system board, only SATA drives are supported, SAS drives not supported.

Configuration 2: two 8 x 2.5" SAS/SATA front backplanes, one 16i RAID/HBA adapter

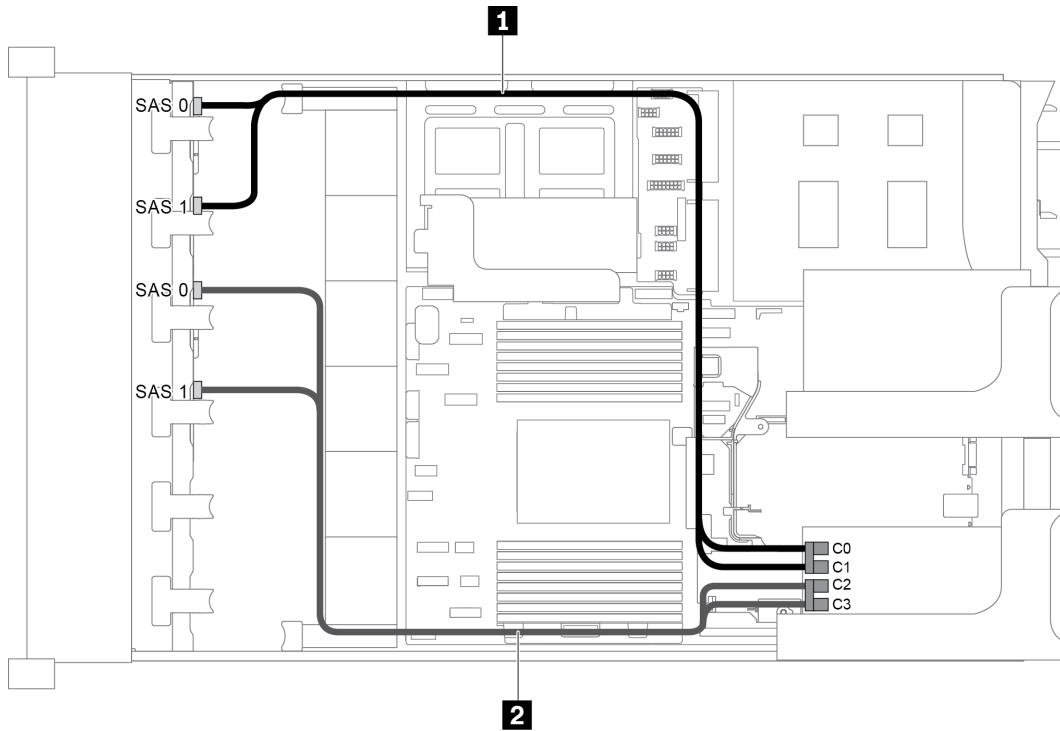


Figure 59. Cable routing for configuration with two 8 x 2.5" SAS/SATA front backplanes and one 16i RAID/HBA adapter

Cable	From	To
1 SAS signal cable	SAS 0 connector on the backplane 1	Connector C0 on the RAID/HBA adapter
	SAS 1 connector on the backplane 1	Connector C1 on the RAID/HBA adapter
2 SAS signal cable	SAS 0 connector on the backplane 2	Connector C2 on the RAID/HBA adapter
	SAS 1 connector on the backplane 2	Connector C3 on the RAID/HBA adapter

Configuration 3: two 8 x 2.5" SAS/SATA front backplanes, two 8i RAID/HBA adapters

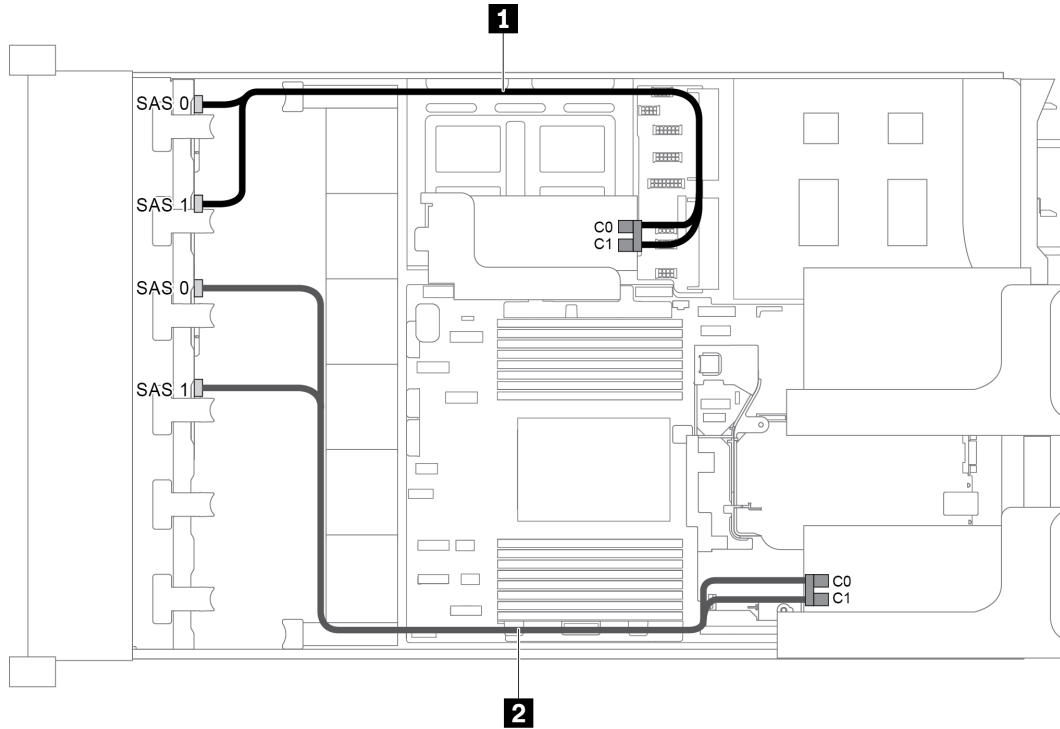


Figure 60. Cable routing for configuration with two 8 x 2.5" SAS/SATA front backplanes and two 8i RAID/HBA adapters

Cable	From	To
1 SAS signal cable	SAS 0 connector on the backplane 1	Connector C0 on the RAID/HBA adapter on the internal riser card
	SAS 1 connector on the backplane 1	Connector C1 on the RAID/HBA adapter on the internal riser card
2 SAS signal cable	SAS 0 connector on the backplane 2	Connector C0 on the RAID/HBA adapter on riser card 1
	SAS 1 connector on the backplane 2	Connector C1 on the RAID/HBA adapter on riser card 1

Configuration 4: two 8 x 2.5" SAS/SATA front backplanes, one rear drive cage (SAS/SATA), one 24i RAID adapter

This configuration supports one rear 2.5-inch drive cage with a 4 x 2.5-inch SAS/SATA drive backplane.

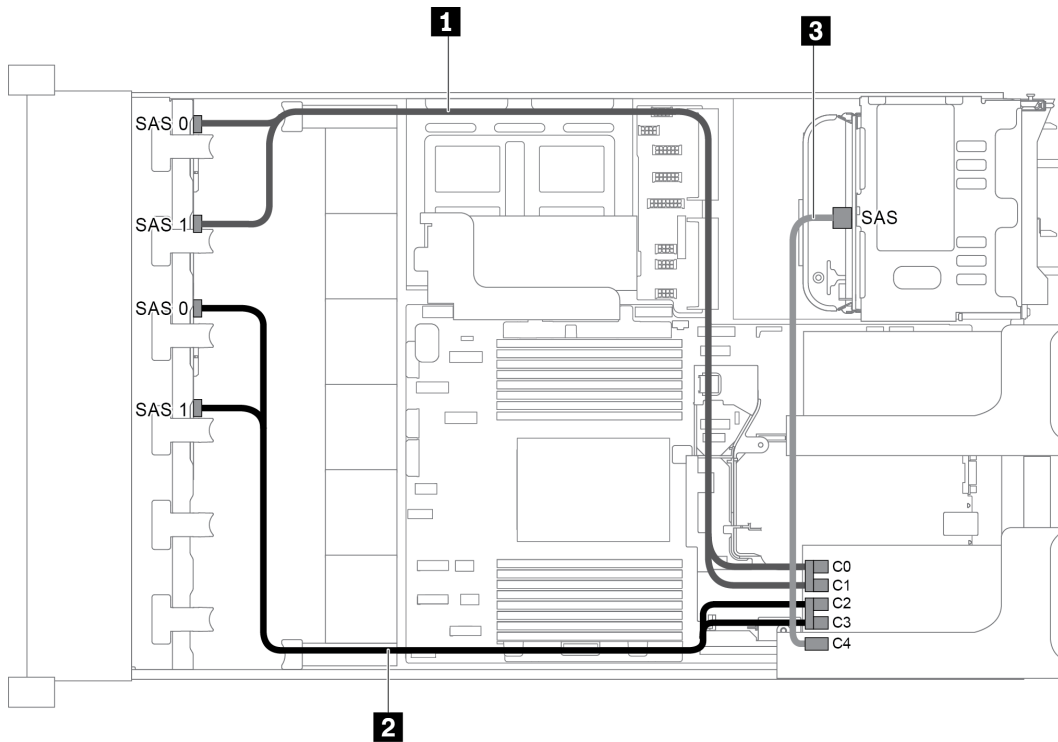


Figure 61. Cable routing for configuration with two 8 x 2.5" SAS/SATA front backplanes, one rear drive cage, and one 24i RAID adapter

Cable	From	To
1 SAS signal cable	SAS 0 connector on the front backplane 1	Connector C0 on the 24i RAID adapter
	SAS 1 connector on the front backplane 1	Connector C1 on the 24i RAID adapter
2 SAS signal cable	SAS 0 connector on the front backplane 2	Connector C2 on the 24i RAID adapter
	SAS 1 connector on the front backplane 2	Connector C3 on the 24i RAID adapter
3 SAS signal cable	SAS connector on the rear backplane	Connector C4 on the 24i RAID adapter

Configuration 5: two 8 x 2.5" SAS/SATA front backplanes, one rear drive cage (SAS/SATA), two RAID/HBA adapters (8i+16i)

This configuration supports one rear 2.5-inch drive cage with a 4 x 2.5-inch SAS/SATA drive backplane.

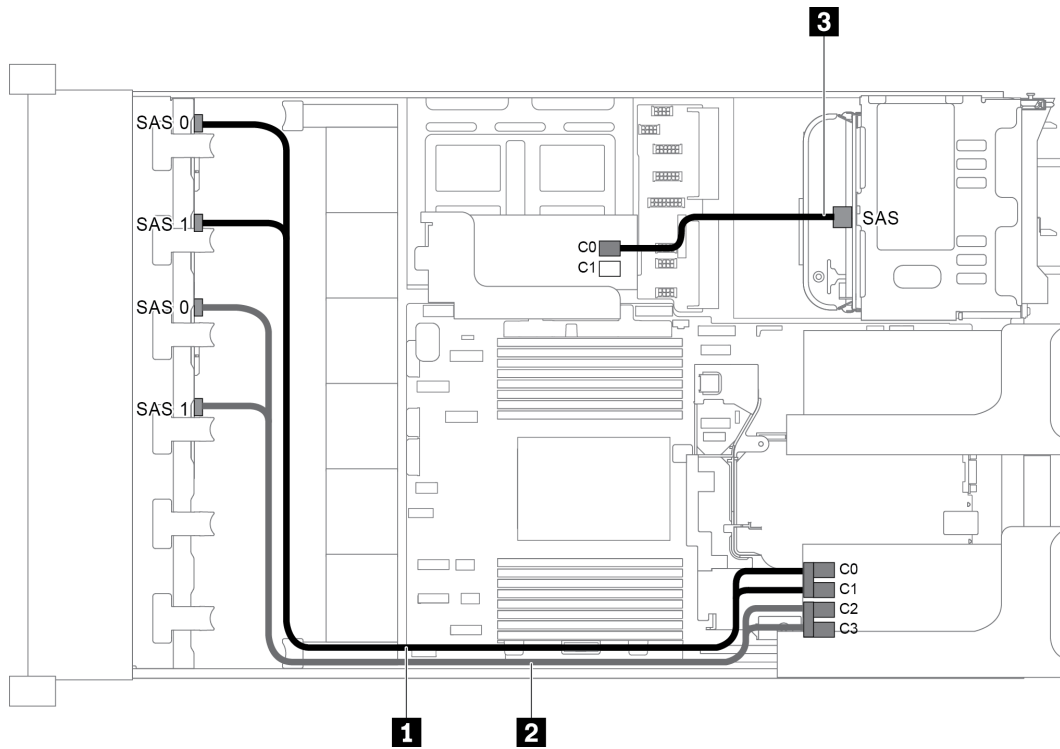


Figure 62. Cable routing for configuration with two 8 x 2.5" SAS/SATA front backplanes, one rear drive cage, and two RAID/HBA adapters (8i+16i)

Cable	From	To
1 SAS signal cable	SAS 0 connector on the front backplane 1	Connector C0 on the 16i RAID/HBA adapter
	SAS 1 connector on the front backplane 1	Connector C1 on the 16i RAID/HBA adapter
2 SAS signal cable	SAS 0 connector on the front backplane 2	Connector C2 on the 16i RAID/HBA adapter
	SAS 1 connector on the front backplane 2	Connector C3 on the 16i RAID/HBA adapter
3 SAS signal cable	SAS connector on the rear backplane	Connector C0 on the 8i RAID/HBA adapter

Configuration 6: two 8 x 2.5" SAS/SATA front backplanes, one rear drive cage (SAS/SATA), three 8i RAID/HBA adapters

This configuration supports one rear 2.5-inch drive cage with a 4 x 2.5-inch SAS/SATA drive backplane.

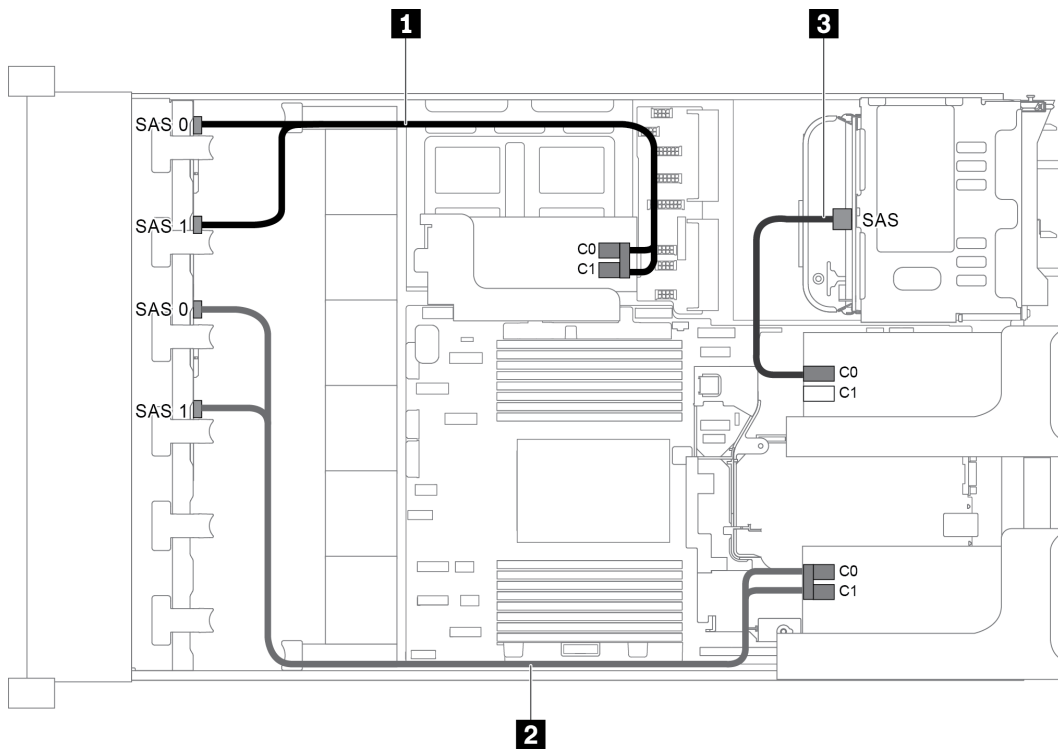


Figure 63. Cable routing for configuration with two 8 x 2.5" SAS/SATA front backplanes, one rear drive cage, and three 8i RAID/HBA adapters

Cable	From	To
1 SAS signal cable	SAS 0 connector on the front backplane 1	Connector C0 on the 8i RAID/HBA adapter on the internal riser card
	SAS 1 connector on the front backplane 1	Connector C1 on the 8i RAID/HBA adapter on the internal riser card
2 SAS signal cable	SAS 0 connector on the front backplane 2	Connector C0 on the 8i RAID/HBA adapter on riser card 1
	SAS 1 connector on the front backplane 2	Connector C1 on the 8i RAID/HBA adapter on riser card 1
3 SAS signal cable	SAS connector on the rear backplane	Connector C0 on the 8i RAID/HBA adapter on riser card 2

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

This section provides cable routing information for the server model with one 8 x 2.5-inch SAS/SATA front backplane and one 8 x 2.5-inch NVMe front backplane. The NVMe backplane provides eight NVMe drive bays (bays 0–7).

- “Configuration 1: two front backplanes (8 NVMe + 8 SAS/SATA), onboard connections” on page 81
- “Configuration 2: two front backplanes (8 NVMe + 8 SAS/SATA), one 8i RAID/HBA adapter” on page 82
- “Configuration 3: two front backplanes (8 NVMe + 8 SAS/SATA), one rear drive cage (SAS/SATA), one 16i RAID/HBA adapter” on page 83
- “Configuration 4: two front backplanes (8 NVMe + 8 SAS/SATA), one rear drive cage (SAS/SATA), two 8i RAID/HBA adapters” on page 84

Configuration 1: two front backplanes (8 NVMe + 8 SAS/SATA), onboard connections

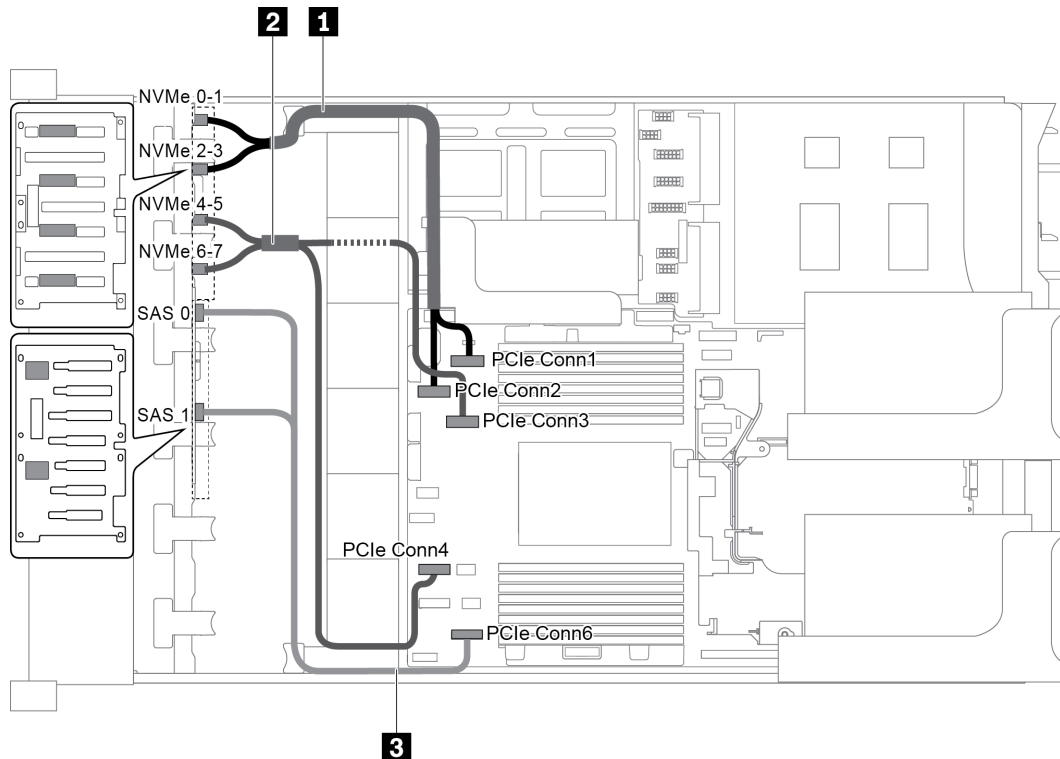


Figure 64. Cable routing for configuration with two front backplanes (8 NVMe + 8 SAS/SATA)

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

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

Configuration 2: two front backplanes (8 NVMe + 8 SAS/SATA), one 8i RAID/HBA adapter

Note: The 8i RAID/HBA adapter can be installed on riser card 1 (scenario 1) or internal riser card (scenario 2). The following illustration shows the cable connections for scenario 1. The cable connections are the same for scenario 2.

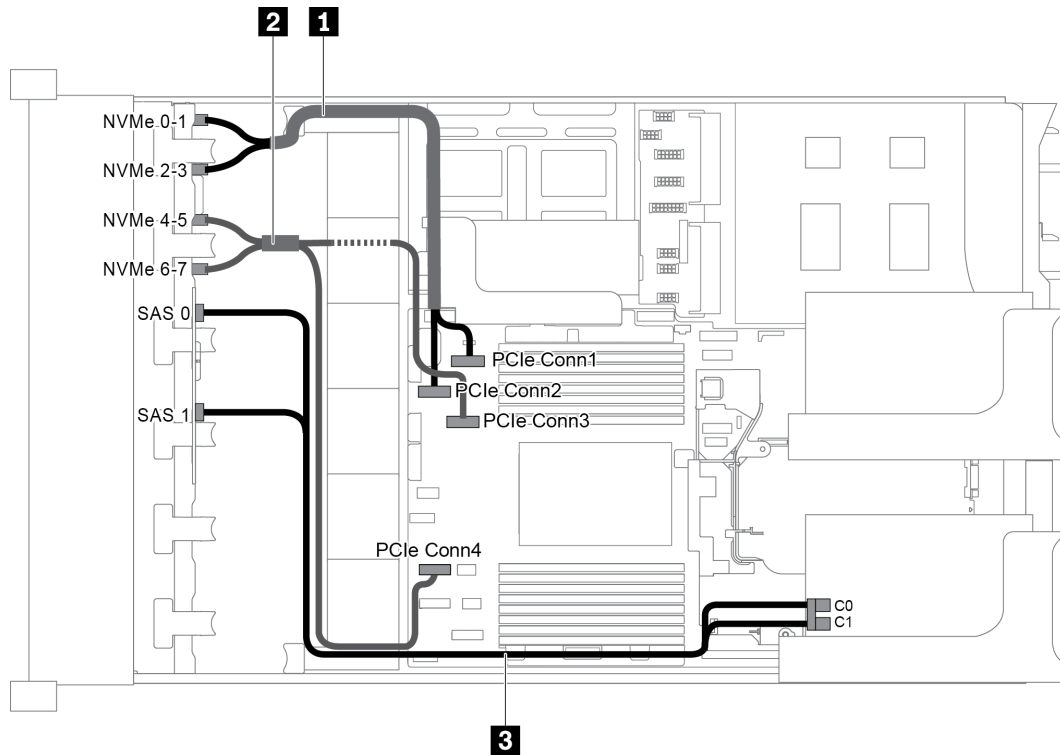


Figure 65. Cable routing for configuration with two front backplanes (8 NVMe + 8 SAS/SATA) and one 8i RAID/HBA adapter

Cable	From	To
1 NVMe signal cable	NVMe 0-1 connector on the NVMe backplane	PCIe connector 1 on the system board
	NVMe 2-3 connector on the NVMe backplane	PCIe connector 2 on the system board
2 NVMe signal cable	NVMe 4-5 connector on the NVMe backplane	PCIe connector 3 on the system board
	NVMe 6-7 connector on the NVMe backplane	PCIe connector 4 on the system board
3 SAS signal cable	SAS 0 connector on the SAS/SATA backplane	Connector C0 on the RAID/HBA adapter
	SAS 1 connector on the SAS/SATA backplane	Connector C1 on the RAID/HBA adapter

Configuration 3: two front backplanes (8 NVMe + 8 SAS/SATA), one rear drive cage (SAS/SATA), one 16i RAID/HBA adapter

This configuration supports one rear 2.5-inch drive cage with a 4 x 2.5-inch SAS/SATA drive backplane.

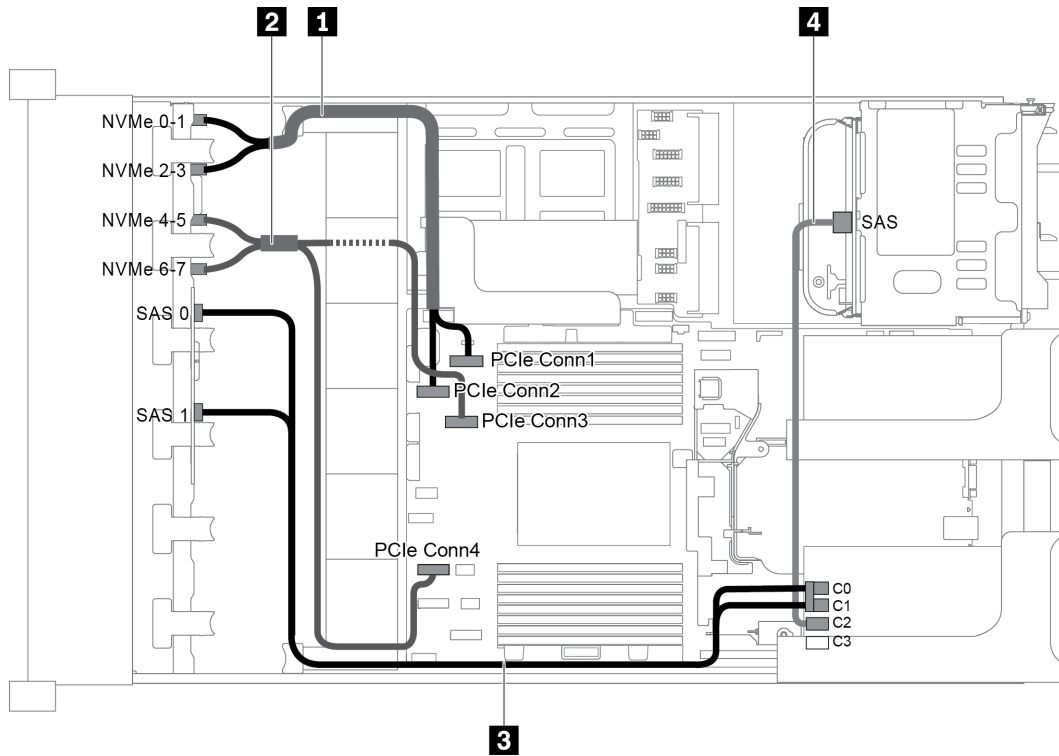


Figure 66. Cable routing for configuration with two front backplanes (8 NVMe + 8 SAS/SATA), one rear drive cage, and one 16i RAID/HBA adapter

Cable	From	To
1 NVMe signal cable	NVMe 0-1 connector on the NVMe backplane	PCIe connector 1 on the system board
	NVMe 2-3 connector on the NVMe backplane	PCIe connector 2 on the system board
2 NVMe signal cable	NVMe 4-5 connector on the NVMe backplane	PCIe connector 3 on the system board
	NVMe 6-7 connector on the NVMe backplane	PCIe connector 4 on the system board
3 SAS signal cable	SAS 0 connector on the SAS/SATA backplane	Connector C0 on the RAID/HBA adapter
	SAS 1 connector on the SAS/SATA backplane	Connector C1 on the RAID/HBA adapter
4 SAS signal cable	SAS connector on the rear backplane	Connector C2 on the RAID/HBA adapter

Configuration 4: two front backplanes (8 NVMe + 8 SAS/SATA), one rear drive cage (SAS/SATA), two 8i RAID/HBA adapters

This configuration supports one rear 2.5-inch drive cage with a 4 x 2.5-inch SAS/SATA drive backplane.

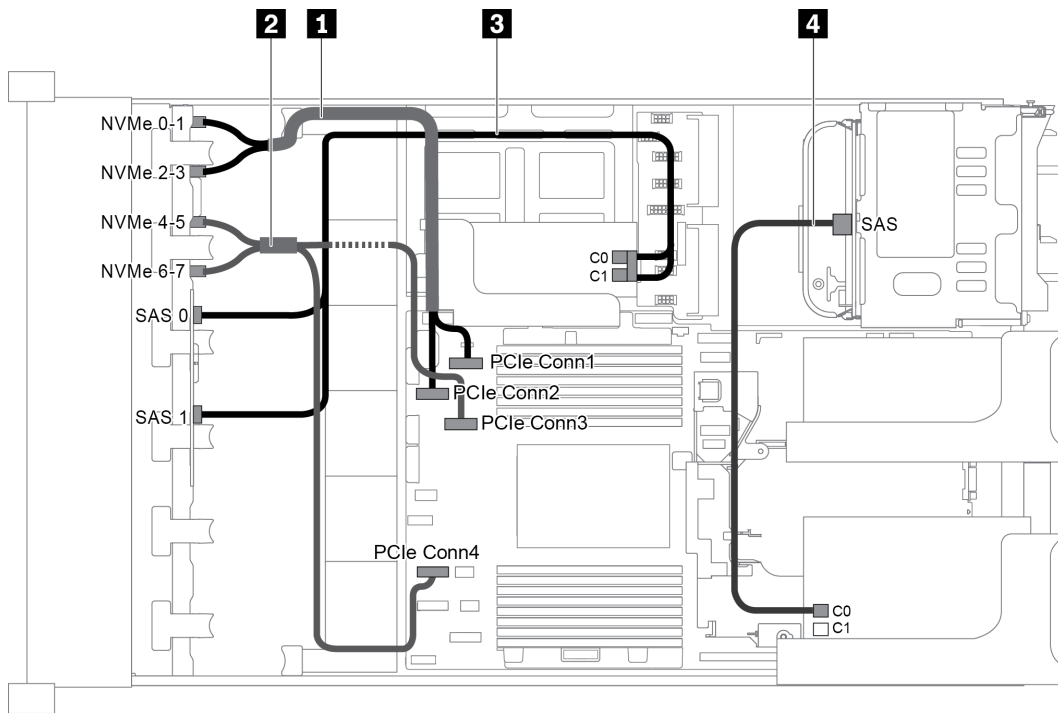


Figure 67. Cable routing for configuration with two front backplanes (8 NVMe + 8 SAS/SATA), one rear drive cage (SAS/SATA), and two 8i RAID/HBA adapters

Cable	From	To
1 NVMe signal cable	NVMe 0-1 connector on the NVMe backplane	PCIe connector 1 on the system board
	NVMe 2-3 connector on the NVMe backplane	PCIe connector 2 on the system board
2 NVMe signal cable	NVMe 4-5 connector on the NVMe backplane	PCIe connector 3 on the system board
	NVMe 6-7 connector on the NVMe backplane	PCIe connector 4 on the system board
3 SAS signal cable	SAS 0 connector on the SAS/SATA backplane	Connector C0 on the RAID/HBA adapter on the internal riser card
	SAS 1 connector on the SAS/SATA backplane	Connector C1 on the RAID/HBA adapter on the internal riser card
4 SAS signal cable	SAS connector on the rear backplane	Connector C0 on the RAID/HBA adapter on riser card 1

Server model with 16 x 2.5-inch front drive bays (NVMe)

This section provides cable routing information for the server model with two 8 x 2.5-inch NVMe front backplanes.

- “Configuration 1: two 8 x 2.5" NVMe front backplanes, onboard connections” on page 85
- “Configuration 2: two 8 x 2.5" NVMe front backplanes, one rear drive cage (SAS/SATA), one 8i RAID/HBA adapter” on page 86
- “Configuration 3: two 8 x 2.5" NVMe front backplanes, one rear drive cage (NVMe), one 810-4P or 1610-4P NVMe switch card” on page 87

Configuration 1: two 8 x 2.5" NVMe front backplanes, onboard connections

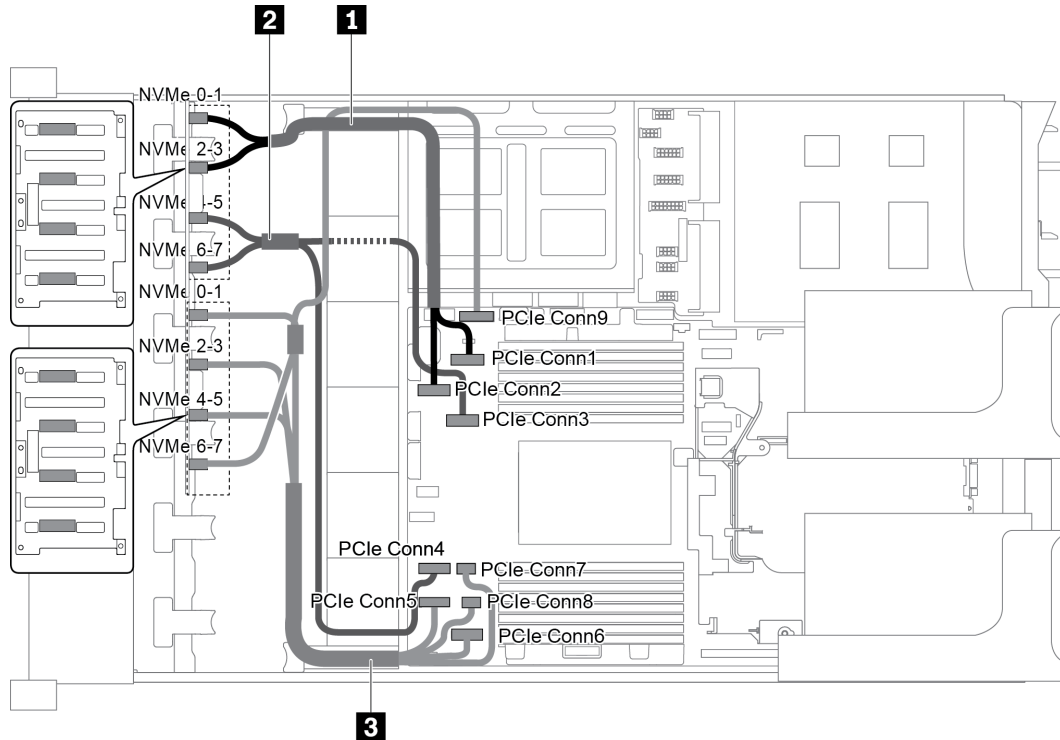


Figure 68. Cable routing for configuration with two 8 x 2.5" NVMe front backplanes

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

Configuration 2: two 8 x 2.5" NVMe front backplanes, one rear drive cage (SAS/SATA), one 8i RAID/HBA adapter

This configuration supports one rear drive cage with the 4 x 2.5-inch SAS/SATA drive backplane.

Note: The RAID/HBA adapter can be installed on riser card 1 (scenario 1) or riser card 2 (scenario 2). The following illustration shows the cable connections for scenario 1. The cable connections are the same for scenario 2.

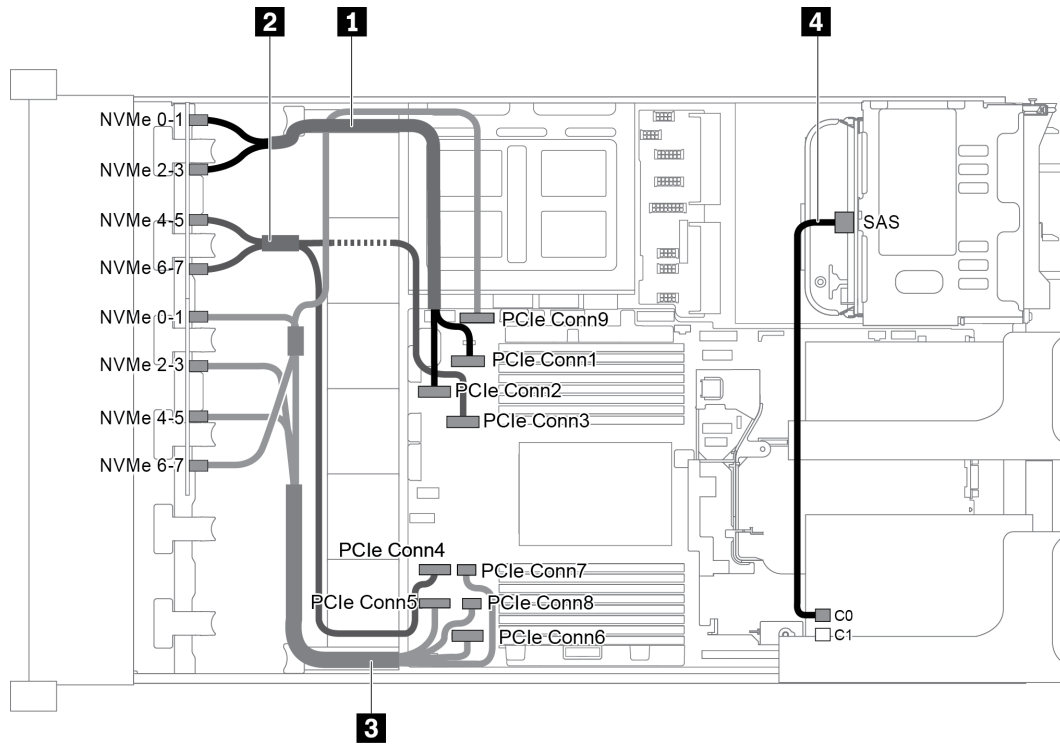


Figure 69. Cable routing for configuration with two 8 x 2.5" NVMe front backplanes, one rear drive cage (SAS/SATA), one 8i RAID/HBA adapter

Cable	From	To
1 NVMe signal cable	NVMe 0-1 connector on backplane 1	PCIe connector 1 on the system board
	NVMe 2-3 connector on backplane 1	PCIe connector 2 on the system board
2 NVMe signal cable	NVMe 4-5 connector on backplane 1	PCIe connector 3 on the system board
	NVMe 6-7 connector on backplane 1	PCIe connector 4 on the system board
3 NVMe signal cable	NVMe 0-1 connector on backplane 2	PCIe connector 5 on the system board
	NVMe 2-3 connector on backplane 2	PCIe connector 6 on the system board
	NVMe 4-5 connector on backplane 2	PCIe connectors 7 and 8 on the system board
	NVMe 6-7 connector on backplane 2	PCIe connector 9 on the system board
4 SAS signal cable	SAS connector on the rear backplane	Connector C0 on the RAID/HBA adapter

Configuration 3: two 8 x 2.5" NVMe front backplanes, one rear drive cage (NVMe), one 810-4P or 1610-4P NVMe switch card

This configuration supports one rear drive cage with the 4 x 2.5-inch NVMe drive backplane.

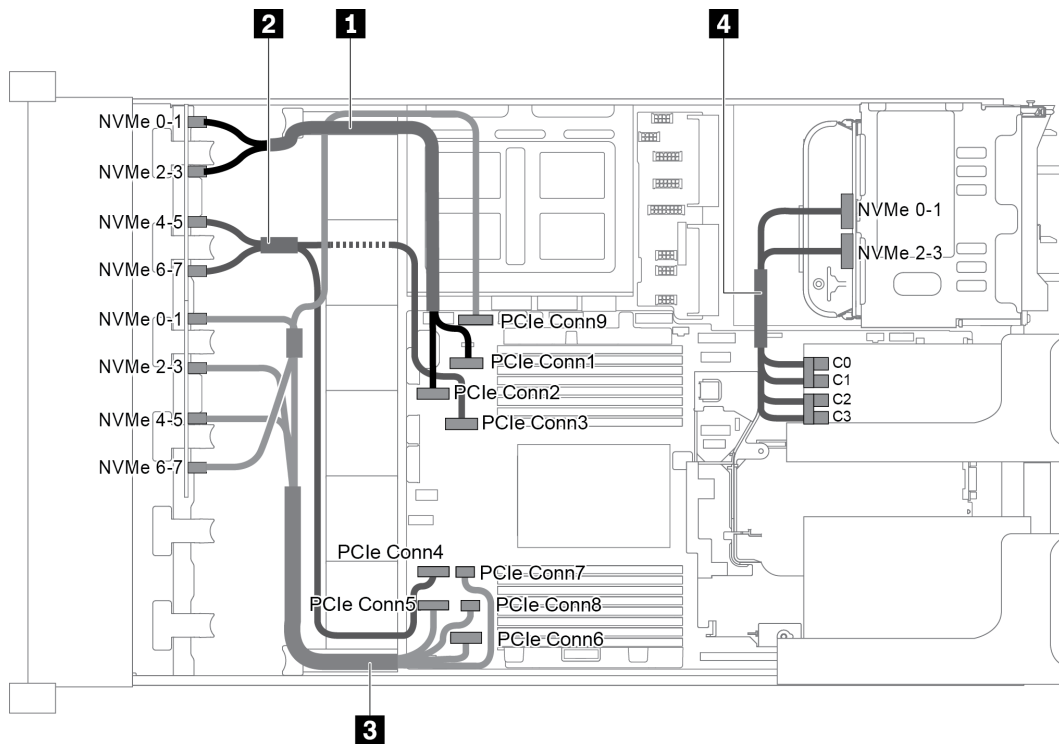


Figure 70. Cable routing for configuration with two 8 x 2.5" NVMe front backplanes, one rear drive cage (NVMe), and one 810-4P or 1610-4P NVMe switch card

Cable	From	To
1 NVMe signal cable	NVMe 0-1 connector on backplane 1	PCIe connector 1 on the system board
	NVMe 2-3 connector on backplane 1	PCIe connector 2 on the system board
2 NVMe signal cable	NVMe 4-5 connector on backplane 1	PCIe connector 3 on the system board
	NVMe 6-7 connector on backplane 1	PCIe connector 4 on the system board
3 NVMe signal cable	NVMe 0-1 connector on backplane 2	PCIe connector 5 on the system board
	NVMe 2-3 connector on backplane 2	PCIe connector 6 on the system board
	NVMe 4-5 connector on backplane 2	PCIe connectors 7 and 8 on the system board
	NVMe 6-7 connector on backplane 2	PCIe connector 9 on the system board
4 NVMe signal cable	NVMe 0-1 connector on the rear backplane	Connectors C0 and C1 on the switch card
	NVMe 2-3 connector on the rear backplane	Connectors C2 and C3 on the switch card

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

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

- “Configuration 1: three 8 x 2.5" SAS/SATA front backplanes, one 24i RAID adapter” on page 89
- “Configuration 2: three 8 x 2.5" SAS/SATA front backplanes, two RAID/HBA adapters (8i+16i)” on page 90
- “Configuration 3: three 8 x 2.5" SAS/SATA front backplanes, three 8i RAID/HBA adapters” on page 91
- “Configuration 4: three 8 x 2.5" SAS/SATA front backplanes, one rear drive cage (SAS/SATA), two RAID/HBA adapters (8i+24i)” on page 92
- “Configuration 5: three 8 x 2.5" SAS/SATA front backplanes, one rear drive cage (SAS/SATA), four 8i RAID/HBA adapters” on page 93
- “Configuration 6: three 8 x 2.5" SAS/SATA front backplanes, one middle drive cage (SAS/SATA), two RAID/HBA adapters (8i+24i)” on page 94
- “Configuration 7: three 8 x 2.5" SAS/SATA front backplanes, one middle drive cage (SAS/SATA), four 8i RAID/HBA adapters” on page 95

Configuration 1: three 8 x 2.5" SAS/SATA front backplanes, one 24i RAID adapter

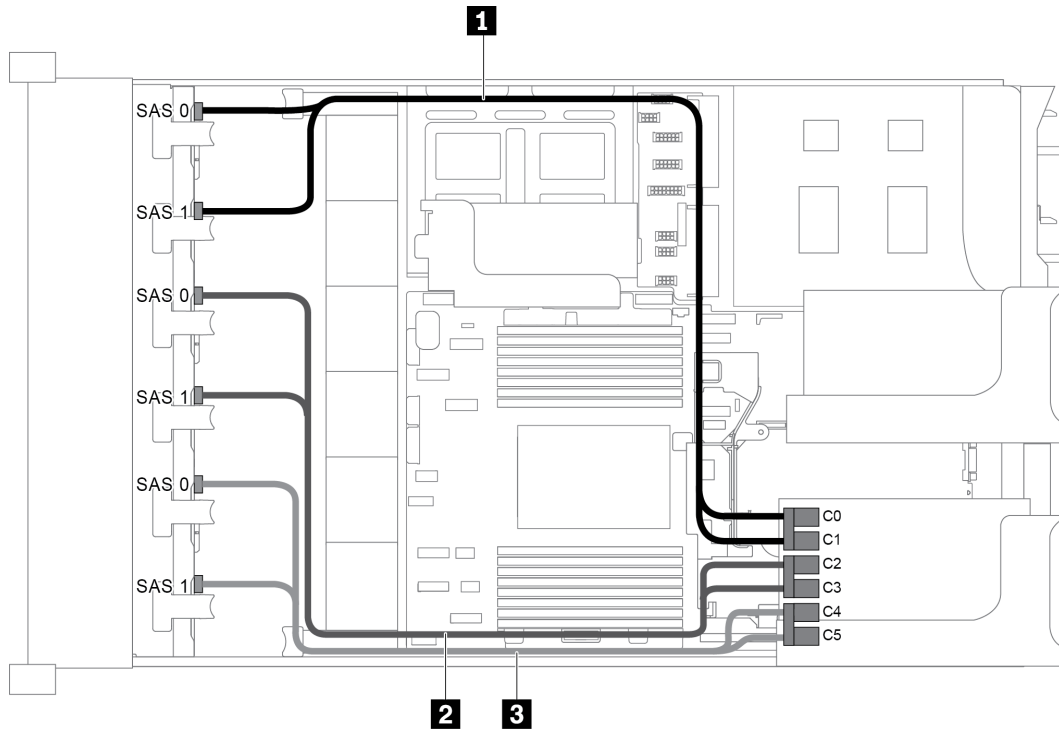


Figure 71. Cable routing for configuration with three 8 x 2.5" SAS/SATA front backplanes and one 24i RAID adapter

Cable	From	To
1 SAS signal cable	SAS 0 connector on the backplane 1	Connector C0 on the 24i RAID adapter
	SAS 1 connector on the backplane 1	Connector C1 on the 24i RAID adapter
2 SAS signal cable	SAS 0 connector on the backplane 2	Connector C2 on the 24i RAID adapter
	SAS 1 connector on the backplane 2	Connector C3 on the 24i RAID adapter
3 SAS signal cable	SAS 0 connector on the backplane 3	Connector C4 on the 24i RAID adapter
	SAS 1 connector on the backplane 3	Connector C5 on the 24i RAID adapter

Configuration 2: three 8 x 2.5" SAS/SATA front backplanes, two RAID/HBA adapters (8i+16i)

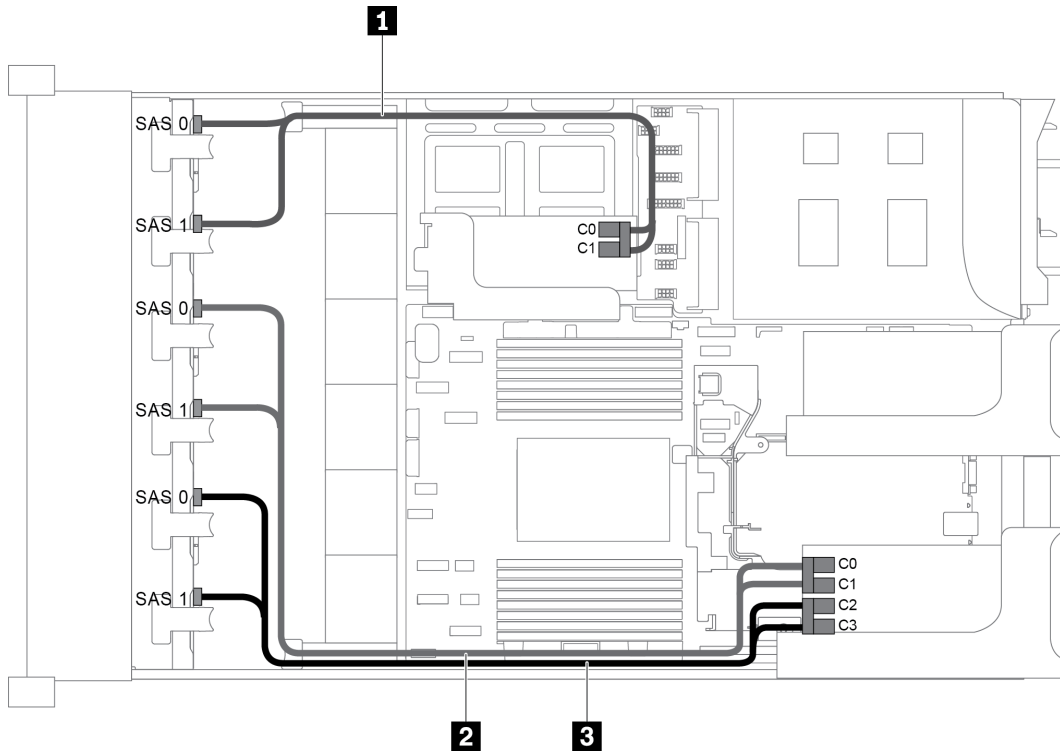


Figure 72. Cable routing for configuration with three 8 x 2.5" SAS/SATA front backplanes and two RAID/HBA adapters (8i +16i)

Cable	From	To
1 SAS signal cable	SAS 0 connector on the backplane 1	Connector C0 on the 8i RAID/HBA adapter
	SAS 1 connector on the backplane 1	Connector C1 on the 8i RAID/HBA adapter
2 SAS signal cable	SAS 0 connector on the backplane 2	Connector C0 on the 16i RAID/HBA adapter
	SAS 1 connector on the backplane 2	Connector C1 on the 16i RAID/HBA adapter
3 SAS signal cable	SAS 0 connector on the backplane 3	Connector C2 on the 16i RAID/HBA adapter
	SAS 1 connector on the backplane 3	Connector C3 on the 16i RAID/HBA adapter

Configuration 3: three 8 x 2.5" SAS/SATA front backplanes, three 8i RAID/HBA adapters

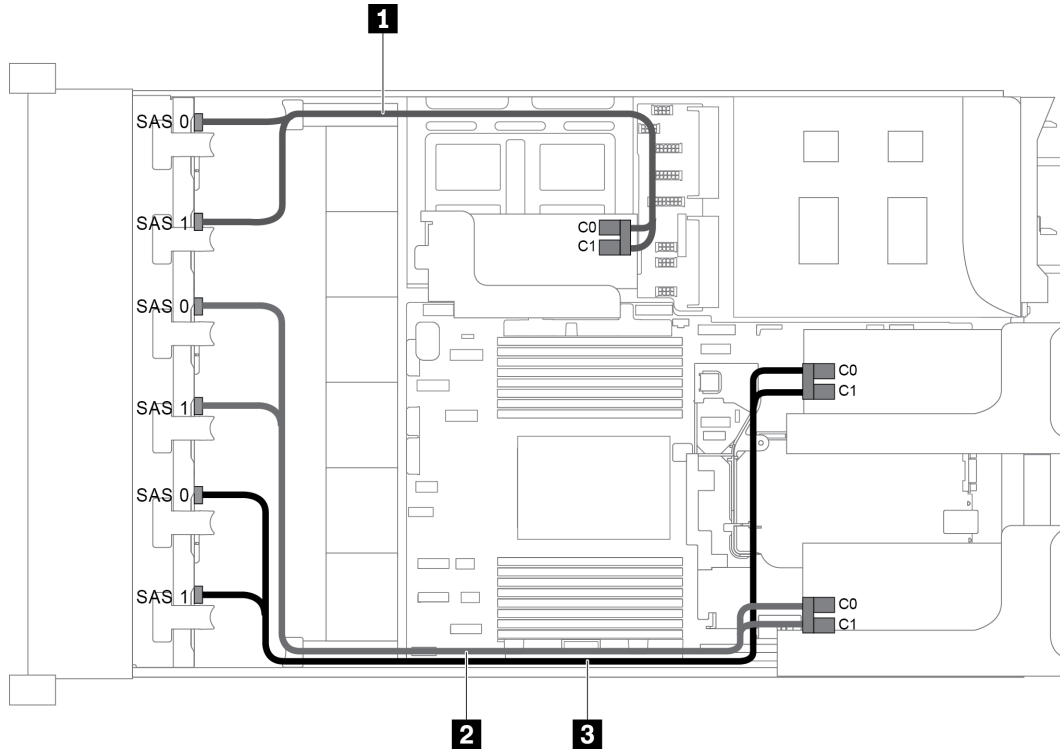


Figure 73. Cable routing for configuration with three 8 x 2.5" SAS/SATA front backplanes and three 8i RAID/HBA adapters

Cable	From	To
1 SAS signal cable	SAS 0 connector on the backplane 1	Connector C0 on the 8i RAID/HBA adapter on the internal riser card
	SAS 1 connector on the backplane 1	Connector C1 on the 8i RAID/HBA adapter on the internal riser card
2 SAS signal cable	SAS 0 connector on the backplane 2	Connector C0 on the 8i RAID/HBA adapter on riser card 1
	SAS 1 connector on the backplane 2	Connector C1 on the 8i RAID/HBA adapter on riser card 1
3 SAS signal cable	SAS 0 connector on the backplane 3	Connector C0 on the 8i RAID/HBA adapter on riser card 2
	SAS 1 connector on the backplane 3	Connector C1 on the 8i RAID/HBA adapter on riser card 2

Configuration 4: three 8 x 2.5" SAS/SATA front backplanes, one rear drive cage (SAS/SATA), two RAID/HBA adapters (8i+24i)

This configuration supports one rear 2.5-inch drive cage with a 4 x 2.5-inch SAS/SATA drive backplane.

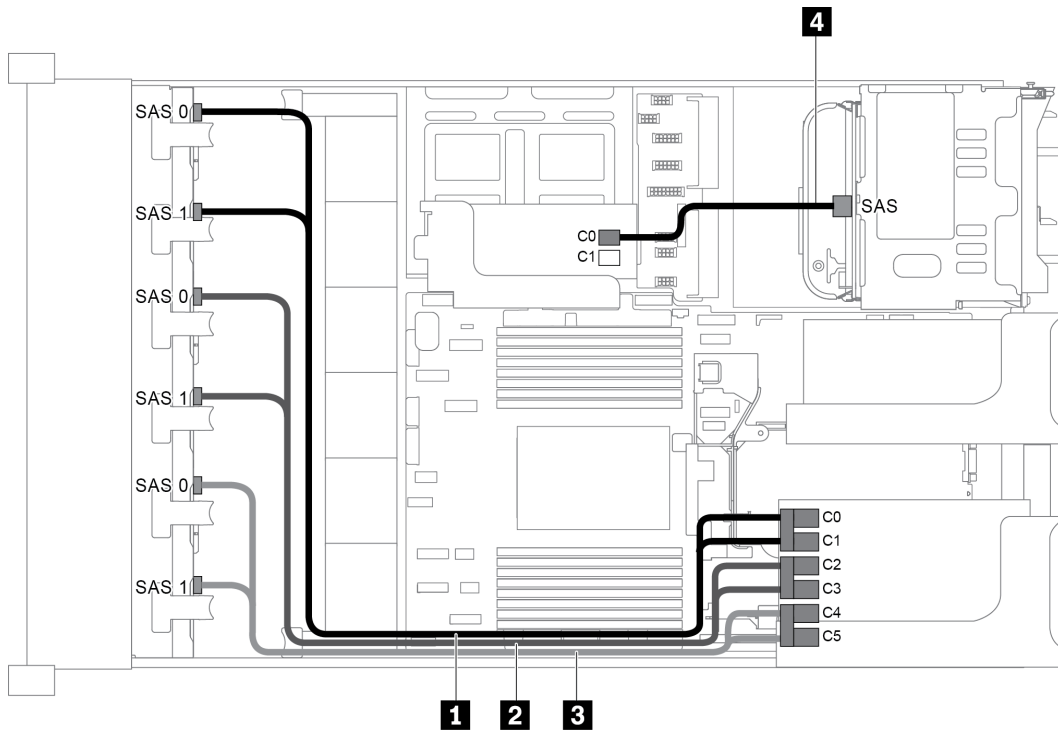


Figure 74. Cable routing for configuration with three 8 x 2.5" SAS/SATA front backplanes, one rear drive cage, and two RAID/HBA adapters (8i+24i)

Cable	From	To
1 SAS signal cable	SAS 0 connector on the backplane 1	Connector C0 on the 24i RAID adapter
	SAS 1 connector on the backplane 1	Connector C1 on the 24i RAID adapter
3 SAS signal cable	SAS 0 connector on the backplane 2	Connector C2 on the 24i RAID adapter
	SAS 1 connector on the backplane 2	Connector C3 on the 24i RAID adapter
4 SAS signal cable	SAS 0 connector on the backplane 3	Connector C4 on the 24i RAID adapter
	SAS 1 connector on the backplane 3	Connector C5 on the 24i RAID adapter
5 SAS signal cable	SAS connector on the rear backplane	Connector C0 on the 8i RAID/HBA adapter

Configuration 5: three 8 x 2.5" SAS/SATA front backplanes, one rear drive cage (SAS/SATA), four 8i RAID/HBA adapters

This configuration supports one rear 2.5-inch drive cage with a 4 x 2.5-inch SAS/SATA drive backplane.

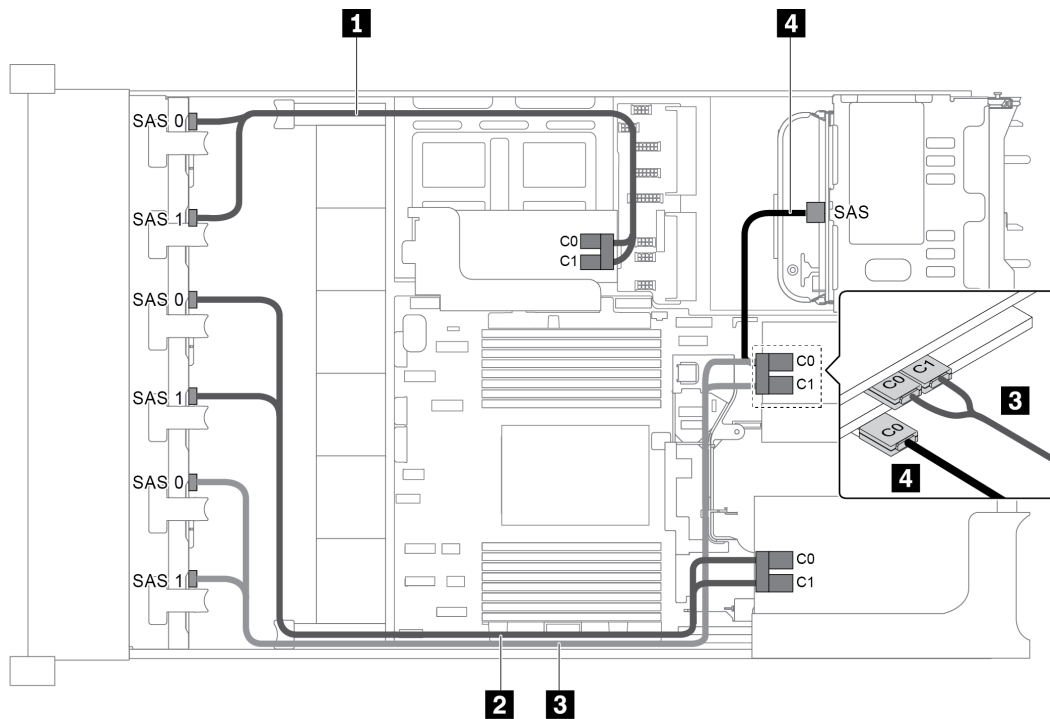


Figure 75. Cable routing for configuration with three 8 x 2.5" SAS/SATA front backplanes, one rear drive cage, and four 8i RAID/HBA adapters

Cable	From	To
1 SAS signal cable	SAS 0 connector on the backplane 1	Connector C0 on the 8i RAID/HBA adapter on the internal riser card
	SAS 1 connector on the backplane 1	Connector C1 on the 8i RAID/HBA adapter on the internal riser card
2 SAS signal cable	SAS 0 connector on the backplane 2	Connector C0 on the 8i RAID/HBA adapter on riser card 1
	SAS 1 connector on the backplane 2	Connector C1 on the 8i RAID/HBA adapter on riser card 1
3 SAS signal cable	SAS 0 connector on the backplane 3	Connector C0 on the 8i RAID/HBA adapter in slot 4 on riser card 2
	SAS 1 connector on the backplane 3	Connector C1 on the 8i RAID/HBA adapter in slot 4 on riser card 2
4 SAS signal cable	SAS connector on the rear backplane	Connector C0 on the 8i RAID/HBA adapter in slot 5 on riser card 2

Configuration 6: three 8 x 2.5" SAS/SATA front backplanes, one middle drive cage (SAS/SATA), two RAID/HBA adapters (8i+24i)

This configuration supports one middle 2.5-inch drive cage with two 4 x 2.5-inch SAS/SATA drive backplanes.

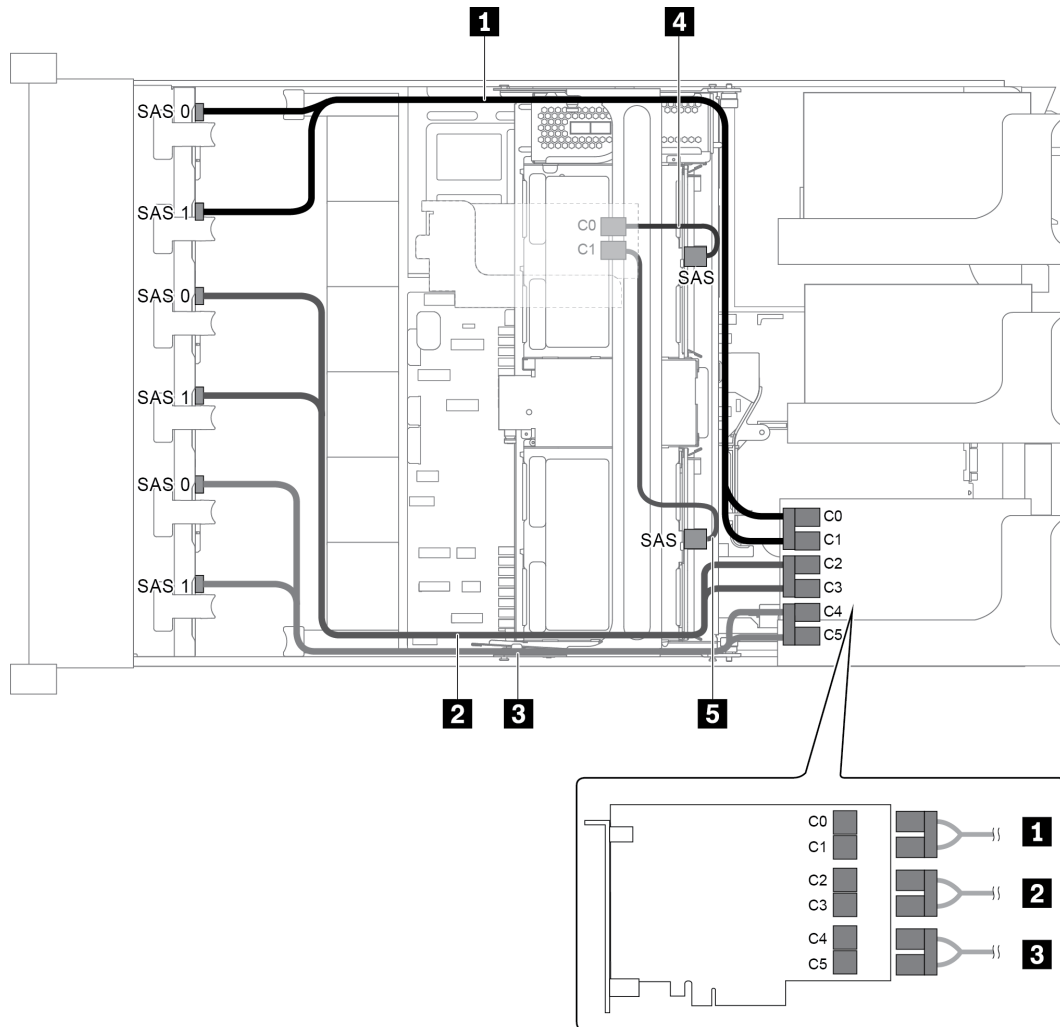


Figure 76. Cable routing for configuration with three 8 x 2.5" SAS/SATA front backplanes, one middle drive cage, and two RAID/HBA adapters (8i+24i)

Cable	From	To
1 SAS signal cable	SAS 0 connector on the backplane 1	Connector C0 on the 24i RAID adapter
	SAS 1 connector on the backplane 1	Connector C1 on the 24i RAID adapter
2 SAS signal cable	SAS 0 connector on the backplane 2	Connector C2 on the 24i RAID adapter
	SAS 1 connector on the backplane 2	Connector C3 on the 24i RAID adapter
3 SAS signal cable	SAS 0 connector on the backplane 3	Connector C4 on the 24i RAID adapter
	SAS 1 connector on the backplane 3	Connector C5 on the 24i RAID adapter
4 SAS signal cable	SAS connector on the middle backplane 1	Connector C0 on the 8i RAID/HBA adapter
5 SAS signal cable	SAS connector on the middle backplane 2	Connector C1 on the 8i RAID/HBA adapter

Configuration 7: three 8 x 2.5" SAS/SATA front backplanes, one middle drive cage (SAS/SATA), four 8i RAID/HBA adapters

This configuration supports one middle 2.5-inch drive cage with two 4 x 2.5-inch SAS/SATA drive backplanes.

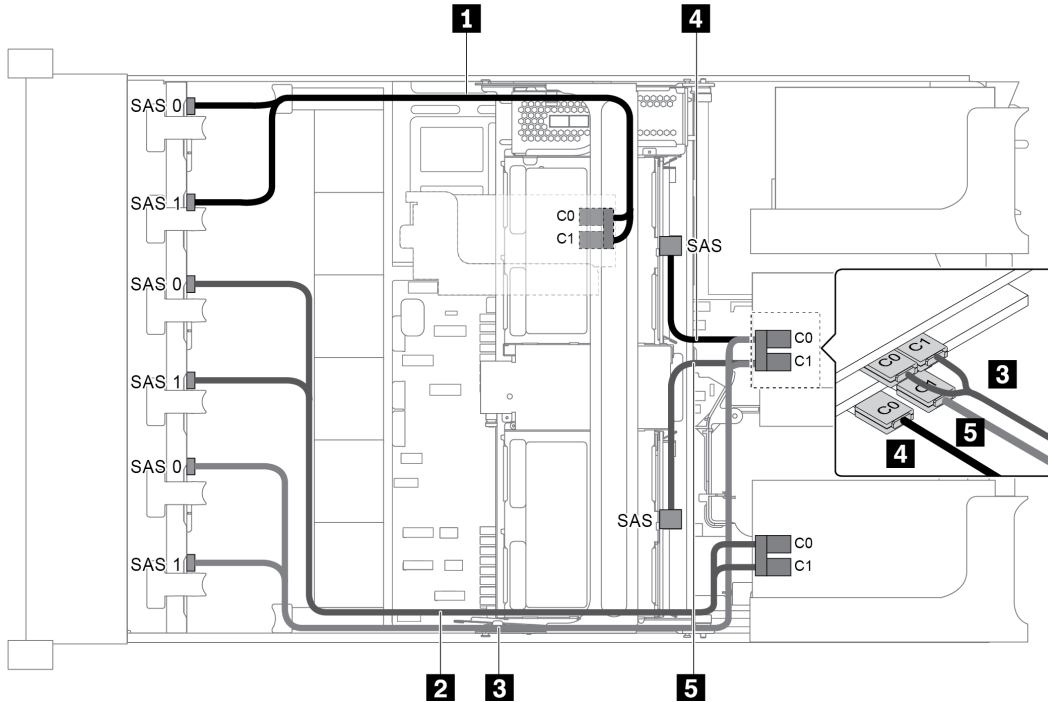


Figure 77. Cable routing for configuration with three 8 x 2.5" SAS/SATA front backplanes, one middle drive cage, and four 8i RAID/HBA adapters

Cable	From	To
1 SAS signal cable	SAS 0 connector on the backplane 1	Connector C0 on the 8i RAID/HBA adapter on the internal riser card
	SAS 1 connector on the backplane 1	Connector C1 on the 8i RAID/HBA adapter on the internal riser card
2 SAS signal cable	SAS 0 connector on the backplane 2	Connector C0 on the 8i RAID/HBA adapter on riser card 1
	SAS 1 connector on the backplane 2	Connector C1 on the 8i RAID/HBA adapter on riser card 1
3 SAS signal cable	SAS 0 connector on the backplane 3	Connector C0 on the 8i RAID/HBA adapter in slot 4 on riser card 2
	SAS 1 connector on the backplane 3	Connector C1 on the 8i RAID/HBA adapter in slot 4 on riser card 2
4 SAS signal cable	SAS connector on the middle backplane 1	Connector C0 on the 8i RAID/HBA adapter in slot 5 on riser card 2
5 SAS signal cable	SAS connector on the middle backplane 2	Connector C1 on the 8i RAID/HBA adapter in slot 5 on riser card 2

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

This section provides cable routing information for the server model with two 8 x 2.5-inch SAS/SATA front backplanes and one 8 x 2.5-inch NVMe front backplane. The NVMe backplane provides eight NVMe drive bays (bays 0–7).

- “Configuration 1: three front backplanes (8 NVMe + 2 x 8 SAS/SATA), onboard connections” on page 97
- “Configuration 2: three front backplanes (8 NVMe + 2 x 8 SAS/SATA), one 16i RAID/HBA adapter” on page 98
- “Configuration 3: three front backplanes (8 NVMe + 2 x 8 SAS/SATA), two 8i RAID/HBA adapters” on page 99
- “Configuration 4: three front backplanes (8 NVMe + 2 x 8 SAS/SATA), one rear drive cage (SAS/SATA), one 24i RAID adapter” on page 100
- “Configuration 5: three front backplanes (8 NVMe + 2 x 8 SAS/SATA), one rear drive cage (SAS/SATA), two RAID/HBA adapters (8i+16i)” on page 101
- “Configuration 6: three front backplanes (8 NVMe + 2 x 8 SAS/SATA), one rear drive cage (SAS/SATA), three 8i RAID/HBA adapters” on page 102
- “Configuration 7: three front backplanes (8 NVMe + 2 x 8 SAS/SATA), one middle drive cage (SAS/SATA), one 24i RAID adapter” on page 103
- “Configuration 8: three front backplanes (8 NVMe + 2 x 8 SAS/SATA), one middle drive cage (SAS/SATA), two RAID/HBA adapters (8i+16i)” on page 105
- “Configuration 9: three front backplanes (8 NVMe + 2 x 8 SAS/SATA), one middle drive cage (SAS/SATA), three 8i RAID/HBA adapters” on page 106

Configuration 1: three front backplanes (8 NVMe + 2 x 8 SAS/SATA), onboard connections

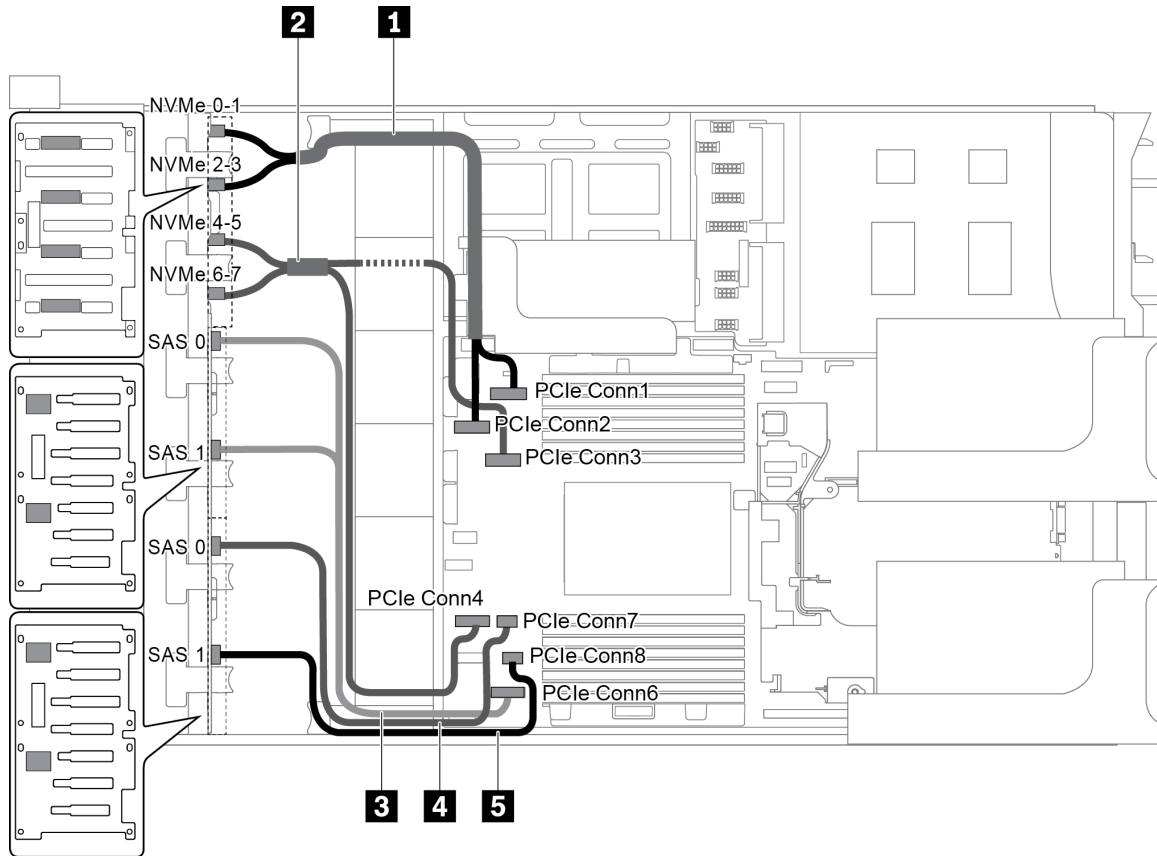


Figure 78. Cable routing for configuration with three front backplanes (8 NVMe + 2 x 8 SAS/SATA)

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

Note: When the SAS/SATA backplanes are connected to PCIe connectors on the system board, only SATA drives are supported, SAS drives not supported.

Configuration 2: three front backplanes (8 NVMe + 2 x 8 SAS/SATA), one 16i RAID/HBA adapter

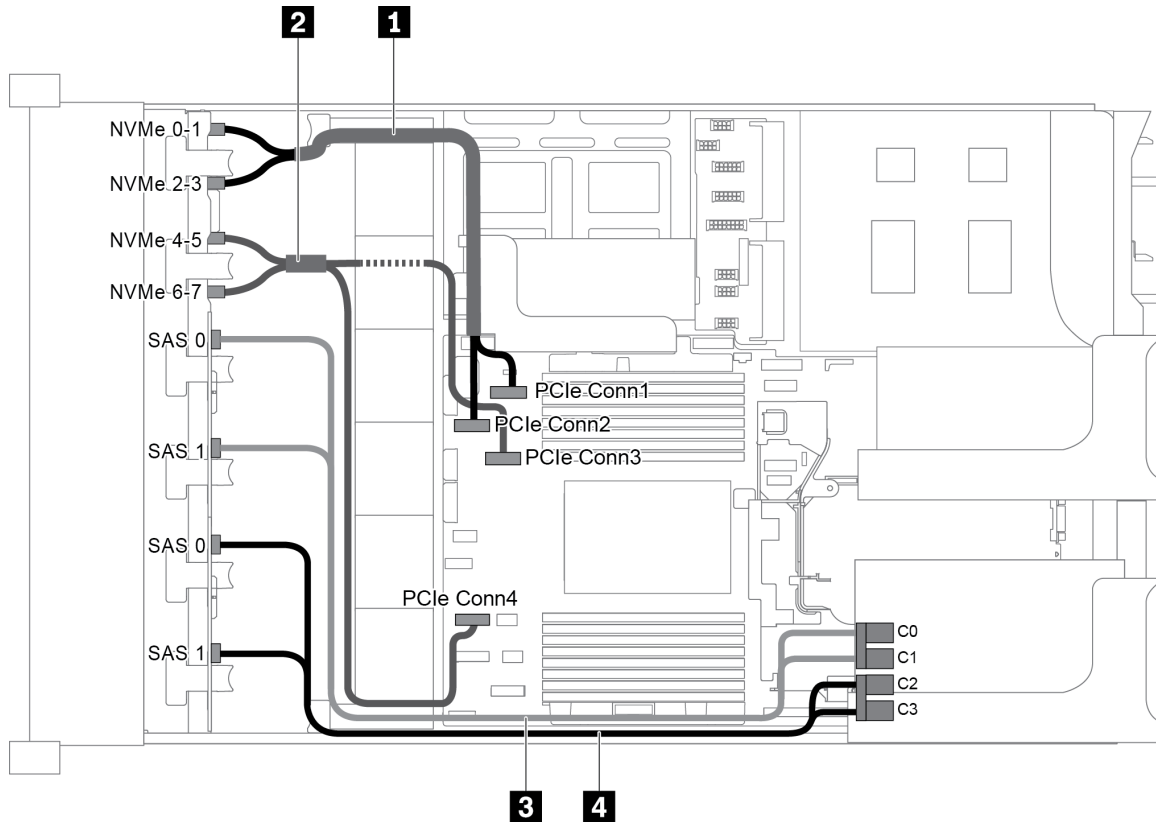


Figure 79. Cable routing for configuration with three front backplanes (8 NVMe + 2 x 8 SAS/SATA) and one 16i RAID/HBA adapter

Cable	From	To
1 NVMe signal cable	NVMe 0-1 connector on the NVMe backplane	PCIe connector 1 on the system board
	NVMe 2-3 connector on the NVMe backplane	PCIe connector 2 on the system board
3 NVMe signal cable	NVMe 4-5 connector on the NVMe backplane	PCIe connector 3 on the system board
	NVMe 6-7 connector on the NVMe backplane	PCIe connector 4 on the system board
4 SAS signal cable	SAS 0 connector on the SAS/SATA backplane 1	Connector C0 on the RAID/HBA adapter
	SAS 1 connector on the SAS/SATA backplane 1	Connector C1 on the RAID/HBA adapter
5 SAS signal cable	SAS 0 connector on the SAS/SATA backplane 2	Connector C2 on the RAID/HBA adapter
	SAS 1 connector on the SAS/SATA backplane 2	Connector C3 on the RAID/HBA adapter

Configuration 3: three front backplanes (8 NVMe + 2 x 8 SAS/SATA), two 8i RAID/HBA adapters

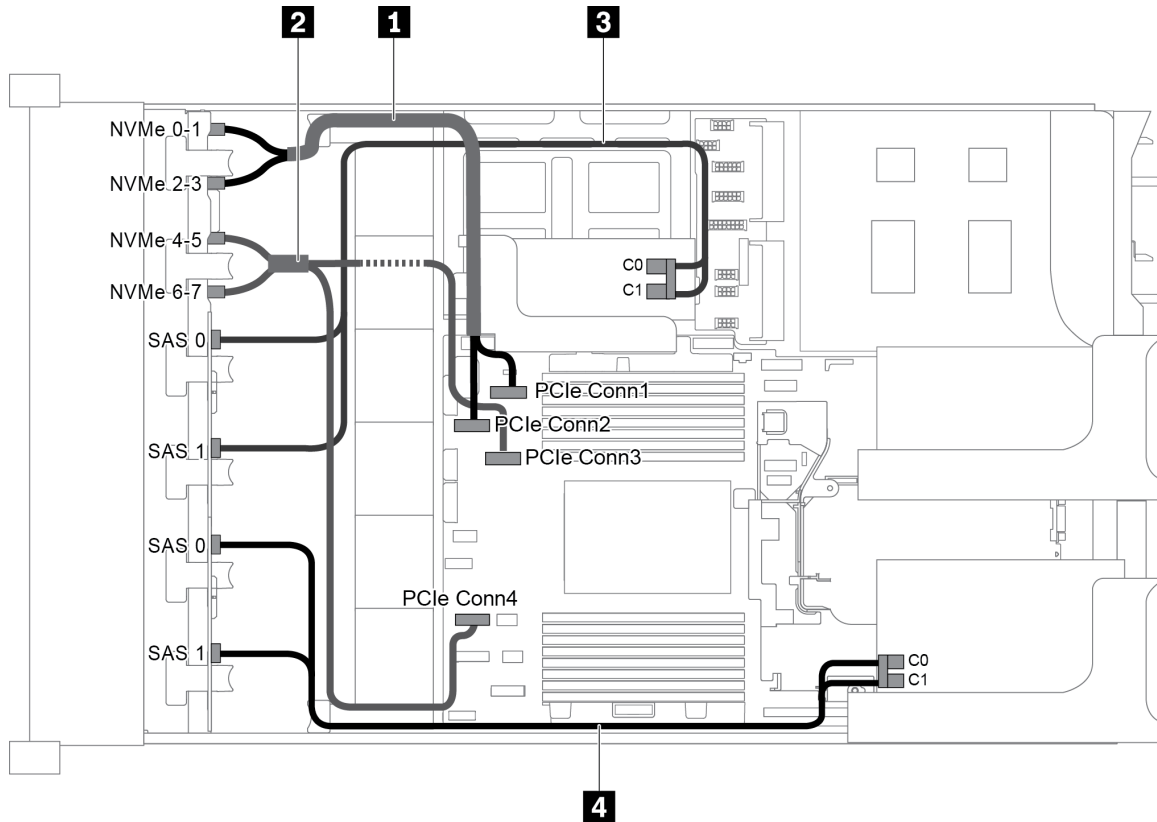


Figure 80. Cable routing for configuration with three front backplanes (8 NVMe + 2 x 8 SAS/SATA) and two 8i RAID/HBA adapters

Cable	From	To
1 NVMe signal cable	NVMe 0-1 connector on the NVMe backplane	PCIe connector 1 on the system board
	NVMe 2-3 connector on the NVMe backplane	PCIe connector 2 on the system board
2 NVMe signal cable	NVMe 4-5 connector on the NVMe backplane	PCIe connector 3 on the system board
	NVMe 6-7 connector on the NVMe backplane	PCIe connector 4 on the system board
3 SAS signal cable	SAS 0 connector on the SAS/SATA backplane 1	Connector C0 on the RAID/HBA adapter on the internal riser card
	SAS 1 connector on the SAS/SATA backplane 1	Connector C1 on the RAID/HBA adapter on the internal riser card
4 SAS signal cable	SAS 0 connector on the SAS/SATA backplane 2	Connector C0 on the RAID/HBA adapter on riser card 1
	SAS 1 connector on the SAS/SATA backplane 2	Connector C1 on the RAID/HBA adapter on riser card 1

Configuration 4: three front backplanes (8 NVMe + 2 x 8 SAS/SATA), one rear drive cage (SAS/SATA), one 24i RAID adapter

This configuration supports one rear 2.5-inch drive cage with a 4 x 2.5-inch SAS/SATA drive backplane.

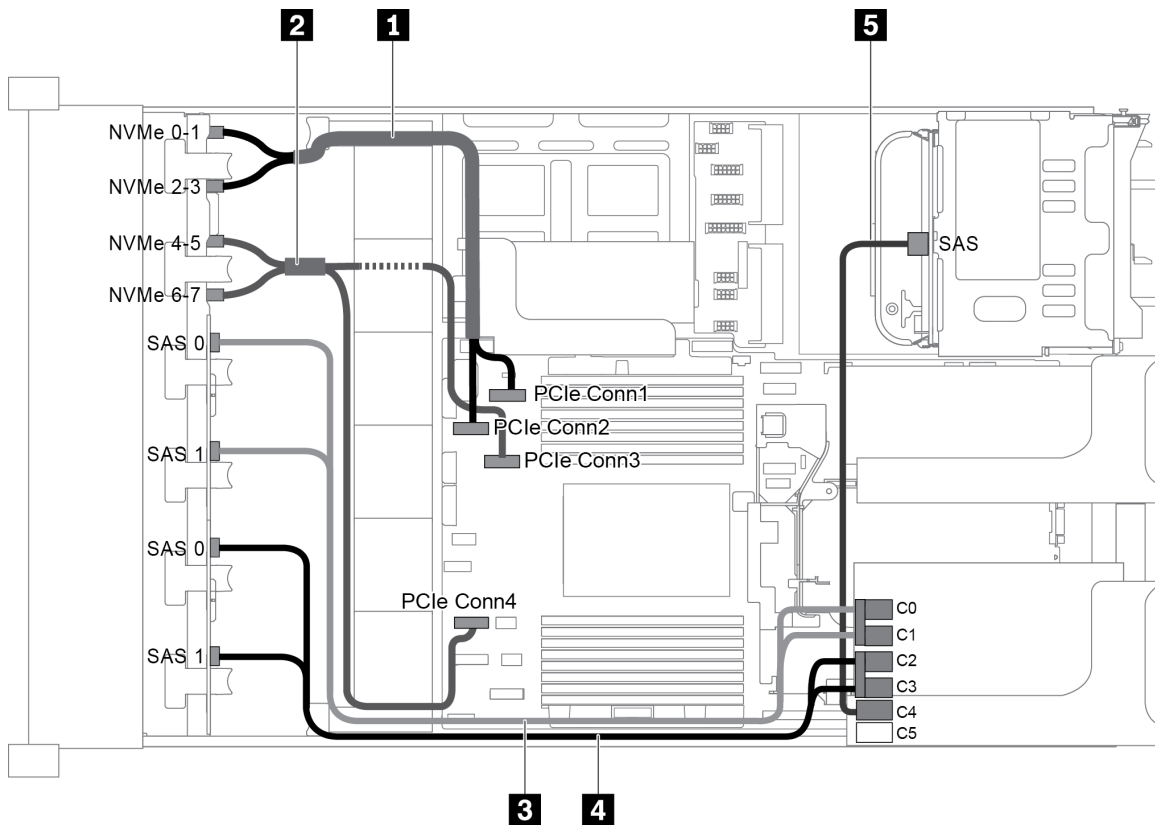


Figure 81. Cable routing for configuration with three front backplanes (8 NVMe + 2 x 8 SAS/SATA), one rear drive cage, and one 24i RAID adapter

Cable	From	To
1 NVMe signal cable	NVMe 0-1 connector on the NVMe backplane	PCIe connector 1 on the system board
	NVMe 2-3 connector on the NVMe backplane	PCIe connector 2 on the system board
2 NVMe signal cable	NVMe 4-5 connector on the NVMe backplane	PCIe connector 3 on the system board
	NVMe 6-7 connector on the NVMe backplane	PCIe connector 4 on the system board
3 SAS signal cable	SAS 0 connector on the SAS/SATA backplane 1	Connector C0 on the RAID adapter
	SAS 1 connector on the SAS/SATA backplane 1	Connector C1 on the RAID adapter
4 SAS signal cable	SAS 0 connector on the SAS/SATA backplane 2	Connector C2 on the RAID adapter
	SAS 1 connector on the SAS/SATA backplane 2	Connector C3 on the RAID adapter
5 SAS signal cable	SAS connector on the rear backplane	Connector C4 on the RAID adapter

Configuration 5: three front backplanes (8 NVMe + 2 x 8 SAS/SATA), one rear drive cage (SAS/SATA), two RAID/HBA adapters (8i+16i)

This configuration supports one rear 2.5-inch drive cage with a 4 x 2.5-inch SAS/SATA drive backplane.

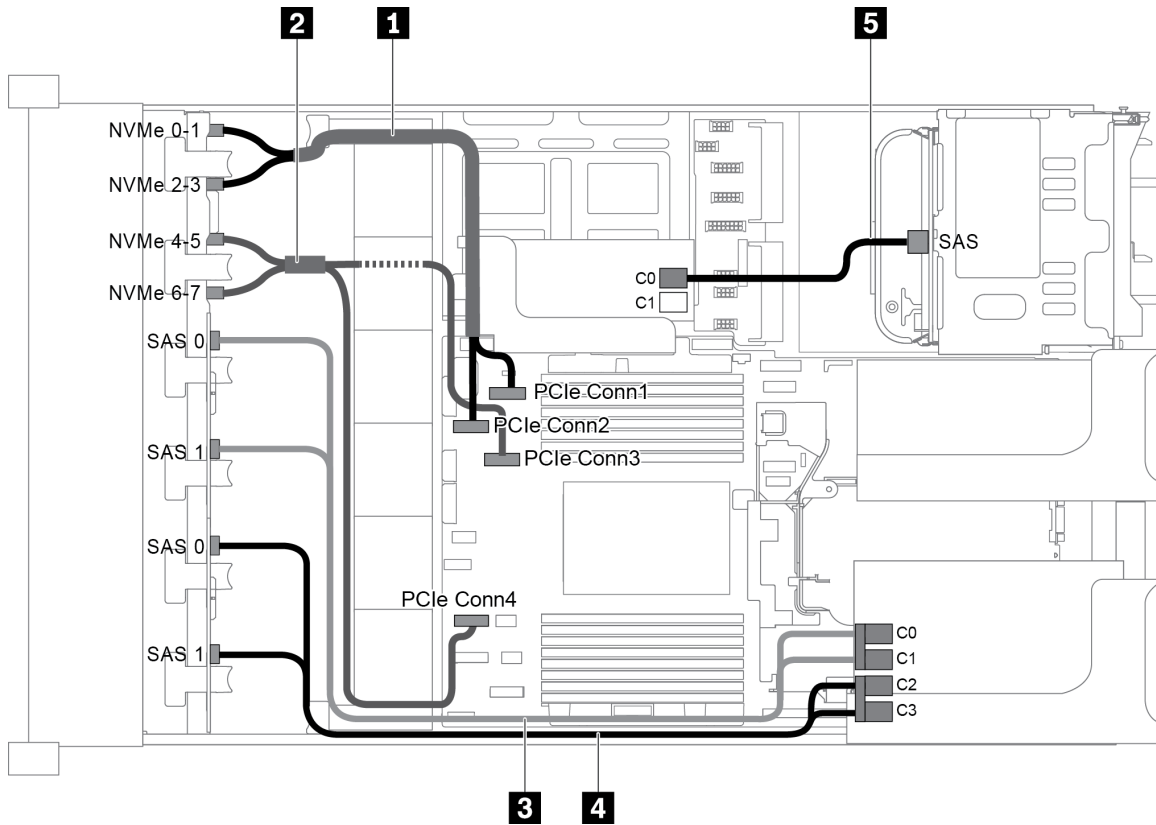


Figure 82. Cable routing for configuration with three front backplanes (8 NVMe + 2 x 8 SAS/SATA), one rear drive cage, and two RAID/HBA adapters (8i+16i)

Cable	From	To
1 NVMe signal cable	NVMe 0-1 connector on the NVMe backplane	PCIe connector 1 on the system board
	NVMe 2-3 connector on the NVMe backplane	PCIe connector 2 on the system board
2 NVMe signal cable	NVMe 4-5 connector on the NVMe backplane	PCIe connector 3 on the system board
	NVMe 6-7 connector on the NVMe backplane	PCIe connector 4 on the system board
3 SAS signal cable	SAS 0 connector on the SAS/SATA backplane 1	Connector C0 on the 16i RAID/HBA adapter
	SAS 1 connector on the SAS/SATA backplane 1	Connector C1 on the 16i RAID/HBA adapter
4 SAS signal cable	SAS 0 connector on the SAS/SATA backplane 2	Connector C2 on the 16i RAID/HBA adapter
	SAS 1 connector on the SAS/SATA backplane 2	Connector C3 on the 16i RAID/HBA adapter
5 SAS signal cable	SAS connector on the rear backplane	Connector C0 on the 8i RAID/HBA adapter

Configuration 6: three front backplanes (8 NVMe + 2 x 8 SAS/SATA), one rear drive cage (SAS/SATA), three 8i RAID/HBA adapters

This configuration supports one rear 2.5-inch drive cage with a 4 x 2.5-inch SAS/SATA drive backplane.

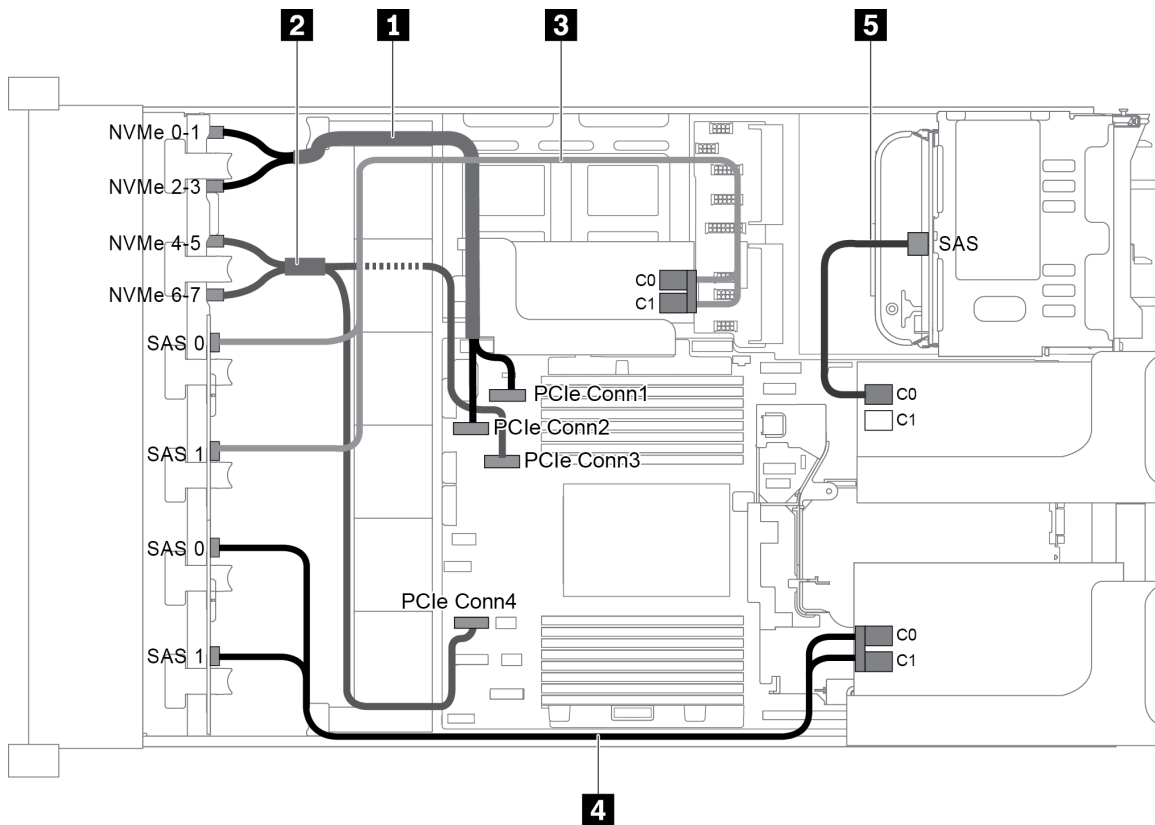


Figure 83. Cable routing for configuration with three front backplanes (8 NVMe + 2 x 8 SAS/SATA), one rear drive cage, and three 8i RAID/HBA adapters

Cable	From	To
1 NVMe signal cable	NVMe 0-1 connector on the NVMe backplane	PCIe connector 1 on the system board
	NVMe 2-3 connector on the NVMe backplane	PCIe connector 2 on the system board
2 NVMe signal cable	NVMe 4-5 connector on the NVMe backplane	PCIe connector 3 on the system board
	NVMe 6-7 connector on the NVMe backplane	PCIe connector 4 on the system board
3 SAS signal cable	SAS 0 connector on the SAS/SATA backplane 1	Connector C0 on the 8i RAID/HBA adapter on the internal riser card
	SAS 1 connector on the SAS/SATA backplane 1	Connector C1 on the 8i RAID/HBA adapter on the internal riser card
4 SAS signal cable	SAS 0 connector on the SAS/SATA backplane 2	Connector C0 on the 8i RAID/HBA adapter on riser card 1
	SAS 1 connector on the SAS/SATA backplane 2	Connector C1 on the 8i RAID/HBA adapter on riser card 1
5 SAS signal cable	SAS connector on the rear backplane	Connector C0 on the 8i RAID/HBA adapter on riser card 2

Configuration 7: three front backplanes (8 NVMe + 2 x 8 SAS/SATA), one middle drive cage (SAS/SATA), one 24i RAID adapter

This configuration supports one middle 2.5-inch drive cage with two 4 x 2.5-inch SAS/SATA drive backplanes.

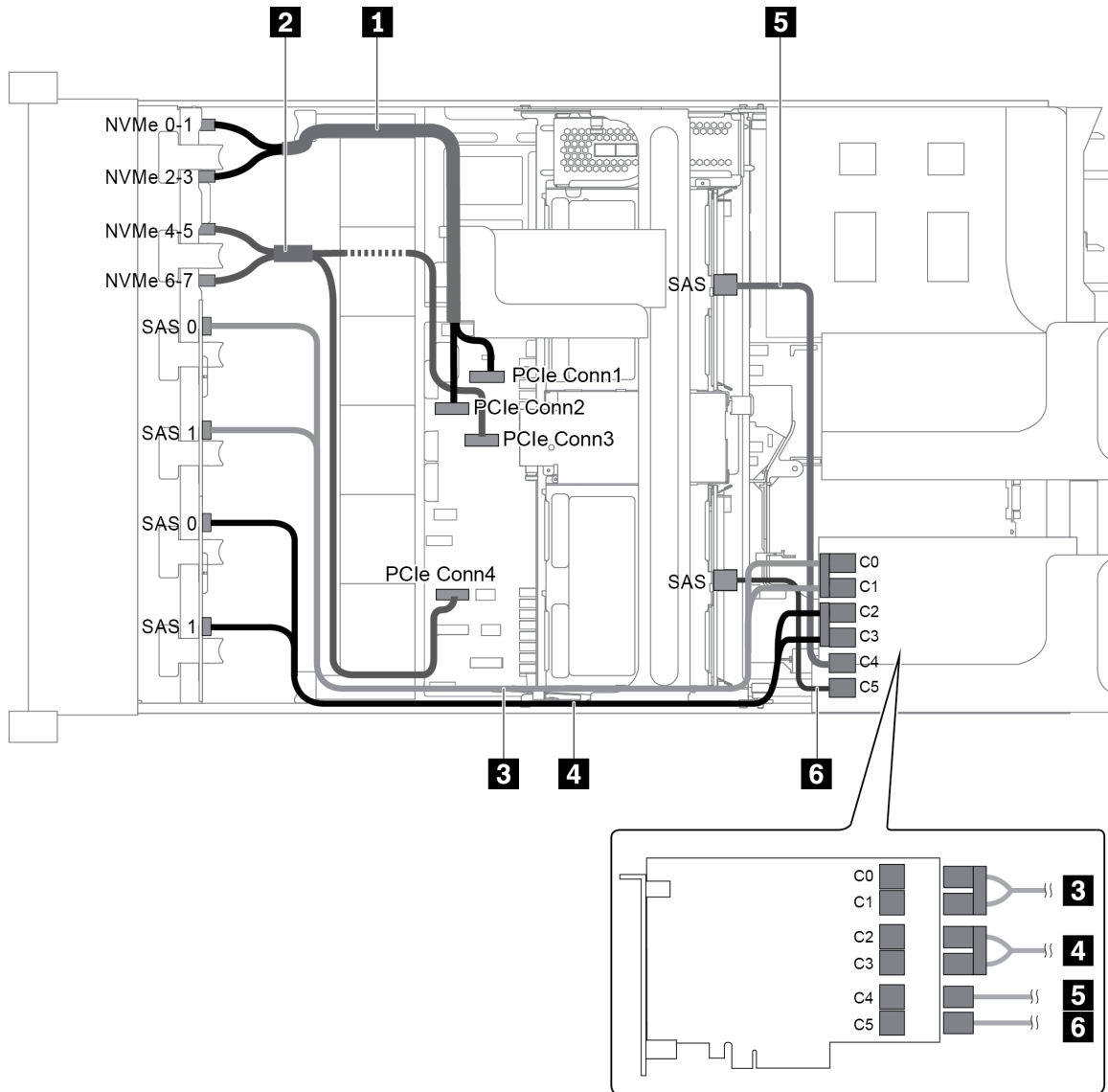


Figure 84. Cable routing for configuration with three front backplanes (8 NVMe + 2 x 8 SAS/SATA), one middle drive cage, and one 24i RAID adapter

Cable	From	To
1 NVMe signal cable	NVMe 0-1 connector on the NVMe backplane	PCIe connector 1 on the system board
	NVMe 2-3 connector on the NVMe backplane	PCIe connector 2 on the system board
2 NVMe signal cable	NVMe 4-5 connector on the NVMe backplane	PCIe connector 3 on the system board
	NVMe 6-7 connector on the NVMe backplane	PCIe connector 4 on the system board
3 SAS signal cable	SAS 0 connector on the SAS/SATA backplane 1	Connector C0 on the RAID adapter

Cable	From	To
	SAS 1 connector on the SAS/SATA backplane 1	Connector C1 on the RAID adapter
4 SAS signal cable	SAS 0 connector on the SAS/SATA backplane 2	Connector C2 on the RAID adapter
	SAS 1 connector on the SAS/SATA backplane 2	Connector C3 on the RAID adapter
5 SAS signal cable	SAS connector on the middle backplane 1	Connector C4 on the RAID adapter
6 SAS signal cable	SAS connector on the middle backplane 2	Connector C5 on the RAID adapter

Configuration 8: three front backplanes (8 NVMe + 2 x 8 SAS/SATA), one middle drive cage (SAS/SATA), two RAID/HBA adapters (8i+16i)

This configuration supports one middle 2.5-inch drive cage with two 4 x 2.5-inch SAS/SATA drive backplanes.

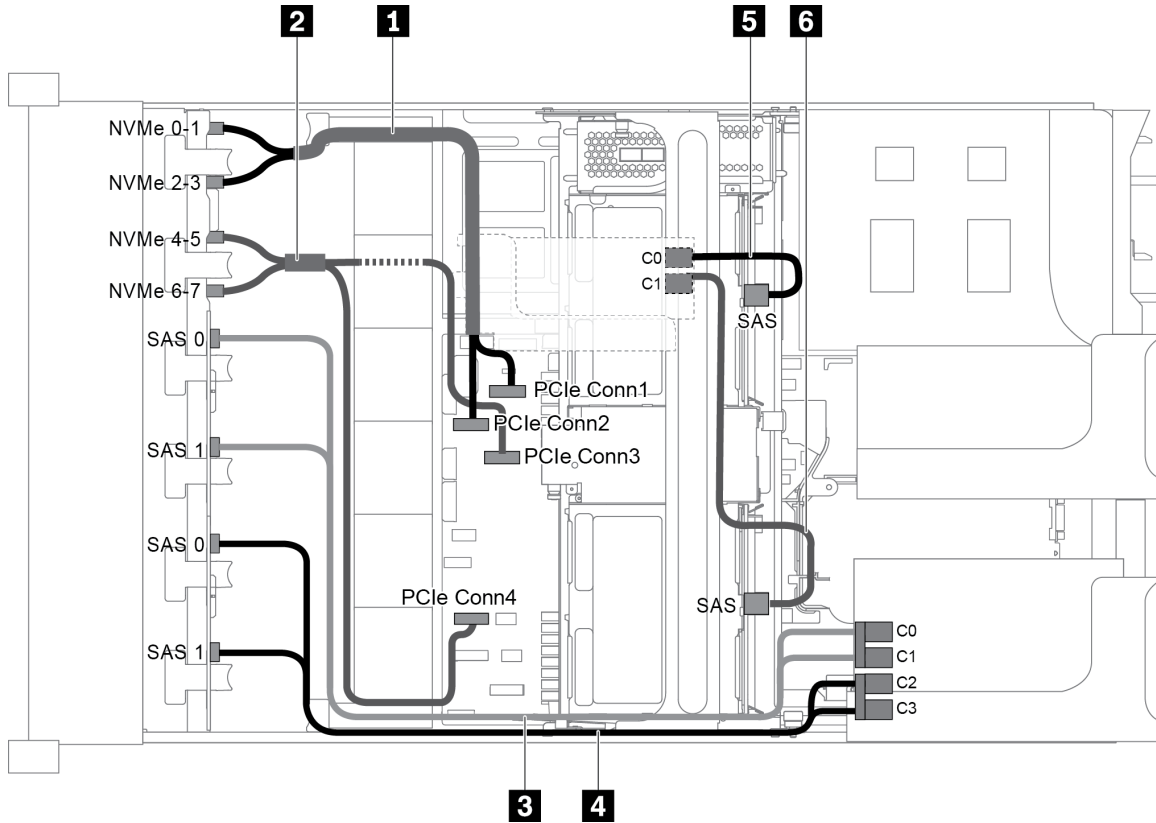


Figure 85. Cable routing for configuration with three front backplanes (8 NVMe + 2 x 8 SAS/SATA), one middle drive cage, and two RAID/HBA adapters (8i+16i)

Cable	From	To
1 NVMe signal cable	NVMe 0-1 connector on the NVMe backplane	PCIe connector 1 on the system board
	NVMe 2-3 connector on the NVMe backplane	PCIe connector 2 on the system board
2 NVMe signal cable	NVMe 4-5 connector on the NVMe backplane	PCIe connector 3 on the system board
	NVMe 6-7 connector on the NVMe backplane	PCIe connector 4 on the system board
3 SAS signal cable	SAS 0 connector on the SAS/SATA backplane 1	Connector C0 on the 16i RAID/HBA adapter
	SAS 1 connector on the SAS/SATA backplane 1	Connector C1 on the 16i RAID/HBA adapter
4 SAS signal cable	SAS 0 connector on the SAS/SATA backplane 2	Connector C2 on the 16i RAID/HBA adapter
	SAS 1 connector on the SAS/SATA backplane 2	Connector C3 on the 16i RAID/HBA adapter

Cable	From	To
5 SAS signal cable	SAS connector on the middle backplane 1	Connector C0 on the 8i RAID/HBA adapter
6 SAS signal cable	SAS connector on the middle backplane 2	Connector C1 on the 8i RAID/HBA adapter

Configuration 9: three front backplanes (8 NVMe + 2 x 8 SAS/SATA), one middle drive cage (SAS/SATA), three 8i RAID/HBA adapters

This configuration supports one middle 2.5-inch drive cage with two 4 x 2.5-inch SAS/SATA drive backplanes.

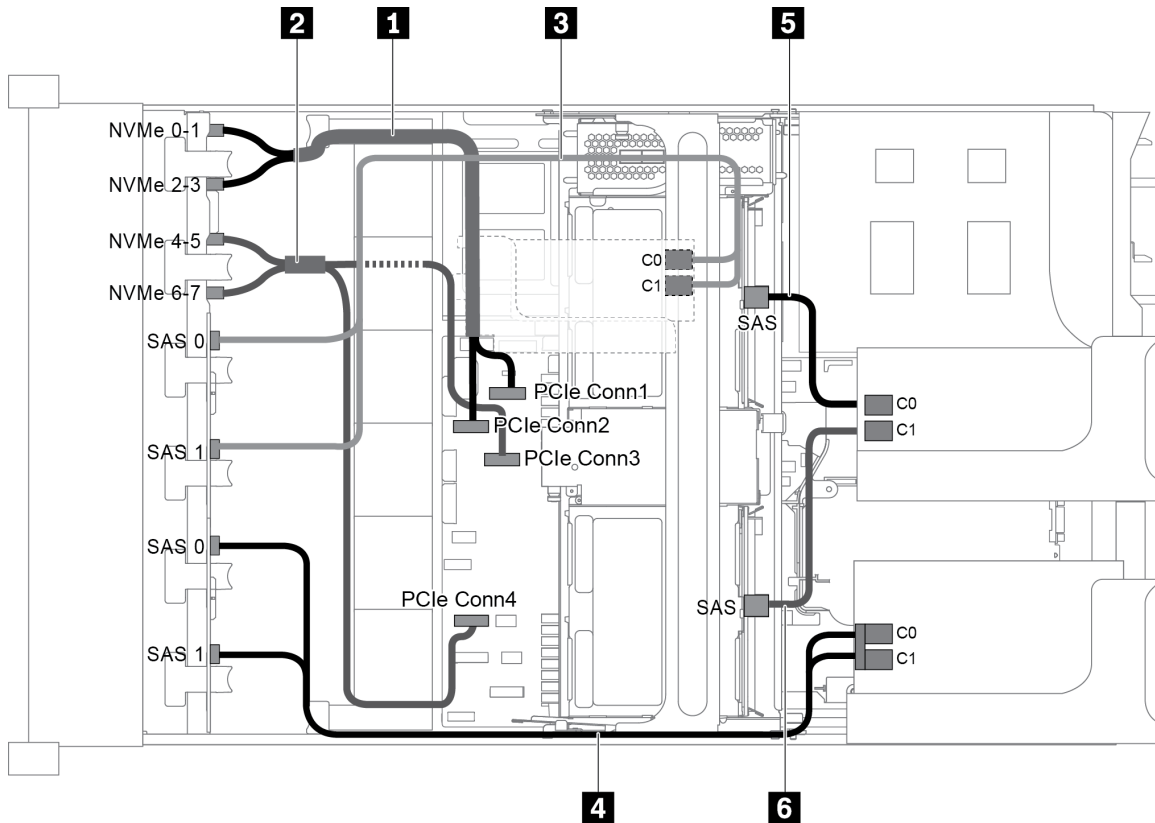


Figure 86. Cable routing for configuration with three front backplanes (8 NVMe + 2 x 8 SAS/SATA), one middle drive cage, and three 8i RAID/HBA adapters

Cable	From	To
1 NVMe signal cable	NVMe 0-1 connector on the NVMe backplane	PCIe connector 1 on the system board
	NVMe 2-3 connector on the NVMe backplane	PCIe connector 2 on the system board
2 NVMe signal cable	NVMe 4-5 connector on the NVMe backplane	PCIe connector 3 on the system board
	NVMe 6-7 connector on the NVMe backplane	PCIe connector 4 on the system board
3 SAS signal cable	SAS 0 connector on the SAS/SATA backplane 1	Connector C0 on the 8i RAID/HBA adapter on the internal riser card
	SAS 1 connector on the SAS/SATA backplane 1	Connector C1 on the 8i RAID/HBA adapter on the internal riser card
4 SAS signal cable	SAS 0 connector on the SAS/SATA backplane 2	Connector C0 on the 8i RAID/HBA adapter on riser card 1

Cable	From	To
	SAS 1 connector on the SAS/SATA backplane 2	Connector C1 on the 8i RAID/HBA adapter on riser card 1
5 SAS signal cable	SAS connector on the middle backplane 1	Connector C0 on the 8i RAID/HBA adapter on riser card 2
6 SAS signal cable	SAS connector on the middle backplane 2	Connector C1 on the 8i RAID/HBA adapter on riser card 2

Server model with 24 x 2.5-inch front drive bays (NVMe)

This section provides cable routing information for the server model with three 8 x 2.5-inch NVMe front backplanes.

- “Configuration 1: three 8 x 2.5" NVMe front backplanes, two 810-4P or 1610-4P NVMe switch cards” on page 109
- “Configuration 2: three 8 x 2.5" NVMe front backplanes, one rear drive cage (SAS/SATA), two 810-4P or 1610-4P NVMe switch cards, one 8i RAID/HBA adapter” on page 111
- “Configuration 3: three 8 x 2.5" NVMe front backplanes, one rear drive cage (NVMe), three 810-4P or 1610-4P NVMe switch cards” on page 113
- “Configuration 4: three 8 x 2.5" NVMe front backplanes, one middle drive cage (SAS/SATA), two 810-4P or 1610-4P NVMe switch cards, one 8i RAID/HBA adapter” on page 115
- “Configuration 5: three 8 x 2.5" NVMe front backplanes, one middle drive cage (NVMe), four 810-4P or 1610-4P NVMe switch cards” on page 117

Configuration 1: three 8 x 2.5" NVMe front backplanes, two 810-4P or 1610-4P NVMe switch cards

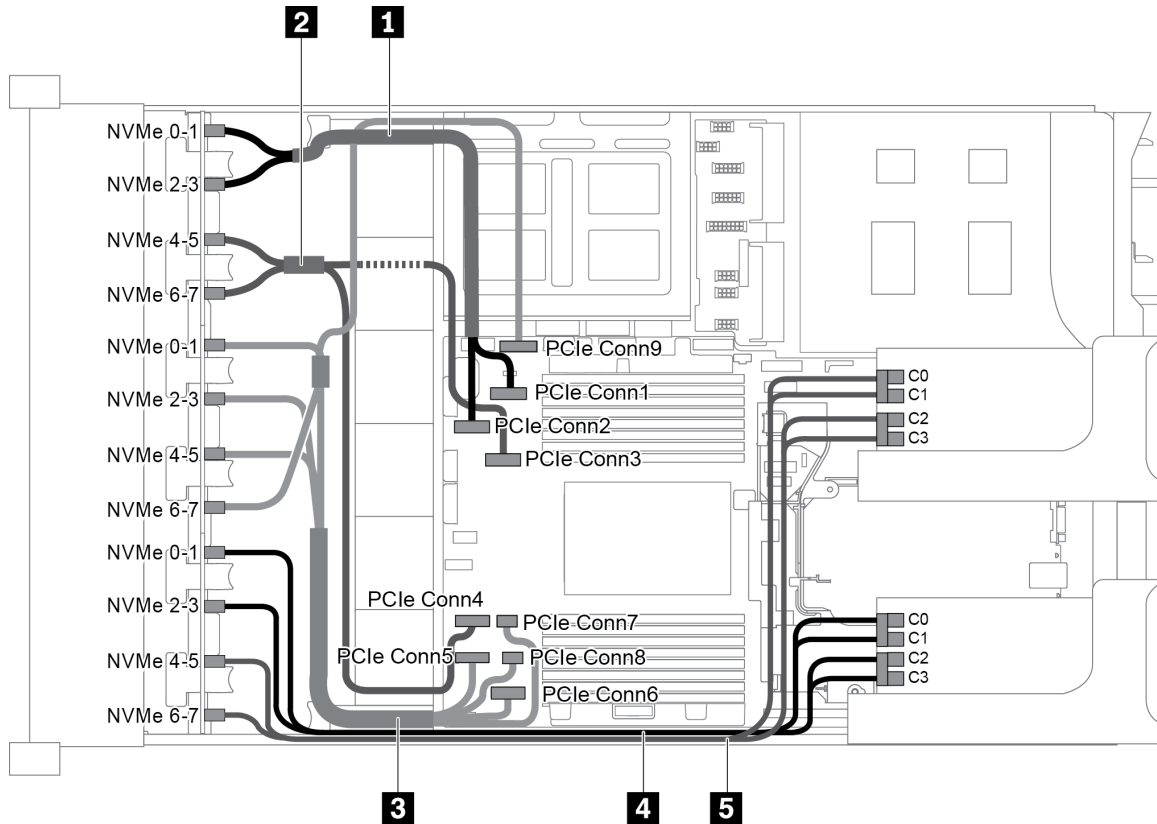


Figure 87. Cable routing for configuration with three 8 x 2.5" NVMe front backplanes and two 810-4P or 1610-4P NVMe switch cards

Cable	From	To
1 NVMe signal cable	NVMe 0-1 connector on the NVMe backplane 1	PCIe connector 1 on the system board
	NVMe 2-3 connector on the NVMe backplane 1	PCIe connector 2 on the system board
2 NVMe signal cable	NVMe 4-5 connector on the NVMe backplane 1	PCIe connector 3 on the system board
	NVMe 6-7 connector on the NVMe backplane 1	PCIe connector 4 on the system board
3 NVMe signal cable	NVMe 0-1 connector on the NVMe backplane 2	PCIe connector 5 on the system board
	NVMe 2-3 connector on the NVMe backplane 2	PCIe connector 6 on the system board
	NVMe 4-5 connector on the NVMe backplane 2	PCIe connectors 7 and 8 on the system board
	NVMe 6-7 connector on the NVMe backplane 2	PCIe connector 9 on the system board
4 NVMe signal cable	NVMe 0-1 connector on the NVMe backplane 3	Connectors C0 and C1 on the switch card 1
	NVMe 2-3 connector on the NVMe backplane 3	Connectors C2 and C3 on the switch card 1

Cable	From	To
5 NVMe signal cable	NVMe 4-5 connector on the NVMe backplane 3	Connectors C0 and C1 on the switch card 2
	NVMe 6-7 connector on the NVMe backplane 3	Connectors C2 and C3 on the switch card 2

Configuration 2: three 8 x 2.5" NVMe front backplanes, one rear drive cage (SAS/SATA), two 810-4P or 1610-4P NVMe switch cards, one 8i RAID/HBA adapter

This configuration supports one rear drive cage with a 4 x 2.5 SAS/SATA drive backplane.

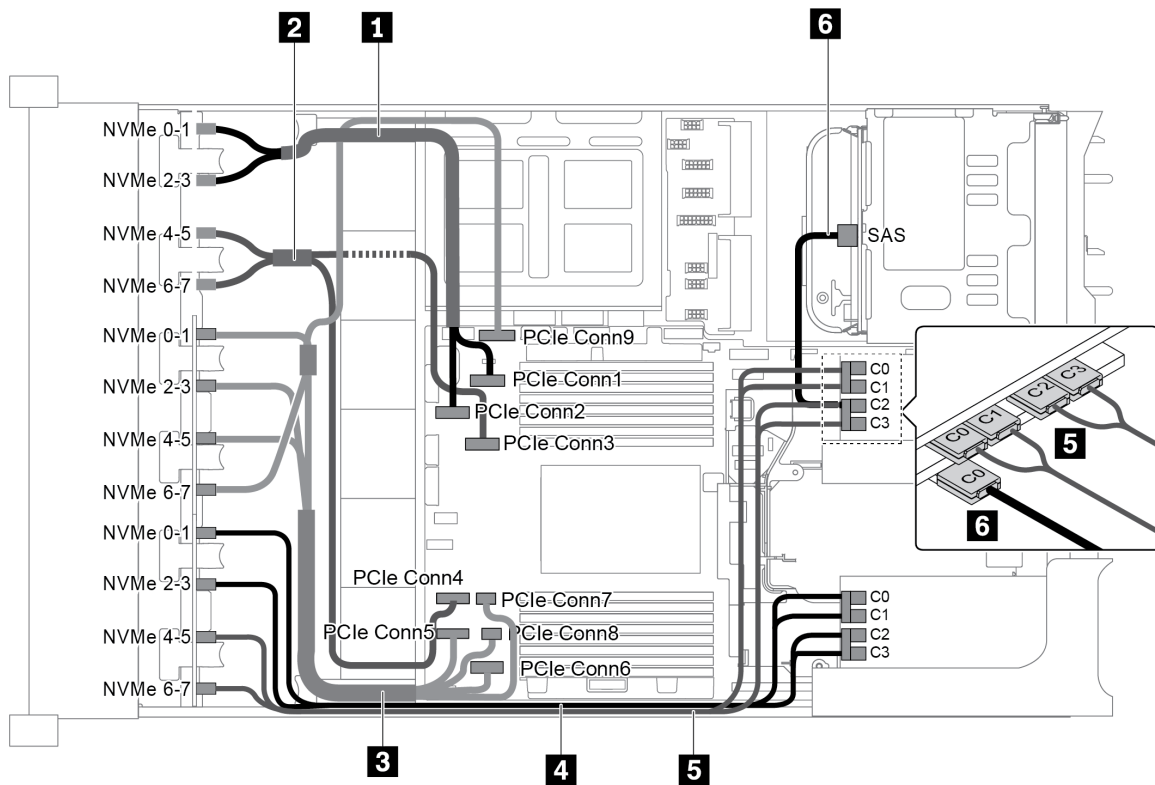


Figure 88. Cable routing for configuration with three 8 x 2.5" NVMe front backplanes, one rear drive cage (SAS/SATA), two 810-4P or 1610-4P NVMe switch cards, and one 8i RAID/HBA adapter

Cable	From	To
1 NVMe signal cable	NVMe 0-1 connector on the NVMe backplane 1	PCIe connector 1 on the system board
	NVMe 2-3 connector on the NVMe backplane 1	PCIe connector 2 on the system board
2 NVMe signal cable	NVMe 4-5 connector on the NVMe backplane 1	PCIe connector 3 on the system board
	NVMe 6-7 connector on the NVMe backplane 1	PCIe connector 4 on the system board
3 NVMe signal cable	NVMe 0-1 connector on the NVMe backplane 2	PCIe connector 5 on the system board
	NVMe 2-3 connector on the NVMe backplane 2	PCIe connector 6 on the system board
	NVMe 4-5 connector on the NVMe backplane 2	PCIe connectors 7 and 8 on the system board
	NVMe 6-7 connector on the NVMe backplane 2	PCIe connector 9 on the system board
4 NVMe signal cable	NVMe 0-1 connector on the NVMe backplane 3	Connectors C0 and C1 on the switch card 1

Cable	From	To
	NVMe 2-3 connector on the NVMe backplane 3	Connectors C2 and C3 on the switch card 1
5 NVMe signal cable	NVMe 4-5 connector on the NVMe backplane 3	Connectors C0 and C1 on the switch card 2
	NVMe 6-7 connector on the NVMe backplane 3	Connectors C2 and C3 on the switch card 2
6 SAS signal cable	SAS connector on the rear drive cage	Connector C0 on the 8i RAID/HBA adapter

Configuration 3: three 8 x 2.5" NVMe front backplanes, one rear drive cage (NVMe), three 810-4P or 1610-4P NVMe switch cards

This configuration supports one rear drive cage with a 4 x 2.5 NVMe drive backplane.

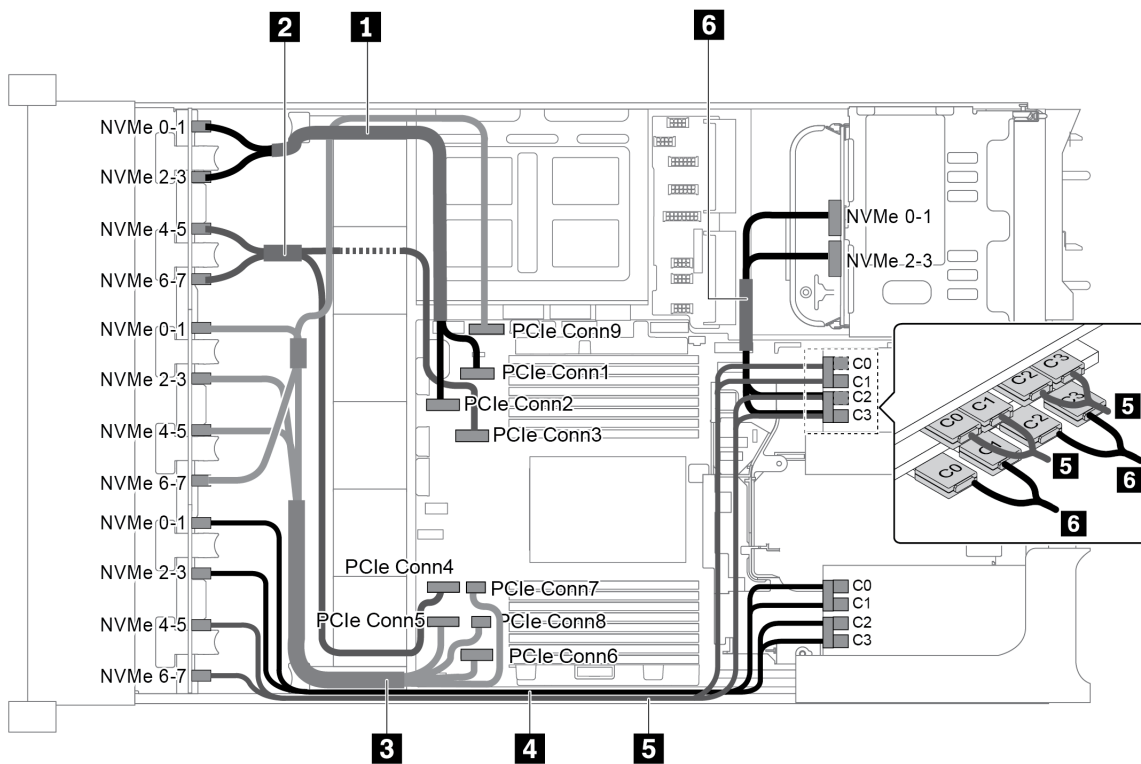


Figure 89. Cable routing for configuration with three 8 x 2.5" NVMe front backplanes, one rear drive cage (NVMe), and three 810-4P or 1610-4P NVMe switch cards

Cable	From	To
1 NVMe signal cable	NVMe 0-1 connector on the NVMe backplane 1	PCIe connector 1 on the system board
	NVMe 2-3 connector on the NVMe backplane 1	PCIe connector 2 on the system board
2 NVMe signal cable	NVMe 4-5 connector on the NVMe backplane 1	PCIe connector 3 on the system board
	NVMe 6-7 connector on the NVMe backplane 1	PCIe connector 4 on the system board
3 NVMe signal cable	NVMe 0-1 connector on the NVMe backplane 2	PCIe connector 5 on the system board
	NVMe 2-3 connector on the NVMe backplane 2	PCIe connector 6 on the system board
	NVMe 4-5 connector on the NVMe backplane 2	PCIe connectors 7 and 8 on the system board
	NVMe 6-7 connector on the NVMe backplane 2	PCIe connector 9 on the system board
4 NVMe signal cable	NVMe 0-1 connector on the NVMe backplane 3	Connectors C0 and C1 on the switch card 1

Cable	From	To
	NVMe 2-3 connector on the NVMe backplane 3	Connectors C2 and C3 on the switch card 1
5 NVMe signal cable	NVMe 4-5 connector on the NVMe backplane 3	Connectors C0 and C1 on the switch card 2
	NVMe 6-7 connector on the NVMe backplane 3	Connectors C2 and C3 on the switch card 2
6 NVMe signal cable	NVMe 0-1 connector on the rear NVMe backplane	Connectors C0 and C1 on the switch card 3
	NVMe 2-3 connector on the rear NVMe backplane	Connectors C2 and C3 on the switch card 3

Configuration 4: three 8 x 2.5" NVMe front backplanes, one middle drive cage (SAS/SATA), two 810-4P or 1610-4P NVMe switch cards, one 8i RAID/HBA adapter

This configuration supports one middle 2.5-inch drive cage with two 4 x 2.5-inch SAS/SATA drive backplanes.

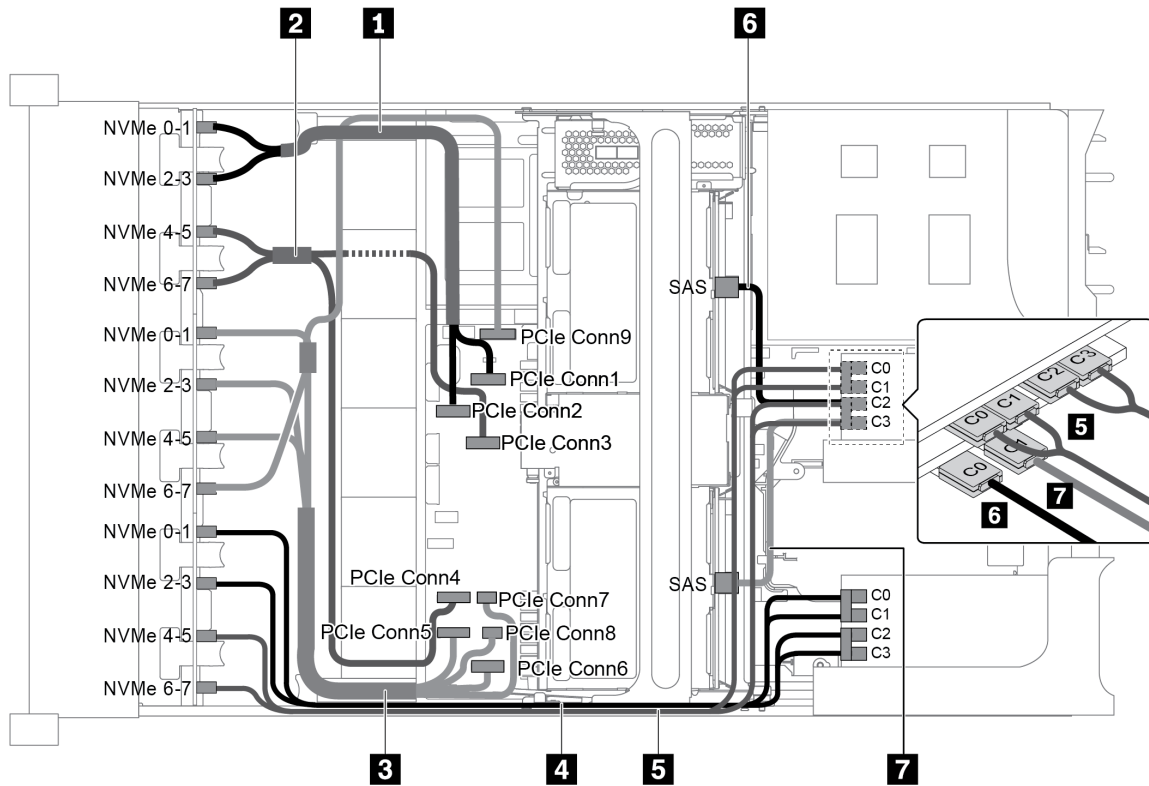


Figure 90. Cable routing for configuration with three 8 x 2.5" NVMe front backplanes, one middle drive cage (SAS/SATA), two 810-4P or 1610-4P NVMe switch cards, and one 8i RAID/HBA adapter

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

Cable	From	To
4 NVMe signal cable	NVMe 0-1 connector on the NVMe backplane 3	Connectors C0 and C1 on the switch card 1
	NVMe 2-3 connector on the NVMe backplane 3	Connectors C2 and C3 on the switch card 1
5 NVMe signal cable	NVMe 4-5 connector on the NVMe backplane 3	Connectors C0 and C1 on the switch card 2
	NVMe 6-7 connector on the NVMe backplane 3	Connectors C2 and C3 on the switch card 2
6 SAS signal cable	SAS connector on the middle backplane 1	Connector C0 on the 8i RAID/HBA adapter
7 SAS signal cable	SAS connector on the middle backplane 2	Connector C1 on the 8i RAID/HBA adapter

Configuration 5: three 8 x 2.5" NVMe front backplanes, one middle drive cage (NVMe), four 810-4P or 1610-4P NVMe switch cards

This configuration supports one middle 2.5-inch drive cage with two 4 x 2.5-inch NVMe drive backplanes.

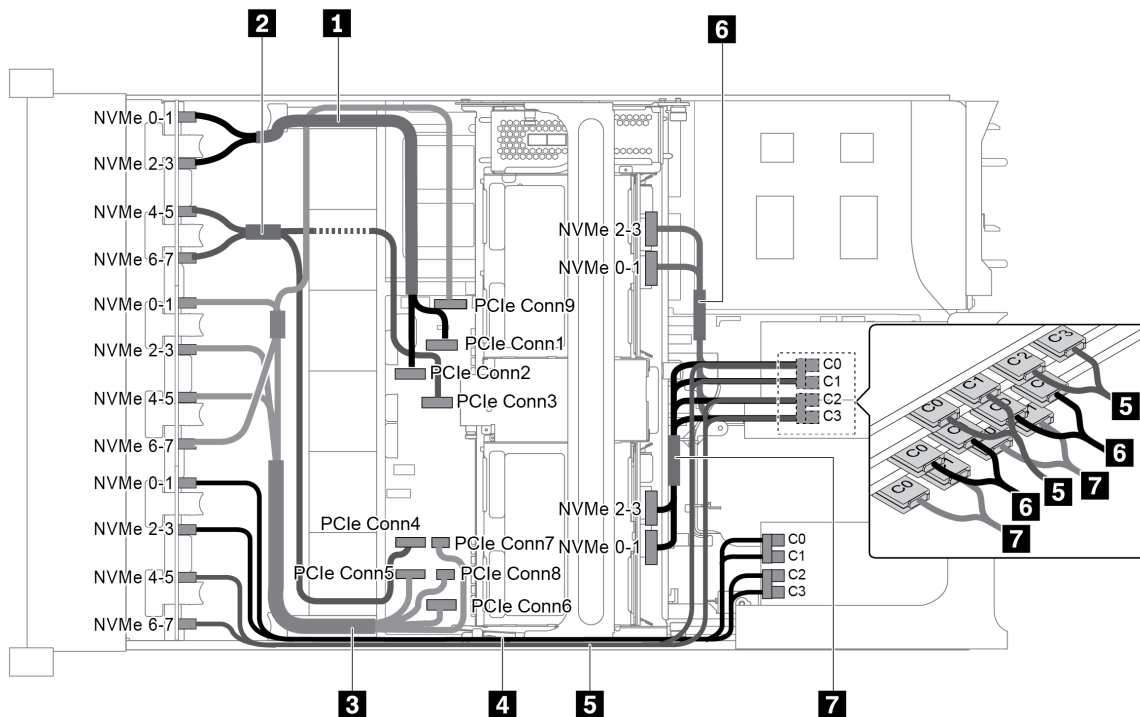


Figure 91. Cable routing for configuration with three 8 x 2.5" NVMe front backplanes, one middle drive cage (NVMe), and four 810-4P or 1610-4P NVMe switch cards

Cable	From	To
1 NVMe signal cable	NVMe 0-1 connector on the NVMe backplane 1	PCIe connector 1 on the system board
	NVMe 2-3 connector on the NVMe backplane 1	PCIe connector 2 on the system board
2 NVMe signal cable	NVMe 4-5 connector on the NVMe backplane 1	PCIe connector 3 on the system board
	NVMe 6-7 connector on the NVMe backplane 1	PCIe connector 4 on the system board
3 NVMe signal cable	NVMe 0-1 connector on the NVMe backplane 2	PCIe connector 5 on the system board
	NVMe 2-3 connector on the NVMe backplane 2	PCIe connector 6 on the system board
	NVMe 4-5 connector on the NVMe backplane 2	PCIe connectors 7 and 8 on the system board
	NVMe 6-7 connector on the NVMe backplane 2	PCIe connector 9 on the system board
4 NVMe signal cable	NVMe 0-1 connector on the NVMe backplane 3	Connectors C0 and C1 on the switch card 1
	NVMe 2-3 connector on the NVMe backplane 3	Connectors C2 and C3 on the switch card 1

Cable	From	To
5 NVMe signal cable	NVMe 4-5 connector on the NVMe backplane 3	Connectors C0 and C1 on the switch card 2
	NVMe 6-7 connector on the NVMe backplane 3	Connectors C2 and C3 on the switch card 2
6 NVMe signal cable	NVMe 0-1 connector on the middle backplane 1	Connectors C0 and C1 on the switch card 3
	NVMe 2-3 connector on the middle backplane 1	Connectors C2 and C3 on the switch card 3
7 SAS signal cable	NVMe 0-1 connector on the middle backplane 2	Connectors C0 and C1 on the switch card 4
	NVMe 2-3 connector on the middle backplane 2	Connectors C2 and C3 on the switch card 4

Connections between the system board, PIB board, and fan board

This section provides connection information for the system board, PIB board, and fan board.

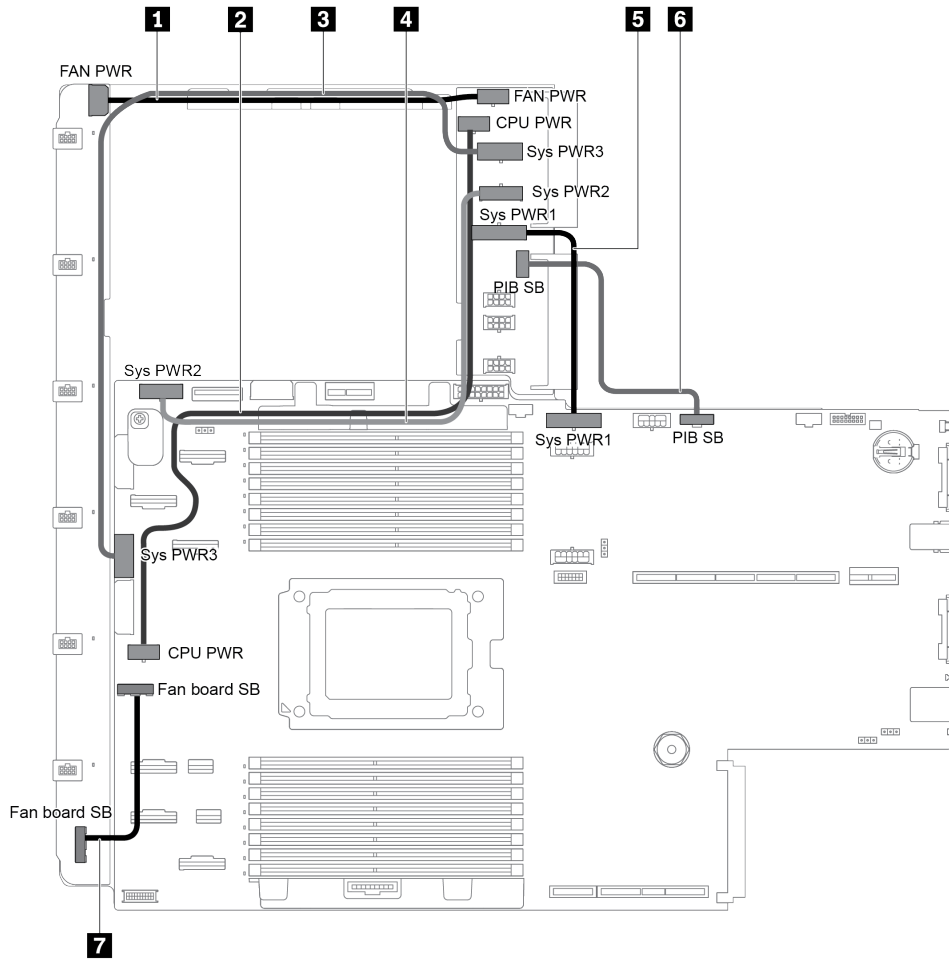


Figure 92. Connections between the system board, PIB board, and fan board

From	To
1 Fan power connector on the PIB board	Fan power connector on the fan board
2 CPU power connector on the PIB board	CPU power connector on the system board
3 System power connector 3 on the PIB board	System power connector 3 on the system board
4 System power connector 2 on the PIB board	System power connector 2 on the system board
5 System power connector 1 on the PIB board	System power connector 1 on the system board
6 Sideband connector on the PIB board	PIB sideband connector on the system board
7 Sideband connector on the fan board	Fan sideband connector on the system board

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:

<http://datacentersupport.lenovo.com/us/en/products/servers/thinksystem/sr655/7y00/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 8.

Installation Guidelines

Use the installation guidelines to install components in your server.

Before installing optional devices, read the following notices carefully:

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

- Read the safety information and guidelines to ensure that you work safely.
 - A complete list of safety information for all products is available at:
http://thinksystem.lenovofiles.com/help/topic/safety_documentation/pdf_files.html
 - The following guidelines are available as well: “Handling static-sensitive devices” on page 124 and “Working inside the server with the power on” on page 123.
- Make sure the components you are installing are supported by the server. For a list of supported optional components for the server, see <http://www.lenovo.com/us/en/serverproven/>.
- When you install a new server, download and apply the latest firmware. This will help ensure that any known issues are addressed, and that your server is ready to work with optimal performance. Go to [ThinkSystem SR655 Drivers and Software](#) to download firmware updates for your server.

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

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

- Have a small flat-blade screwdriver, a small Phillips screwdriver, a T8 torx screwdriver, and a T20 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. In the Customize a Model pane:

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

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.
- All processor sockets must contain either a socket cover or a processor with heat sink.
- When more than one processor is installed, fan population rules for each server must be strictly followed.

Working inside the server with the power on

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

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

- Avoid loose-fitting clothing, particularly around your forearms. Button or roll up long sleeves before working inside the server.
- Prevent your necktie, scarf, badge rope, or long hair from dangling into the server.
- Remove jewelry, such as bracelets, necklaces, rings, cuff links, and wrist watches.

- Remove items from your shirt pocket, such as pens and pencils, in case they fall into the server as you lean over it.
- Avoid dropping any metallic objects, such as paper clips, hairpins, and screws, into the server.

Handling static-sensitive devices

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

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

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

Technical rules

This topic provides technical rules for the server.

- “Drive bay configurations and requirements” on page 125
- “Technical rules for processor and heat sink” on page 127
- “Technical rules for system fans” on page 128
- “Technical rules for storage controller adapters” on page 129
- “Technical rules for GPU adapters” on page 129
- “Technical rules for PCIe Flash storage adapters” on page 132

Drive bay configurations and requirements

This topic describes the drive bay configurations supported by the server and the requirements for hardware configurations.

The server supports hot-swap drives in three drive zones:

- Front bays: up to 12 x 3.5-inch or 24 x 2.5-inch hot-swap bays
- Middle (internal) bays: up to 4 x 3.5-inch or 8 x 2.5-inch hot-swap bays
- Rear bays: up to 4 x 3.5-inch or 4 x 2.5-inch hot-swap bays

Depending on the server chassis and hardware configurations, the server supports different drive bay combinations.

- “Chassis with 3.5-inch front drive bays” on page 125
- “Chassis with 2.5-inch front drive bays” on page 126

Chassis with 3.5-inch front drive bays

The following table shows the supported drive bay combinations for the chassis with 3.5-inch front drive bays.

Notes:

- NVMe drives are only supported in the front drive bays (bays 8–11), using the AnyBay backplane (which offers 4 x NVMe capable drive bays).
- When the front drive bays are 3.5-inch bays, the middle drive bays are also 3.5-inch bays. However, the rear drive bays can be either 2.5-inch SAS/SATA or 3.5-inch SAS/SATA bays.
- When the front SAS/SATA backplane is connected to PCIe connectors on the system board, only SATA drives are supported. No SAS drives are supported.
- For the middle/rear drive cage with an NVMe backplane, only 7 mm NVMe drives (installed in the 15 mm-height drive trays) are supported. The 15 mm drives are not supported.
- To support a middle drive cage:
 - Performance fans (speed of 29000 RPM) must be installed.
 - The processor TDP must be lower than or equal to 155 watts.
 - The ambient temperature must be lower than or equal to 35°C (95°F).
 - All empty memory slots must be covered with a memory module filler or new memory module to ensure optimal air flow.
- To support a rear drive cage:

- Performance fans (speed of 29000 RPM) must be installed.
- The processor TDP must be lower than or equal to 225 watts.
- The ambient temperature must be lower than or equal to 35°C (95°F).

3.5": 3.5-inch; 2.5": 2.5-inch

Config	Total drives	Front bays (3.5")		Mid bays (3.5")	Rear bays (3.5" or 2.5")	
		SAS/SATA	AnyBay	SAS/SATA	3.5" SAS/SATA	2.5" SAS/SATA
3.5-inch chassis – SAS/SATA drives only						
A	8	8	0	0	0	0
B	12	12	0	0	0	0
C	16	12	0	0	4	0
D	16	12	0	0	0	4
E	20	12	0	4	4	0
F	20	12	0	4	0	4
3.5-inch chassis – SAS/SATA and AnyBay drives						
G	12	8	4	0	0	0
H	16	8	4	0	4	0
I	16	8	4	0	0	4
J	20	8	4	4	4	0
K	20	8	4	4	0	4
3.5-inch chassis – no backplanes, no drives						
L	0	12 (with drive fillers)	0	0	0	0

Chassis with 2.5-inch front drive bays

The following table shows the supported drive combinations for the chassis with 2.5-inch front drive bays.

Notes:

- With the 2.5-inch chassis, all drive bays are 2.5-inch bays. No 3.5-inch drives are supported.
- Middle drive bays and rear drive bays cannot be used concurrently.
- When the front SAS/SATA backplane is connected to PCIe connectors on the system board, only SATA drives are supported. No SAS drives are supported.
- For the middle/rear drive cage with an NVMe backplane, only 7 mm NVMe drives (installed in the 15 mm-height drive trays) are supported. The 15 mm drives are not supported.
- To support a middle drive cage:
 - Performance fans (speed of 29000 RPM) must be installed.
 - The processor TDP must be lower than or equal to 155 watts.
 - The ambient temperature must be lower than or equal to 35°C (95°F).

Note that the ambient temperature must be lower than or equal to 30°C (86°F) for the server model with 24 NVMe front drive bays.

- All empty memory slots must be covered with a memory module filler or new memory module to ensure optimal air flow.

- To support a rear drive cage:
 - Performance fans (speed of 29000 RPM) must be installed.
 - The processor TDP must be lower than or equal to 225 watts.
 - The ambient temperature must be lower than or equal to 35°C (95°F).

3.5": 3.5-inch; 2.5": 2.5-inch

Config	Total drives	Front bays (2.5")		Mid bays (2.5")		Rear bays (2.5")	
		SAS/SATA	NVMe	SAS/SATA	NVMe	SAS/SATA	NVMe
2.5-inch chassis – SAS/SATA drives only							
A	8	8	0	0	0	0	0
B	16	16	0	0	0	0	0
C	20	16	0	0	0	4	0
D	24	24	0	0	0	0	0
E	28	24	0	0	0	4	0
F	32	24	0	8	0	0	0
2.5-inch chassis – SAS/SATA and NVMe drives in the front bays							
G	16	8	8	0	0	0	0
H	20	8	8	0	0	4	0
I	24	16	8	0	0	0	0
J	28	16	8	0	0	4	0
K	32	16	8	8	0	0	0
2.5-inch chassis – only NVMe drives in the front bays							
L	8	0	8	0	0	0	0
M	16	0	16	0	0	0	0
N	20	0	16	0	0	4	0
O	20	0	16	0	0	0	4
P	24	0	24	0	0	0	0
Q	28	0	24	0	0	4	0
R	28	0	24	0	0	0	4
S	32	0	24	8	0	0	0
T	32	0	24	0	8	0	0
2.5-inch chassis – no backplanes, no drives							
U	0	24 (with drive fillers)	0	0	0	0	0

Technical rules for processor and heat sink

Processor and heat sink selection rules:

Heat sink	Configuration
1U Standard	<ul style="list-style-type: none"> Processor TDP \leq 200 watts With GPU or mid drive bays
1U Performance	<ul style="list-style-type: none"> Processor TDP \geq 225 watts With GPU or mid drive bays
2U Performance	Without GPU or mid drive bays

Rules about 280-watt processor selection

Depending on your configuration, if you need to install the 280-watt processor, follow the below rules:

- For better cooling, if your server is configured with a 280-watt processor, install a memory module filler or a new memory module to cover the slot.
- For server model with twelve 3.5-inch SAS/SATA front drives, or with eight 3.5-inch SAS/SATA and four 3.5-inch Anybay front drives, if installed with 280-watt processor, it can support up to 35°C (95°F) ambient, but can not support OCP Ethernet adapter, or any PCIe card in PCIe slot 1, slot 2, and slot 3.
- For server model with twelve 3.5-inch SAS/SATA front drives and four 3.5-inch rear drives, or with eight 3.5-inch SAS/SATA, four 3.5-inch Anybay front drives and four 3.5-inch rear drives, if installed with a 280-watt processor, it can support up to 30°C (86°F) ambient, but can not support OCP Ethernet adapter, or any PCIe card in PCIe slot 3.
- For server model with twelve 3.5-inch SAS/SATA front drives, or with eight 3.5-inch SAS/SATA and four 3.5-inch Anybay front drives, if installed with middle drives, 280-watt processor is not supported.
- For server model with twenty four 2.5-inch SAS/SATA front drives, or with twenty four 2.5-inch Anybay, or with sixteen 2.5-inch SAS/SATA and eight Anybay front drives, if installed with 280-watt processor, it can support up to 35°C (95°F) ambient, but can not support the following OCP Ethernet adapters:
 - ThinkSystem Broadcom 57416 10GBASE-T 2-port OCP Ethernet Adapter
 - ThinkSystem Broadcom 57454 10/25GbE SFP28 4-port OCP Ethernet Adapter
 - ThinkSystem Broadcom 57416 10GBASE-T 2-port + 5720 1GbE 2-port OCP Ethernet Adapter
 - ThinkSystem Broadcom 57454 10GBASE-T 4-port OCP Ethernet Adapter

Technical rules for system fans

Note: If there is an OCP 3.0 Ethernet adapter installed, when the system is powered off but still plugged in to AC power, fans 5 and fan 6 will continue to spin at a much lower speed. This is the system design to provide proper cooling for the OCP 3.0 Ethernet adapter.

Follow the following rules for system fan selection:

- Standard fan: for processor with TDP of 155 watts or lower
- Performance fan (speed of 29000 RPM):
 - Processor with TDP of 180 watts or higher
 - Middle drive cage
 - Rear drive cage
 - M.2 drive
 - GPU adapter
 - PCIe SSD adapter
 - Ethernet adapter of 100 GbE or higher

Five system fans (fan 2 to fan 6) are adequate to provide proper cooling, if there is no M.2 drive, internal PCIe adapter, middle or rear drive cage, GPU adapter, PCIe SSD adapter, Ethernet adapter of 10 GbE or higher on PCIe slot 7/8, or OCP 3.0 Ethernet adapter installed. However, you must keep the location for fan 1 occupied by a fan filler to ensure proper airflow.

Technical rules for storage controller adapters

The following table lists the controller adapters used for the internal storage of the server.

Storage adapter	Maximum supported	Slot selection priority	Suggested priority (between adapters)	Super capacitor
ThinkSystem 430-8i SAS/SATA 12Gb HBA	4	9, 1, 2, 3, 4, 5, 6	16	No
ThinkSystem 430-16i SAS/SATA 12Gb HBA	2	1, 2, 3, 4, 5, 6	16	No
ThinkSystem RAID 530-8i PCIe 12Gb Adapter	4	9, 1, 2, 3, 4, 5, 6	15	No
ThinkSystem RAID 730-8i 1GB Cache PCIe 12Gb Adapter	3	9, 1, 2, 3, 4, 5, 6	14	No
ThinkSystem RAID 730-8i 2GB Flash PCIe 12Gb Adapter	3	9, 1, 2, 3, 4, 5, 6	13	Yes
ThinkSystem RAID 930-8i 2GB Flash PCIe 12Gb Adapter	3	9, 1, 2, 3, 4, 5, 6	11	Yes
ThinkSystem RAID 930-16i 4GB Flash PCIe 12Gb Adapter	1	1, 2, 3, 4, 5, 6	12	Yes
ThinkSystem RAID 930-24i 4GB Flash PCIe 12Gb Adapter	1	1, 2, 3, 4, 5	10	Yes
ThinkSystem 810-4P NVMe Switch Adapter	4	1, 4, 5, 6	4	No
ThinkSystem 1610-4P NVMe Switch Adapter	4	1, 4, 5	3	No

Notes:

- 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>.
- The RAID 530-8i adapter cannot be mixed with the RAID 730-8i 1G adapter.
- The RAID 730-8i 1G adapter is not available for North America.
- The RAID 730-8i 2G adapter cannot be mixed with the RAID 730-8i 1G adapter or RAID 930-8i adapter.
- If the rear 3.5-inch drive cage is installed, the RAID 930-24i adapter can only be installed in slot 3. If the rear 2.5-inch drive cage is installed, the RAID 930-24i adapter can only be installed in slot 1 or 2.

Technical rules for GPU adapters

The server supports the following graphics processing units (GPUs).

Table 12. Supported GPUs

GPU	Slots priority	Maximum supported	Suggested priority (between adapters)
ThinkSystem NVIDIA Tesla V100 16GB PCIe Passive GPU	1, 4, 7 (double-wide)	3	2
ThinkSystem NVIDIA Tesla V100 32GB PCIe Passive GPU	1, 4, 7 (double-wide)	3	2
ThinkSystem NVIDIA Tesla V100S 32GB PCIe Passive GPU	1, 4, 7 (double-wide)	3	2
ThinkSystem NVIDIA A100 40GB PCIe Gen4 Passive GPU	1, 4, 7 (double-wide)	3	2
ThinkSystem NVIDIA Tesla T4 16GB PCIe Passive GPU	1, 2, 4, 5, 7, 8 (single-wide)	6	2
ThinkSystem NVIDIA Quadro P620 2GB PCIe Active GPU	1, 2, 4, 5, 7, 8 (single-wide)	6	2

GPU adapters are supported when all of the following conditions are met:

- No middle drive cage, rear drive cage, or PCIe Flash storage adapter is installed.
- Riser cards with PCIe x16 slots are available.

Note: This requirement is specified for server configured with V100, V100S, A100 adapter or 6 x T4 adapters.

- The 1U heat sink is installed.

Notes:

- This requirement is specified for server configured with V100, V100S, A100 adapter or 6 x T4 adapters.
- Can be performance heat sink or standard heat sink depending on processor TDP. For details, see “Technical rules for processor and heat sink” on page 127.
- The high performance system fans (speed of 29000 RPM) are installed.
- The 1100-watt or 1600-watt power supplies are installed. 1600-watt power supplies must be used if two or more double-wide GPU adapters are installed.
- All GPU adapters to be installed must be identical.
- All empty memory slots must be covered with a memory module filler or new memory module to ensure optimal air flow.
- Supported server models, processor TDP, and ambient temperature:

Table 13. Processor and thermal requirements for GPUs

Server model (front drive bays)	Maximum GPUs	Maximum processor TDP	Maximum ambient temperature
8 x 3.5-inch SAS/SATA 8 x 2.5-inch SAS/SATA 16 x 2.5-inch SAS/SATA	3 x V100/V100S/A100 GPUs	280 watts	30°C (86°F)
8 x 3.5-inch SAS/SATA	6 x T4 GPUs	200 watts	35°C (95°F)
8 x 3.5-inch SAS/SATA	6 x T4 GPUs	280 watts	30°C (86°F)
8 x 2.5-inch SAS/SATA 16 x 2.5-inch SAS/SATA	6 x T4 GPUs	280 watts	35°C (95°F)
8 x 3.5-inch SAS/SATA 12 x 3.5-inch SAS/SATA 8 x 2.5-inch SAS/SATA 16 x 2.5-inch SAS/SATA 24 x 2.5-inch SAS/SATA	6 x P620 GPUs	240 watts	35°C (95°F)

The following table shows the riser cards for double-wide GPUs. In such a configuration, slots 1, 4, 7 are x16 used by the GPUs, and slots 2, 5, 8 are inaccessible. The remaining slots 3 and 6 are available for x8 adapters.

Notes: To install an A100 double-wide GPU in slot 4 or slot 7, either of the riser cages is required:

- x16/x8/x8 Riser 2 cage (FRU PN: 03GX031)
- x16/x16 Riser 3 cage (FRU PN: 03GX032)

Table 14. Riser cards for double-wide GPUs

Riser 1: x16, x8, x8	ThinkSystem SR655 x16/x8/x8 PCIe Gen4 Riser1
Riser 2: x16, x8, x8	ThinkSystem SR655 x16/x16 PCIe Gen4 Riser2
Riser 3: x16, x16	ThinkSystem SR655 x16/x16 PCIe Gen4 Riser3

The following table shows the riser cards for single-wide GPUs. With six GPUs installed, slots 1, 2, 4, 5, 7, and 8 are used by the GPUs.

Table 15. Riser cards for single-wide GPUs

Riser 1: x16, x16, NA	ThinkSystem SR655 x16/x16 PCIe Gen4 Riser1
Riser 2: x16, x16, NA	ThinkSystem SR655 x16/x16 PCIe Gen4 Riser2
Riser 3: x16, x16	ThinkSystem SR655 x16/x16 PCIe Gen4 Riser3

Technical rules for OCP Ethernet adapters

The server supports one OCP Ethernet adapter to provide two or four Ethernet connectors. The supported OCP Ethernet adapters depend on the server model and system fans installed.

- With standard system fans or performance fans, the following server models support an OCP Ethernet adapter with a speed of 10 GbE or higher:
 - 8 x 3.5-inch SAS/SATA front drive bays
 - 8 x 2.5-inch SAS/SATA front drive bays
 - 8 x 2.5 NVMe front drive bays
 - 16 x 2.5-inch SAS/SATA front drive bays
 - 16 x 2.5 NVMe front drive bays
 - 8 x 2.5-inch SAS/SATA+8 NVMe front drive bays
- With performance fans, the following server models support an OCP Ethernet adapter with a speed of 10 GbE or higher:
 - 24 x 2.5-inch SAS/SATA front drive bays
 - 16 x 2.5-inch SAS/SATA+8 NVMe front drive bays
- Regardless of system fans, the following server models do not support an OCP Ethernet adapter with a speed of 10 GbE or higher:
 - 12 x 3.5-inch SAS/SATA front drive bays
 - 8 x 3.5-inch SAS/SATA + 4 Anybay front drive bays
 - 24 x 2.5 NVMe front drive bays

If the server is installed with 280-watt processor, refer to “Rules about 280-watt processor selection” on page 128 for the OCP Ethernet Adapter limitations.

Technical rules for PCIe Flash storage adapters

The server supports the following PCIe Flash storage adapters:

PCIe Flash storage adapter	Slots supported	Maximum supported	Suggested priority (between adapters)
ThinkSystem HHHL Kioxia CM5-V 1.6TB Mainstream NVMe PCIe3.0 x4 Flash Adapter	1–8	6	18
ThinkSystem HHHL Kioxia CM5-V 3.2TB Mainstream NVMe PCIe3.0 x4 Flash Adapter	1–8	6	18
ThinkSystem HHHL Kioxia CM5-V 6.4TB Mainstream NVMe PCIe3.0 x4 Flash Adapter	1–8	6	18

The PCIe Flash storage adapters are supported at the following conditions:

- The processor TDP is less than or equal to 155 watts.
- The ambient temperature is less than or equal to 35°C (95°F).
- High performance system fans (speed of 29000 RPM) are installed.
- No GPU adapter is installed.

Security bezel replacement

Use this information to remove and install the security bezel.

Note: The security bezel is available on some models.

Remove the security bezel

Use this information to remove the security bezel.



To remove the security bezel, complete the following steps:

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

- YouTube: <https://www.youtube.com/playlist?list=PLYV5R7hVcs-BYjgwMTzXbgbC6fhKRcCdR>
- Youku: http://list.youku.com/albumlist/show/id_52222445.html

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

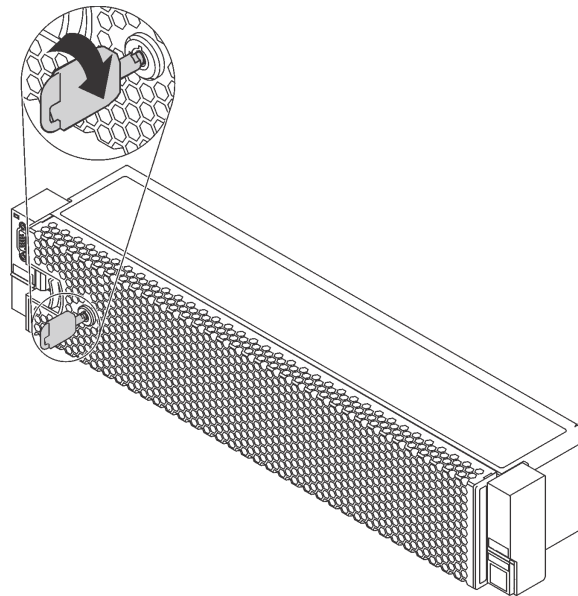


Figure 93. Unlocking the security bezel

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

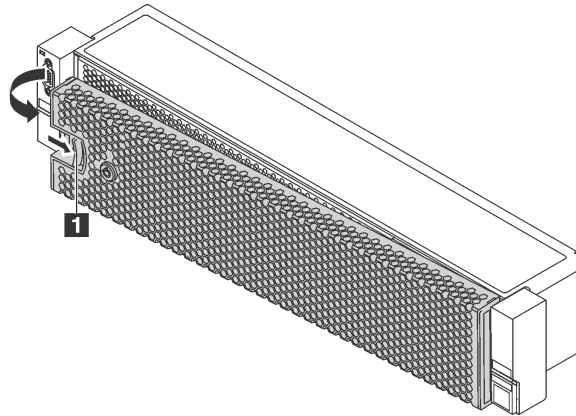


Figure 94. Security bezel removal

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

Install the security bezel

Use this information to install the security bezel.



Before installing the security bezel, if you have removed the rack latches, reinstall them. See "Install the rack latches" on page 139.

To install the security bezel, complete the following steps:

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

- YouTube: <https://www.youtube.com/playlist?list=PLYV5R7hVcs-BYjgwMTzXbgbC6fhKRcCdR>
- Youku: http://list.youku.com/albumlist/show/id_52222445.html

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.

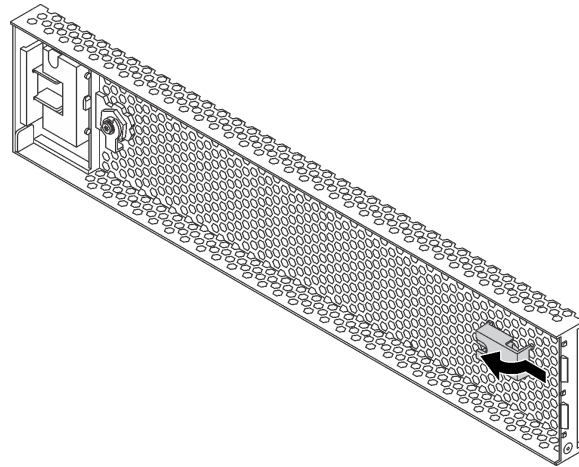


Figure 95. Key removal

Step 2. Carefully insert the tabs on the security bezel into the slots on the right rack latch. Then, press and hold the release latch **1** and pivot the security bezel inward until the other side clicks into place.

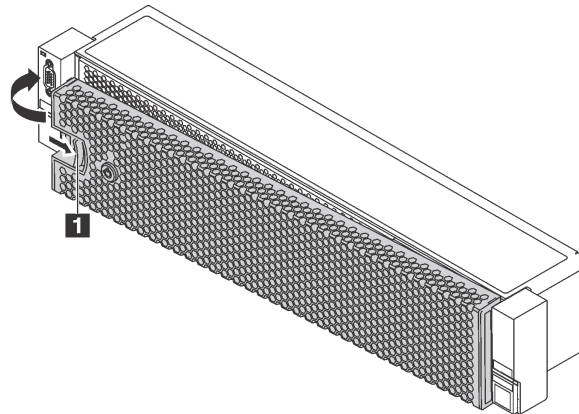


Figure 96. Security bezel installation

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

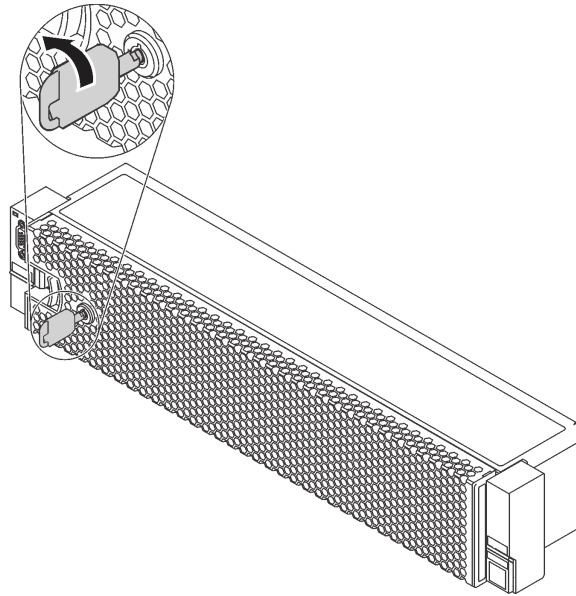


Figure 97. Locking the security bezel


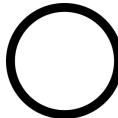

Rack latches replacement

Use this information to remove and install the rack latches.

Note: Depending on the model, the left rack latch might be assembled with a VGA connector and the right rack latch might be assembled with the front I/O assembly.

Remove the rack latches

Use this information to remove the rack latches.

	“Read the installation Guidelines” on page 121		“Power off the server for this task” on page 11		“ATTENTION: Static Sensitive Device Ground package before opening” on page 124
---	---	---	--	--	---

Note: If the rack latches are not assembled with a VGA connector or the front I/O assembly, you can remove the rack latches without powering off the server.

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 133.

2. Use a flat-blade screwdriver to remove the ID label plate on the right rack latch and place it in a safe place.

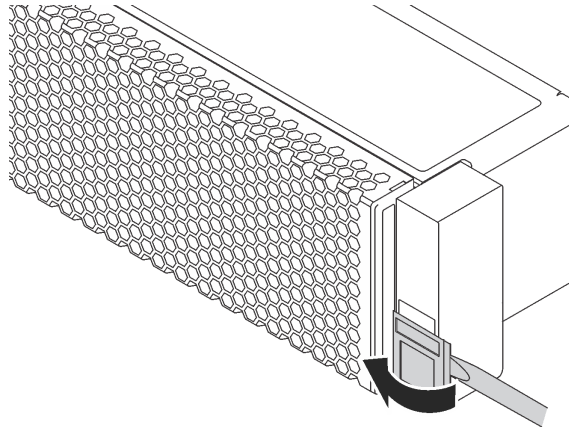


Figure 98. ID label plate removal

To remove the rack latches, complete the following steps:

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

- YouTube: <https://www.youtube.com/playlist?list=PLYV5R7hVcs-BYjgwMTzXbqbC6fhKRcCdR>
- Youku: http://list.youku.com/albumlist/show/id_52222445.html

Step 1. Do one of the following:

- If the rack latches are not assembled with a VGA connector or the front I/O assembly, go to the next step.
- If the rack latches are assembled with a VGA connector, the front I/O assembly, or both, complete the following steps:
 1. Disconnect the VGA cable , the front-I/O-assembly cable, or both cables from the system board.

2. Remove the screws that secure the cable retainer on the side of the server. Then, remove the cable retainer from the chassis.

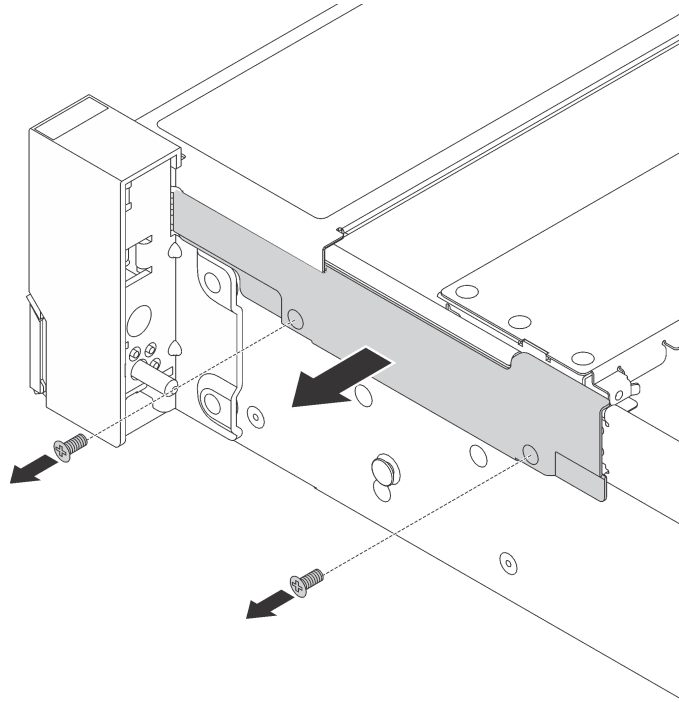


Figure 99. Cable retainer removal

- Step 2. On each side of the server, remove the screws that secure the rack latch.

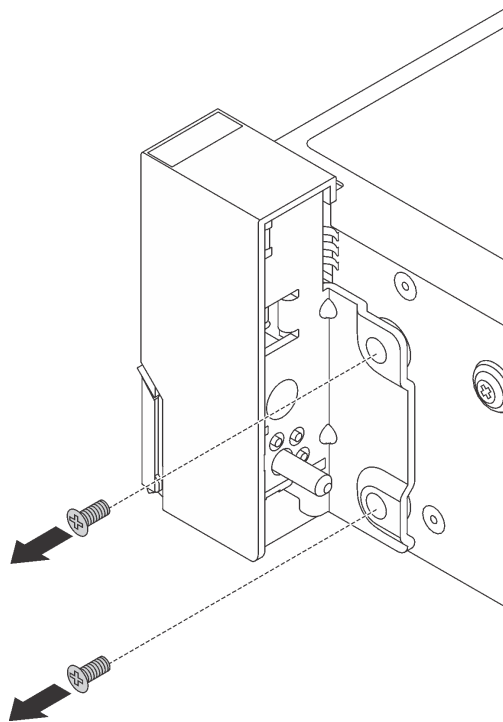


Figure 100. Screws removal

Step 3. On each side of the server, slide the rack latch forward slightly and then remove the rack latch from the chassis.

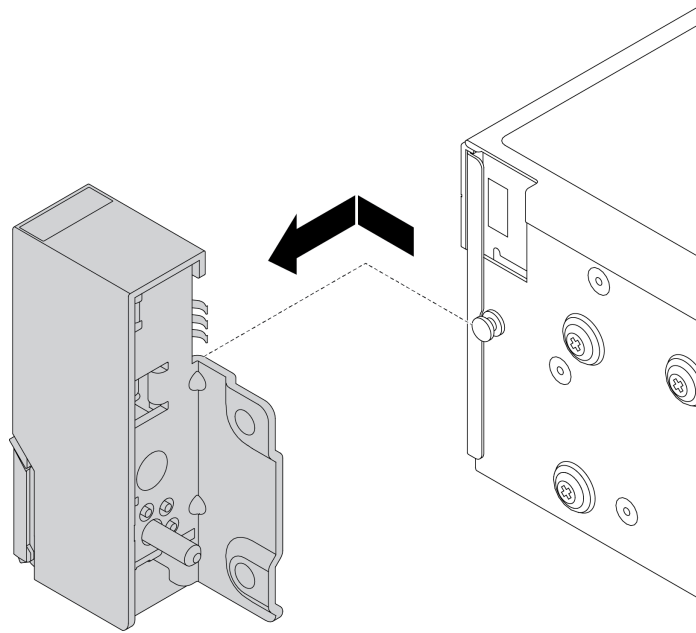





Figure 101. Rack latch removal

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

Install the rack latches

Use this information to install the rack latches.

	“Read the installation Guidelines” on page 121		“Power off the server for this task” on page 11		“ATTENTION: Static Sensitive Device Ground package before opening” on page 124
---	---	---	--	--	---

Note: If the rack latches are not assembled with a VGA connector or the front I/O assembly, you can install the rack latches without powering off the server.

To install the rack latches, complete the following steps:

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

- YouTube: <https://www.youtube.com/playlist?list=PLYV5R7hVcs-BYjgwMTzXbgbC6fhKRsCdR>
- Youku: http://list.youku.com/albumlist/show/id_52222445.html

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

Step 2. 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 backward.

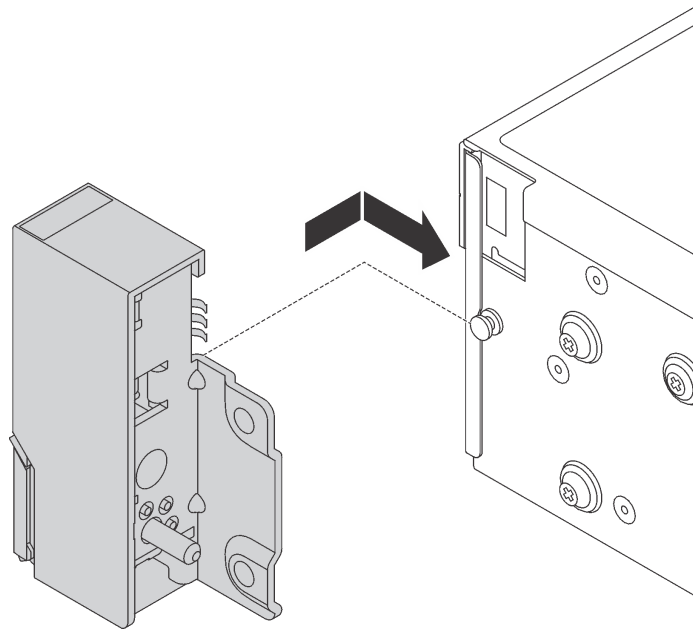


Figure 102. Rack latch installation

Step 3. Install the screws to secure the rack latch on each side of the server.

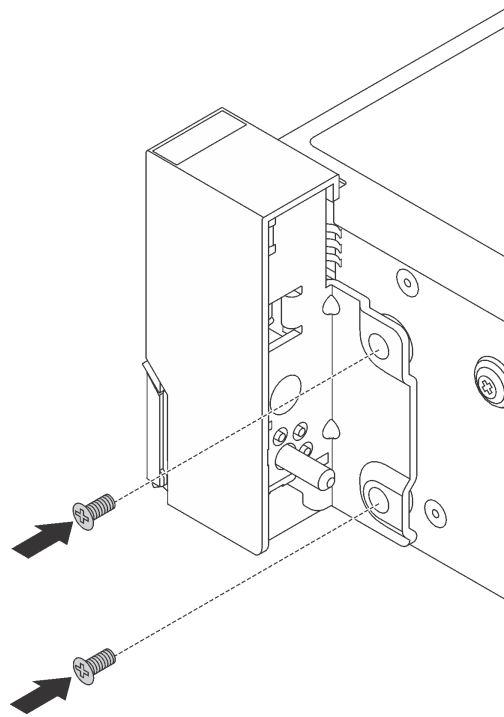


Figure 103. Screws installation

Step 4. If the rack latches are assembled with a VGA connector, the front I/O assembly, or both, complete the following steps:

1. Route the VGA cable, the front-I/O-assembly cable, or both cables across the notch on the chassis as shown. Then, install the screws to secure the cable retainer.

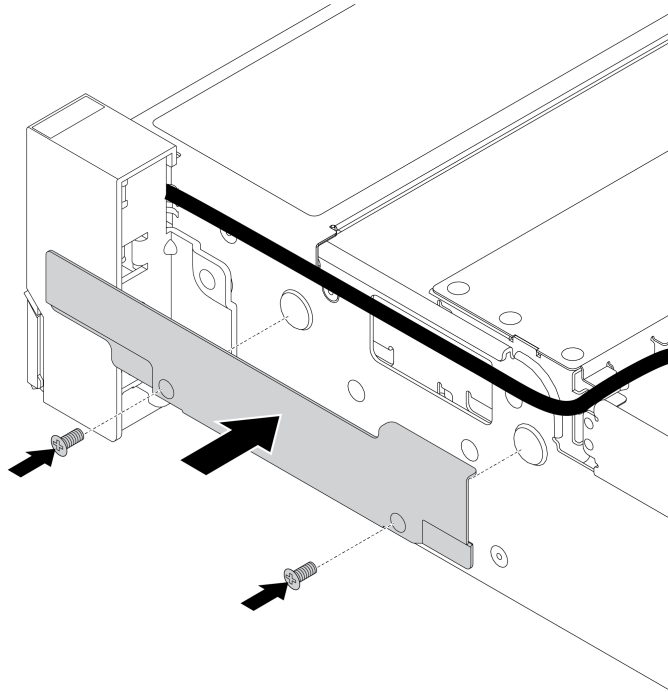


Figure 104. Cable retainer installation

2. Connect the VGA cable, the front-I/O-assembly cable, or both cables to the system board. See “Internal cable routing” on page 37.

After installing the rack latches:

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

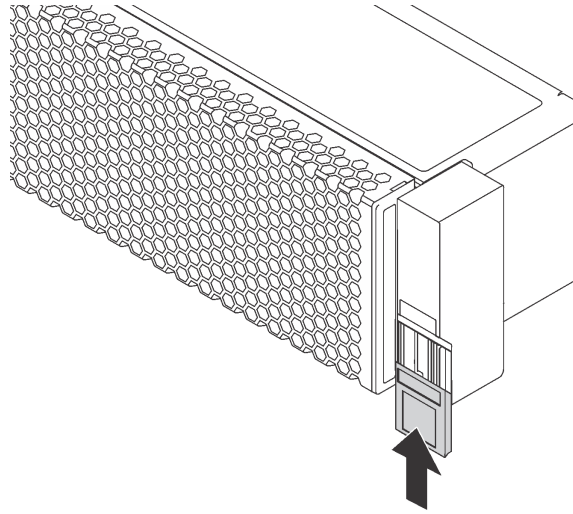


Figure 105. ID label plate installation


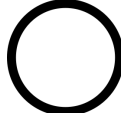

2. Complete the parts replacement. See “Complete the parts replacement” on page 274.

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>“Read the installation Guidelines” on page 121</p>	 <p>“Power off the server for this task” on page 11</p>	 <p>“ATTENTION: Static Sensitive Device Ground package before opening” on page 124</p>
---	--	--

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:

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

- YouTube: <https://www.youtube.com/playlist?list=PLYV5R7hVcs-BYjgwMTzXbgbC6fhKRScdR>
- Youku: http://list.youku.com/albumlist/show/id_52222445.html

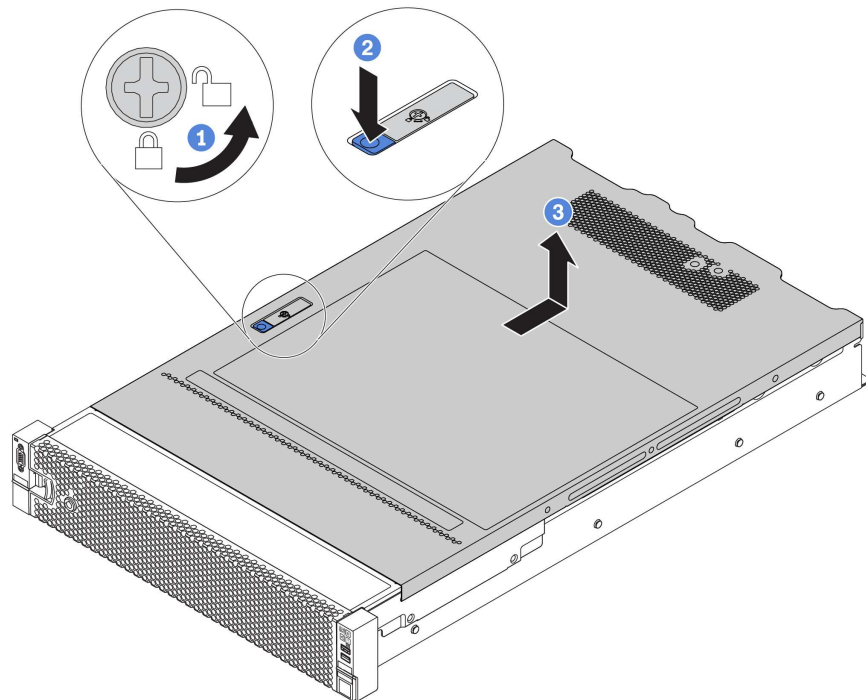


Figure 106. Top cover removal

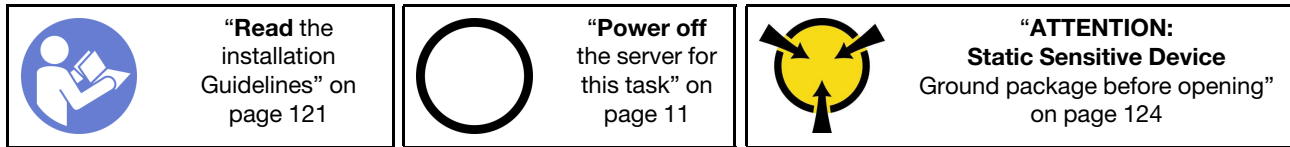
- Step 1. Use a screwdriver to turn the cover lock to the unlocked position as shown.
- Step 2. Press the release button on the cover latch and then fully open the cover latch.
- Step 3. Slide the top cover to the rear until it is disengaged from the chassis. Then, lift the top cover off the chassis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

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 turn on the server. Operating the server with the top cover removed might damage server components.

Install the top cover

Use this information to install the top cover.



Before you install 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 connected and routed correctly. See “Internal cable routing” on page 37.
3. If you are installing a new top cover, attach the service label to the new top cover first if necessary.

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

To install the top cover, complete the following steps:

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

- YouTube: <https://www.youtube.com/playlist?list=PLYV5R7hVcs-BYiqwMTzXbgbC6fhKRsCdR>
- Youku: http://list.youku.com/albumlist/show/id_52222445.html

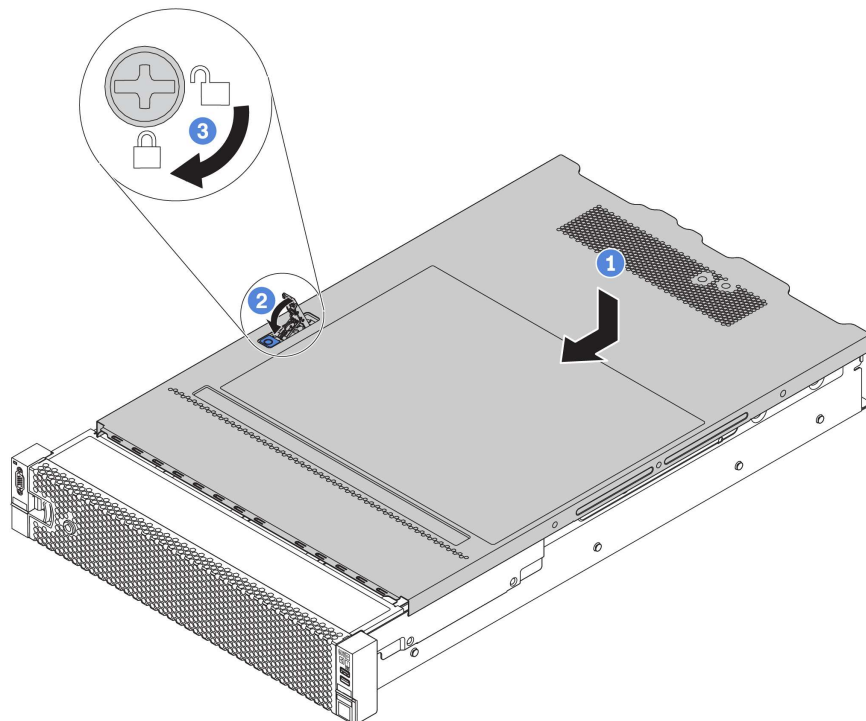


Figure 107. Top cover installation

- 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 the guides on both sides of the chassis. Then, slide the top cover to the front of the chassis.

Note: Before you slide the top cover forward, ensure that all the tabs on the top cover engage the chassis correctly.

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

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

After installing the top cover, complete the parts replacement. See “Complete the parts replacement” on page 274.

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

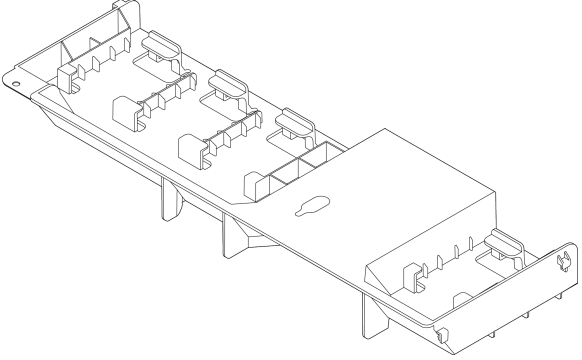
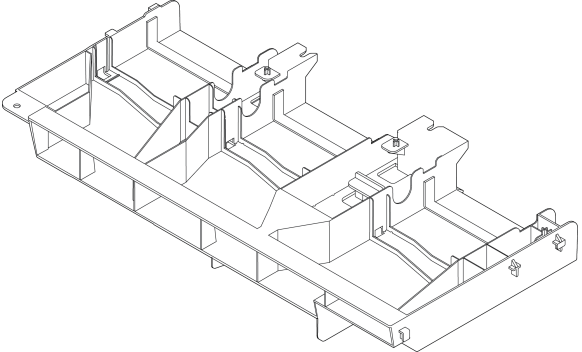
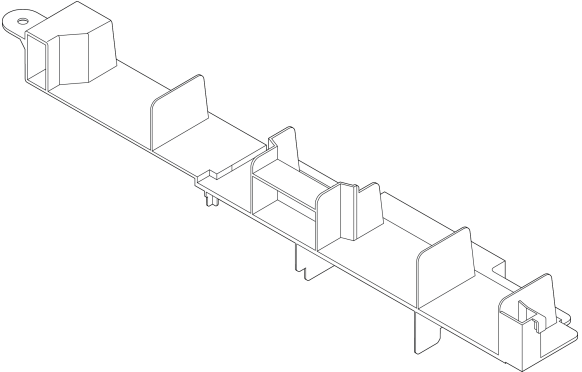
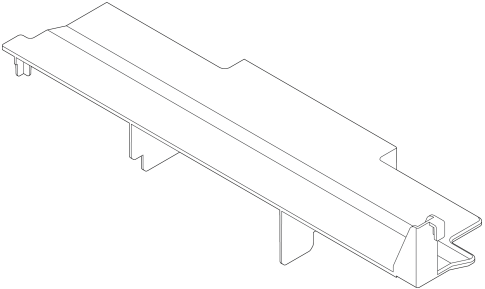


CAUTION:

Hazardous moving fan blades nearby.

The air baffle varies by the server hardware configuration. Select the appropriate air baffle for your server.

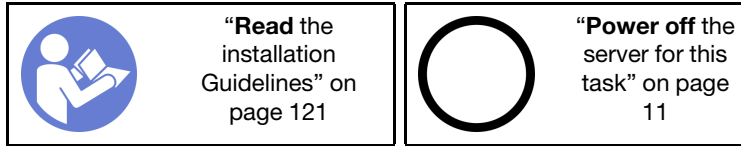
Table 16. Air baffles

If...	Then choose...
<p>The server has no middle drive cage or GPU adapter installed.</p>	<p>Standard air baffle</p>  <p>A perspective view of a standard air baffle, which is a long, flat metal plate with several raised sections and mounting tabs along its length.</p>
<p>The server has GPU adapters installed, but no middle drive cage or rear drive cage installed.</p> <p>Note: The GPU kit also comes with an add-on GPU air baffle for the GPU. For details, see “Install a GPU adapter” on page 232.</p>	<p>Air baffle for GPU</p>  <p>A perspective view of an air baffle specifically designed for GPU adapters, featuring a more complex structure with multiple vertical dividers and mounting points.</p>
<p>The server has the middle 8 x 2.5-inch drive cage installed.</p>	<p>Air baffle for middle 8 x 2.5-inch drive cage</p>  <p>A perspective view of an air baffle designed for a middle 8 x 2.5-inch drive cage, showing a long profile with several vertical dividers and a mounting tab at the rear.</p>
<p>The server has the middle 4 x 3.5-inch drive cage installed.</p>	<p>Air baffle for middle 4 x 3.5-inch drive cage</p>  <p>A perspective view of an air baffle designed for a middle 4 x 3.5-inch drive cage, showing a long profile with a few vertical dividers and a mounting tab at the rear.</p>

Note: The replacement procedures for the air baffles are the same. The illustrations in this topic use the standard air baffle as an example.

Remove the air baffle

Use this information to remove the air baffle.



Before removing the air baffle:

1. Remove the top cover. See “Remove the top cover” on page 142.
2. If there is a RAID super capacitor module installed on the air baffle, disconnect the RAID super capacitor module cable first.
3. If there is a GPU installed on the air baffle, remove the GPU first. See “Remove a GPU adapter” on page 230.

To remove the air baffle, complete the following step:

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

- YouTube: <https://www.youtube.com/playlist?list=PLYV5R7hVcs-BYjgwMTzXbgbC6fhKRScdR>
- Youku: http://list.youku.com/albumlist/show/id_52222445.html

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

Note: The illustration shows removing the standard air baffle. The procedure is the same for removing the other air baffles.

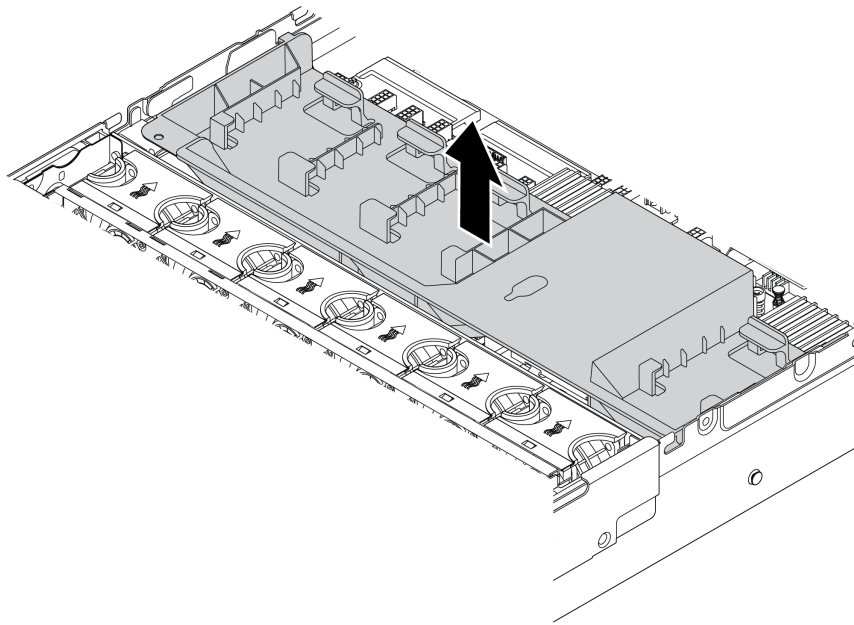

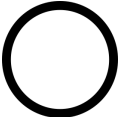


Figure 108. Removal of the standard air baffle

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

Install the air baffle

Use this information to install the air baffle.

	“Read the installation Guidelines” on page 121		“Power off the server for this task” on page 11
---	---	---	--

Before installing the air baffle:

1. Ensure that no tools or loose screws are left inside your server.
2. Ensure that all components have been reassembled correctly.
3. Ensure that all cables inside the server have been properly routed and they will not interfere with installing the air baffle.
4. Select the appropriate air baffle for your server. See Table 16 “Air baffles” on page 146.

To install the air baffle, complete the following steps:

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

- YouTube: <https://www.youtube.com/playlist?list=PLYV5R7hVcs-BYiqwMTzXbqbC6fhKRScdR>
- Youku: http://list.youku.com/albumlist/show/id_52222445.html

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

Note: The illustration shows installing the standard air baffle. The procedure is the same for installing the other air baffles.

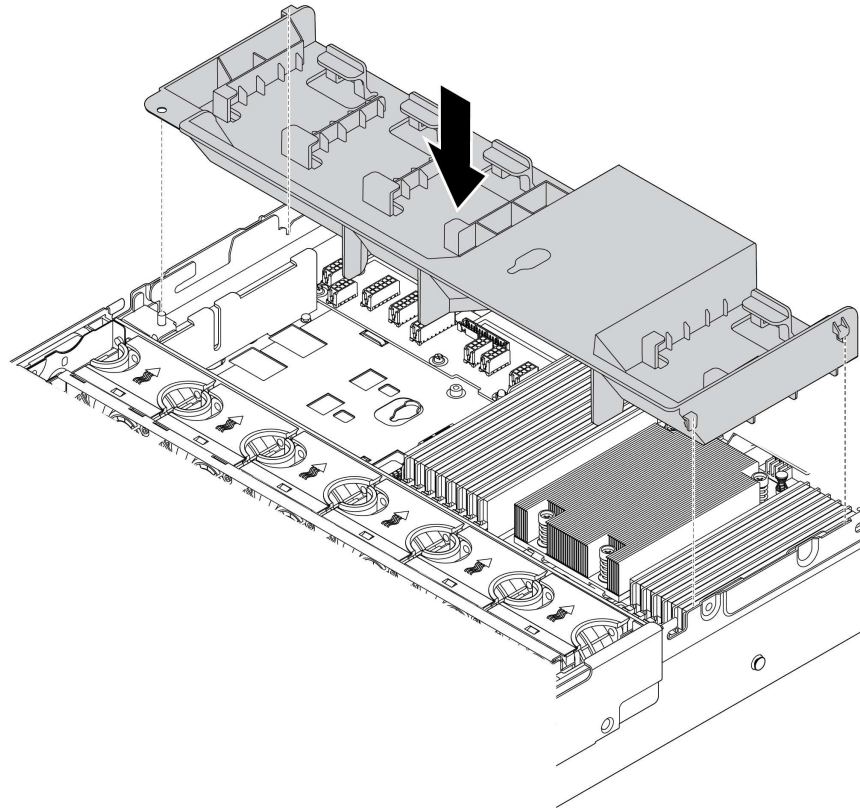


Figure 109. Installation of the standard air baffle

After installing the air baffle:

1. If you have removed a RAID super capacitor module, reinstall it and connect it to the RAID adapter with the extension cable. See “Install a super capacitor module on the air baffle” on page 152.
2. If you have removed a GPU, reinstall it. See “Install a GPU adapter” on page 232.
3. Complete the parts replacement. See “Complete the parts replacement” on page 274.

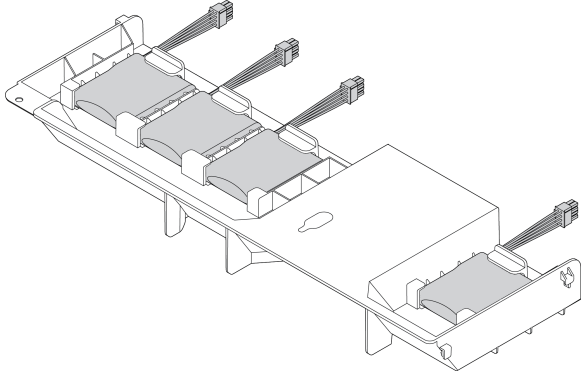
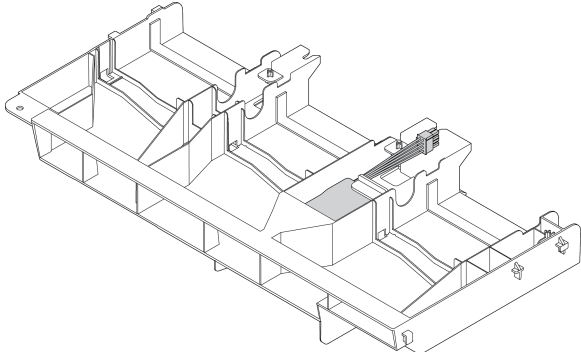
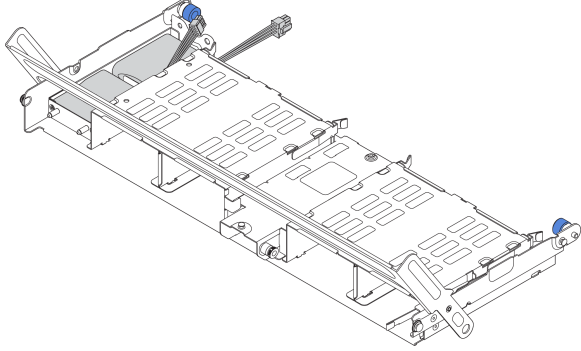
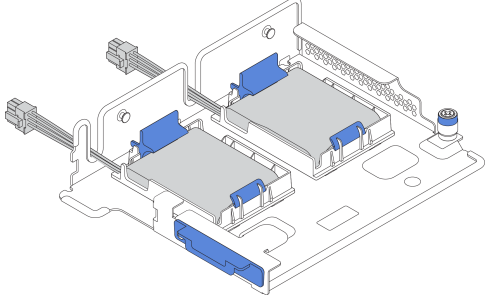
RAID super capacitor module replacement

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

The RAID super capacitor module protects the cache memory on the installed RAID adapter. You can purchase a RAID super capacitor module from Lenovo. For a list of supported options, see:

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

The quantity of supported RAID super capacitor modules depends on the hardware configurations.

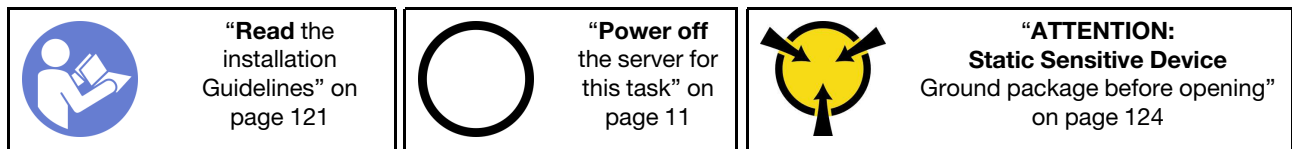
Location	Quantity
<p>Standard air baffle</p> 	<p>Up to four RAID super capacitor modules</p>
<p>Air baffle for GPU</p> 	<p>Up to one RAID super capacitor module</p>
<p>Middle 2.5-inch drive cage</p> 	<p>Up to two RAID super capacitor modules</p>
<p>Internal riser kit</p> 	<p>Up to two RAID super capacitor modules</p>

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

- “Remove a super capacitor module from the air baffle” on page 151
- “Install a super capacitor module on the air baffle” on page 152
- “Remove a super capacitor module from the middle 2.5-inch drive cage” on page 152
- “Install a super capacitor module on the middle 2.5-inch drive cage” on page 154
- “Remove a super capacitor module from the internal riser kit” on page 155
- “Install a super capacitor module on the internal riser kit” on page 156

Remove a super capacitor module from the air baffle

Use this information to remove a super capacitor module from the air baffle (standard air baffle or air baffle for GPU).



Before removing the RAID super capacitor module:

1. Remove the top cover. See “Remove the top cover” on page 142.
2. Disconnect the cable of the RAID super capacitor module.

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

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

- YouTube: <https://www.youtube.com/playlist?list=PLYV5R7hVcs-BYjgwMTzXbgbC6fhKRdR>
- Youku: http://list.youku.com/albumlist/show/id_52222445.html

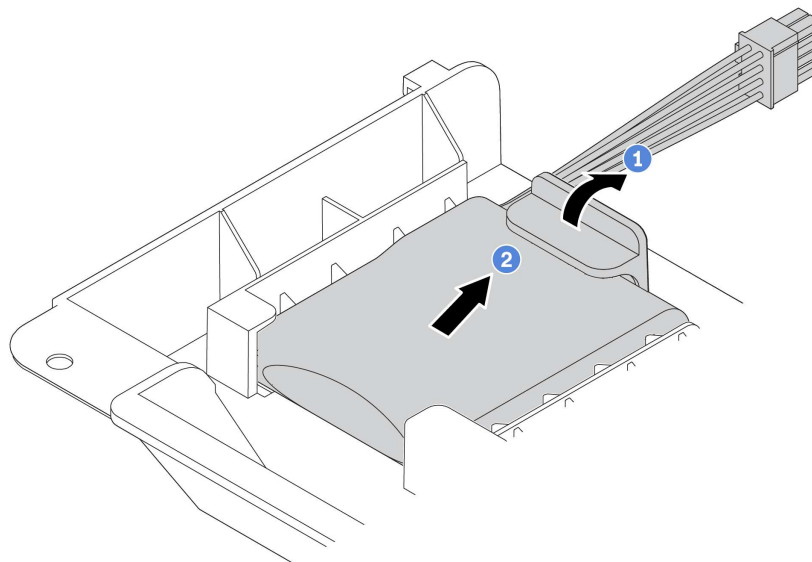


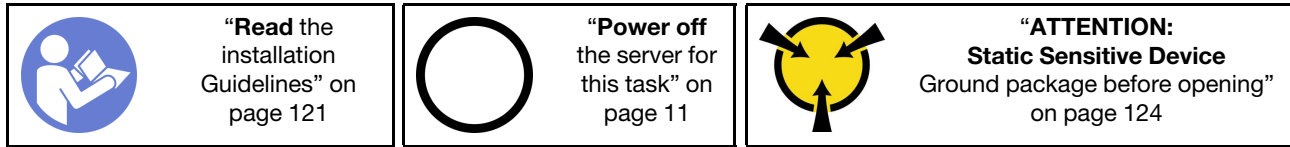
Figure 110. Super capacitor module removal

- 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.

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

Install a super capacitor module on the air baffle

Use this information to install a super capacitor module on the air baffle (standard air baffle or air baffle for GPU).



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

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

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

- YouTube: <https://www.youtube.com/playlist?list=PLYV5R7hVcs-BYjgwMTzXbgbC6fhKRrCdR>
- Youku: http://list.youku.com/albumlist/show/id_52222445.html

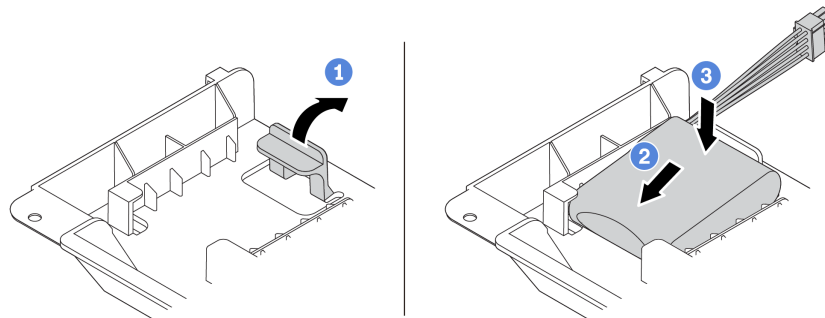


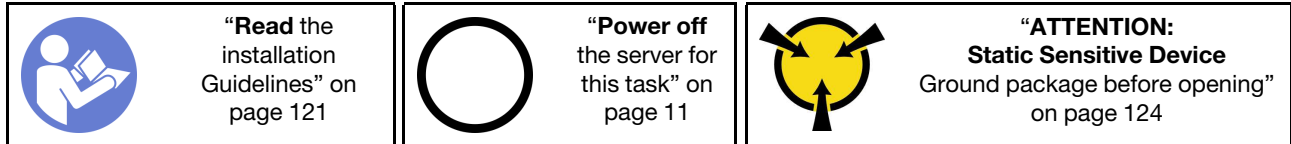
Figure 111. Super capacitor installation on the air baffle

- Step 1. Open the retention clip on a holder.
- Step 2. Put a super capacitor module into the holder.
- Step 3. Press it down to secure it into the holder.
- Step 4. Connect the super capacitor module to an adapter with the extension cable that comes with the super capacitor module. See “RAID super capacitor modules” on page 41.

After installing the super capacitor module, complete the parts replacement. See “Complete the parts replacement” on page 274

Remove a super capacitor module from the middle 2.5-inch drive cage

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



Before removing the RAID super capacitor module:

1. Remove the top cover. See “Remove the top cover” on page 142.
2. Disconnect the cable of the RAID super capacitor module.

To remove a super capacitor module from the middle 2.5-inch drive cage, complete the following steps:

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

- YouTube: <https://www.youtube.com/playlist?list=PLYV5R7hVcs-BYigwMTzXbgbC6fhKRrCdR>
- Youku: http://list.youku.com/albumlist/show/id_52222445.html

Step 1. Open the drive cage handle.

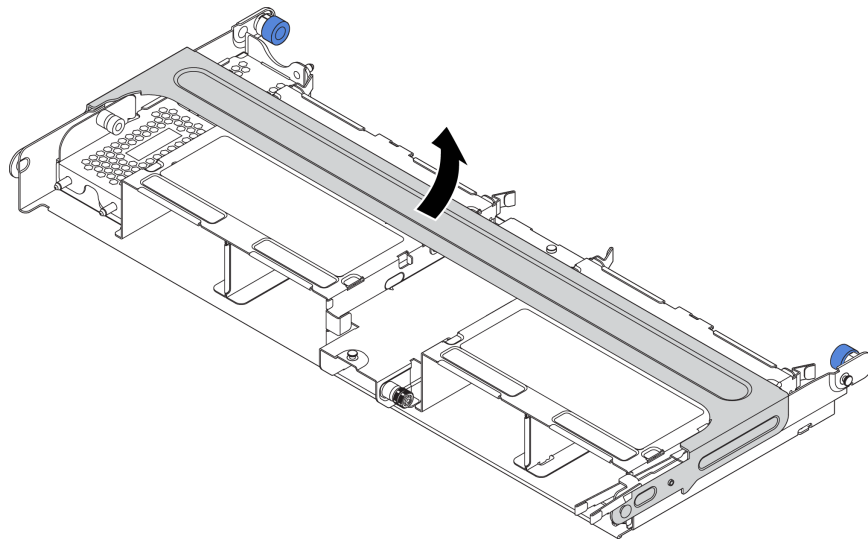


Figure 112. Opening the handle of the middle drive cage

- Step 2. Remove the super capacitor module.
- Pull out the blue latch on the super capacitor cover.
 - Slide the cover out of the holder.
 - Take the super capacitor module out of the holder.

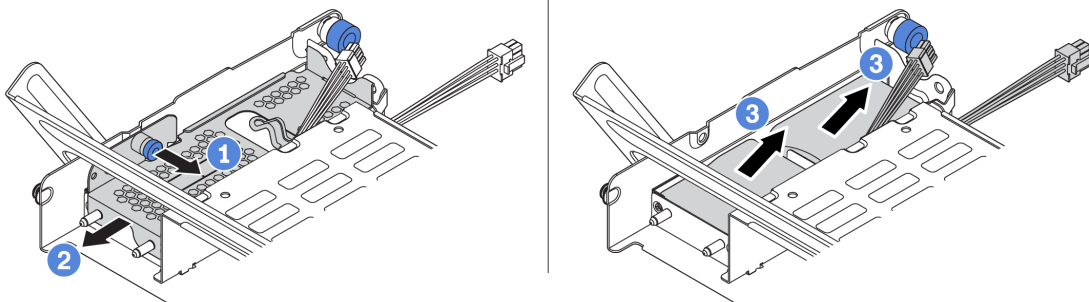


Figure 113. Removing the super capacitor module

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

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

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

	<p>“Read the installation Guidelines” on page 121</p>		<p>“Power off the server for this task” on page 11</p>		<p>“ATTENTION: Static Sensitive Device Ground package before opening” on page 124</p>
--	---	--	--	--	---

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

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

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

- YouTube: <https://www.youtube.com/playlist?list=PLYV5R7hVcs-BYjgwMTzXbgbC6fhKRcCdR>
- Youku: http://list.youku.com/albumlist/show/id_52222445.html

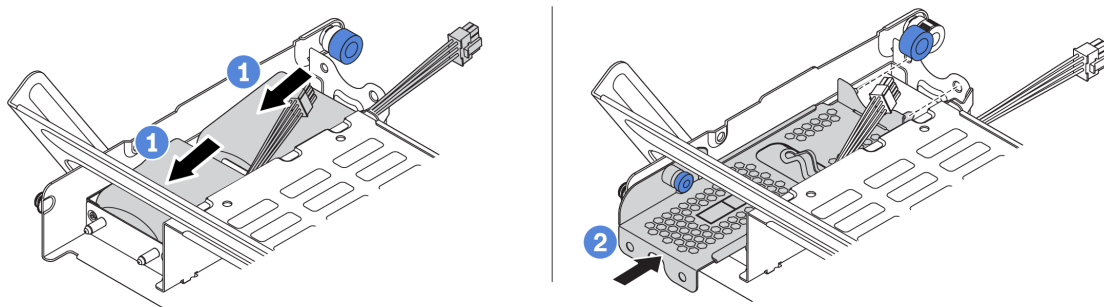


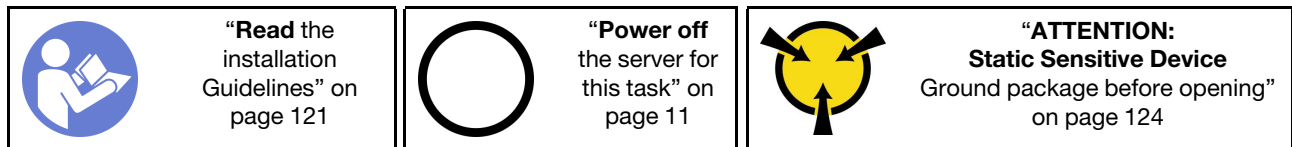
Figure 114. Super capacitor installation the middle 2.5-inch drive cage

- Step 1. Put a super capacitor module into the holder, and press it down to secure it into the holder.
- Step 2. Align the pins on the super capacitor cover with the holes in the super capacitor holder, pull out the blue latch on the cover, and slide the cover into the holder until the pins pass through the holes. Then, release the blue latch to lock the cover into place.
- Step 3. Connect the super capacitor module to an adapter with the extension cable that comes with the super capacitor module. See “RAID super capacitor modules” on page 41.

After installing the super capacitor module, complete the parts replacement. See “Complete the parts replacement” on page 274

Remove a super capacitor module from the internal riser kit

Use this information to remove a super capacitor module from the internal riser kit.



Before removing a super capacitor module from the internal riser kit:

1. Remove the top cover. See “Remove the top cover” on page 142.
2. Remove the M.2 module if installed. See “Remove the M.2 adapter and M.2 drive” on page 162
3. Remove the internal riser assembly. See “Remove the internal riser card” on page 158.
4. Disconnect the cable of the super capacitor module.

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

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

- YouTube: <https://www.youtube.com/playlist?list=PLYV5R7hVcs-BYigwMTzXbqbC6fhKRsCdR>
- Youku: http://list.youku.com/albumlist/show/id_52222445.html

- Step 1. Open the retention clip on the super capacitor holder, and take the super capacitor module out of the holder.

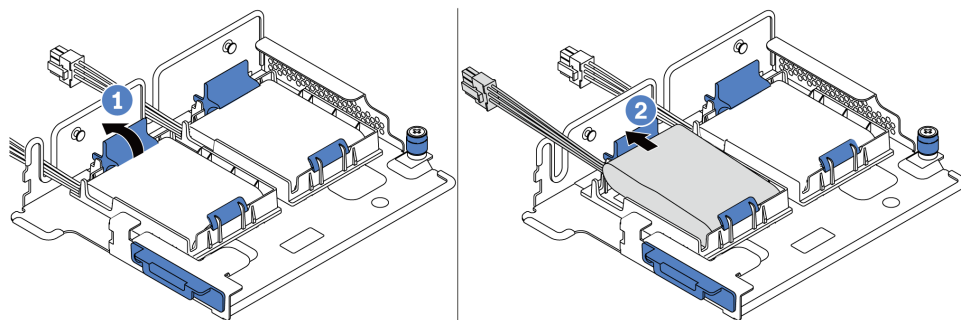


Figure 115. Super capacitor module removal

Step 2. Remove the super capacitor holder as shown if necessary.

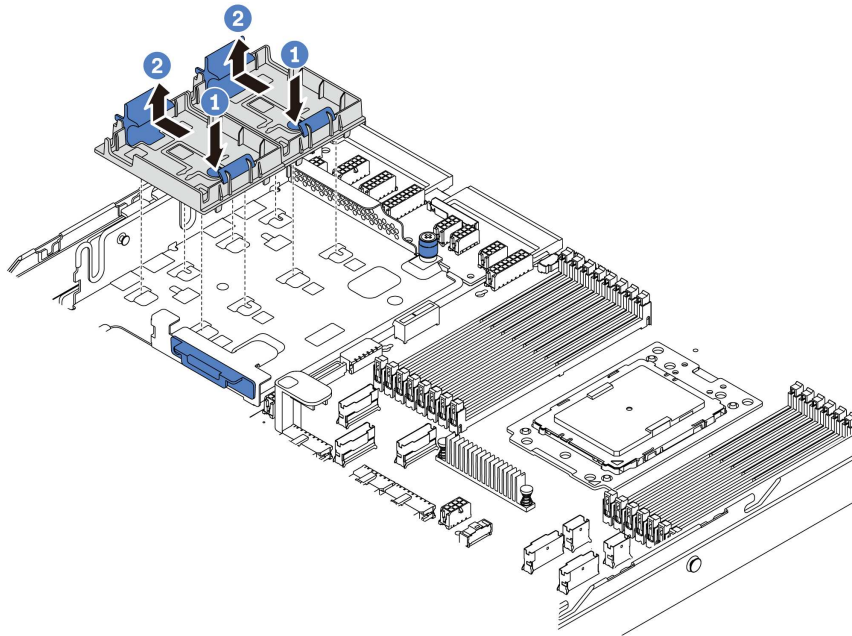

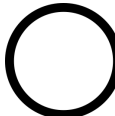



Figure 116. Super capacitor holder removal

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

Install a super capacitor module on the internal riser kit

Use this information to install a super capacitor module on the internal riser kit.

	<p>“Read the installation Guidelines” on page 121</p>		<p>“Power off the server for this task” on page 11</p>		<p>“ATTENTION: Static Sensitive Device Ground package before opening” on page 124</p>
---	---	---	--	--	---

Before installing the RAID super capacitor module on the internal riser kit, touch the static-protective package that contains the new RAID super capacitor module to any unpainted surface on the outside of the server. Then, take the new RAID super capacitor module out of the package and place it on a static-protective surface.

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

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

- YouTube: <https://www.youtube.com/playlist?list=PLYV5R7hVcs-BYjgwMTzXbgbC6fhKRScdR>
- Youku: http://list.youku.com/albumlist/show/id_52222445.html

Step 1. Install the M.2/riser support bracket.

- a. Align the notches on the M.2/riser support bracket with the pins on the chassis, and put the support bracket in place as shown.
- b. Fasten the screw.

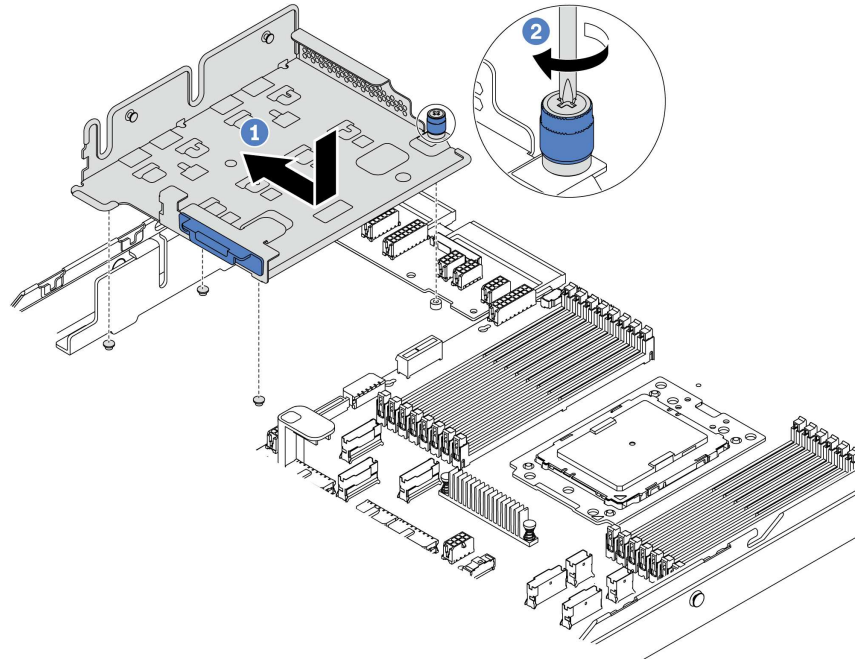


Figure 117. Support bracket installation

Step 2. Install two super capacitor holders.

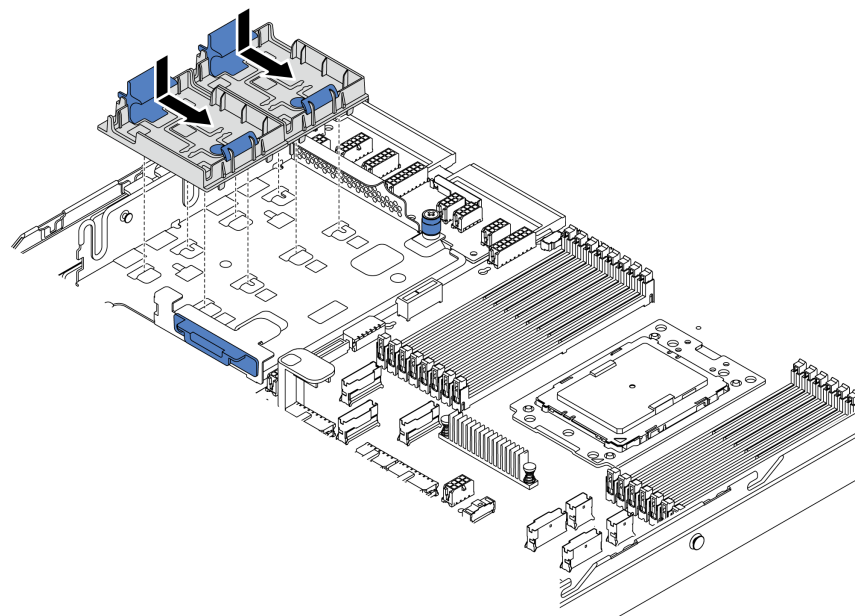


Figure 118. Super capacitor holder installation

- Step 3. Install the super capacitor module.
- Open the retention clip on the super capacitor holder.
 - Put a super capacitor module into the holder.
 - Press super capacitor module down to secure it into the holder.

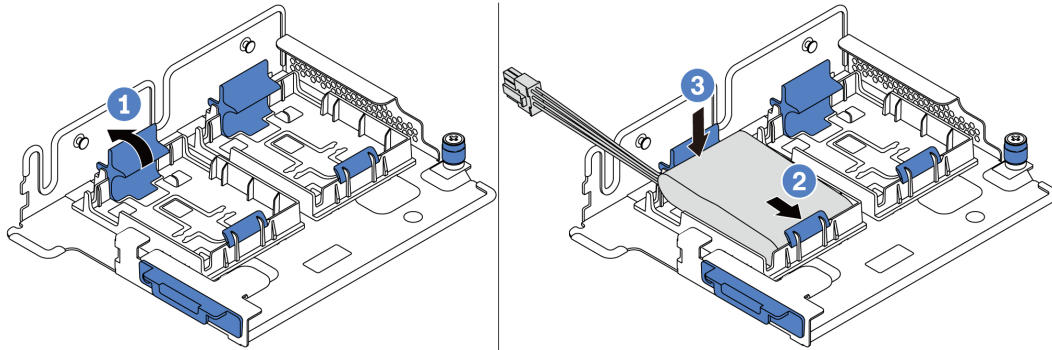


Figure 119. Super capacitor module installation

- Step 4. Connect the super capacitor module to an adapter with the extension cable that comes with the super capacitor module. See “RAID super capacitor modules” on page 41.

After installing the super capacitor module, complete the parts replacement. See “Complete the parts replacement” on page 274

Internal riser card replacement

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

Remove the internal riser card

Use this information to remove the internal riser card.

	<p>“Read the installation Guidelines” on page 121</p>		<p>“ATTENTION: Static Sensitive Device Ground package before opening” on page 124</p>
--	---	--	---

Before removing the internal riser assembly:

- Remove the top cover. See “Remove the top cover” on page 142.
- Remove the air baffle. See “Remove the air baffle” on page 147.
- If there is an M.2 module installed, remove it first. See “Remove the M.2 adapter and M.2 drive” on page 162.
- If there is a PCIe adapter installed on the internal riser card, disconnect the cables from the PCIe adapter first.

To remove the internal riser card, complete the following steps:

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

- YouTube: <https://www.youtube.com/playlist?list=PLYV5R7hVcs-BYjgwMTzXbgbC6fhKRsCdR>
- Youku: http://list.youku.com/albumlist/show/id_52222445.html

Step 1. Grasp the internal riser assembly by its edges and carefully lift it straight up and off the chassis.

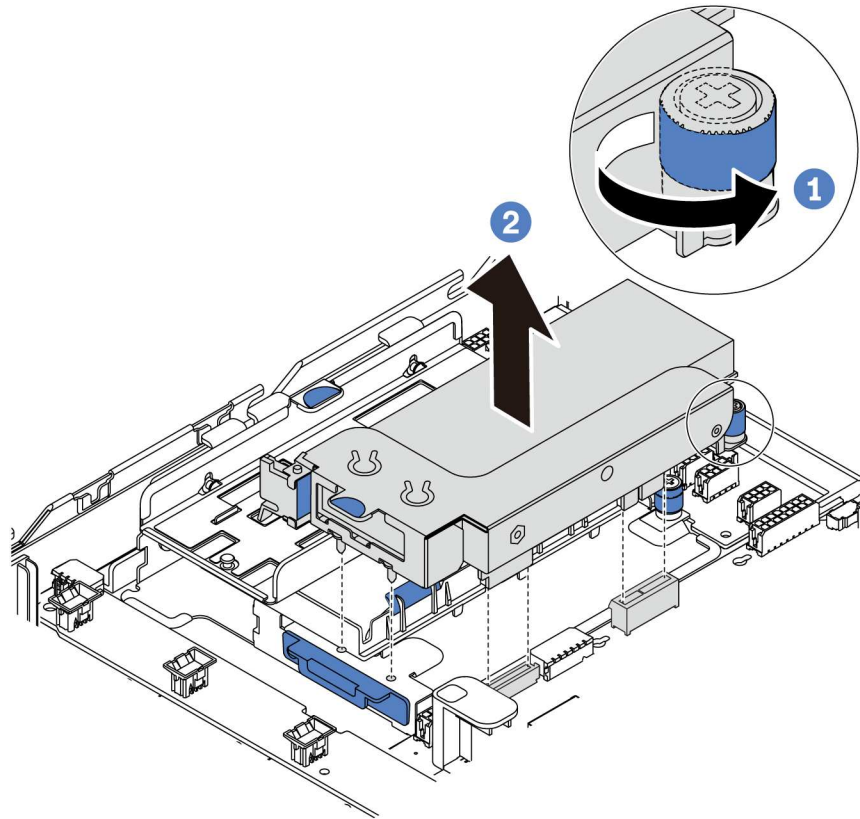


Figure 120. Internal riser assembly removal

Step 2. Remove the PCIe adapter from the riser assembly.

- a. Pivot the blue latch to the open position.
- b. Grasp the PCIe adapter by its edges and carefully pull it out of the PCIe slot.

Note: The PCIe adapter might fit tightly into the PCIe slot. If necessary, alternatively move each side of the PCIe adapter a small and equal amount until it is removed from the slot.

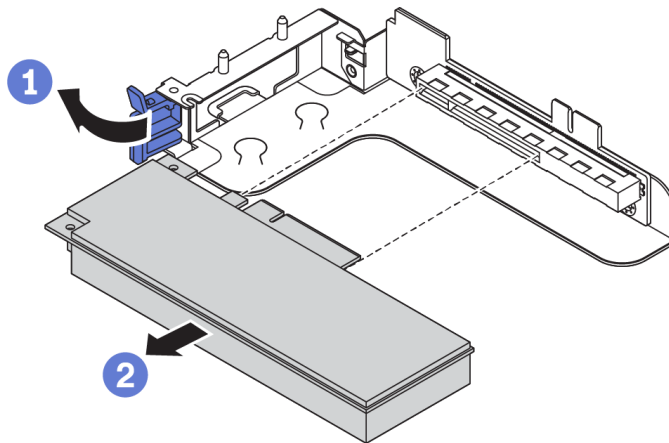


Figure 121. PCIe adapter removal

- Step 3. Remove the internal riser card.
- Remove the two screws that secure the failing riser card.
 - Remove the failing riser card from the bracket.

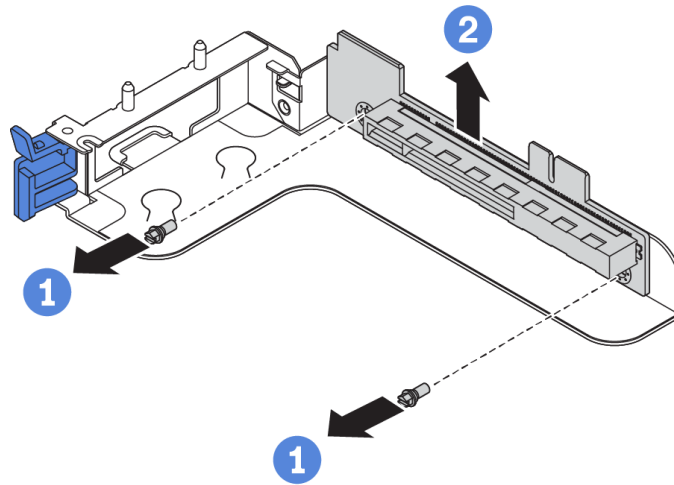

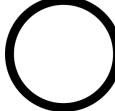



Figure 122. Internal riser card removal

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

Install the internal riser card

Use this information to install the internal riser card.

	<p>“Read the installation Guidelines” on page 121</p>		<p>“Power off the server for this task” on page 11</p>		<p>“ATTENTION: Static Sensitive Device Ground package before opening” on page 124</p>
---	--	---	---	--	--

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

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

- YouTube: <https://www.youtube.com/playlist?list=PLYV5R7hVcs-BYjgwMTzXbgbC6fhKRScdR>
- Youku: http://list.youku.com/albumlist/show/id_52222445.html

- Step 1. Install the internal riser card onto the riser bracket.
- Align the holes in the riser card with the mounting studs on the bracket.
 - Install the two screws to secure the riser card to the bracket.

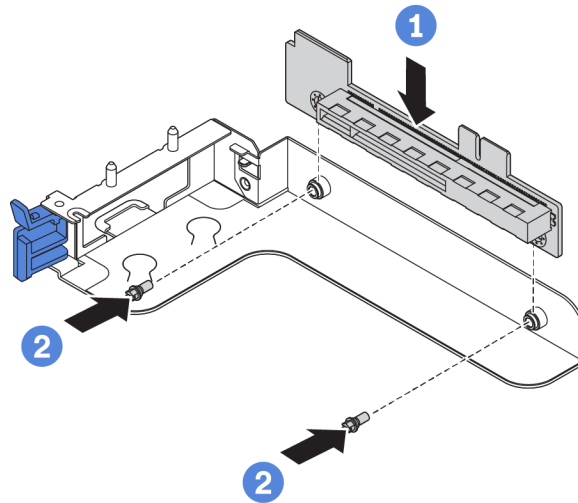


Figure 123. Riser card installation

- Step 2. Reinstall the PCIe adapter on the new riser card.
- Open the blue latch on the riser bracket.
 - Slide the PCIe adapter into the PCIe slot on the riser card.
 - Close the blue latch to secure the PCIe adapter.

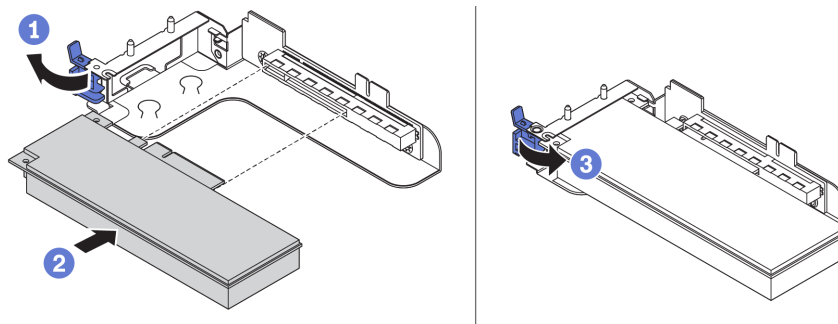


Figure 124. PCIe adapter installation

Step 3. Install the riser assembly into the chassis.

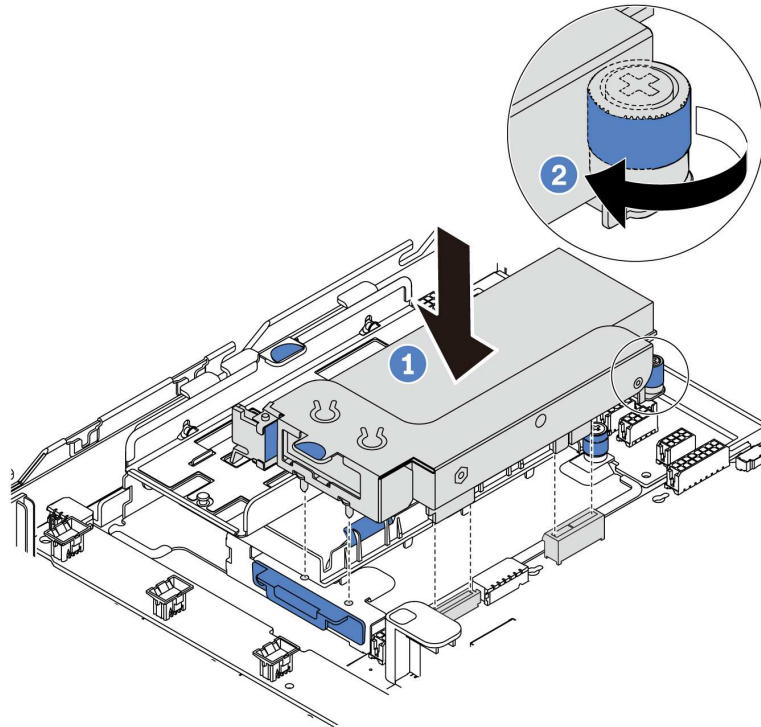


Figure 125. Internal riser assembly installation

Step 4. Reconnect any cables to the PCIe adapter. See “Riser cards” on page 46.

After installing the internal riser card, complete the parts replacement. See “Complete the parts replacement” on page 274.

M.2 adapter and M.2 drive replacement

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

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 142.
2. For easier operation, remove the internal riser assembly next to the M.2 adapter. See “Remove the internal riser card” on page 158.

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

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

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

- YouTube: <https://www.youtube.com/playlist?list=PLYV5R7hVcs-BYiqwMTzXbgbC6fhKRcDR>
- Youku: http://list.youku.com/albumlist/show/id_52222445.html

- Step 1. Disconnect the cables from the system board.
Step 2. Remove the M.2 drive from the M.2 adapter.

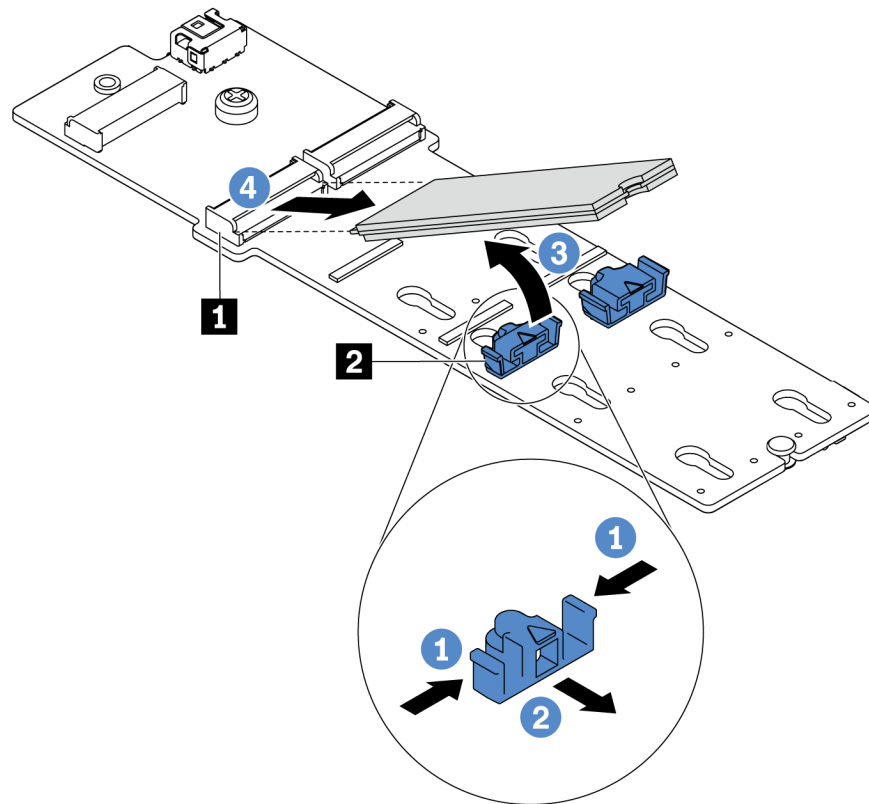


Figure 126. M.2 drive removal

- 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 3. Loosen the screw and remove the M.2 adapter from the bracket.

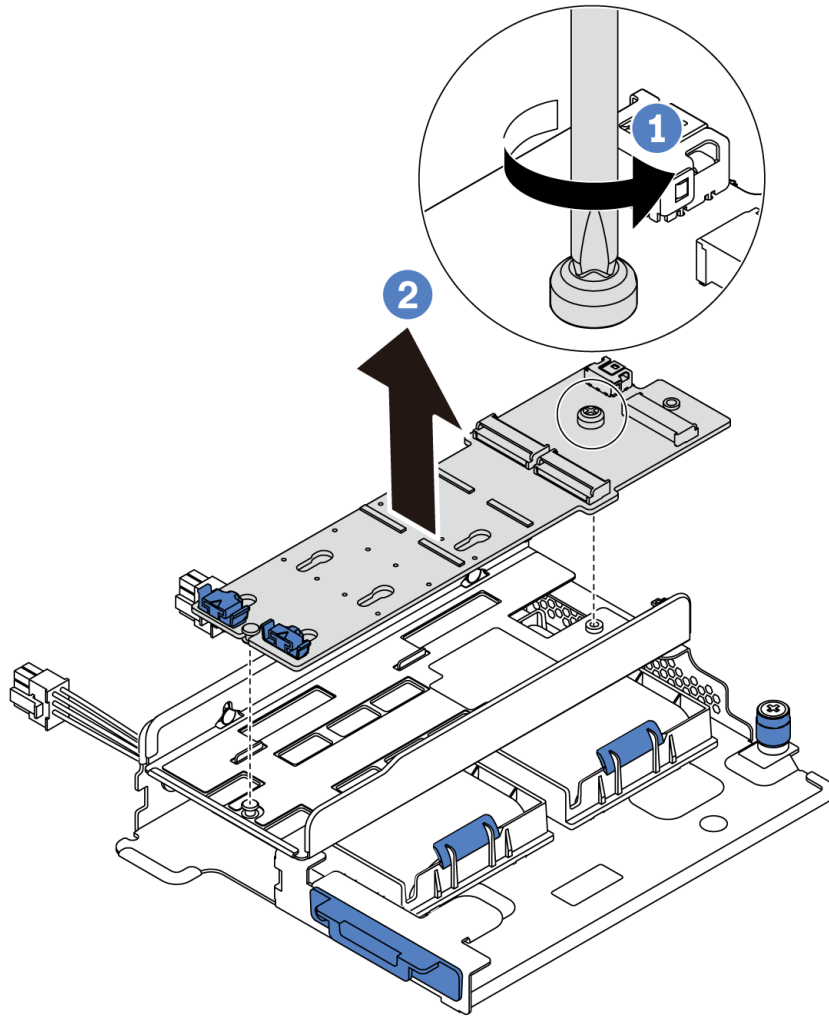


Figure 127. M.2 adapter removal

Step 4. Remove the M.2 adapter bracket if necessary.

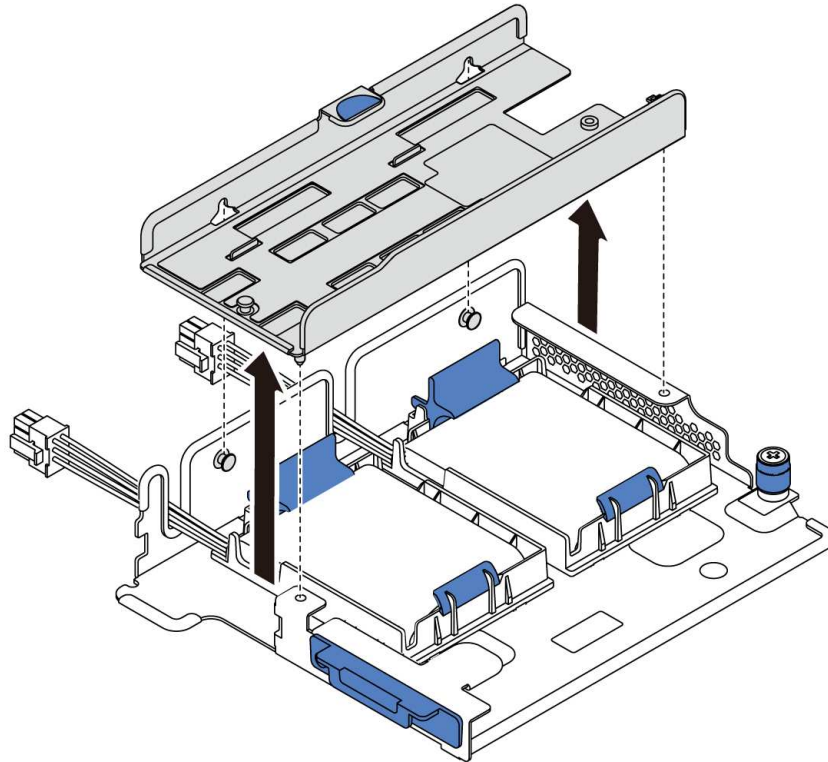

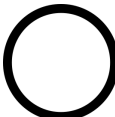



Figure 128. M.2 adapter bracket removal

Adjust the retainer on the M.2 adapter

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

 <p>“Read the installation Guidelines” on page 121</p>	 <p>“Power off the server for this task” on page 11</p>	 <p>“ATTENTION: Static Sensitive Device Ground package before opening” on page 124</p>
--	---	---

Before adjusting the retainer on the M.2 adapter, locate the correct keyhole that the retainer should be installed into to accommodate the particular size of the M.2 drive you wish to install.

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

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

- YouTube: <https://www.youtube.com/playlist?list=PLYV5R7hVcs-BYjgwMTzXbgbC6fhKRcCdR>
- Youku: http://list.youku.com/albumlist/show/id_52222445.html

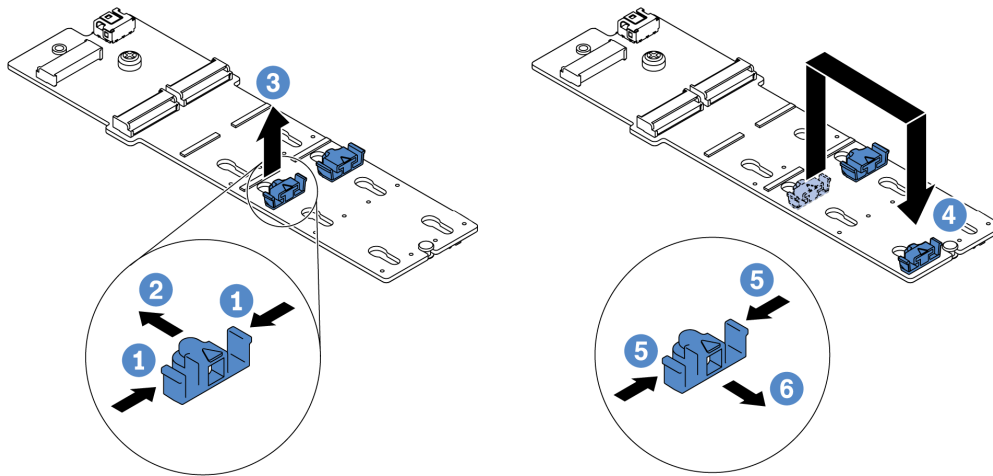


Figure 129. M.2 retainer adjustment

- Step 1. Press both sides of the retainer.
- 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 (toward the small opening of the keyhole) until it is seated in place.

Install the M.2 adapter and M.2 drive

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

	<p>“Read the installation Guidelines” on page 121</p>		<p>“Power off the server for this task” on page 11</p>		<p>“ATTENTION: Static Sensitive Device Ground package before opening” on page 124</p>
--	--	--	---	--	--

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

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

Notes:

- The M.2 adapter 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.
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 connector on the M.2 adapter.

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

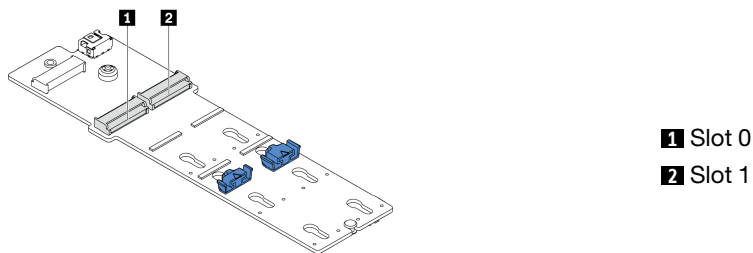


Figure 130. M.2 drive slot

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

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

- YouTube: <https://www.youtube.com/playlist?list=PLYV5R7hVcs-BYjgwMTzXbgbC6fhKRcCdR>
- Youku: http://list.youku.com/albumlist/show/id_52222445.html

Step 1. Install the M.2/riser support bracket and install the super capacitor modules on it. See “Install a super capacitor module on the internal riser kit” on page 156.

Step 2. Align the pins of the M.2 bracket with the two holes on both sides of the M.2/riser support bracket, and then install the M.2 bracket on the super capacitor modules.

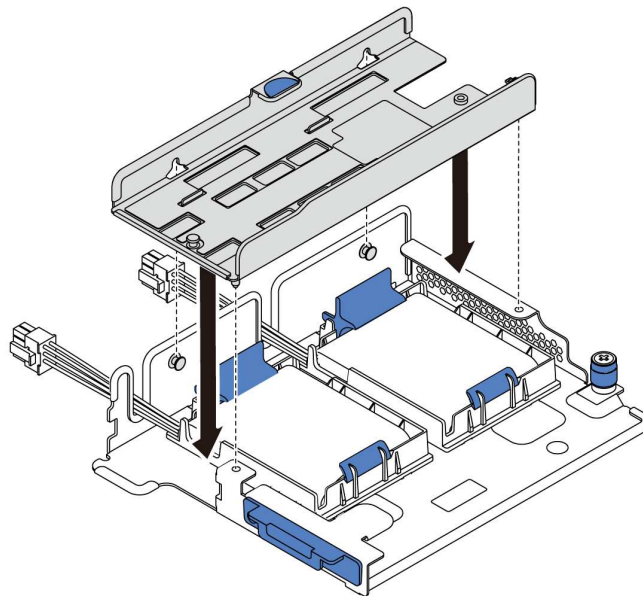


Figure 131. M.2 bracket installation

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

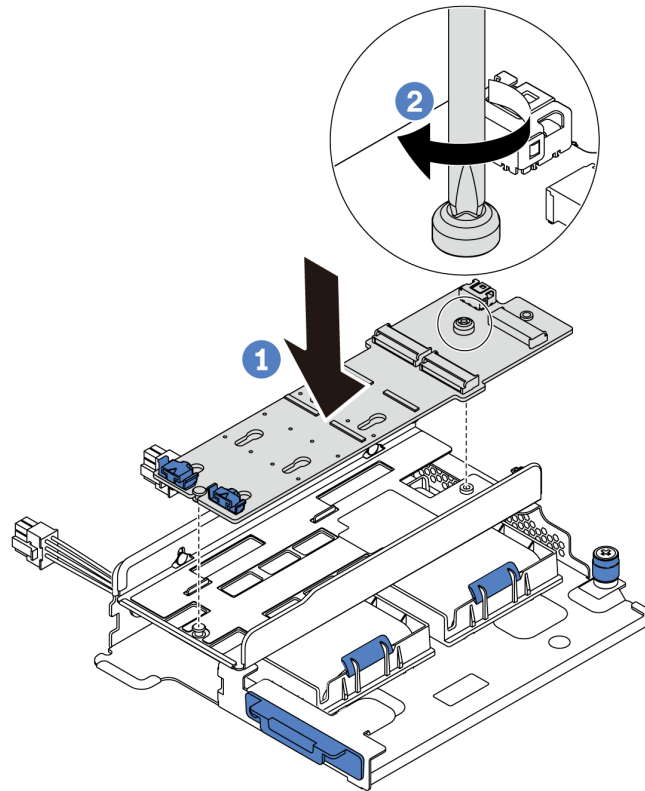


Figure 132. M.2 adapter installation

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.
- d.

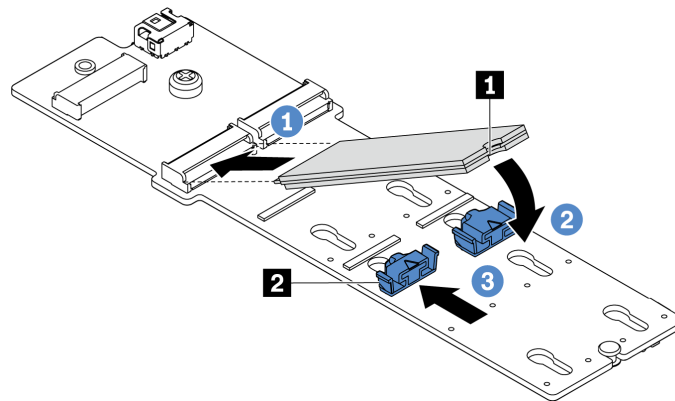


Figure 133. M.2 drive installation

Step 5. Connect the cables to the system board. See “M.2 drives” on page 41.

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

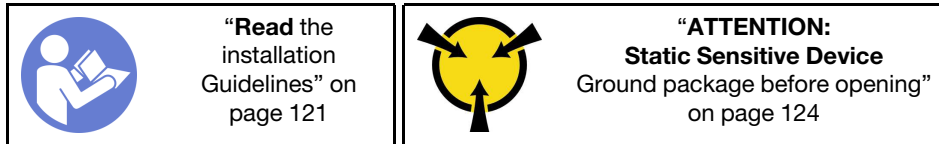
1. Complete the parts replacement. See “Complete the parts replacement” on page 274.
2. Use the Lenovo XClarity Provisioning Manager Lite to configure the RAID. For more information, see: https://sysmgt.lenovofiles.com/help/topic/ixpml_v2/Introduction.html.

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.

Attention: When removing a system fan without powering off the server, do not touch the system fan cage.

Before removing a system fan:

1. Remove the top cover. See “Remove the top cover” on page 142.

2. View the fan error LEDs **1** to locate the failing system fan.

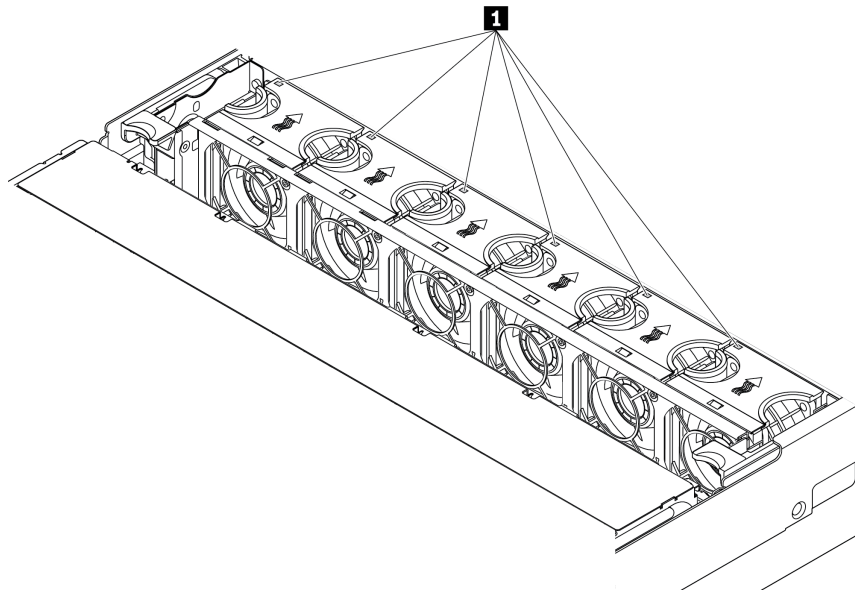


Figure 134. Viewing the fan error LEDs from the top of the system fans

To remove a system fan, complete the following steps:

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

- YouTube: <https://www.youtube.com/playlist?list=PLYV5R7hVcs-BYjgwMTzXbqbC6fhKRcCdR>
- Youku: http://list.youku.com/albumlist/show/id_52222445.html

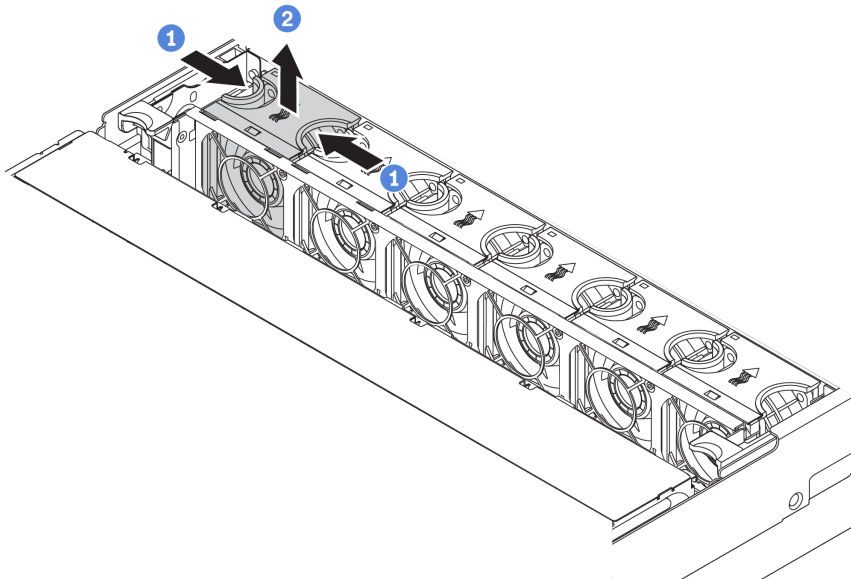


Figure 135. System fan removal

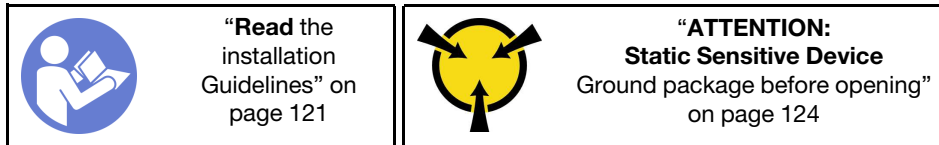
- Step 1. Grasp the top of the system fan with your fingers.
- Step 2. Lift the system fan out of the server.

After removing the system fan:

1. Install a new system fan or install a fan filler to cover the place. See “Install a system fan” on page 171.
2. If you are instructed to return the old system fan, follow all packaging instructions and use any packaging materials that are provided.

Install a system fan

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



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.

Attention: When installing a system fan without powering off the server, do not touch the system fan cage.

To install a system fan, complete the following steps:

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

- YouTube: <https://www.youtube.com/playlist?list=PLYV5R7hVcs-BYjgwMTzXbgbC6fhKRcCdR>
- Youku: http://list.youku.com/albumlist/show/id_52222445.html

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

Step 2. Position the system fan above the system fan cage. The system fan connector on the bottom of the system fan should face the rear of the chassis. Press the system fan straight down until it is seated into place.

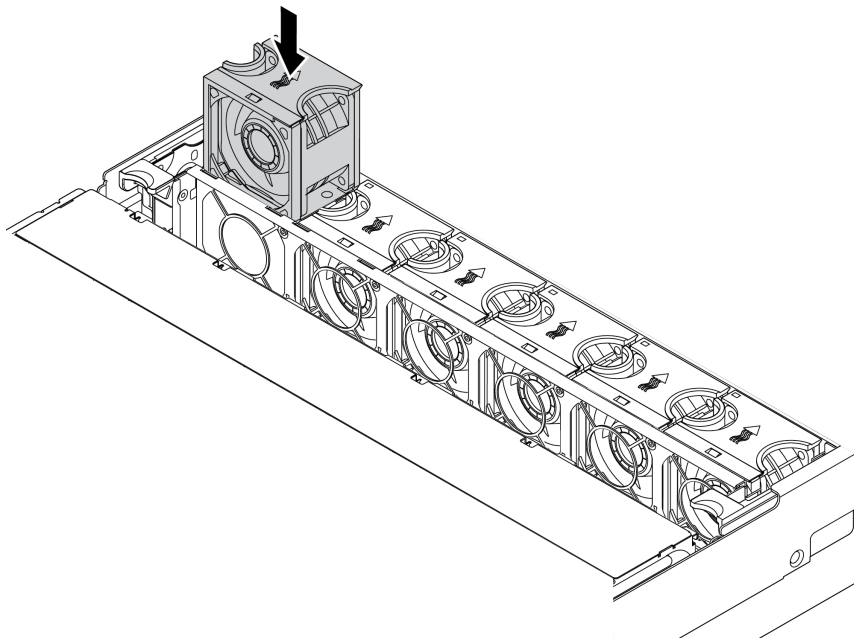


Figure 136. System fan installation


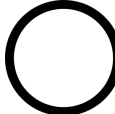

After installing the system fan, complete the parts replacement. See “Complete the parts replacement” on page 274.

System fan cage replacement

Use this information to remove and install the system fan cage.

Remove the system fan cage

Use this information to remove the system fan cage.

	“Read the installation Guidelines” on page 121		“Power off the server for this task” on page 11		“ATTENTION: Static Sensitive Device Ground package before opening” on page 124
---	---	---	--	--	---

Before removing the system fan cage:

1. Remove the top cover. See “Remove the top cover” on page 142.
2. If you are replacing the system fan cage, remove all system fans first. See “Remove a system fan” on page 169. If you are removing the system fan cage to access other components, you can remove it with the system fans installed.

To remove the system fan cage, complete the following steps:

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

- YouTube: <https://www.youtube.com/playlist?list=PLYV5R7hVcs-BYiqwMTzXbqbC6fhKRrCdR>

- Youku: http://list.youku.com/albumlist/show/id_52222445.html

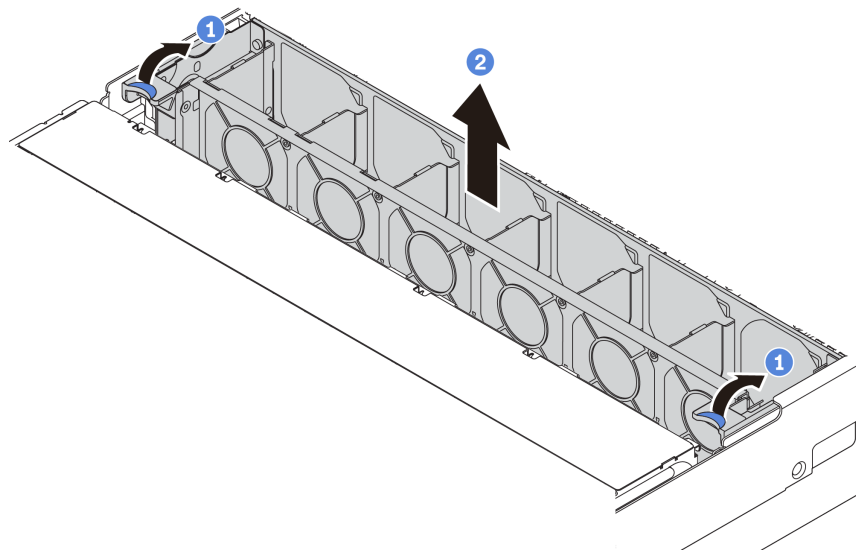





Figure 137. System fan cage removal

- Step 1. Rotate the levers of the system fan cage to the rear of the server.
 Step 2. Lift the system fan cage straight up and out of the chassis.

Install the system fan cage

Use this information to install the system fan cage.

 <p>“Read the installation Guidelines” on page 121</p>	 <p>“Power off the server for this task” on page 11</p>	 <p>“ATTENTION: Static Sensitive Device Ground package before opening” on page 124</p>
---	--	--

To install the system fan cage, complete the following steps:

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

- YouTube: <https://www.youtube.com/playlist?list=PLYV5R7hVcs-BYjgwMTzXbqbC6fhKRcCdR>
- Youku: http://list.youku.com/albumlist/show/id_52222445.html

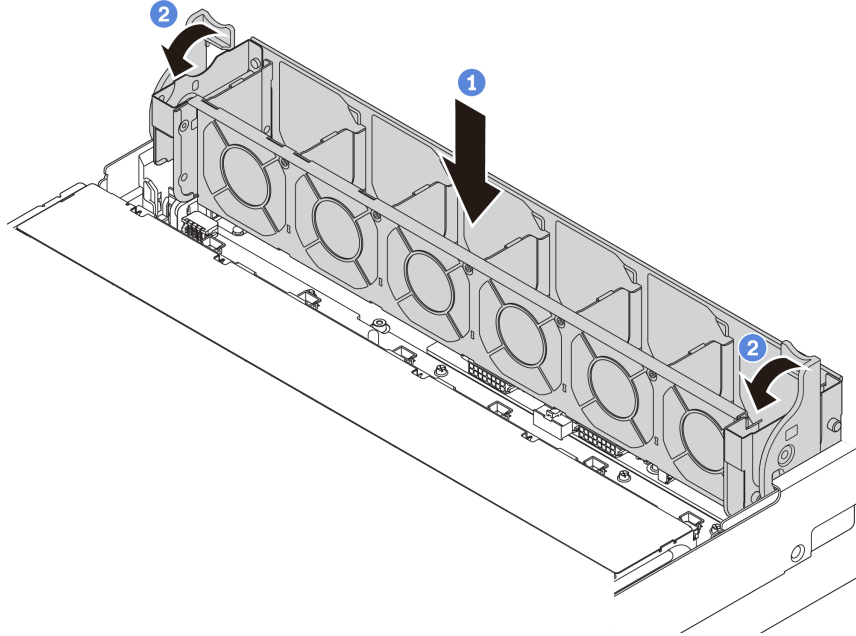


Figure 138. System fan cage installation

Step 1. Align both sides of the system fan cage with the corresponding mounting posts in the chassis. Then, press the system fan cage straight down into the chassis.

Note: If there are system fans installed in the system fan cage, ensure that the system fans are correctly connected to the system fan connectors on the system board.

Step 2. Rotate the levers of the system fan cage to the front of the server to secure the system fan cage.

After installing the system fan cage:

1. If you have removed the system fans, reinstall them. See “Install a system fan” on page 171.
2. Complete the parts replacement. See “Complete the parts replacement” on page 274.

Front I/O assembly replacement

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

Note: Depending on the model, your server and the front I/O assembly might look different from the illustrations in this topic.

Remove the front I/O assembly

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

	<p>“Read the installation Guidelines” on page 121</p>	<p>“Power off the server for this task” on page 11</p>	<p>“ATTENTION: Static Sensitive Device Ground package before opening” on page 124</p>
--	---	--	---

Note: The following procedure is based on the scenario that you are removing the front I/O assembly for the server model with eight 3.5-inch drive bays.

For server models with 2.5-inch front drive bays or twelve 3.5-inch front drive bays, the front I/O assembly is assembled with the right rack latch. See “Remove the rack latches” on page 136 for the removal procedures.

Before removing the front I/O assembly:

1. Remove the top cover. See “Remove the top cover” on page 142.
2. If the security bezel is installed, remove it. See “Remove the security bezel” on page 133.
3. Disconnect the cables of the front I/O assembly from the system board. See “Front I/O assembly” on page 39.

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

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

- YouTube: <https://www.youtube.com/playlist?list=PLYV5R7hVcs-BYjqwMTzXbqbC6fhKRsCdR>
- Youku: http://list.youku.com/albumlist/show/id_52222445.html

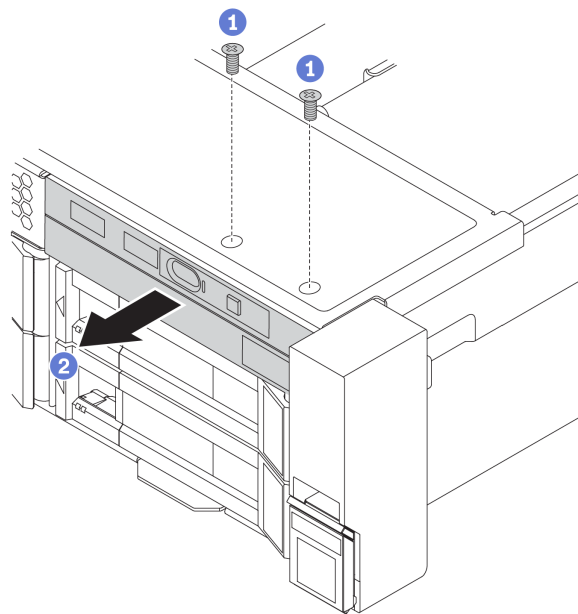


Figure 139. Front I/O assembly removal




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

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

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

Install the front I/O assembly

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

	“Read the installation Guidelines” on page 121		“Power off the server for this task” on page 11		“ATTENTION: Static Sensitive Device Ground package before opening” on page 124
---	---	---	--	--	--

Note: The following procedure is based on the scenario that you are installing the front I/O assembly for the server model with eight 3.5-inch front drive bays.

For server models with 2.5-inch front drive bays or twelve 3.5-inch front drive bays, the front I/O assembly is assembled with the right rack latch. See “Install the rack latches” on page 139 for the installation procedures.

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

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

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

- YouTube: <https://www.youtube.com/playlist?list=PLYV5R7hVcs-BYiqwMTzXbqbC6fhKRScdR>
- Youku: http://list.youku.com/albumlist/show/id_52222445.html

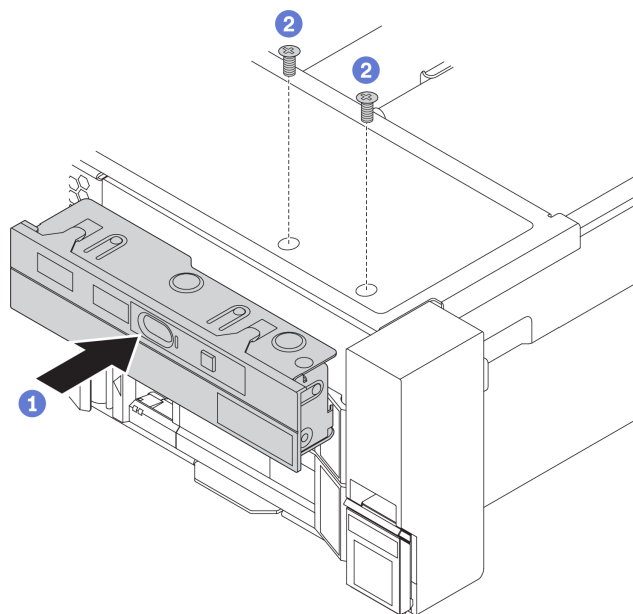


Figure 140. Front I/O assembly installation

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

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

After installing the front I/O assembly:

1. Connect the cables of the front I/O assembly to the system board. See “Front I/O assembly” on page 39.
2. Complete the parts replacement. See “Complete the parts replacement” on page 274.

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 powering off the server, which helps you avoid significant interruption to the operation of the system.

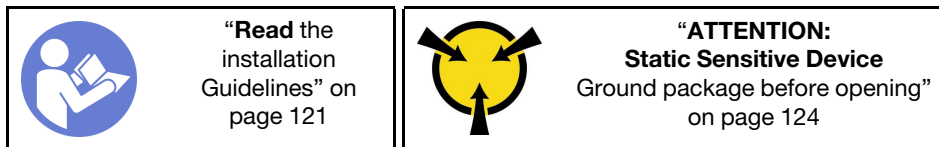
Notes:

- 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 back 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 labels 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 that the installed drives are NVMe drives.
3. If the security bezel is installed, remove it. See “Remove the security bezel” on page 133.

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

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

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

- YouTube: <https://www.youtube.com/playlist?list=PLYV5R7hVcs-BYjgwMTzXbgbC6fhKRcCdR>
- Youku: http://list.youku.com/albumlist/show/id_52222445.html

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

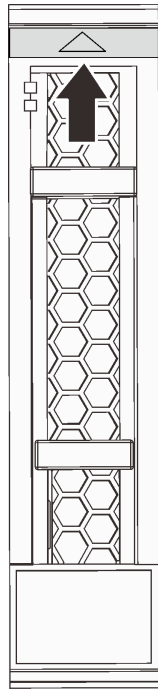


Figure 141. Opening the drive tray handle of a 2.5-inch hot-swap drive

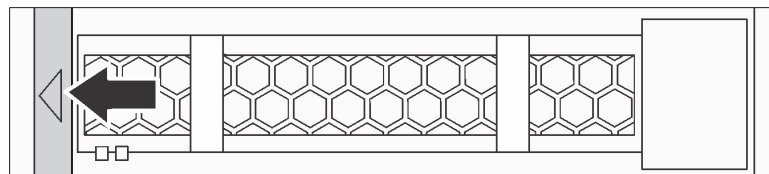


Figure 142. Opening the drive tray handle of a 3.5-inch hot-swap drive

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

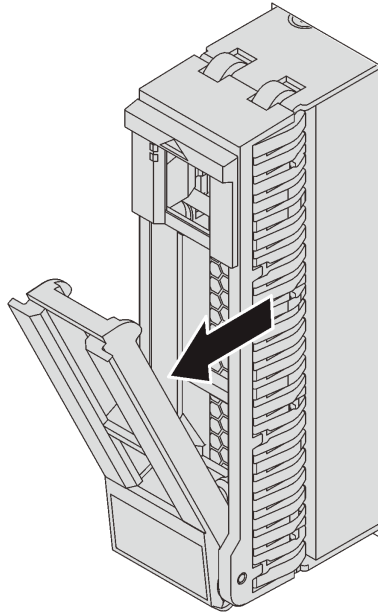


Figure 143. 2.5-inch hot-swap drive removal

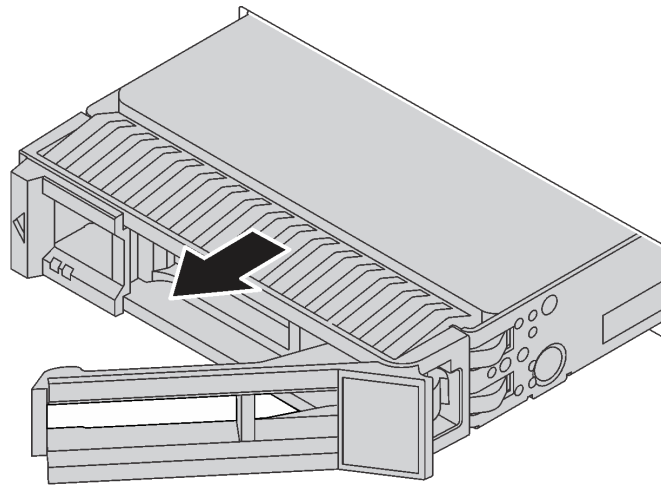


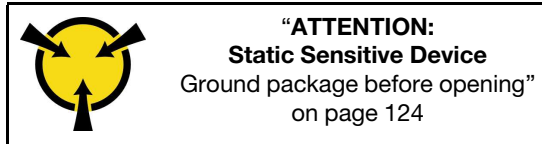
Figure 144. 3.5-inch hot-swap drive removal

After removing a hot-swap drive:

1. Install the drive filler or a new drive to cover the drive bay. See “Install a hot-swap drive” on page 179.
2. If you are instructed to return the old hot-swap drive, follow all packaging instructions and use any packaging materials that are provided.

Install a hot-swap drive

Use this information to install a hot-swap drive.



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

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

Note: For the middle/rear drive cage with an NVMe backplane, only 7 mm NVMe drives (installed in the 15 mm-height drive trays) are supported. The 15 mm drives are not supported.

For a list of supported drives, see:

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

- The drive bays are numbered to indicate the installation order (starting from number “0”). Follow the installation order when you install a drive. See “Front view” on page 13.
- You can mix drives of different types, different sizes, and different capacities in one system, but not in one RAID array. The following priority is recommended for installing the drives:
 - Drive type priority: NVMe SSD, SAS SSD, SATA SSD, SAS HDD, SATA HDD
 - Drive size priority: 2.5 inch, 3.5 inch
 - Drive capacity priority: the lowest capacity first
- The drives in a single RAID array must be the same type, same size, and same capacity.
- The type and number of supported drives vary by server model and backplane configuration. For more information, see “Drive bay configurations and requirements” on page 125.

Before installing a hot-swap drive:

1. If the drive bay has a drive filler installed, pinch the two tabs to remove the drive filler. Keep the drive filler in a safe place.

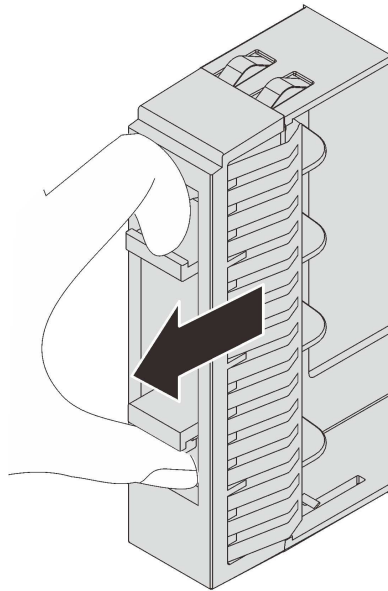


Figure 145. 2.5-inch drive filler removal

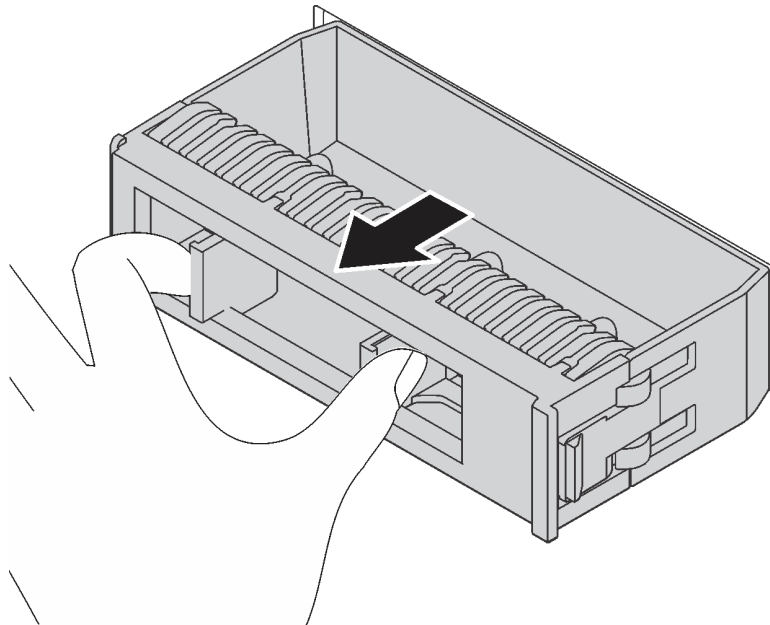


Figure 146. 3.5-inch drive filler removal

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.

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

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

- YouTube: <https://www.youtube.com/playlist?list=PLYV5R7hVcs-BYjgwMTzXbgbC6fhKRcCdR>
- Youku: http://list.youku.com/albumlist/show/id_52222445.html

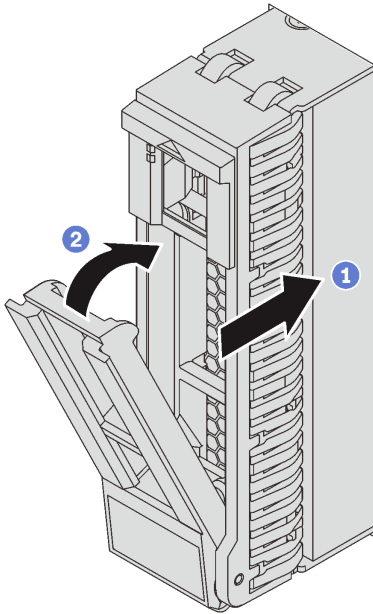


Figure 147. 2.5-inch hot-swap drive installation

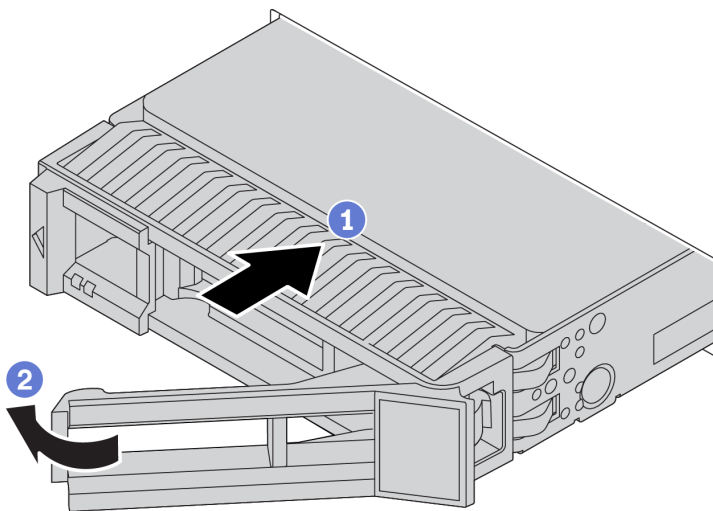


Figure 148. 3.5-inch hot-swap drive installation

- 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. If you have removed the security bezel, reinstall it. See “Install the security bezel” on page 134.
2. Use the Lenovo XClarity Provisioning Manager Lite to configure the RAID if necessary. For more information, see:
https://sysmgt.lenovofiles.com/help/topic/ixpml_v2/Introduction.html

Front backplane replacement

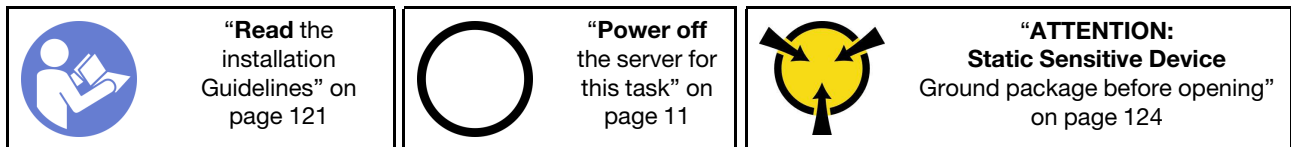
Use this information to remove and install a hot-swap-drive front backplane.

This topic contains the following information:

- “Remove the front 2.5-inch-drive backplane” on page 183
- “Install the front 2.5-inch-drive backplane” on page 184
- “Remove the front 3.5-inch-drive backplane” on page 186
- “Install the front 3.5-inch-drive backplane” on page 187

Remove the front 2.5-inch-drive backplane

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



Before removing the 2.5-inch-drive backplane:

1. Remove the top cover. See “Remove the top cover” on page 142.
2. Remove the system fan cage for easier operation. See “Remove the system fan cage” on page 172.
3. Remove all the installed drives and fillers (if any) from the drive bays. See “Remove a hot-swap drive” on page 177.

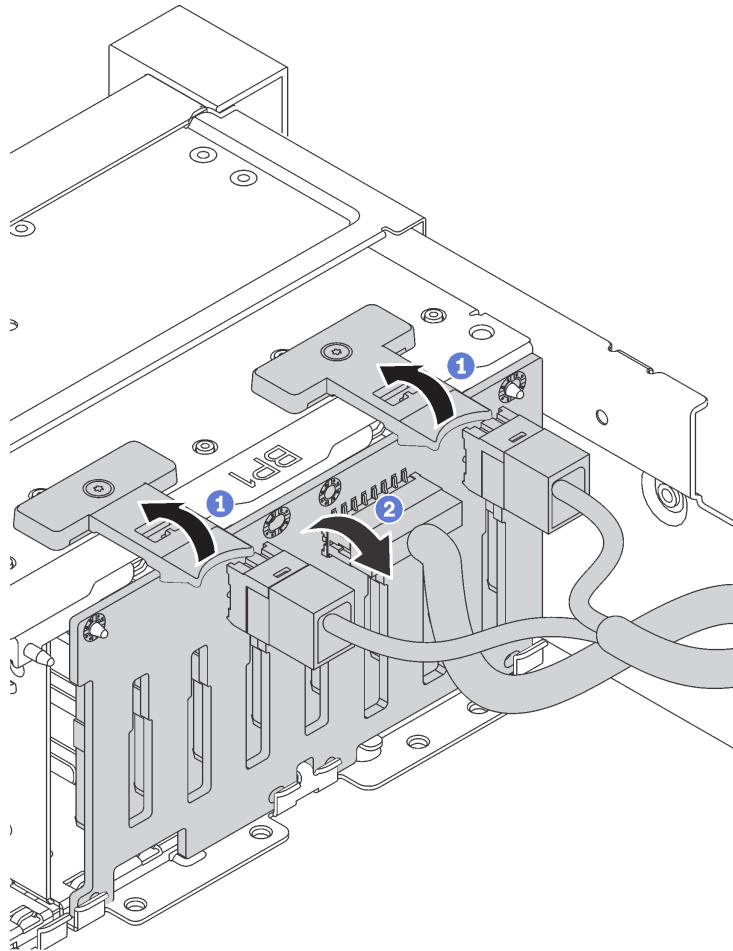
To remove the 2.5-inch-drive backplane, complete the following steps:

Note: Depending on the specific type, your backplane might look different from the illustration in this topic.

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

- YouTube: <https://www.youtube.com/playlist?list=PLYV5R7hVcs-BYjgwMTzXbgbC6fhKRScdR>
- Youku: http://list.youku.com/albumlist/show/id_52222445.html

Step 1. Lift the release tabs and rotate the backplane backward slightly to release it from the two pins on the chassis.


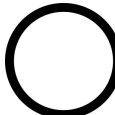



Step 2. Record the cable connections on the backplane and then disconnect all cables from the backplane. For information about the backplane cable routing, see “Backplanes” on page 51.

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

Install the front 2.5-inch-drive backplane

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

	<p>“Read the installation Guidelines” on page 121</p>		<p>“Power off the server for this task” on page 11</p>		<p>“ATTENTION: Static Sensitive Device Ground package before opening” on page 124</p>
---	---	---	--	--	---

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

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

Before installing the 2.5-inch-drive backplane, 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.

To install the 2.5-inch-drive backplane, complete the following steps:

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

- YouTube: <https://www.youtube.com/playlist?list=PLYV5R7hVcs-BYigwMTzXbqbC6fhKRsCdR>
- Youku: http://list.youku.com/albumlist/show/id_52222445.html

Step 1. Connect the cables to the backplane. See “Backplanes” on page 51.

Step 2. Align the bottom of the backplane in the slots on the bottom of the chassis. Then, rotate the backplane to vertical position and align the holes in the backplane with the pins on the chassis and press the backplane into position. The release tabs will secure the backplane in place.

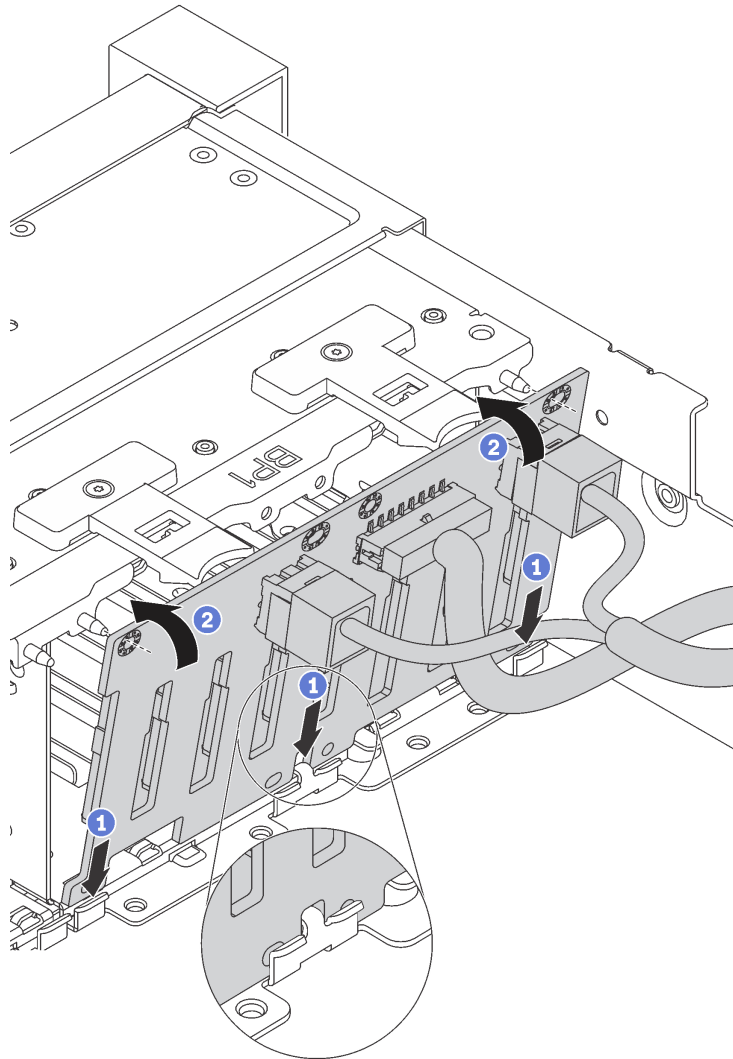





Figure 149. 2.5-inch-drive backplane installation

After installing the 2.5-inch-drive backplane:

1. Reinstall all the drives and fillers (if any) into the drive bays. See “Install a hot-swap drive” on page 179.
2. Complete the parts replacement. See “Complete the parts replacement” on page 274.

Remove the front 3.5-inch-drive backplane

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

 <p>“Read the installation Guidelines” on page 121</p>	 <p>“Power off the server for this task” on page 11</p>	 <p>“ATTENTION: Static Sensitive Device Ground package before opening” on page 124</p>
---	--	---

Note: The procedure is based on the scenario that you want to remove the backplane for up to twelve 3.5-inch drives. The procedure is similar for the backplane for up to eight 3.5-inch drives.

Before removing the 3.5-inch-drive backplane:

1. Remove the top cover. See “Remove the top cover” on page 142.
2. Remove the system fan cage for easier operation. See “Remove the system fan cage” on page 172.
3. Remove all the installed drives and fillers (if any) from the drive bays. See “Remove a hot-swap drive” on page 177.

To remove the 3.5-inch-drive backplane, complete the following steps:

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

- YouTube: <https://www.youtube.com/playlist?list=PLYV5R7hVcs-BYjqwMTzXbqbC6fhKRdR>
- Youku: http://list.youku.com/albumlist/show/id_52222445.html

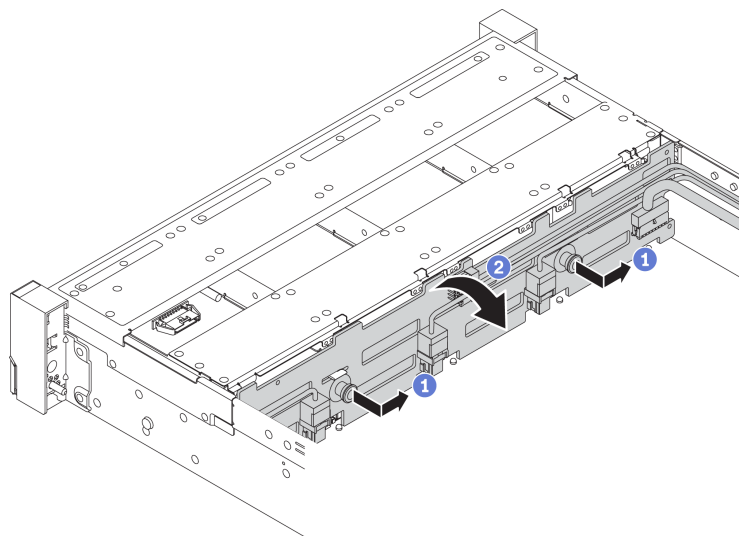



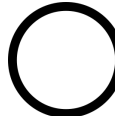

Figure 150. 3.5-inch-drive backplane removal

- Step 1. Pull out the plungers and slightly slide the backplane to the side as shown.
- Step 2. Rotate the backplane down to release it from the four hooks on the chassis. Then, carefully lift the backplane out of the chassis.
- Step 3. Record the cable connections on the backplane and then disconnect all cables from the backplane. For information about the backplane cable routing, see “Backplanes” on page 51.

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

Install the front 3.5-inch-drive backplane

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

 <p>“Read the installation Guidelines” on page 121</p>	 <p>“Power off the server for this task” on page 11</p>	 <p>“ATTENTION: Static Sensitive Device Ground package before opening” on page 124</p>
---	--	--

Note: The procedure is based on the scenario that you want to install the backplane for up to twelve 3.5-inch drives. The procedure is similar for the backplane for up to eight 3.5-inch drives.

Before installing the 3.5-inch-drive backplane, 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.

To install the 3.5-inch-drive backplane, complete the following steps:

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

- YouTube: <https://www.youtube.com/playlist?list=PLYV5R7hVcs-BYiqwMTzXbgbC6fhKRScdR>
- Youku: http://list.youku.com/albumlist/show/id_52222445.html

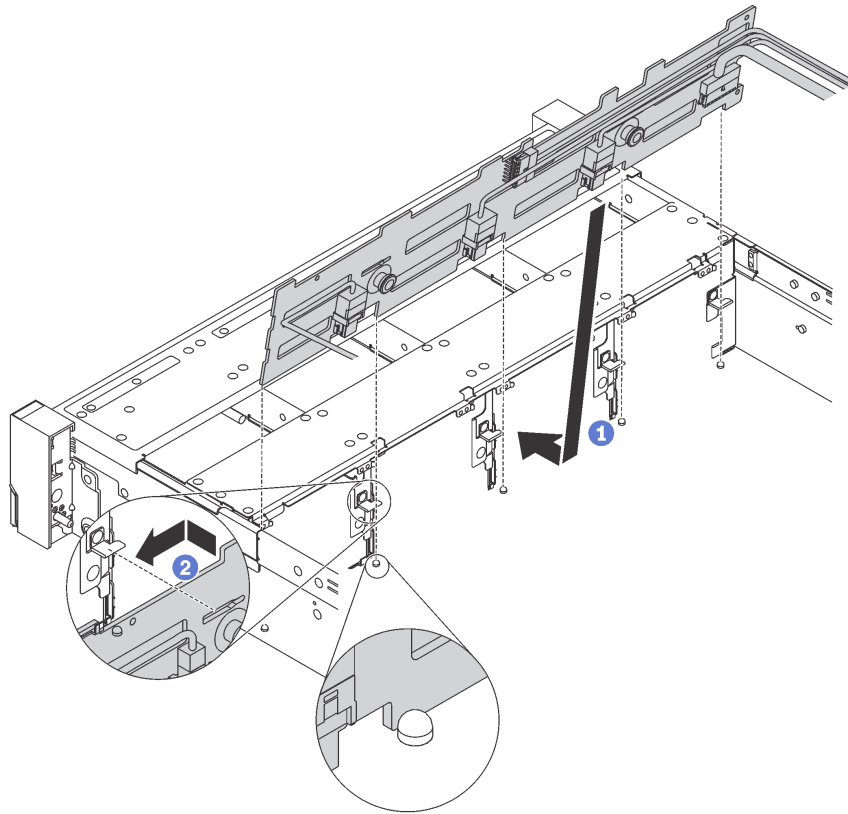


Figure 151. 3.5-inch-drive backplane installation

- Step 1. Connect the cables to the backplane. See “Backplanes” on page 51.
- Step 2. Align the backplane with the chassis and lower it into the chassis. Then, put the backplane into place with it leaning backward slightly.
- Step 3. Rotate the backplane to vertical position to ensure that the four hooks on the chassis pass through the corresponding holes in the backplane. Then, slide the new backplane as shown until it is secured into place.

After installing the 3.5-inch-drive backplane:

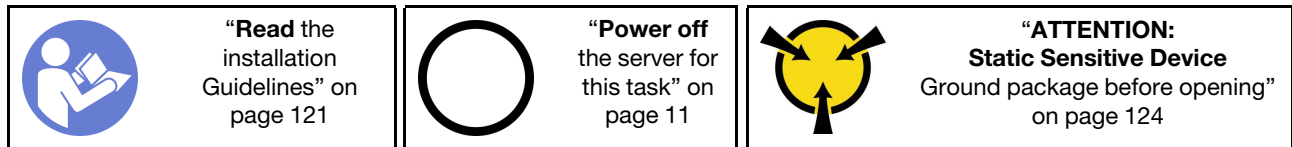
1. Reinstall all the drives and fillers (if any) into the drive bays. See “Install a hot-swap drive” on page 179.
2. Complete the parts replacement. See “Complete the parts replacement” on page 274.

Middle/Rear backplane replacement

Use this information to remove and install a middle or rear backplane.

Remove the middle or rear 2.5-inch-drive backplane

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



Before removing the middle or rear 2.5-inch-drive backplane:

1. Remove the top cover. See “Remove the top cover” on page 142.
2. If you are removing the middle backplane, remove the system fan cage for easier operation. See “Remove the system fan cage” on page 172.
3. Remove all the installed drives and fillers (if any) from the drive bays. See “Remove a hot-swap drive” on page 177.

To remove the middle or rear 2.5-inch-drive backplane, complete the following steps:

Note: The illustration shows removing the backplane from the middle drive cage. The procedure is the same for removing the backplane from the rear drive cage.

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

- YouTube: <https://www.youtube.com/playlist?list=PLYV5R7hVcs-BYjgwMTzXbqbC6fhKRScdR>
- Youku: http://list.youku.com/albumlist/show/id_52222445.html

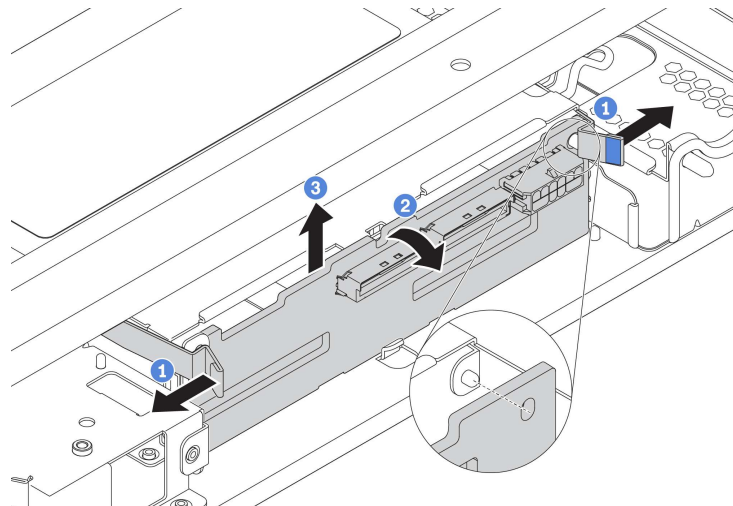



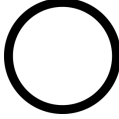

Figure 152. Removing the middle or rear 2.5-inch-drive backplane

- Step 1. Slightly pivot the release latches outwards in the direction as shown.
- Step 2. Pivot the backplane to release it from the two pins on the drive cage.
- Step 3. Carefully lift the backplane out of the drive cage.

Step 4. Record the cable connections on the backplane and then disconnect all cables from the backplane. For information about the backplane cable routing, see “Backplanes” on page 51.

Install the middle or rear 2.5-inch-drive backplane

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

	“Read the installation Guidelines” on page 121		“Power off the server for this task” on page 11		“ATTENTION: Static Sensitive Device Ground package before opening” on page 124
---	---	---	--	--	---

To install the middle or rear 2.5-inch-drive backplane, complete the following steps:

Notes:

- The illustration shows installing the backplane on the middle drive cage. The procedure is the same for installing the backplane on the rear drive cage.
- For an NVMe backplane, only 7 mm NVMe drives (installed in 15 mm-height drive trays) are supported, 15 mm NVMe drives not supported.

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

- YouTube: <https://www.youtube.com/playlist?list=PLYV5R7hVcs-BYjgwMTzXbgbC6fhKRcCdR>
- Youku: http://list.youku.com/albumlist/show/id_52222445.html

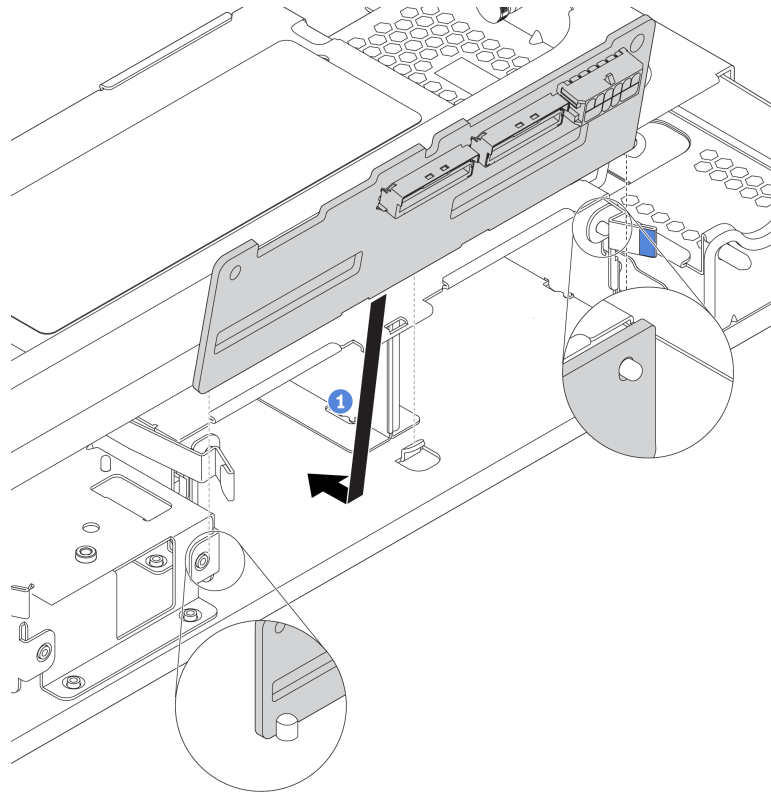


Figure 153. Installing the middle or rear 2.5-inch-drive backplane

Step 1. Align the bottom of the backplane with the studs at the bottom of the drive cage.

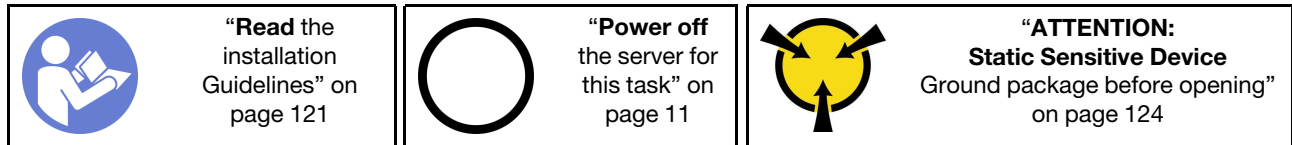
Step 2. Rotate the backplane to vertical position so that the holes in the backplane pass through the pins on the drive cage, and press the backplane into position. The release latches will secure the backplane in place.

After installing the middle or rear 2.5-inch-drive backplane:

1. Reinstall all the drives and fillers (if any) into the drive bays. See “Install a hot-swap drive” on page 179.
2. Complete the parts replacement. See “Complete the parts replacement” on page 274.

Remove the middle or rear 3.5-inch-drive backplane

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



Before removing the middle or rear 3.5-inch-drive backplane:

1. Remove the top cover. See “Remove the top cover” on page 142.
2. If you are removing the middle backplane, remove the system fan cage for easier operation. See “Remove the system fan cage” on page 172.
3. Remove all the installed drives and fillers (if any) from the drive bays. See “Remove a hot-swap drive” on page 177.

To remove the middle or rear backplane, complete the following steps:

Note: The illustration shows removing the backplane from the middle drive cage. The procedure is the same for removing the backplane from the rear drive cage.

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

- YouTube: <https://www.youtube.com/playlist?list=PLYV5R7hVcs-BYigwMTzXbqbC6fhKRsCdR>
- Youku: http://list.youku.com/albumlist/show/id_52222445.html

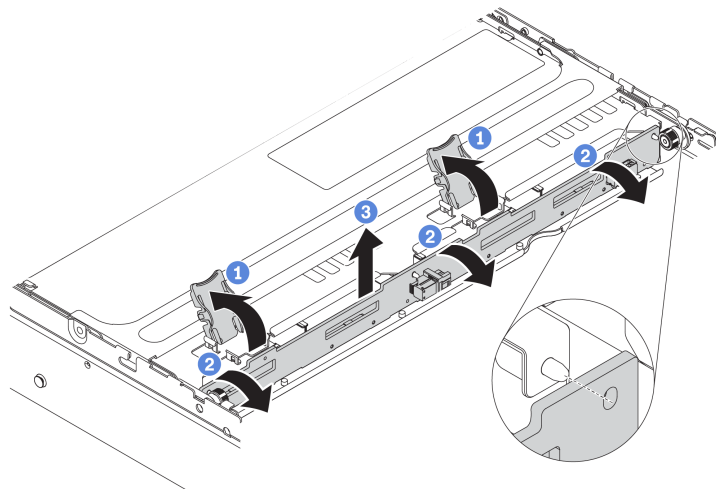


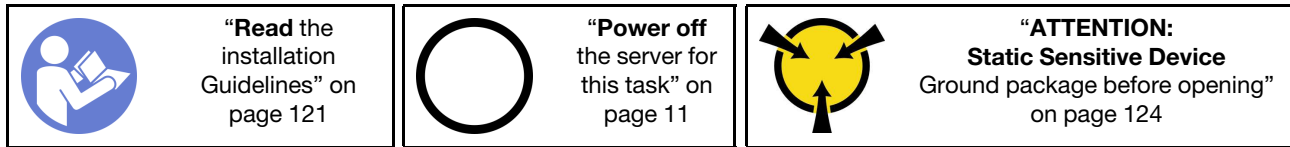
Figure 154. Removing the middle or rear 3.5-inch-drive backplane

Step 1. Open the release latches that secure the backplane.

- Step 2. Pivot the backplane slightly to release it from the three pins on the drive cage.
- Step 3. Record the cable connections on the backplane and then disconnect all cables from the backplane. For information about the backplane cable routing, see “Backplanes” on page 51.

Install the middle or rear 3.5-inch-drive backplane

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



To install the middle or rear 3.5-inch-drive backplane, complete the following steps:

Note: The illustration shows installing the backplane on the middle drive cage. The procedure is the same for installing the backplane on the rear drive cage.

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

- YouTube: <https://www.youtube.com/playlist?list=PLYV5R7hVcs-BYiqwMTzXbqbC6fhKRcCdR>
- Youku: http://list.youku.com/albumlist/show/id_52222445.html

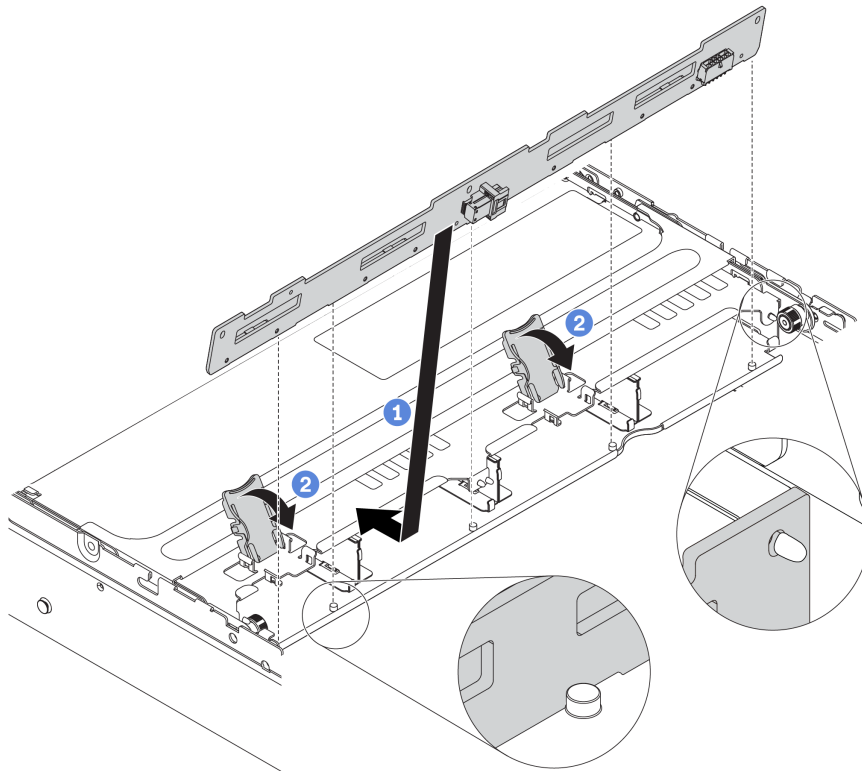


Figure 155. Installing the middle or rear 3.5-inch-drive backplane

- Step 1. Align the bottom of the backplane with the studs at the bottom of the drive cage. Rotate the backplane to vertical position so that the holes in the backplane pass through the pins on the drive cage.
- Step 2. Close the release latches to secure the backplane in place.

After installing the middle or rear 3.5-inch-drive backplane:

1. Reinstall all the drives and fillers (if any) into the drive bays. See “Install a hot-swap drive” on page 179.
2. Complete the parts replacement. See “Complete the parts replacement” on page 274.

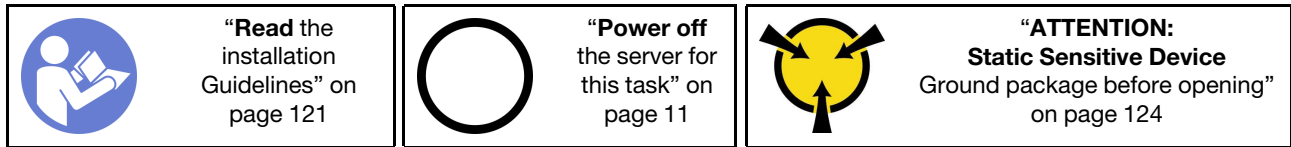
Middle drive cage replacement

Use this information to remove and install the middle 2.5-inch or 3.5-inch drive cage.

- “Remove the middle 2.5-inch drive cage” on page 193
- “Install the middle 2.5-inch drive cage” on page 195
- “Remove the middle 3.5-inch drive cage” on page 199
- “Install the middle 3.5-inch drive cage” on page 201

Remove the middle 2.5-inch drive cage

Use this information to remove the middle 2.5-inch drive cage.



Before removing the middle drive cage:

1. Remove the top cover. See “Remove the top cover” on page 142.
2. Remove the system fan cage for easier operation. See “Remove the system fan cage” on page 172.
3. Disconnect cables from the middle drive cage.
4. Remove all the installed drives and fillers (if any) from the drive bays. See “Remove a hot-swap drive” on page 177.

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

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

- YouTube: <https://www.youtube.com/playlist?list=PLYV5R7hVcs-BYjgwMTzXbgbC6fhKRScdR>
- Youku: http://list.youku.com/albumlist/show/id_52222445.html

Step 1. Rotate the handle to open it.

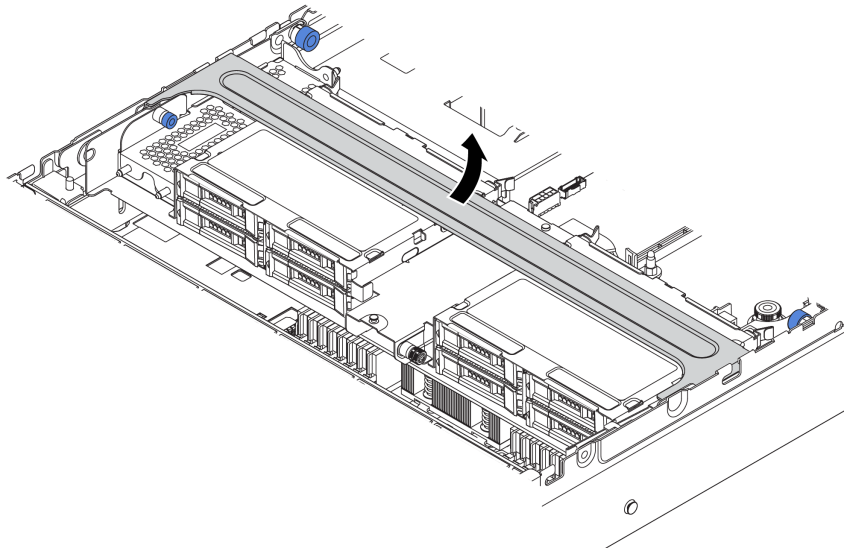


Figure 156. Opening the drive cage handle

Step 2. Remove the drives from the drive cage.

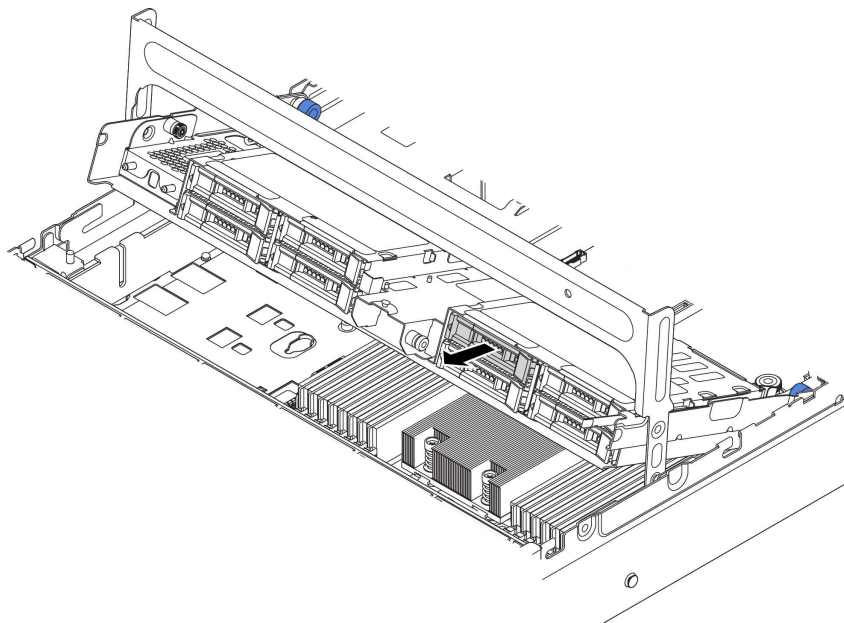


Figure 157. Removing drives from middle 2.5-inch drive cage

Step 3. Pull and twist plunger pins and carefully lift the middle rear cage upward to release it from the chassis.

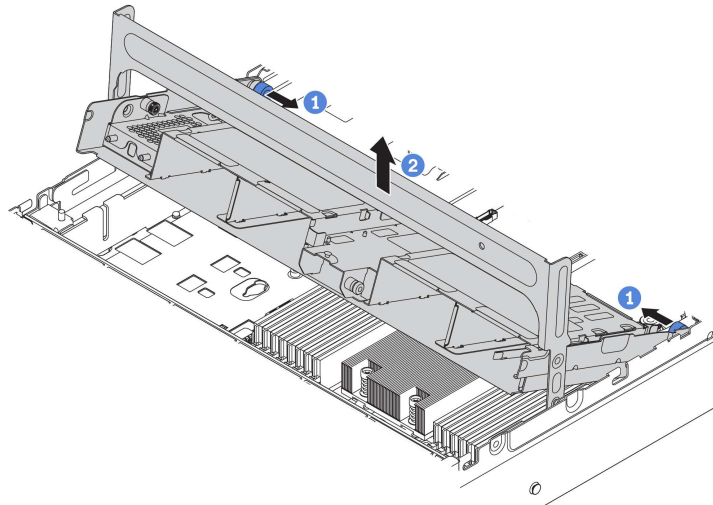


Figure 158. Removing the middle 2.5-inch drive cage

Step 4. Press the latch as shown and close the handle.

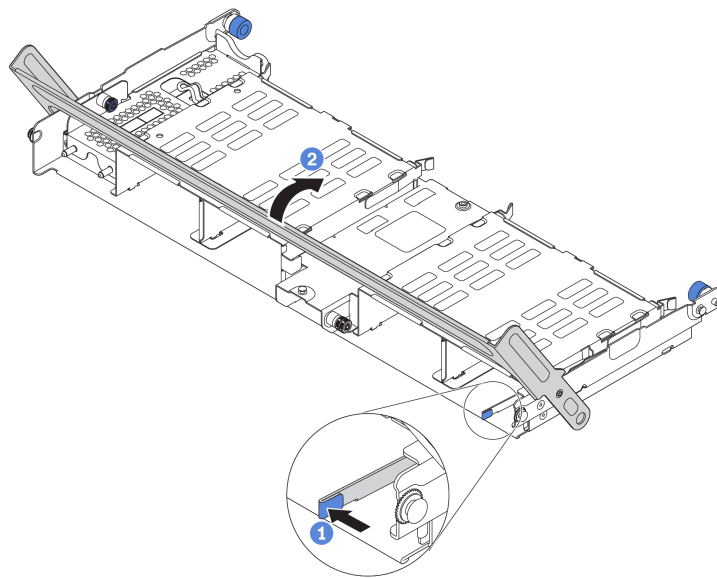
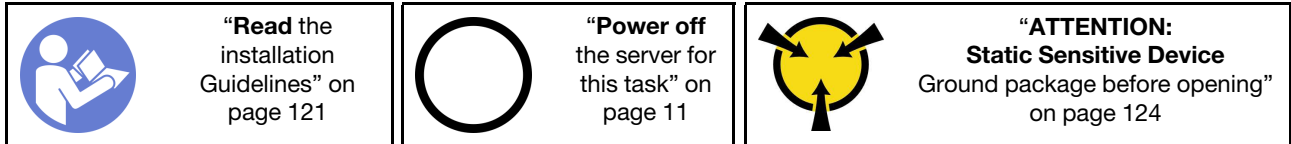


Figure 159. Closing the handle for the middle 2.5-inch drive cage

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

Install the middle 2.5-inch drive cage

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



Notes:

- The middle drive cage is supported on some server models at certain conditions. For detailed information, see “Drive bay configurations and requirements” on page 125.
- The middle drive cage kit comes with an air baffle, 1U performance heat sink, and performance system fans (speed of 29000 RPM). If the air baffle, heat sink, and system fans of your server differ from those in the kit, replace them first.

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

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

- YouTube: <https://www.youtube.com/playlist?list=PLYV5R7hVcs-BYjgwMTzXbgbC6fhKRcCdR>
- Youku: http://list.youku.com/albumlist/show/id_52222445.html

- Step 1. Install the middle drive cage onto the chassis.
- Put the rear pins into the chassis slots.
 - Rotate the front of the drive cage down into place.

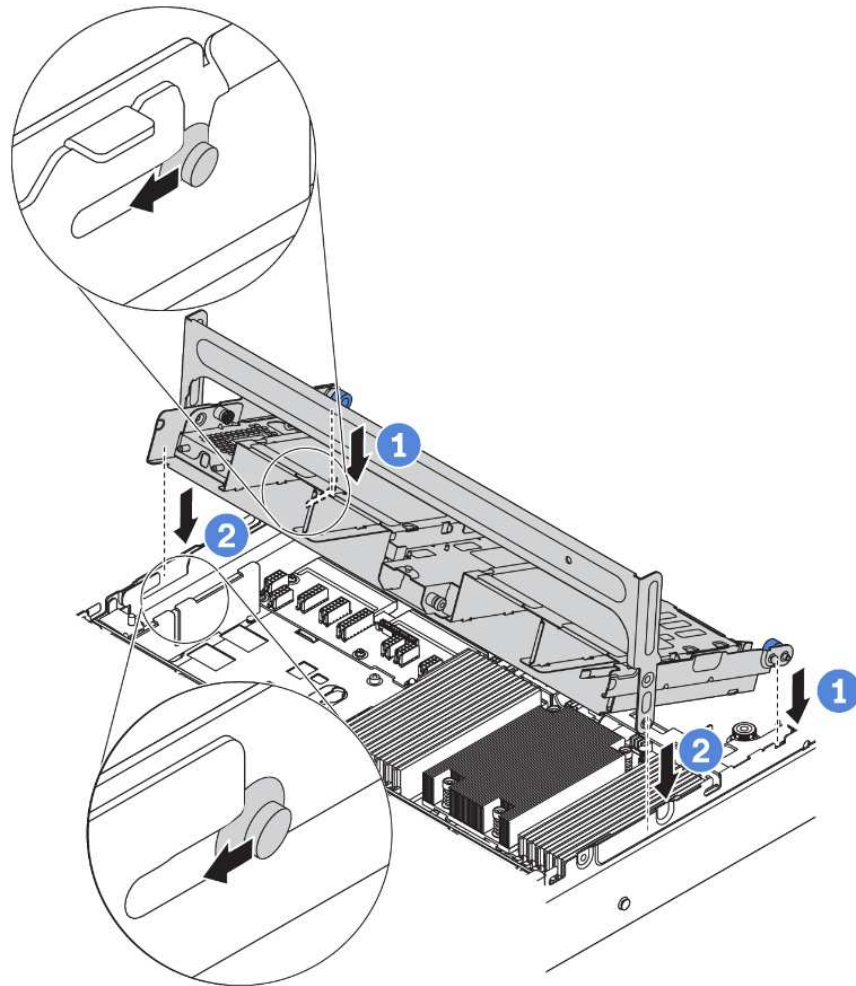


Figure 160. Installing the middle 2.5-inch drive cage

Step 2. Install drives into the middle drive cage. See “Install a hot-swap drive” on page 179.

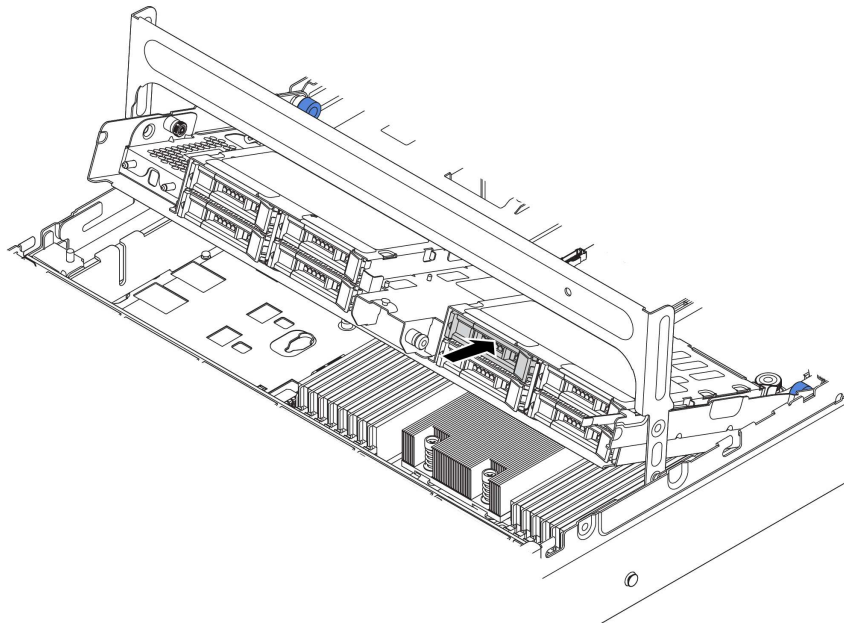


Figure 161. Installing drives into the drive cage

- Step 3. Close the drive cage handle.
- a. Press the latch as shown.
 - b. Rotate the handle to close it.

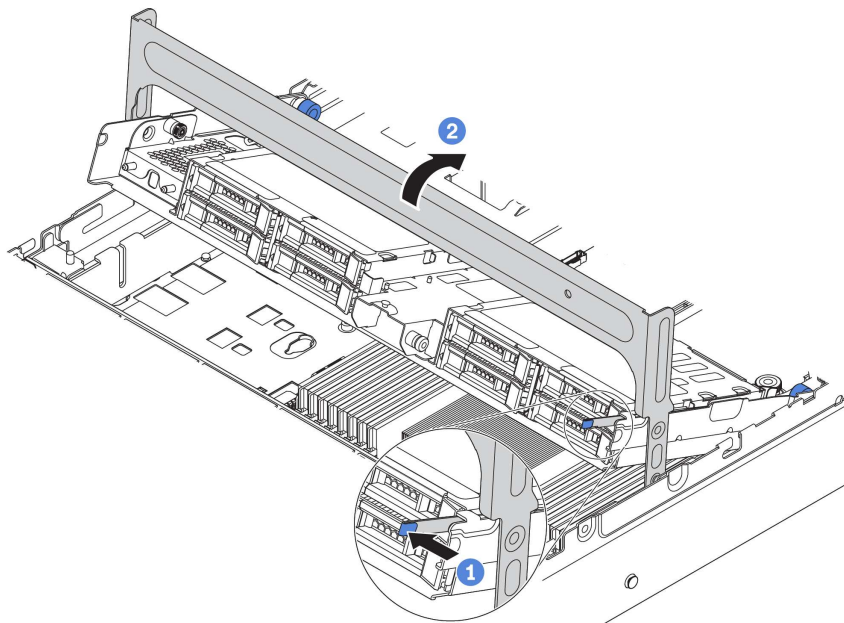


Figure 162. Closing the cage handle

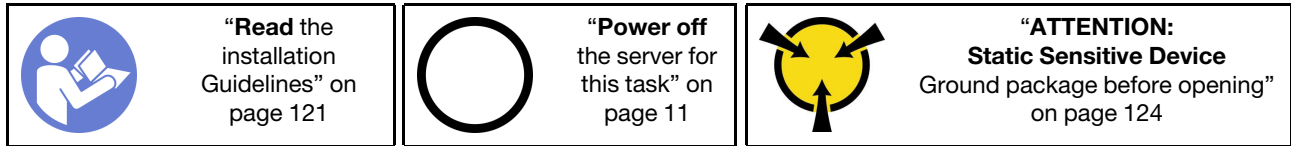
After installing the middle drive cage:

1. Connect cables from the backplanes to a RAID/HBA adapter. See “Backplanes” on page 51.

2. Complete the parts replacement. See “Complete the parts replacement” on page 274.

Remove the middle 3.5-inch drive cage

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



Before removing the middle drive cage:

1. Remove the top cover. See “Remove the top cover” on page 142.
2. Remove the system fan cage for easier operation. See “Remove the system fan cage” on page 172.
3. Disconnect cables from the middle drive cage.
4. Remove all the installed drives and fillers (if any) from the drive bays. See “Remove a hot-swap drive” on page 177.

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

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

- YouTube: <https://www.youtube.com/playlist?list=PLYV5R7hVcs-BYjgwMTzXbgbC6fhKRcCdR>
- Youku: http://list.youku.com/albumlist/show/id_52222445.html

Step 1. Rotate the handle to open it.

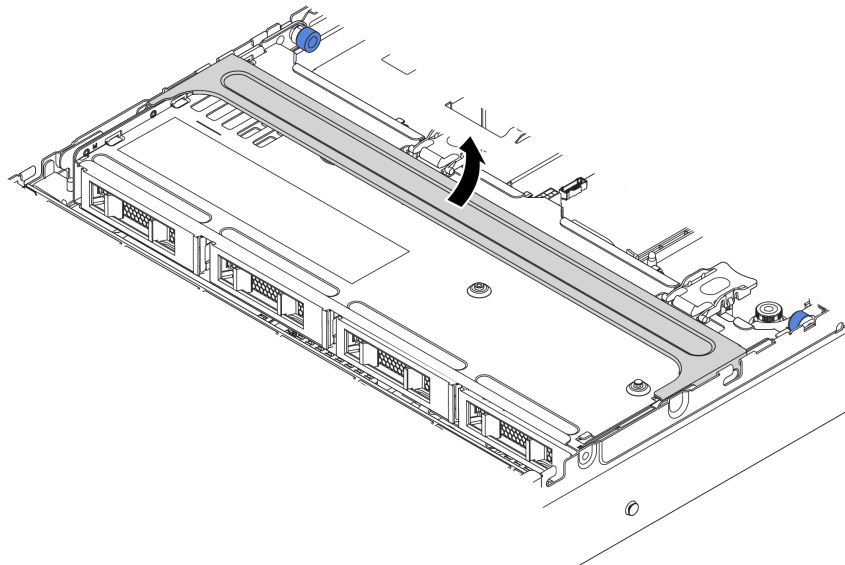


Figure 163. Opening the drive cage handle

Step 2. Remove the drives from the drive cage.

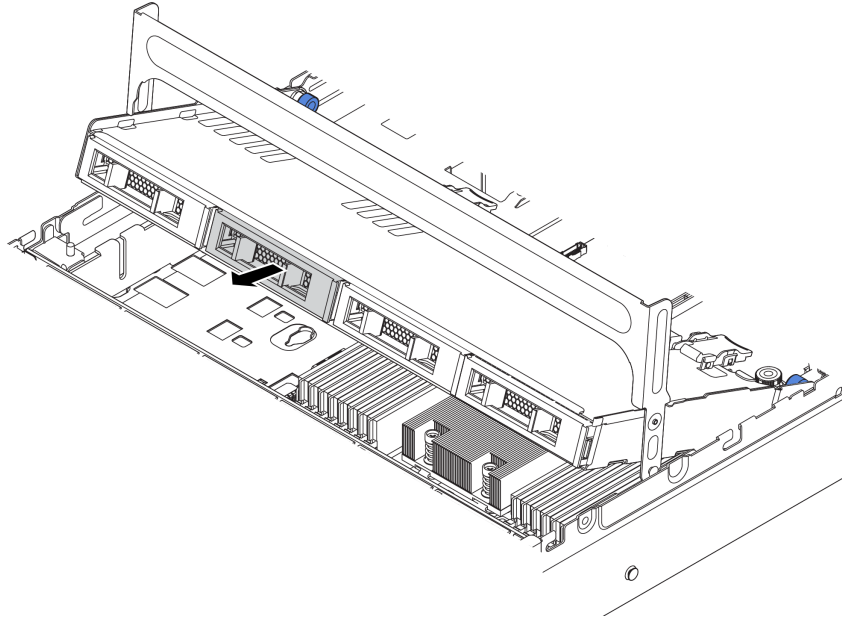


Figure 164. Removing drives from middle 3.5-inch drive cage

Step 3. Pull and twist plunger pins and carefully lift the middle rear cage upward to release it from the chassis.

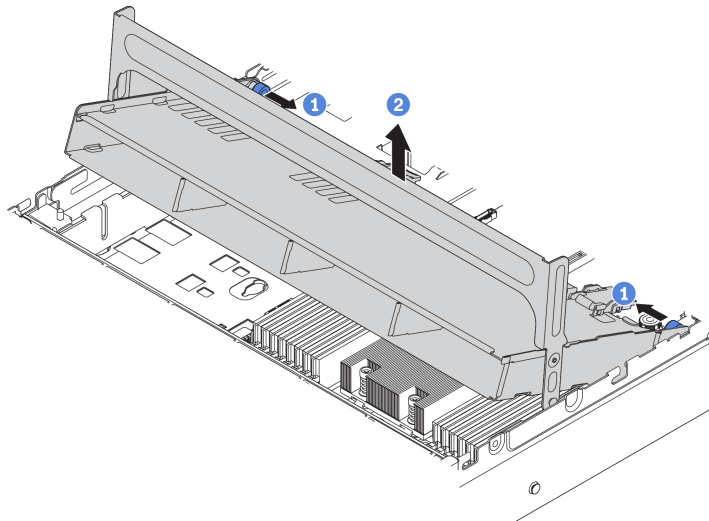


Figure 165. Removing the middle 3.5-inch drive cage

Step 4. Press the latch as shown and close the handle.

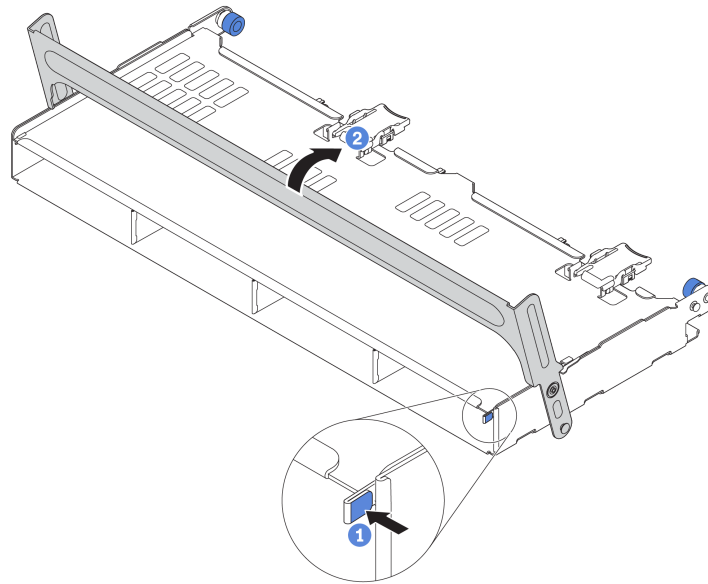

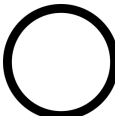



Figure 166. Closing the handle for the middle 3.5-inch drive cage

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

Install the middle 3.5-inch drive cage

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

	“Read the installation Guidelines” on page 121		“Power off the server for this task” on page 11		“ATTENTION: Static Sensitive Device Ground package before opening” on page 124
---	---	---	--	--	---

Notes:

- The middle drive cage is supported on some server models at certain conditions. For detailed information, see “Drive bay configurations and requirements” on page 125.
- The middle drive cage kit comes with an air baffle, 1U performance heat sink, and performance system fans (speed of 29000 RPM). If the air baffle, heat sink, and system fans of your server differs from those in the kit, replace them first.

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

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

- YouTube: <https://www.youtube.com/playlist?list=PLYV5R7hVcs-BYjgwMTzXbgbC6fhKRdR>
- Youku: http://list.youku.com/albumlist/show/id_52222445.html

- Step 1. Install the middle drive cage onto chassis.
- a. Put the rear pins into the chassis slots.
 - b. Rotate the front of the drive cage down into place.

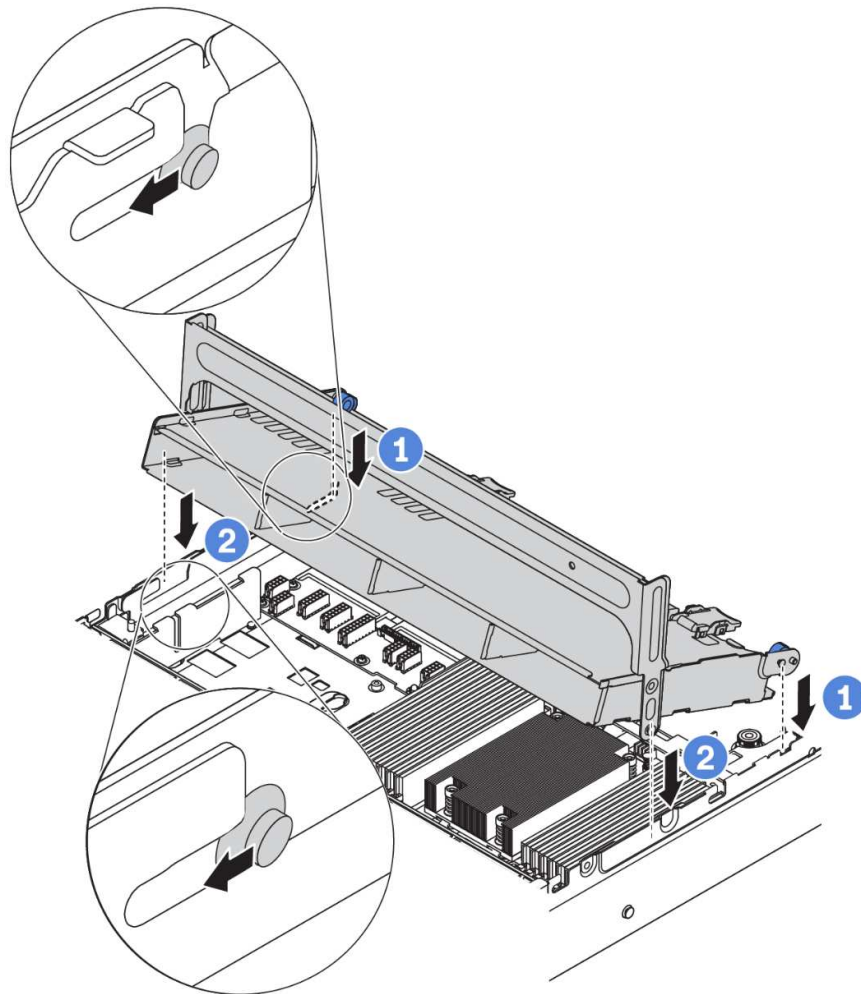


Figure 167. Installing the middle 3.5-inch drive cage

Step 2. Install drives into the middle drive cage. See “Install a hot-swap drive” on page 179.

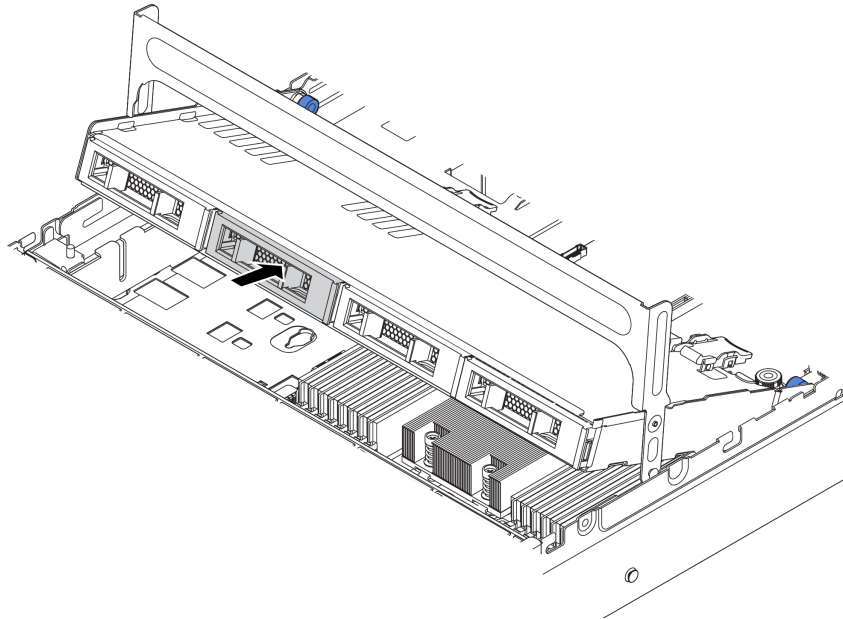


Figure 168. Installing drives into the drive cage

- Step 3. Close the drive cage handle.
- a. Press the latch as shown.
 - b. Rotate the handle to close it.

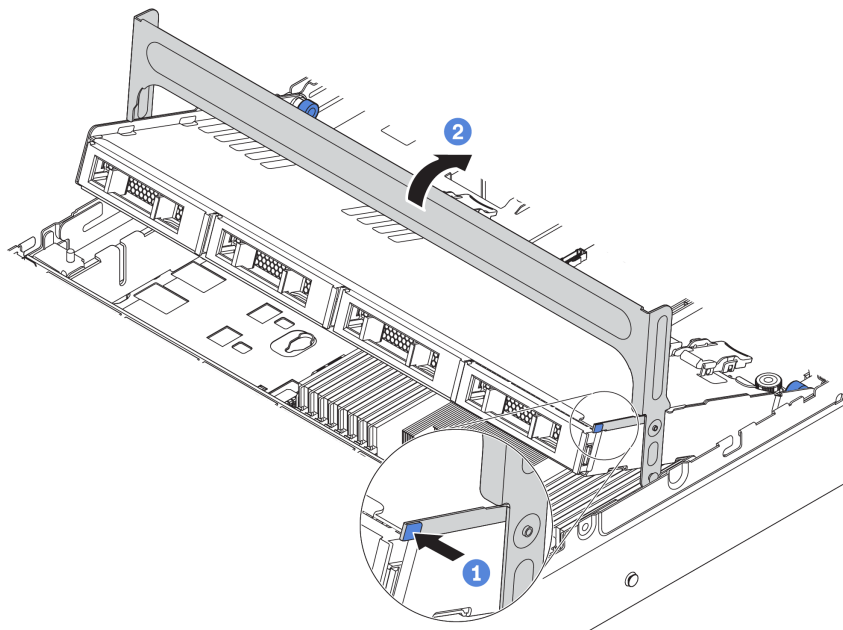


Figure 169. Closing the cage handle

After installing the middle drive cage:

1. Connect cables from the backplanes to a RAID/HBA adapter. See “Backplanes” on page 51.

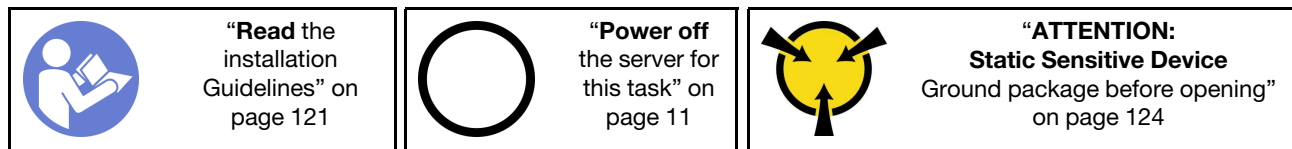
2. Complete the parts replacement. See “Complete the parts replacement” on page 274.

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.



Attention:

- Disconnect all power cords for this task.
- Memory modules are sensitive to static discharge and require special handling. In addition to the standard guidelines for “Handling static-sensitive devices” on page 124:
 - 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 of passive components by the high insertion force.

Before removing a memory module:

1. Remove the top cover. See “Remove the top cover” on page 142.
2. If your server comes with an air baffle or middle drive cage, remove it first. See “Remove the air baffle” on page 147.

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

- YouTube: <https://www.youtube.com/playlist?list=PLYV5R7hVcs-BYjgwMTzXbgbC6fhKRrCdR>
- Youku: http://list.youku.com/albumlist/show/id_52222445.html

To remove a memory module, complete the following steps:

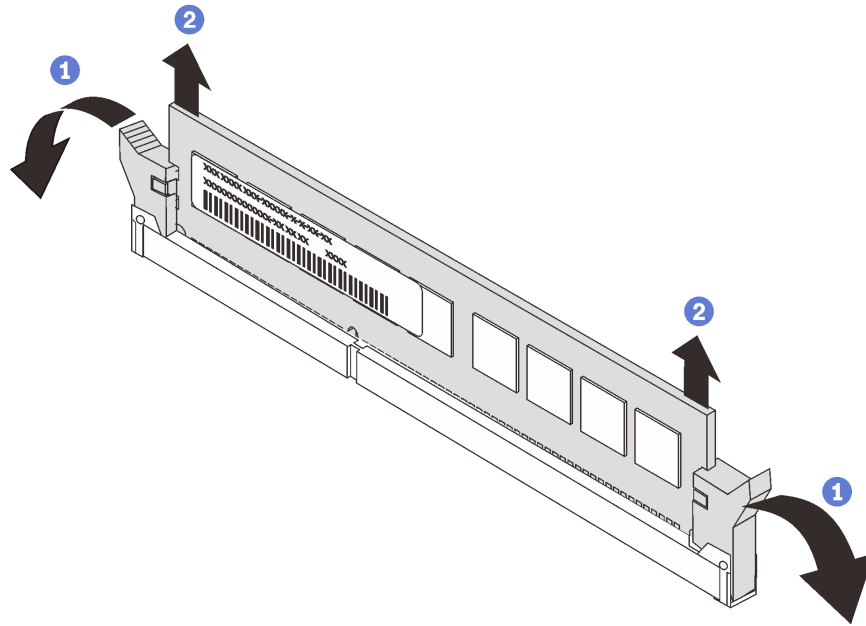


Figure 170. Memory module removal

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 up to remove it from the slot.

After removing a memory module:

1. If your server is configured with a 280-watt processor, or GPU adapter(s), or middle HDD bay, install a memory module filler or a new memory module to cover the slot. See “Install a memory module” on page 207.
2. If you are instructed to return the old memory module, follow all packaging instructions and use any packaging materials that are provided.

Memory module installation rules

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

Your server has 16 memory slots and supports:

- Minimum: 8 GB
- Maximum: 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

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

Follow 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 is supported in different channels, operating at 2933 MHz.

Note: Operating speed depends on the processor model. For example, 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.

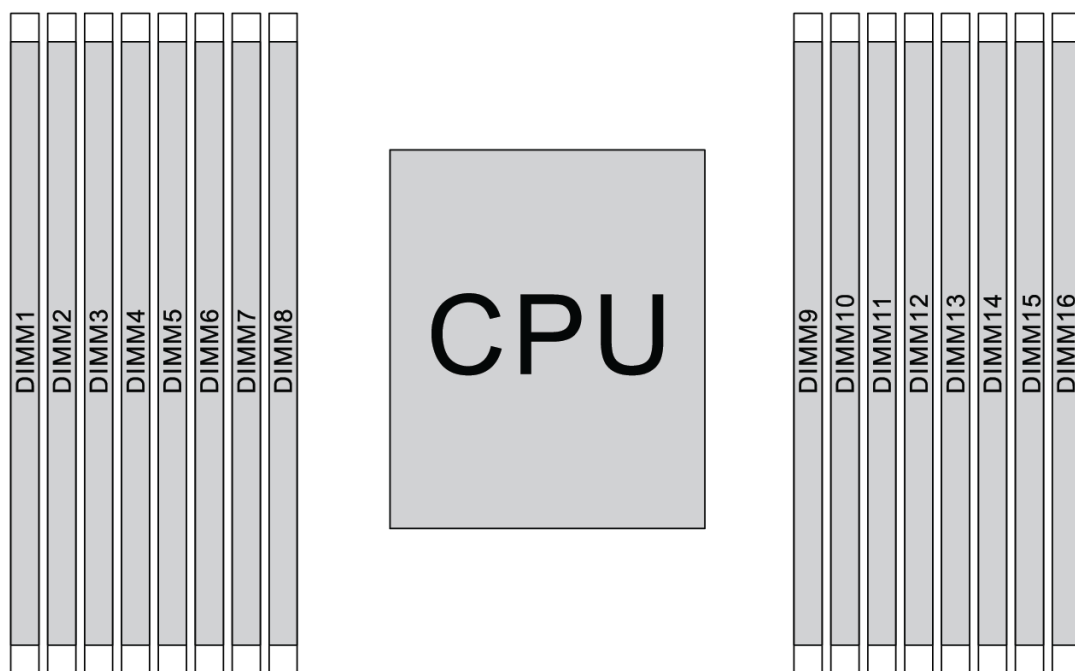


Figure 171. DIMM locations


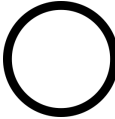

The following table shows the relationship between the processors, memory controllers, memory channels, slots, and DIMM numbers. The system has eight channels, and supports up to two DIMMs per channel. DIMMs must be populated from farthest slot (slot 1) to closest slot (slot 0) to the processor on a 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 17. DIMM installation order

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

Install a memory module

Use this information to install a memory module.

	<p>“Read the installation Guidelines” on page 121</p>		<p>“Power off the server for this task” on page 11</p>		<p>“ATTENTION: Static Sensitive Device Ground package before opening” on page 124</p>
---	--	---	---	--	--

Attention:

- Disconnect all power cords for this task.
- Memory modules are sensitive to static discharge and require special handling. In addition to the standard guidelines for “Handling static-sensitive devices” on page 124:
 - Always wear an electrostatic-discharge strap when removing or installing memory modules. Electrostatic-discharge gloves can also be used.
 - Never hold two or more memory modules together so that they do not touch each other. Do not stack memory modules directly on top of each other during storage.

- Never touch the gold memory module connector contacts or allow these contacts to touch the outside of the memory module connector housing.
- Handle memory modules with care: never bend, twist, or drop a memory module.
- Do not use any metal tools (such as jigs or clamps) to handle the memory modules, because the rigid metals may damage the memory modules.
- Do not insert memory modules while holding packages or passive components, which can cause package cracks or detachment of passive components by the high insertion force.

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 205. Ensure that you observe the installation rules and sequence.

To install a memory module, complete the following steps:

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

- YouTube: <https://www.youtube.com/playlist?list=PLYV5R7hVcs-BYjgwMTzXbgbC6fhKRScdR>
- Youku: http://list.youku.com/albumlist/show/id_52222445.html

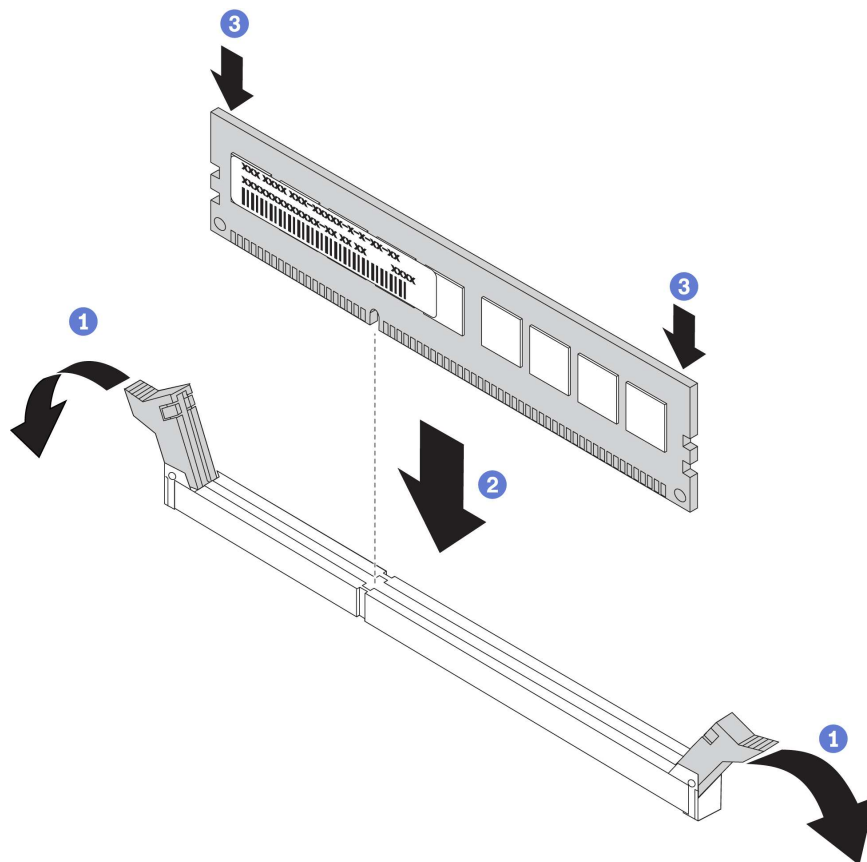


Figure 172. Memory module installation

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.

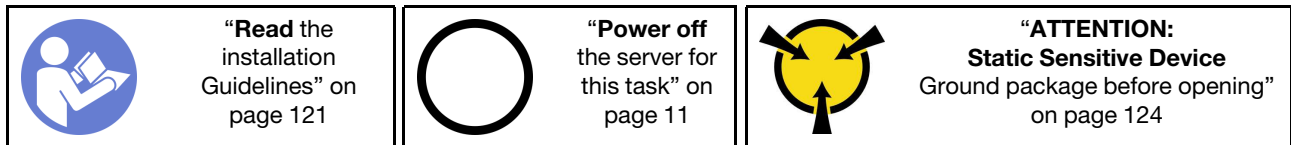
After installing the memory module, complete the parts replacement. See “Complete the parts replacement” on page 274.

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.



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:

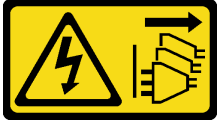
When replacing the lithium battery, use only Lenovo specified part number or an equivalent type battery recommended by the manufacturer. If your system has a module containing a lithium battery,

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 142.
2. Remove any parts and disconnect any cables that might impede your access to the CMOS battery.

To remove the CMOS battery, complete the following steps:

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

- YouTube: <https://www.youtube.com/playlist?list=PLYV5R7hVcs-BYiqwMTzXbqbC6fhKRScdR>
- Youku: http://list.youku.com/albumlist/show/id_52222445.html

Step 1. Locate the CMOS battery. See “System board components” on page 26.

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.

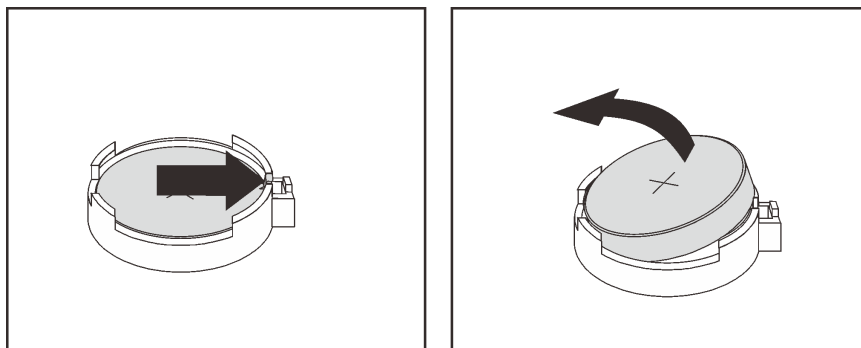


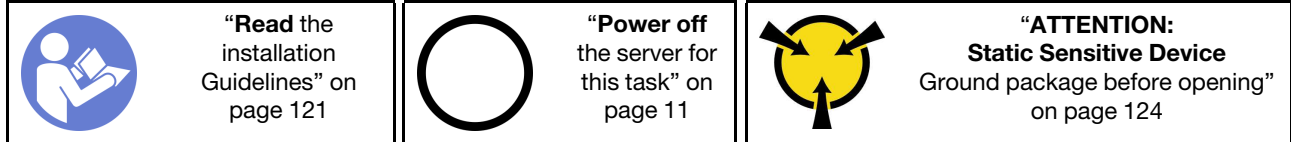
Figure 173. CMOS battery removal

After removing the CMOS battery:

1. Install a new CMOS battery. See “Install the CMOS battery” on page 211.
2. Dispose of the CMOS battery as required by local ordinances or regulations.

Install the CMOS battery

Use this information to install the CMOS battery.



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.
- 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:

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

- YouTube: <https://www.youtube.com/playlist?list=PLYV5R7hVcs-BYiqwMTzXbqbC6fhKRdR>
- Youku: http://list.youku.com/albumlist/show/id_52222445.html

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 and place it on a static-protective surface.

Step 2. Install the new CMOS battery as shown. Ensure that the CMOS battery socket holds the battery securely.

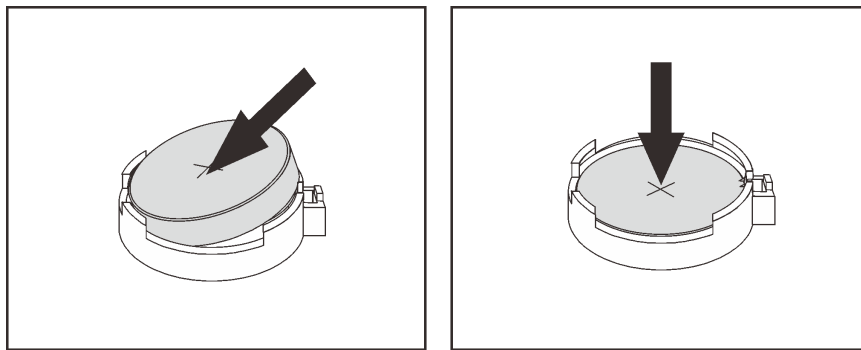


Figure 174. CMOS battery installation

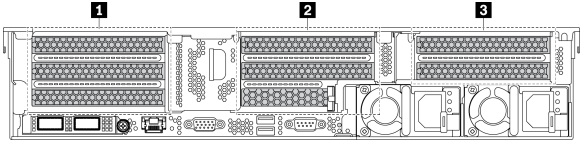
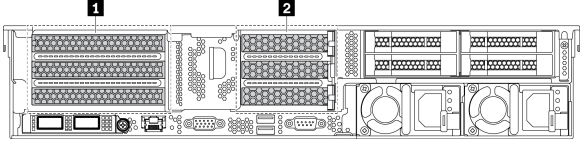
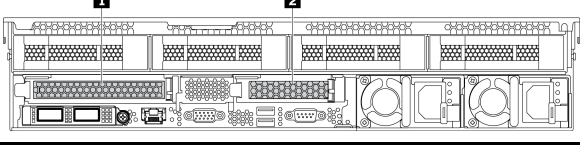
After installing the CMOS battery:

1. Complete the parts replacement. See “Complete the parts replacement” on page 274.
2. Use the Setup utility to set the date, time, and any passwords.

Riser card replacement

Use this information to remove and install a riser card.

Your server supports the following rear configurations:




Rear configuration	Image
<p>8 PCIe slots: The server has eight PCIe slots, without any rear drive cage.</p> <ul style="list-style-type: none"> • 1: riser 1 bracket, 3FH • 2: riser 2 bracket, 2FH1LP • 3: riser 3 bracket, 2FH 	
<p>Rear 2.5-inch drive cage: The server has six PCIe slots, with a rear 2.5-inch drive cage.</p> <ul style="list-style-type: none"> • 1: riser 1 bracket, 3FH • 2: riser 2 bracket, 3LP 	
<p>Rear 3.5-inch drive cage: The server has two PCIe slots, with a rear 3.5-inch drive cage.</p> <ul style="list-style-type: none"> • 1: riser 1 bracket, 1FH • 2: riser 2 bracket, 1LP 	

Depending on your configuration, refer to the specific topics to remove or install a riser card:

- “Remove a riser card (8 PCIe slots)” on page 213
- “Remove a riser card (rear 2.5-inch drive cage)” on page 214
- “Remove a riser card (rear 3.5-inch drive cage)” on page 216
- “Install a riser card (8 PCIe slots)” on page 217
- “Install a riser card (rear 2.5-inch drive cage)” on page 219
- “Install a riser card (rear 3.5-inch drive cage)” on page 220

Remove a riser card (8 PCIe slots)

Use this information to remove a riser card.

 <p>“Read the installation Guidelines” on page 121</p>	 <p>“Power off the server for this task” on page 11</p>	 <p>“ATTENTION: Static Sensitive Device Ground package before opening” on page 124</p>
---	--	--

Before removing a riser card:

1. Remove the top cover. See “Remove the top cover” on page 142.
2. If there is any PCIe adapter installed on the riser card, record the cable connections first. Then, disconnect all cables from the PCIe adapter.

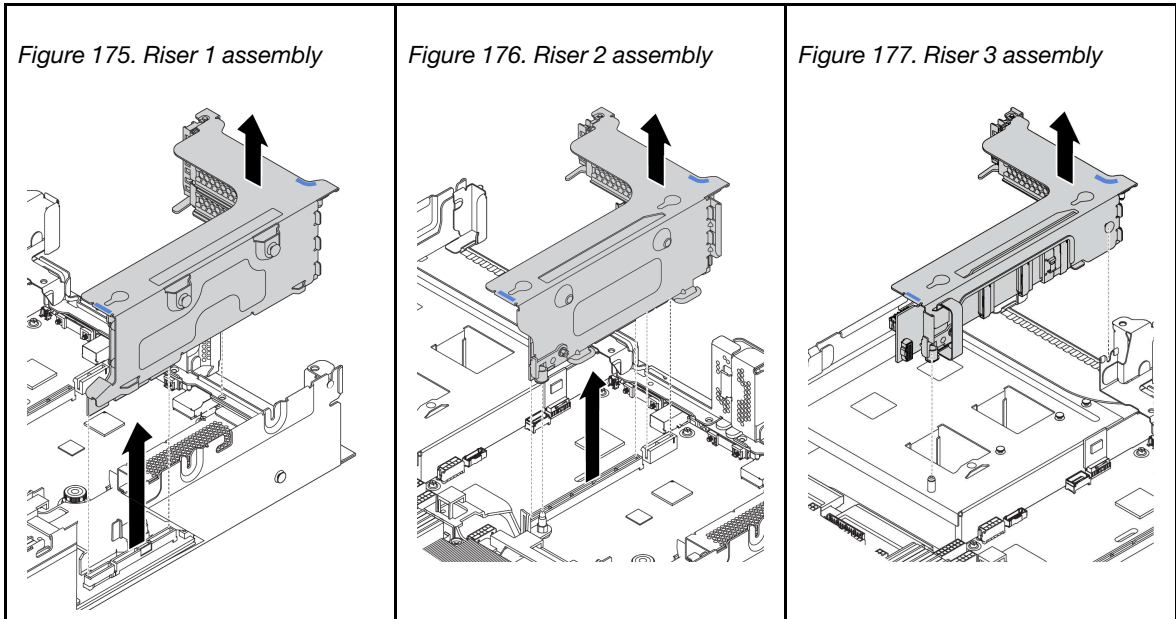
To remove a riser card, complete the following steps:

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

- YouTube: <https://www.youtube.com/playlist?list=PLYV5R7hVcs-BYjgwMTzXbqbC6fhKRScdR>
- Youku: http://list.youku.com/albumlist/show/id_52222445.html

Step 1. Grasp the riser assembly by its edges and carefully lift it straight up and off the chassis.

Table 18. Riser assembly removal



- Step 2. Remove the PCIe adapters that are installed on the riser card. See “Remove a PCIe adapter” on page 225.
- Step 3. Remove the two screws that secure the failing riser card. Then, remove the failing riser card from the bracket.

Note: The illustration shows removing the riser card from riser 1 bracket. The procedure is the same for removing riser cards from other riser brackets.

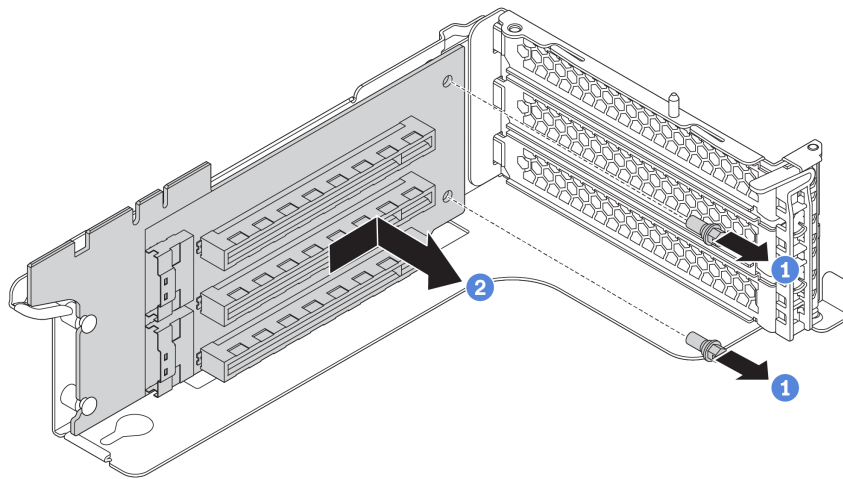
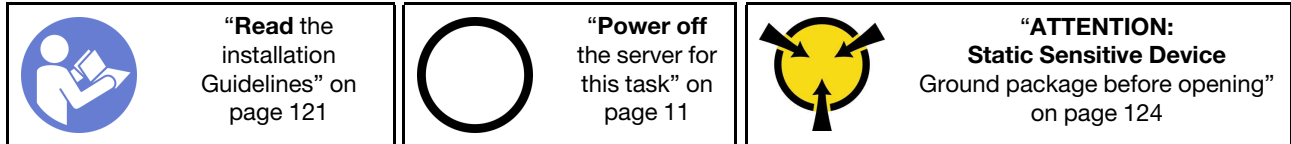


Figure 178. Riser card removal

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

Remove a riser card (rear 2.5-inch drive cage)

Use this information to remove a riser card.



Before removing a riser card:

1. Remove the top cover. See “Remove the top cover” on page 142.
2. If there is any PCIe adapter installed on the riser card, record the cable connections first. Then, disconnect all cables from the PCIe adapter.

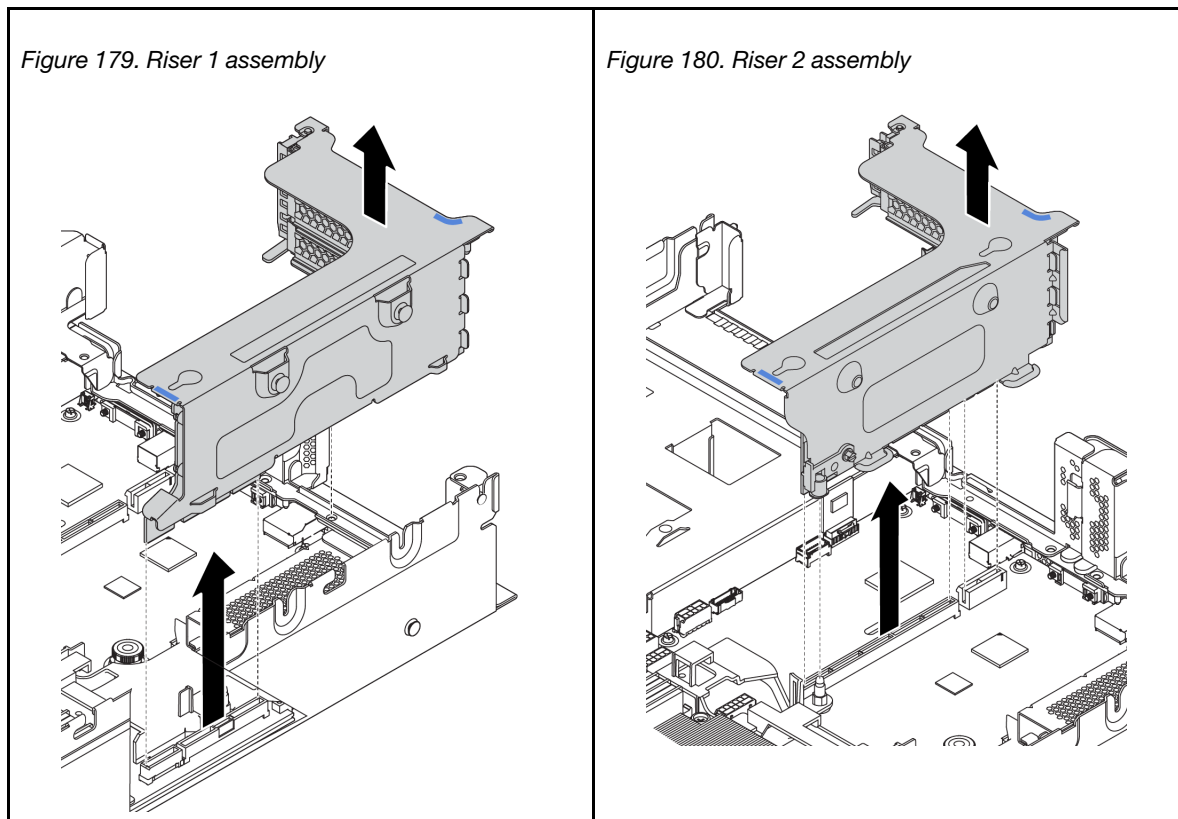
To remove a riser card, complete the following steps:

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

- YouTube: <https://www.youtube.com/playlist?list=PLYV5R7hVcs-BYigwMTzXbgbC6fhKRrCdR>
- Youku: http://list.youku.com/albumlist/show/id_52222445.html

Step 1. Grasp the riser assembly by its edges and carefully lift it straight up and off the chassis.

Table 19. Riser assembly removal



Step 2. Remove the PCIe adapters that are installed on the riser card. See “Remove a PCIe adapter” on page 225.

Step 3. Remove the two screws that secure the failing riser card. Then, remove the failing riser card from the bracket.

Note: The illustration shows removing the riser card from riser 1 bracket. The procedure is the same for removing riser cards from other riser brackets.

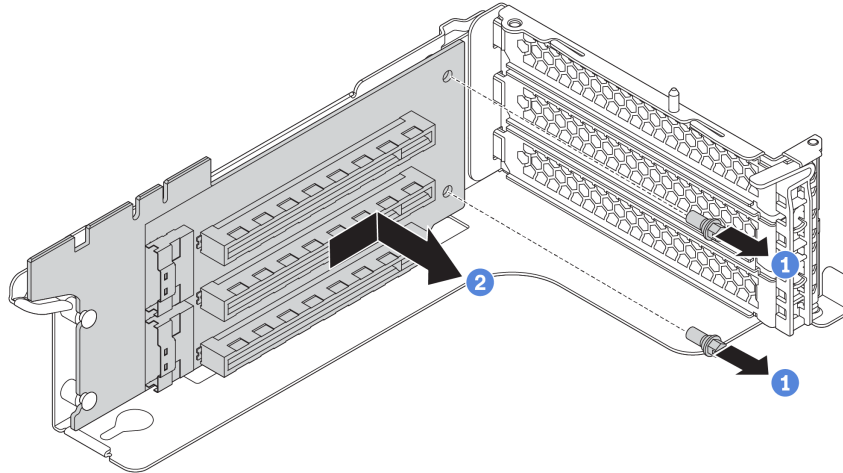

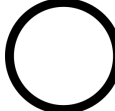



Figure 181. Riser card removal

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

Remove a riser card (rear 3.5-inch drive cage)

Use this information to remove a riser card.

	“Read the installation Guidelines” on page 121		“Power off the server for this task” on page 11		“ATTENTION: Static Sensitive Device Ground package before opening” on page 124
---	---	---	--	--	--

Before removing a riser card:

1. Remove the top cover. See “Remove the top cover” on page 142.
2. Remove the rear 3.5-inch drive cage to access to the riser bracket. See “Remove the rear 3.5-inch drive cage” on page 241.
3. If there is any PCIe adapter installed on the riser card, record the cable connections first. Then, disconnect all cables from the PCIe adapter.

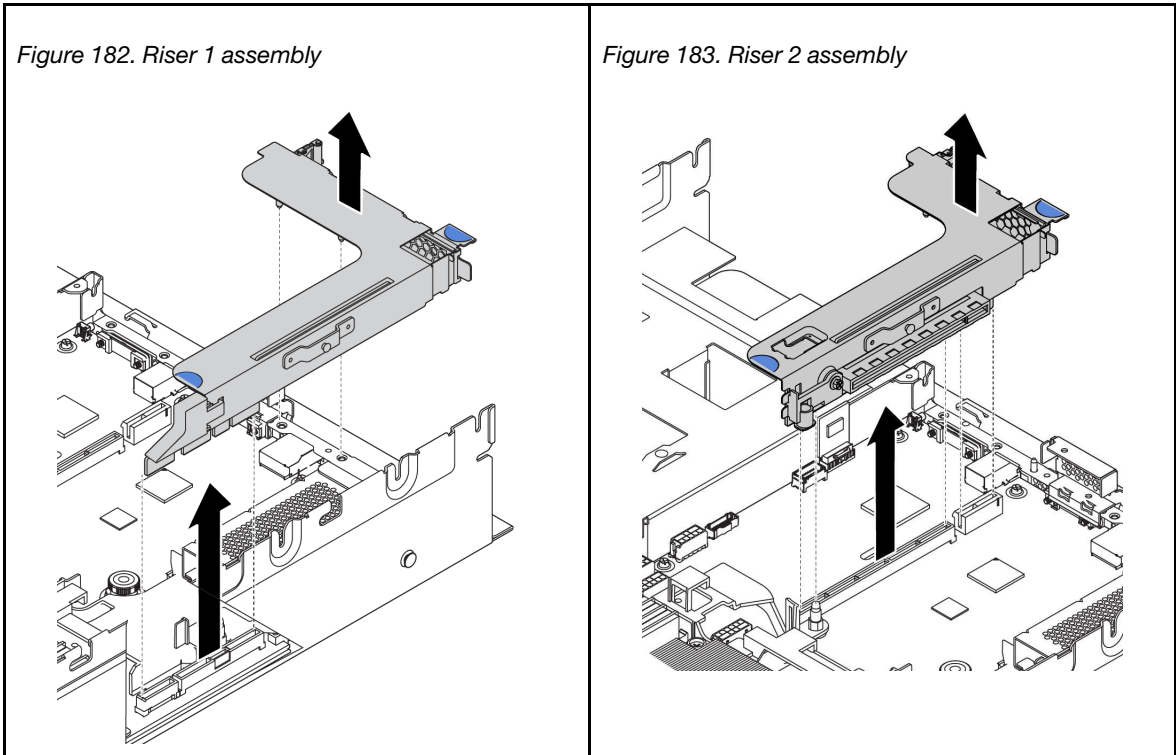
To remove a riser card, complete the following steps:

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

- YouTube: <https://www.youtube.com/playlist?list=PLYV5R7hVcs-BYjgwMTzXbgbC6fhKRcCdR>
- Youku: http://list.youku.com/albumlist/show/id_52222445.html

Step 1. Grasp the riser assembly by its edges and carefully lift it straight up and off the chassis.

Table 20. Riser assembly removal



- Step 2. Remove the PCIe adapters that are installed on the riser card. See “Remove a PCIe adapter” on page 225.
- Step 3. Remove the two screws that secure the failing riser card. Then, remove the failing riser card from the bracket.

Note: The illustration shows removing the riser card from riser 1 bracket. The procedure is the same for removing riser cards from other riser brackets.

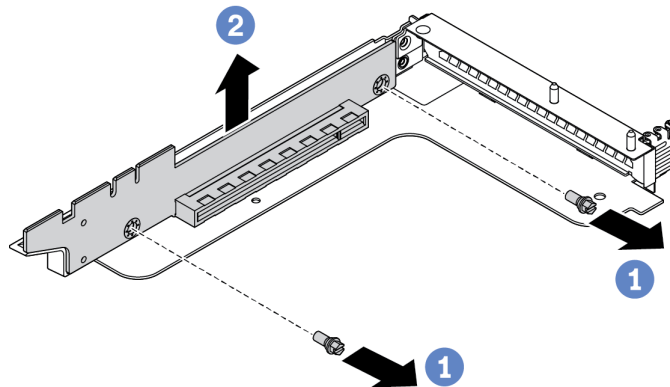
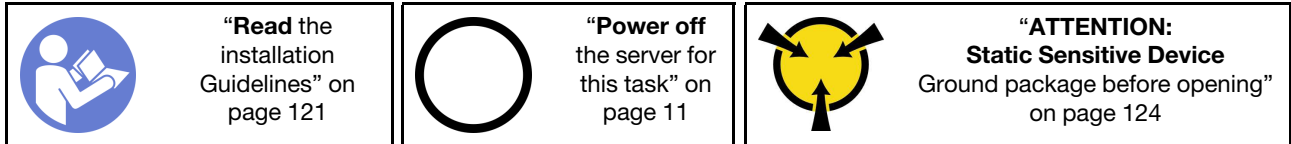


Figure 184. Riser card removal

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

Install a riser card (8 PCIe slots)

Use this information to install a riser card.



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:

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

- YouTube: <https://www.youtube.com/playlist?list=PLYV5R7hVcs-BYjgwMTzXbgbC6fhKRcCdR>
- Youku: http://list.youku.com/albumlist/show/id_52222445.html

Step 1. Align the holes in the riser card with the mounting studs on the bracket. Install the riser card to the bracket in the direction as shown. Then, install the two screws to secure the riser card to the bracket.

Note: The illustration shows installing the riser card in riser 1 bracket. The procedure is the same for installing riser cards in other riser brackets.

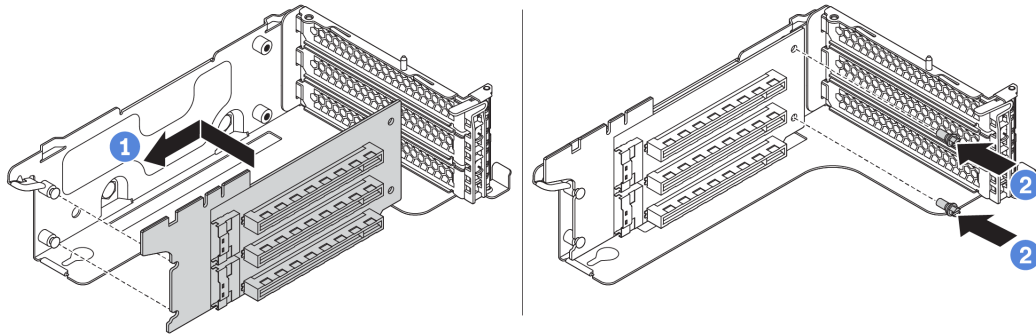
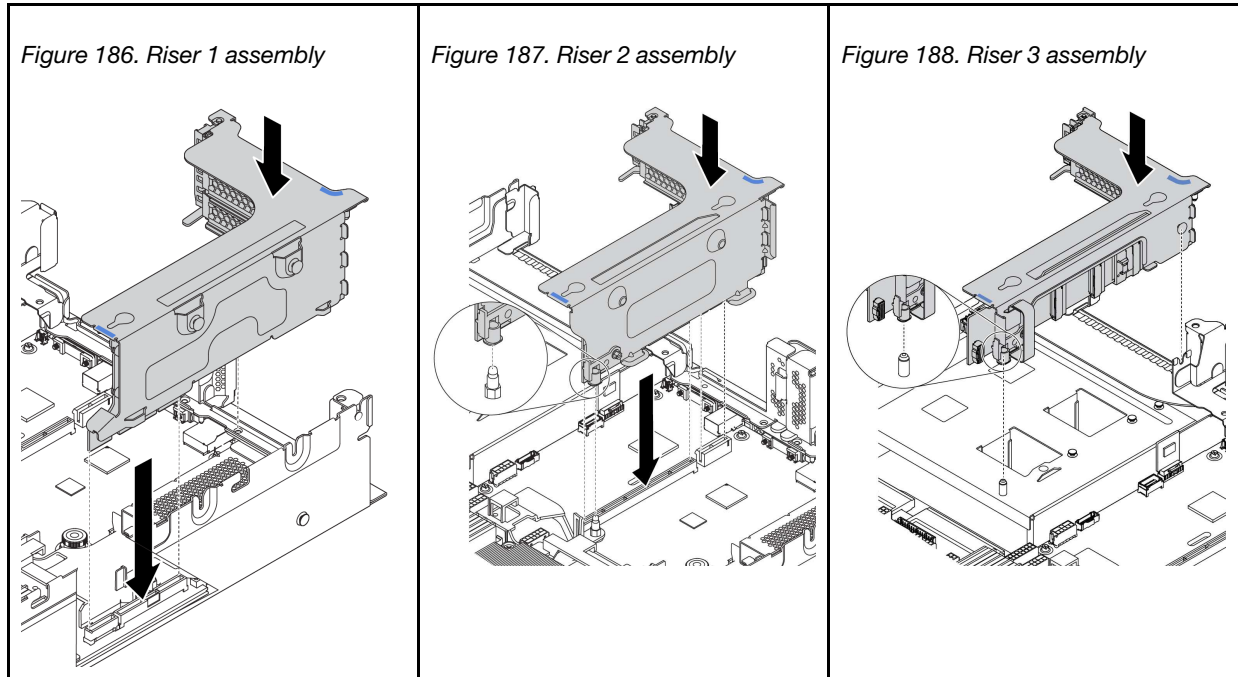


Figure 185. Riser card installation

After installing the riser card:

1. Refer to your note to reconnect any cables to the removed PCIe adapters.
2. Reinstall the PCIe adapters on the new riser card. See “Install a PCIe adapter” on page 227.
3. Install the riser assembly.


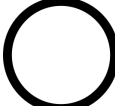

Table 21. Riser assembly installation



4. Complete the parts replacement. See “Complete the parts replacement” on page 274.

Install a riser card (rear 2.5-inch drive cage)

Use this information to install a riser card.

	“Read the installation Guidelines” on page 121		“Power off the server for this task” on page 11		“ATTENTION: Static Sensitive Device Ground package before opening” on page 124
---	--	---	---	--	--

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:

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

- YouTube: <https://www.youtube.com/playlist?list=PLYV5R7hVcs-BYjgwMTzXbgbC6fhKRcCdR>
- Youku: http://list.youku.com/albumlist/show/id_52222445.html

Step 1. Align the holes in the riser card with the mounting studs on the bracket. Install the riser card to the bracket in the direction as shown. Then, install the two screws to secure the riser card to the bracket.

Note: The illustration shows installing the riser card in riser 1 bracket. The procedure is the same for installing riser cards in other riser brackets.

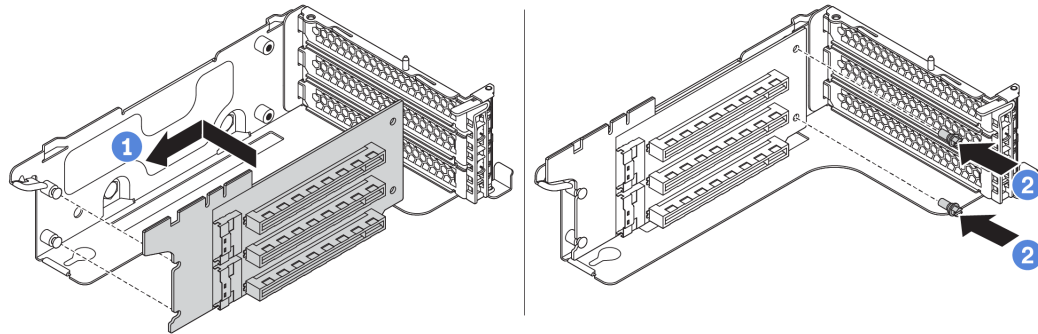
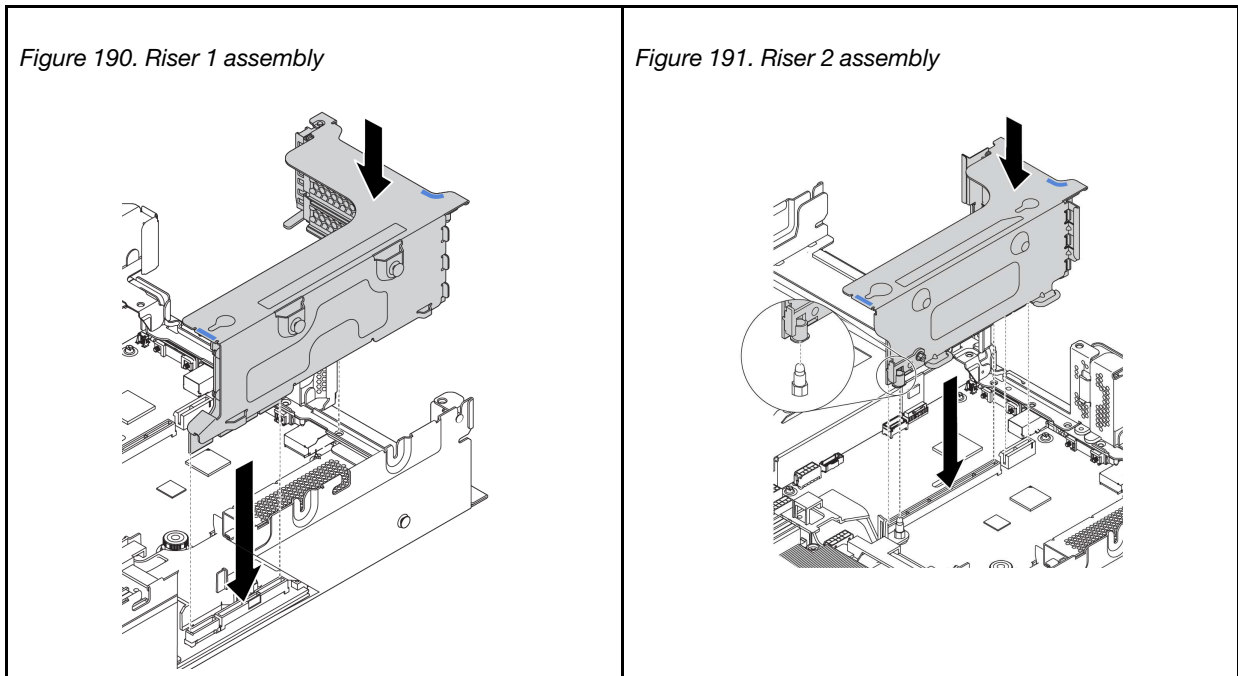


Figure 189. Riser card installation

After installing the riser card:

1. Reconnect any cables to the removed PCIe adapters. See “Riser cards” on page 46.
2. Reinstall the PCIe adapters on the new riser card. See “Install a PCIe adapter” on page 227.
3. Install the riser assembly.

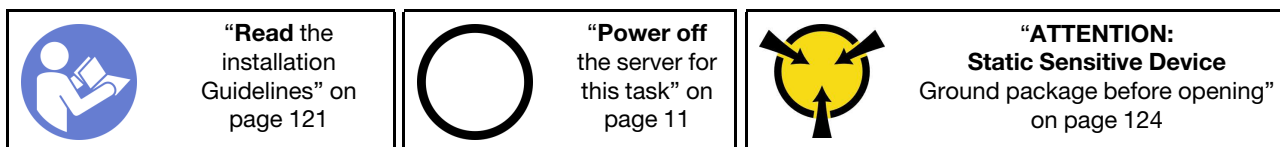
Table 22. Riser assembly installation



4. Complete the parts replacement. See “Complete the parts replacement” on page 274.

Install a riser card (rear 3.5-inch drive cage)

Use this information to install a riser card.



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:

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

- YouTube: <https://www.youtube.com/playlist?list=PLYV5R7hVcs-BYjgwMTzXbgbC6fhKRsCdR>
- Youku: http://list.youku.com/albumlist/show/id_52222445.html

Step 1. Align the holes in the riser card with the mounting studs on the bracket. Then, install the riser card to the bracket in the direction as shown. then, install the two screws to secure the riser card to the bracket.

Note: The illustration shows installing the riser card in riser 1 bracket. The procedure is the same for installing riser cards in other riser brackets.

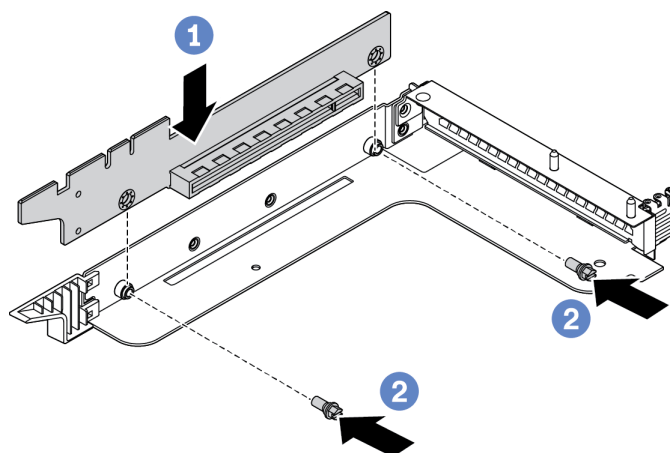
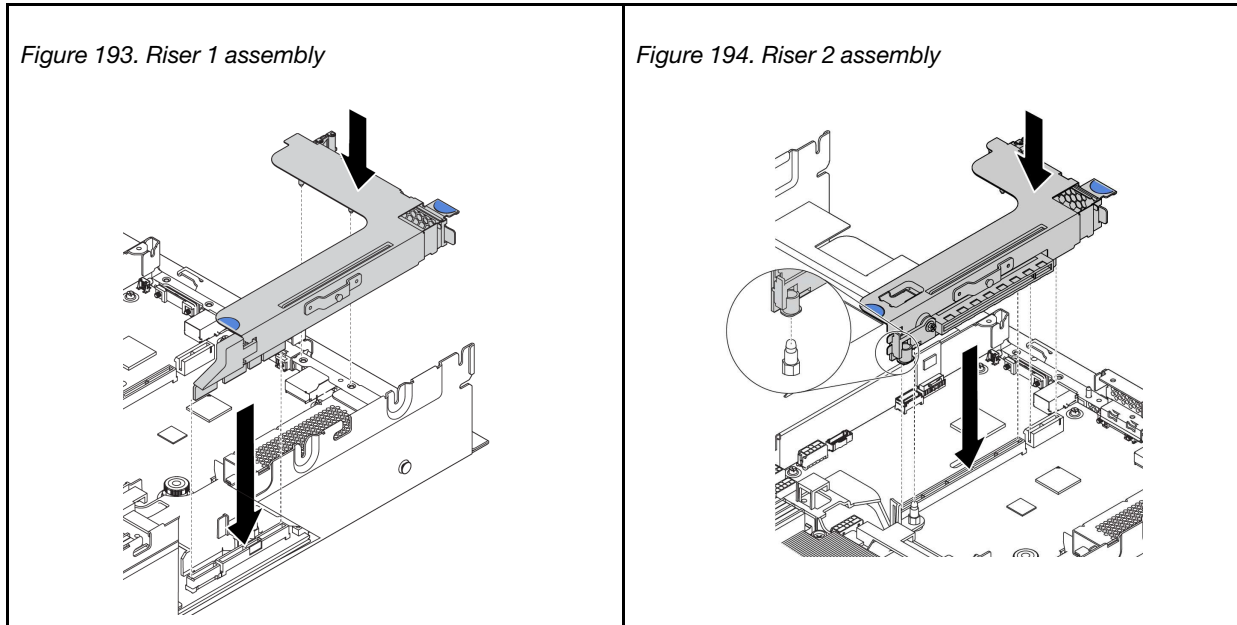


Figure 192. Riser card installation

After installing the riser card:

1. Reconnect any cables to the removed PCIe adapters. See “Riser cards” on page 46.
2. Reinstall the PCIe adapters on the new riser card. See “Install a PCIe adapter” on page 227.
3. Install the riser assembly.

Table 23. Riser assembly installation



4. Install the rear 3.5-inch drive cage. See “Install the rear 3.5-inch drive cage” on page 242.
5. Complete the parts replacement. See “Complete the parts replacement” on page 274.

Intrusion switch replacement

Use this information to remove and install the 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).


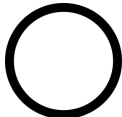

Notes: The intrusion switch assembly can only be installed onto the riser 2 bracket of the following rear configurations:

- 8 PCIe slots: The server has eight PCIe slots, without any rear drive cage.
- Rear 2.5-inch drive cage: The server has six PCIe slots, with a rear 2.5-inch drive cage.

For more information about the rear configurations, see “Riser card replacement” on page 212.

Remove the intrusion switch

Use this information to remove the intrusion switch.

	“Read the installation Guidelines” on page 121		“Power off the server for this task” on page 11		“ATTENTION: Static Sensitive Device Ground package before opening” on page 124
---	---	---	--	--	--

Before removing the 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 142.
3. Remove the riser 2 assembly. See “Remove a riser card (8 PCIe slots)” on page 213 or “Remove a riser card (rear 2.5-inch drive cage)” on page 214.

To remove the intrusion switch, complete the following steps:

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

- YouTube: <https://www.youtube.com/playlist?list=PLYV5R7hVcs-BYigwMTzXbqbC6fhKRrCdR>
- Youku: http://list.youku.com/albumlist/show/id_52222445.html

Step 1. Disconnect the cable of the intrusion switch from the system board.

Step 2. Remove the intrusion switch assembly from the riser bracket:

1. Loosen the screw.
2. Slide the intrusion switch assembly as shown to remove it from the riser bracket.

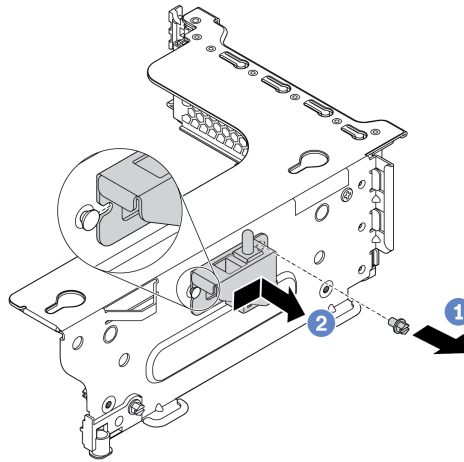


Figure 195. Intrusion switch assembly removal

Step 3. Slide the intrusion switch as shown to remove it from the intrusion switch bracket.

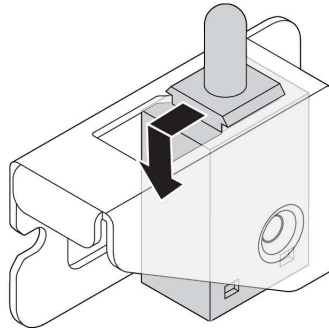





Figure 196. Intrusion switch removal

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

Install the intrusion switch

Use this information to install the intrusion switch.

	“Read the installation Guidelines” on page 121		“Power off the server for this task” on page 11		“ATTENTION: Static Sensitive Device Ground package before opening” on page 124
---	---	---	--	--	--

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 the intrusion switch, complete the following steps:

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

- YouTube: <https://www.youtube.com/playlist?list=PLYV5R7hVcs-BYjgwMTzXbgbC6fhKRcCdR>
- Youku: http://list.youku.com/albumlist/show/id_52222445.html

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

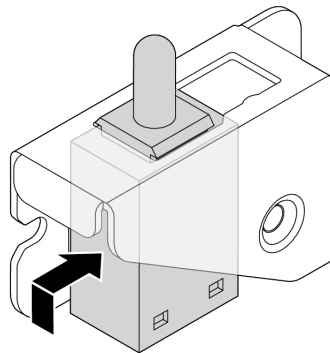


Figure 197. Intrusion switch installation

Step 2. Install the intrusion switch assembly onto the riser bracket as illustrated:

1. Slide the intrusion switch assembly in the direction as shown until it is fully seated.
2. Tighten the screw.

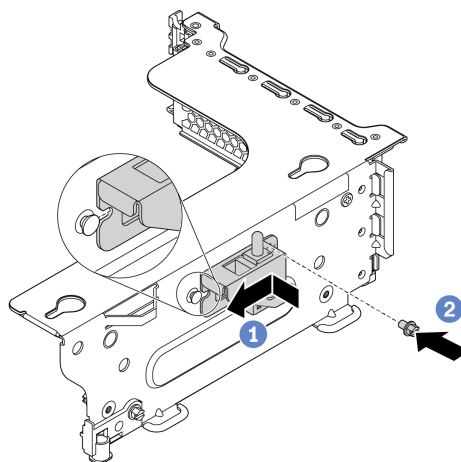


Figure 198. Intrusion switch assembly installation

Step 3. Connect the cable of the intrusion switch to the intrusion switch connector on the system board. For the location of the intrusion switch connector, refer to “System board components” on page 26.

After installing the intrusion switch:

1. Install the riser 2 assembly. See “Install a riser card (8 PCIe slots)” on page 217 or “Install a riser card (rear 2.5-inch drive cage)” on page 219.
2. Connect the intrusion switch cable to the system board. See “Intrusion switch” on page 46
3. Complete the parts replacement. See “Complete the parts replacement” on page 274.

PCIe adapter replacement

Use this information to remove and install a PCIe adapter.

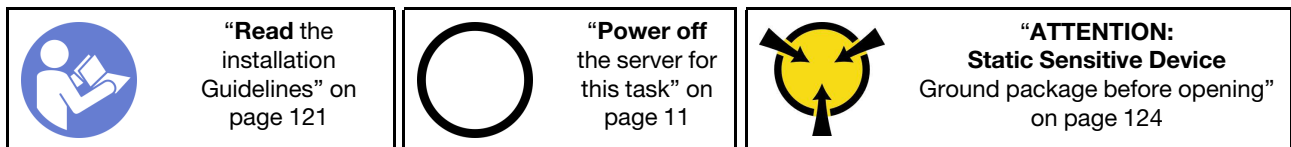
The PCIe adapter can be an Ethernet card, a host bus adapter, a RAID adapter, a PCIe solid-state drive, or any other supported PCIe adapters. PCIe adapters vary by type, but the installation and removal procedures are the same.

Note: For a list of the supported PCIe adapters, see:

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

Remove a PCIe adapter

Use this information to remove a PCIe adapter.



Notes:

- Depending on the specific type, your PCIe adapter, riser card, and riser bracket might look different from the illustration in this topic. The illustration shows how to remove a PCIe adapter from riser card 1 in riser 1 bracket. The removal procedure is similar for PCIe adapters on other riser cards in other riser brackets.
- Use any documentation that comes with the PCIe adapter and follow those instructions in addition to the instructions in this topic.

Before removing a PCIe adapter:

1. Remove the top cover. See “Remove the top cover” on page 142.
2. Record the cable connections on the PCIe adapter and then disconnect all cables from the PCIe adapter.
3. Remove the riser bracket and lay it upside down on a flat, clean, and static-protective surface. See “Riser card replacement” on page 212.

To remove a PCIe adapter, complete the following steps:

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

- YouTube: <https://www.youtube.com/playlist?list=PLYV5R7hVcs-BYjgwMTzXbqbC6fhKRsCdR>
- Youku: http://list.youku.com/albumlist/show/id_52222445.html

Step 1. Press the tab to pivot the PCIe adapter retention latch to the open position.

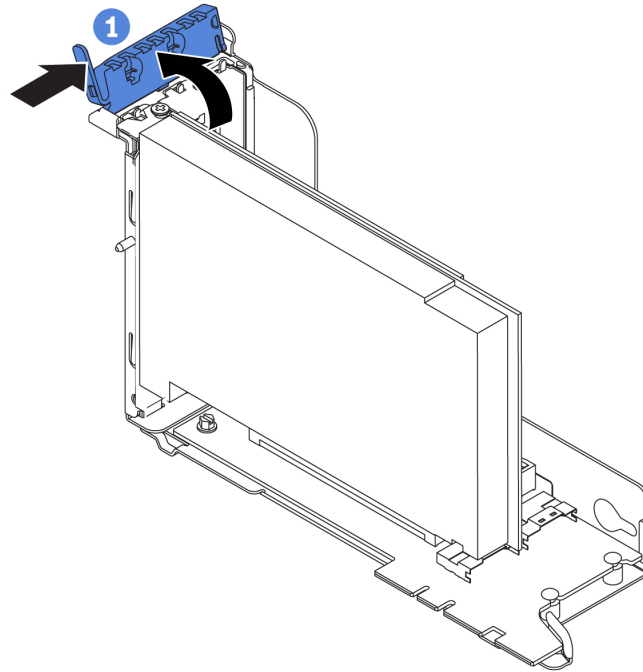


Figure 199. PCIe adapter removal (1)

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

Note: The PCIe adapter might fit tightly into the PCIe slot. If necessary, alternatively move each side of the PCIe adapter a small and equal amount until it is removed from the slot.

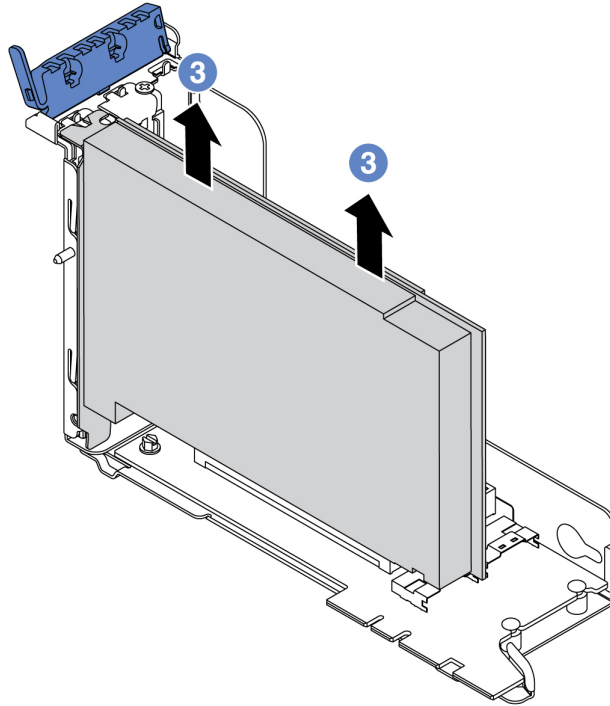

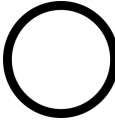



Figure 200. PCIe adapter removal (3)

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

Install a PCIe adapter

Use the following information to install a PCIe adapter.

	<p>“Read the installation Guidelines” on page 121</p>		<p>“Power off the server for this task” on page 11</p>		<p>“ATTENTION: Static Sensitive Device Ground package before opening” on page 124</p>
---	---	---	--	--	---

Notes:

- Depending on the specific type, your PCIe adapter, riser card, and riser bracket might look different from the illustration in this topic. The illustration shows how to install a PCIe adapter onto riser card 1 in riser 1 bracket. The installation procedure is similar for PCIe adapters on other riser cards in other riser brackets.
- Use any documentation that comes with the PCIe adapter and follow those instructions in addition to the instructions in this topic.

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. If you are going to install a RAID/HBA adapter, refer to “Technical rules for storage controller adapters” on page 129.
3. If you are going to install a PCIe SSD adapter, refer to “Technical rules for PCIe Flash storage adapters” on page 132.
4. If you are going to install a GPU adapter, refer to “Install a GPU adapter” on page 232.
5. If you are going to install a PCIe network adapter, note that PCIe network adapter of 10 GbE or higher can not be installed in slot 3.
6. If the server is installed with a 280-watt processor, refer to “Rules about 280-watt processor selection” on page 128 for PCIe adapter limitations.
7. Locate an appropriate PCIe slot. See “Rear view” on page 20 to identify the PCIe slots of your server.

To install a PCIe adapter, complete the following steps:

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

- YouTube: <https://www.youtube.com/playlist?list=PLYV5R7hVcs-BYiqwMTzXbgbC6fhKRsCdR>
- Youku: http://list.youku.com/albumlist/show/id_52222445.html

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

Note: Carefully handle the PCIe adapter by its edges.

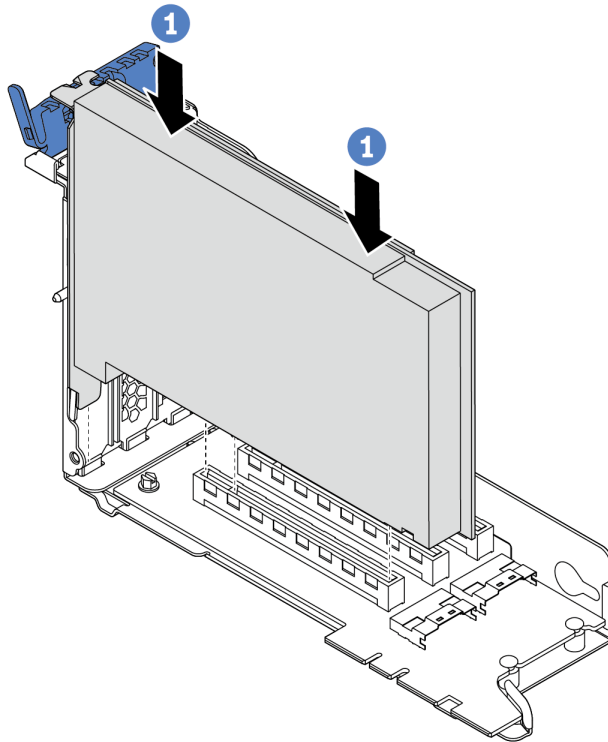


Figure 201. PCIe adapter installation (1)

Step 2. Pivot the PCIe adapter retention latch to the closed position.

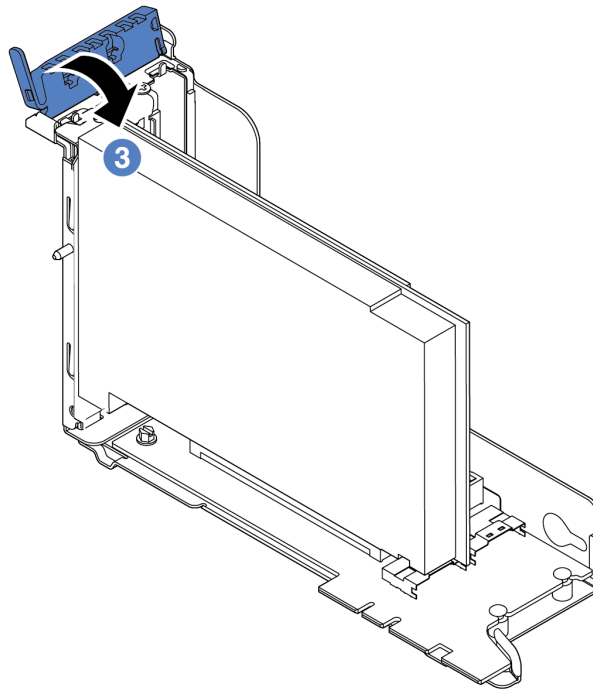


Figure 202. PCIe adapter installation (3)

After installing the PCIe adapter on the riser assembly:


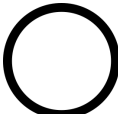

1. Refer to your record to reconnect the cables. See “Riser cards” on page 46.
2. Reinstall the riser bracket. See “Riser card replacement” on page 212.
3. Complete the parts replacement. See “Complete the parts replacement” on page 274.

GPU replacement

Use this information to remove and install a GPU adapter.

Remove a GPU adapter

Use this information to remove a GPU adapter.

	“Read the installation Guidelines” on page 121		“Power off the server for this task” on page 11		“ATTENTION: Static Sensitive Device Ground package before opening” on page 124
---	---	---	--	--	--

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 142.

2. Remove the riser bracket that has the GPU adapter installed. For instructions on how to remove the riser bracket, see “Riser card replacement” on page 212.

To remove a GPU adapter, complete the following steps:

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

- YouTube: <https://www.youtube.com/playlist?list=PLYV5R7hVcs-BYjgwMTzXbqbC6fhKRsCdR>
- Youku: http://list.youku.com/albumlist/show/id_52222445.html

Step 1. Depending on the GPU type, remove the add-on GPU air baffle for the GPU adapter.

- For a double-wide GPU adapter (for example, NVIDIA V100 GPU):

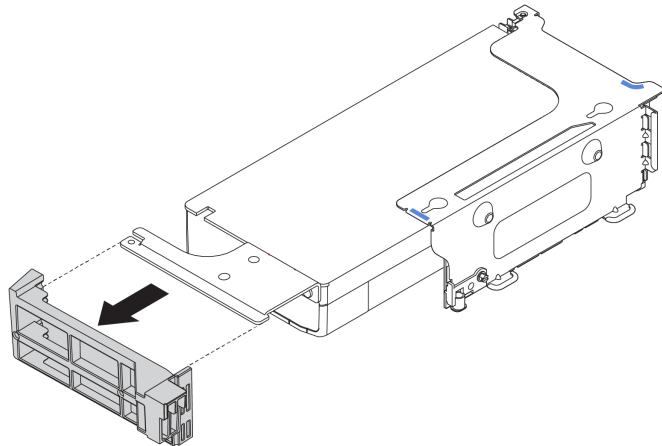


Figure 203. Removing the add-on GPU air baffle for a double-wide GPU adapter

- For a single-wide GPU adapter (for example, NVIDIA T4 GPU):

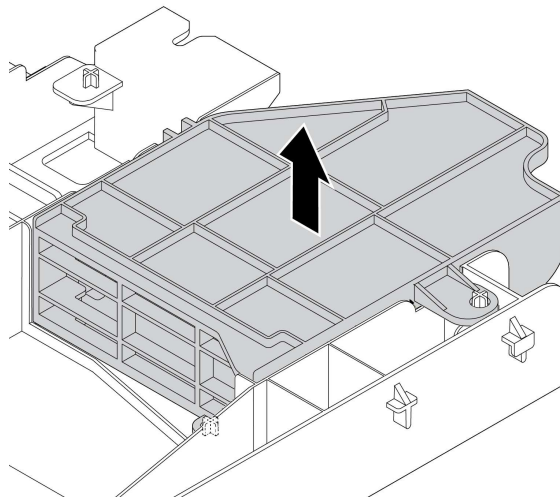


Figure 204. Removing the add-on GPU air baffle for a single-wide GPU adapter


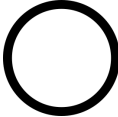

Step 2. Disconnect the power cable from the GPU adapter.

Step 3. Remove the GPU adapter from the riser bracket. See “Remove a PCIe adapter” on page 225.

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

Install a GPU adapter

Use this information to install a GPU adapter.

 <p>“Read the installation Guidelines” on page 121</p>	 <p>“Power off the server for this task” on page 11</p>	 <p>“ATTENTION: Static Sensitive Device Ground package before opening” on page 124</p>
--	---	---

Note: GPU adapters are supported on some server models with requirements. See “Technical rules for GPU adapters” on page 129.

The GPU adapter kit comes with a 1U performance heat sink, performance system fans (speed of 29000 RPM), and GPU air baffles. Before installing the GPU:

1. Install the 1U performance heat sink. See “Install a heat sink” on page 258
2. Install the performance system fans. See “Install a system fan” on page 171
3. Install the required air baffle. See “Install the air baffle” on page 148.

To install a GPU adapter, complete the following steps:

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

- YouTube: <https://www.youtube.com/playlist?list=PLYV5R7hVcs-BYjgwMTzXbgbC6fhKRrCdR>
- Youku: http://list.youku.com/albumlist/show/id_52222445.html

Step 1. Depending on the GPU type, install the add-on GPU air baffle for the GPU adapter.

- For a double-wide GPU adapter (for example, NVIDIA V100 GPU): If the GPU adapter does not have a bracket installed, install the screws to secure the GPU bracket **1** to the GPU adapter. Then, install the add-on GPU air baffle **2** to the GPU adapter.

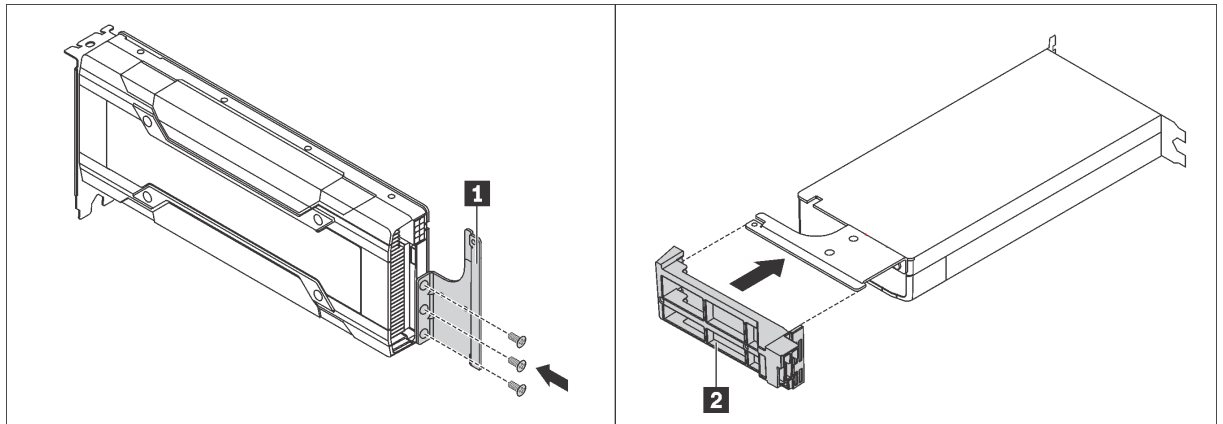


Figure 205. Installing the add-on GPU air baffle for a double-wide GPU adapter

- For a single-wide GPU adapter (for example, NVIDIA T4 GPU), install the add-on GPU air baffle onto the air baffle.

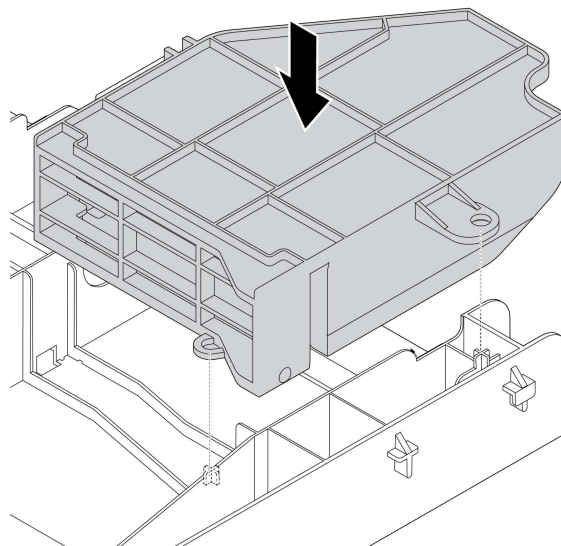


Figure 206. Installing the add-on GPU air baffle for a single-wide GPU adapter

Step 2. Locate the appropriate PCIe slot for the GPU adapter.

Step 3. 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 227.

Step 4. Connect the power cable to the power connector on the GPU. See “GPU adapters” on page 45.

Step 5. Install the riser assembly. See “Riser card replacement” on page 212.

After installing the GPU adapter, complete the parts replacement. See “Complete the parts replacement” on page 274.

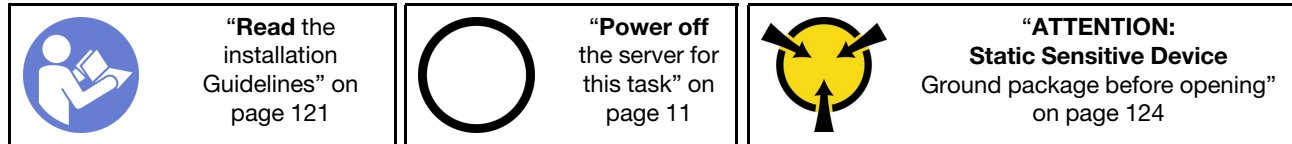
TPM adapter replacement (for Chinese Mainland only)

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 (for Chinese Mainland only)

Use this information to remove the TPM adapter.



Before removing the TPM adapter, remove the top cover. See “Remove the top cover” on page 142.

To remove the TPM adapter, complete the following steps:

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

- YouTube: <https://www.youtube.com/playlist?list=PLYV5R7hVcs-BYjgwMTzXbgbC6fhKRScdR>
- Youku: http://list.youku.com/albumlist/show/id_52222445.html

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

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

Notes:

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

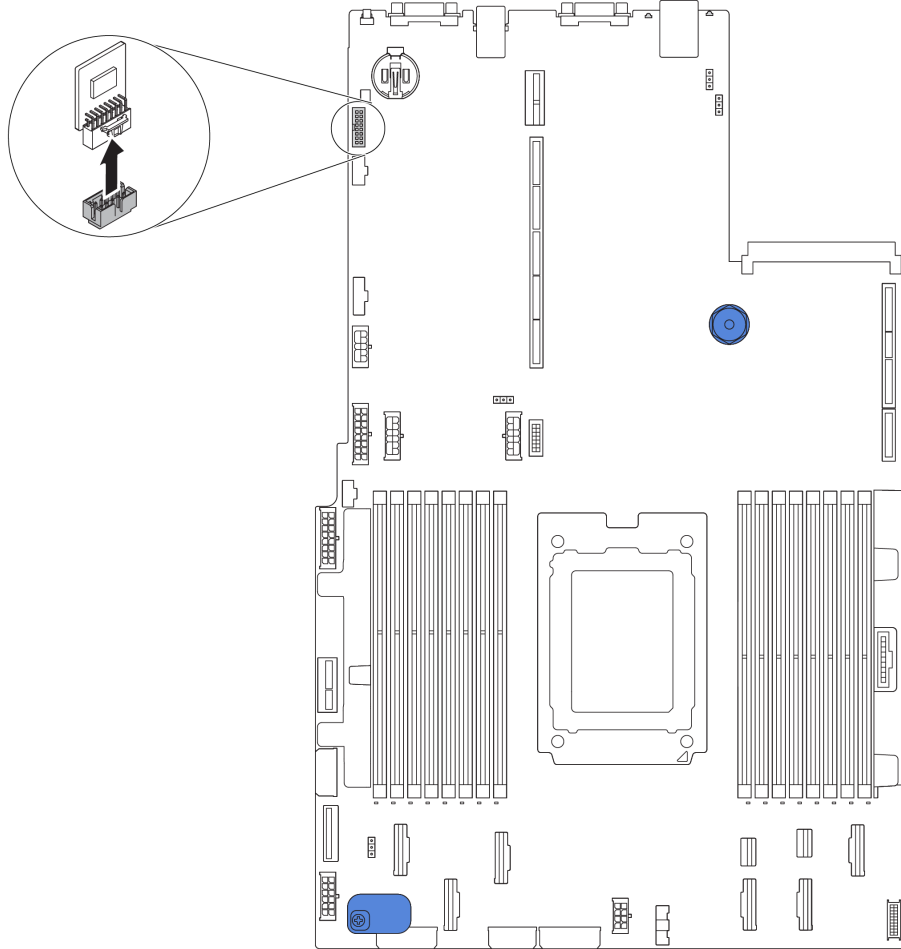

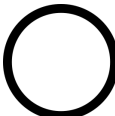



Figure 207. TPM adapter removal

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 (for Chinese Mainland only)

Use this information to install the TPM adapter.

	<p>“Read the installation Guidelines” on page 121</p>		<p>“Power off the server for this task” on page 11</p>		<p>“ATTENTION: Static Sensitive Device Ground package before opening” on page 124</p>
---	---	---	--	--	---

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

To install the TPM adapter, complete the following steps:

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

- YouTube: <https://www.youtube.com/playlist?list=PLYV5R7hVcs-BYiqwMTzXbqbC6fhKRdR>
- Youku: http://list.youku.com/albumlist/show/id_52222445.html

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

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

Notes:

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

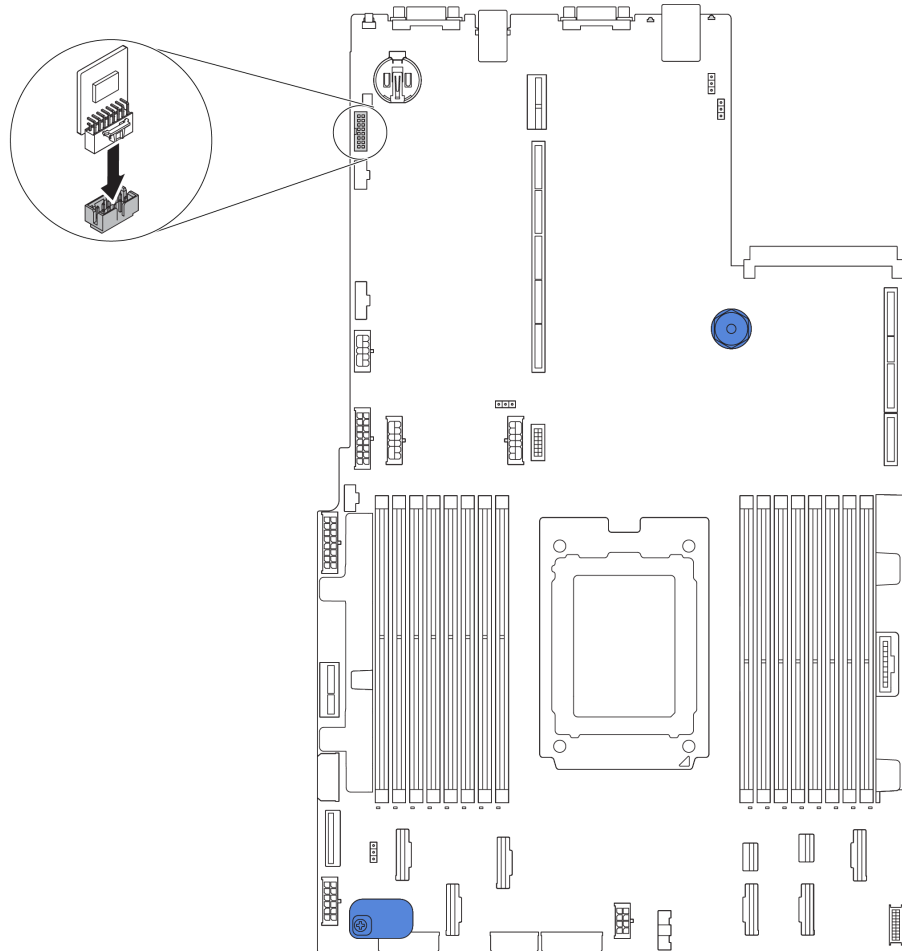


Figure 208. TPM adapter installation


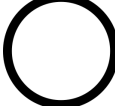

After installing the TPM adapter, complete the parts replacement. See “Complete the parts replacement” on page 274.

OCP 3.0 Ethernet adapter replacement

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

Remove the OCP 3.0 Ethernet adapter

Use this information to remove the OCP 3.0 Ethernet adapter.

	“Read the installation Guidelines” on page 121		“Power off the server for this task” on page 11		“ATTENTION: Static Sensitive Device Ground package before opening” on page 124
---	---	---	--	--	--

CAUTION:

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

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

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

- YouTube: <https://www.youtube.com/playlist?list=PLYV5R7hVcs-BYigwMTzXbqbC6fhKRsCdR>
- Youku: http://list.youku.com/albumlist/show/id_52222445.html

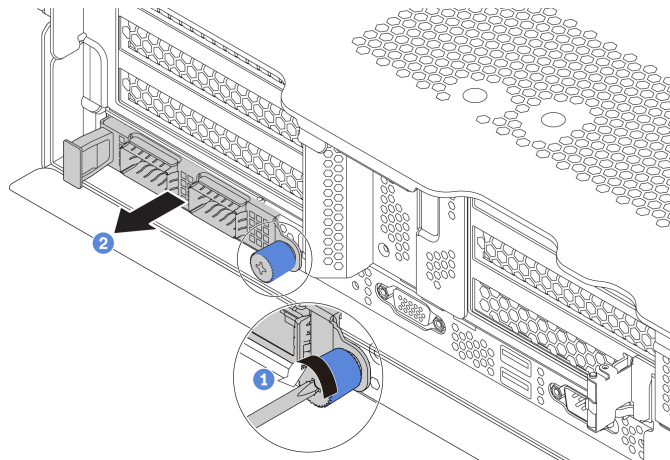


Figure 209. OCP 3.0 Ethernet adapter removal


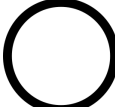

Step 1. Loosen the thumbscrew that secures the card.

Step 2. Pull out the OCP 3.0 Ethernet adapter.

After removing the OCP 3.0 Ethernet adapter, reinstall a new OCP 3.0 Ethernet adapter or a card filler.

Install the OCP 3.0 Ethernet adapter

Use this information to install the OCP 3.0 Ethernet adapter.

	“Read the installation Guidelines” on page 121		“Power off the server for this task” on page 11		“ATTENTION: Static Sensitive Device Ground package before opening” on page 124
---	---	---	--	--	--

CAUTION:

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

Before installing the OCP 3.0 Ethernet adapter, touch the static-protective package that contains the new OCP 3.0 Ethernet adapter to any unpainted surface on the outside of the server. Then, take the new OCP 3.0 Ethernet adapter out of the package and place it on a static-protective surface.

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

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

- YouTube: <https://www.youtube.com/playlist?list=PLYV5R7hVcs-BYjgwMTzXbgbC6fhKRScdR>
- Youku: http://list.youku.com/albumlist/show/id_52222445.html

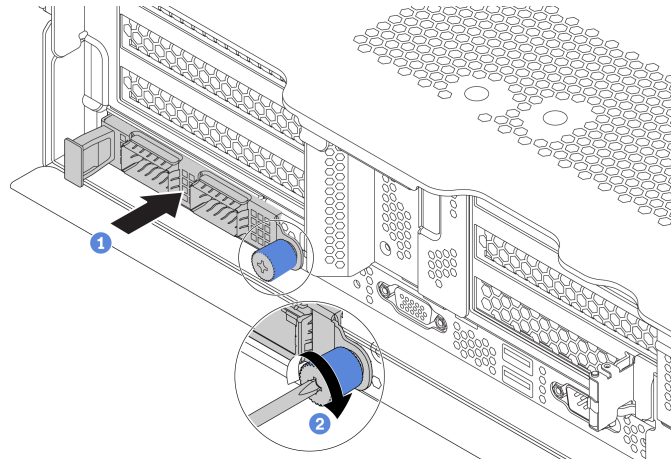


Figure 210. OCP 3.0 Ethernet adapter installation

- Step 1. Push the OCP 3.0 Ethernet adapter as shown to insert it into the connector on the system board.
- Step 2. Tighten the thumbscrew to secure the card.
- Step 3. Attach the OCP label to the rear of the server.

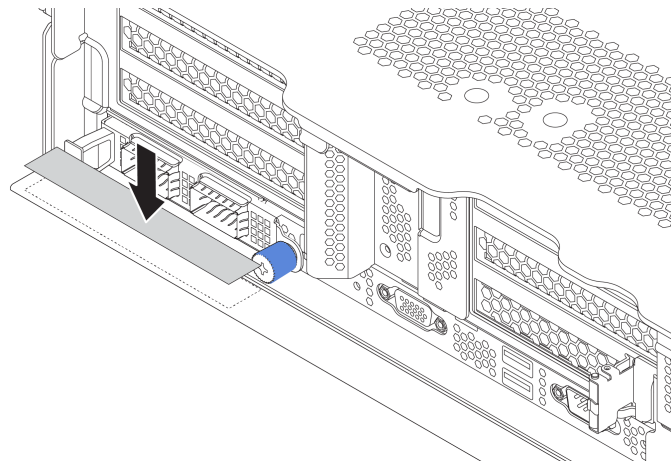


Figure 211. Attaching the OCP label

After installing the OCP 3.0 Ethernet adapter, complete the parts replacement. See “Complete the parts replacement” on page 274.

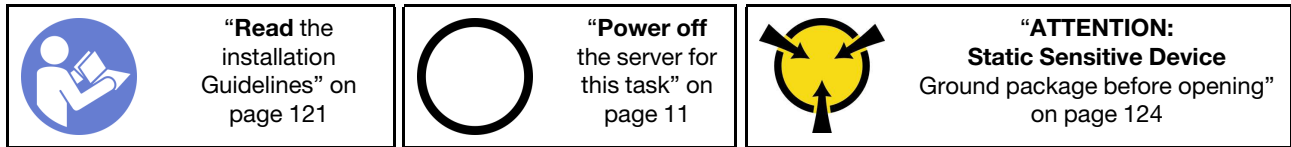
Rear drive cage replacement

Use this information to remove and install the 2.5-inch or 3.5-inch rear drive cage.

- “Remove the rear 2.5-inch drive cage” on page 239
- “Install the rear 2.5-inch drive cage” on page 240
- “Remove the rear 3.5-inch drive cage” on page 241
- “Install the rear 3.5-inch drive cage” on page 242

Remove the rear 2.5-inch drive cage

Use this information to remove the rear 2.5-inch drive cage.



Before removing the rear drive cage:

1. Remove the top cover. See “Remove the top cover” on page 142.
2. Disconnect the cables from the rear drive cage.
3. Remove all the installed drives and fillers (if any) from the drive bays. See “Remove a hot-swap drive” on page 177.

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

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

- YouTube: <https://www.youtube.com/playlist?list=PLYV5R7hVcs-BYjgwMTzXbgbC6fhKRrCdR>
- Youku: http://list.youku.com/albumlist/show/id_52222445.html

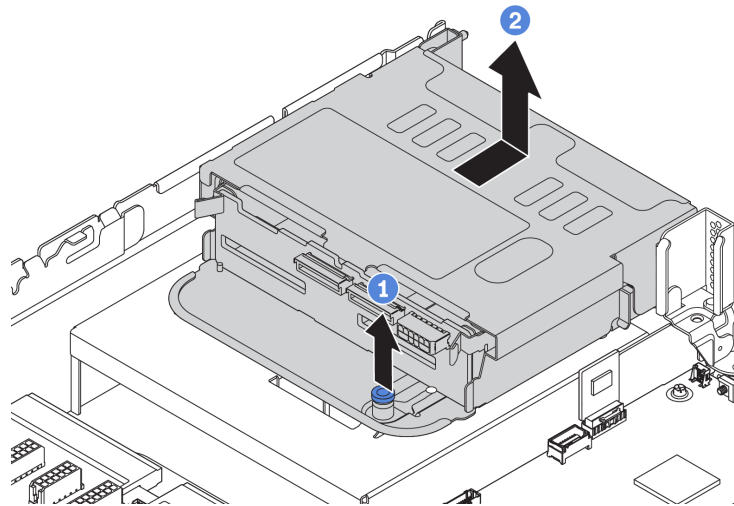


Figure 212. Removing the rear 2.5-inch drive cage


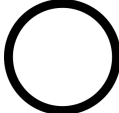

Step 1. Twist and pull out the blue plunger.

- Step 2. Slide the drive cage towards the rear of the chassis to release it.
- Step 3. If needed, remove the backplane from the drive cage. See “Middle/Rear backplane replacement” on page 189.

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

Install the rear 2.5-inch drive cage

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

 <p>“Read the installation Guidelines” on page 121</p>	 <p>“Power off the server for this task” on page 11</p>	 <p>“ATTENTION: Static Sensitive Device Ground package before opening” on page 124</p>
---	--	--

Note: The rear drive cage is supported on some server models at certain conditions. For detailed information, see “Drive bay configurations and requirements” on page 125.

The rear drive cage kit comes with required riser brackets, rear wall bracket, and performance system fans (speed of 29000 RPM). Before installing the rear drive cage:

1. Install the rear wall bracket.

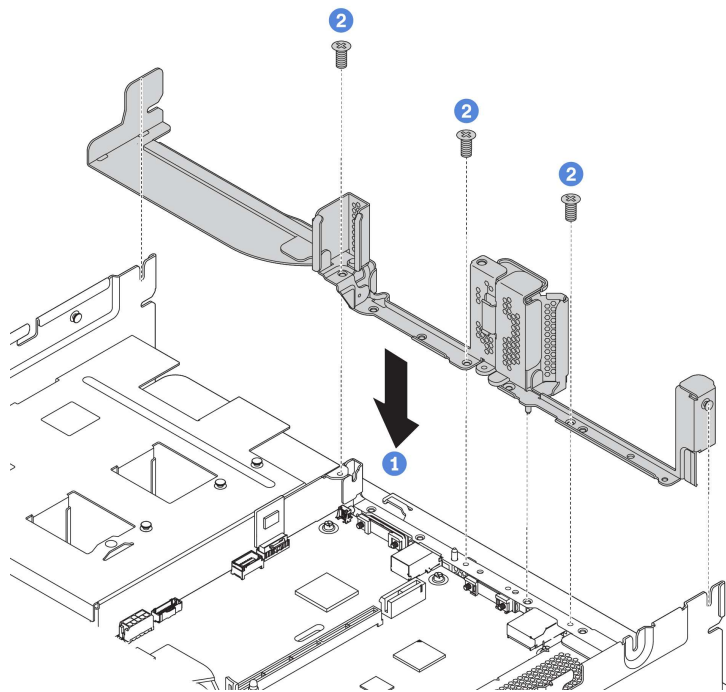


Figure 213. Installing rear wall bracket for the rear 2.5-inch drive cage

2. Install the required riser bracket. See “Riser card replacement” on page 212.
3. Install the performance system fans. See “System fan replacement” on page 169.
4. Install the backplane to the drive cage. See “Install the middle or rear 2.5-inch-drive backplane” on page 190.

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

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

- YouTube: <https://www.youtube.com/playlist?list=PLYV5R7hVcs-BYigwMTzXbqbC6fhKRrCdR>
- Youku: http://list.youku.com/albumlist/show/id_52222445.html

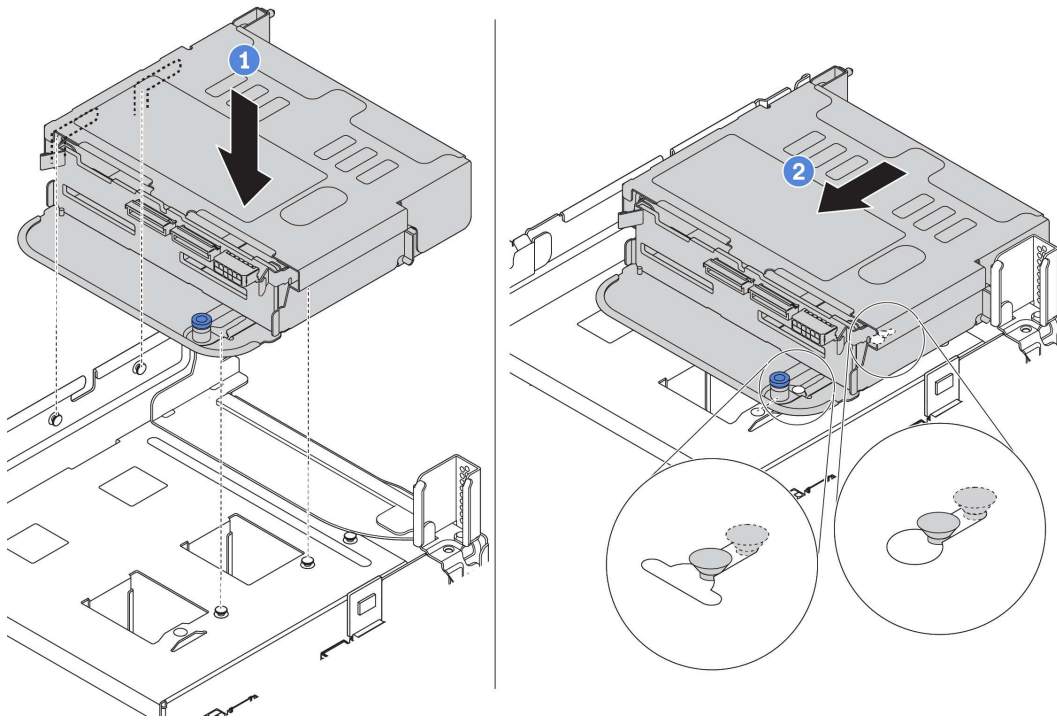


Figure 214. Installing the rear 2.5-inch drive cage

- Step 1. Align the rear drive cage with the chassis, and lower the drive cage into the chassis.
- Step 2. Move the rear drive cage forward until it clicks into position.
- Step 3. Check and ensure that the plunger is latched into place to secure the rear drive cage.

After installing the rear drive cage:




1. Reinstall the drives or drive fillers into the rear drive cage. See “Install a hot-swap drive” on page 179.

Note: For an NVMe backplane, only 7 mm NVMe drives (installed in 15 mm-height drive trays) are supported, 15 mm NVMe drives not supported.

2. Connect cables to the rear drive cage. See “Backplanes” on page 51.
3. Complete the parts replacement. See “Complete the parts replacement” on page 274.

Remove the rear 3.5-inch drive cage

Use this information to remove the rear 3.5-inch drive cage.

 <p>“Read the installation Guidelines” on page 121</p>	 <p>“Power off the server for this task” on page 11</p>	 <p>“ATTENTION: Static Sensitive Device Ground package before opening” on page 124</p>
---	--	--

Before removing the rear drive cage:

1. Remove the top cover. See “Remove the top cover” on page 142.
2. Disconnect the cables from the rear drive cage.
3. Remove all the installed drives and fillers (if any) from the drive bays. See “Remove a hot-swap drive” on page 177.

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

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

- YouTube: <https://www.youtube.com/playlist?list=PLYV5R7hVcs-BYiqwMTzXbqbC6fhKRScdR>
- Youku: http://list.youku.com/albumlist/show/id_52222445.html

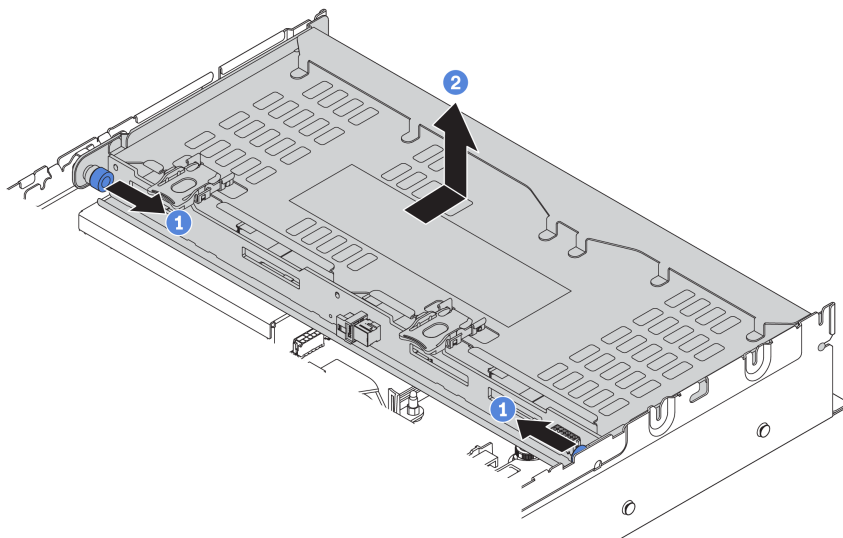





Figure 215. Removing the rear 3.5-inch drive cage

- Step 1. Twist and pull out the blue plungers.
- Step 2. Slide the drive cage towards the rear of the chassis to release it.
- Step 3. If needed, remove the backplane from the drive cage. See “Middle/Rear backplane replacement” on page 189.

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

Install the rear 3.5-inch drive cage

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

	“Read the installation Guidelines” on page 121		“Power off the server for this task” on page 11		“ATTENTION: Static Sensitive Device Ground package before opening” on page 124
---	---	---	--	--	---

Note: The rear drive cage is supported on some server models at certain conditions. For detailed information, see “Drive bay configurations and requirements” on page 125.

The rear drive cage kit comes with required riser brackets, rear wall bracket, and performance system fans (speed of 29000 RPM). Before installing the rear drive cage:

1. Install the rear wall bracket.

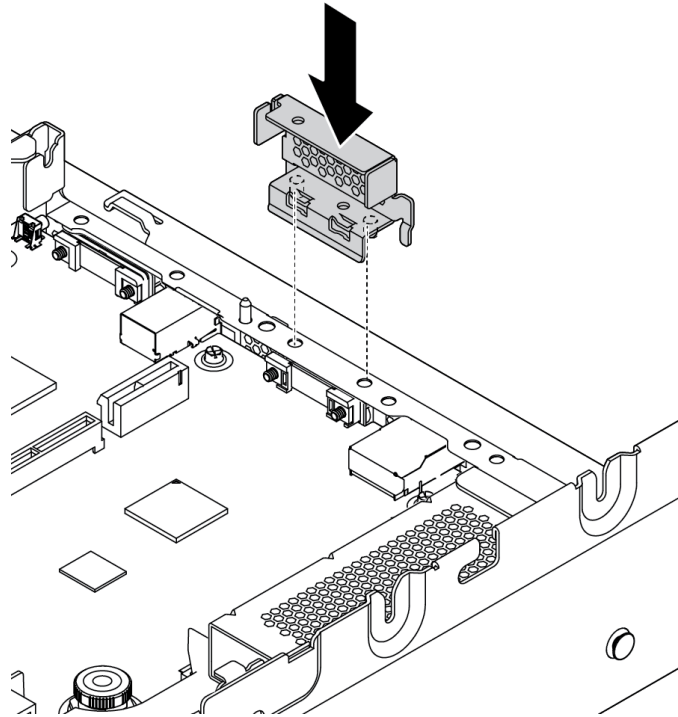


Figure 216. Installing rear wall bracket for the rear 3.5-inch drive cage

2. Install the required riser bracket. See “Riser card replacement” on page 212.
3. Install the performance system fans. See “System fan replacement” on page 169.
4. Install the backplane on the drive cage. See “Install the middle or rear 3.5-inch-drive backplane” on page 192.

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

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

- YouTube: <https://www.youtube.com/playlist?list=PLYV5R7hVcs-BYjgwMTzXbgbC6fhKRcCdR>
- Youku: http://list.youku.com/albumlist/show/id_52222445.html

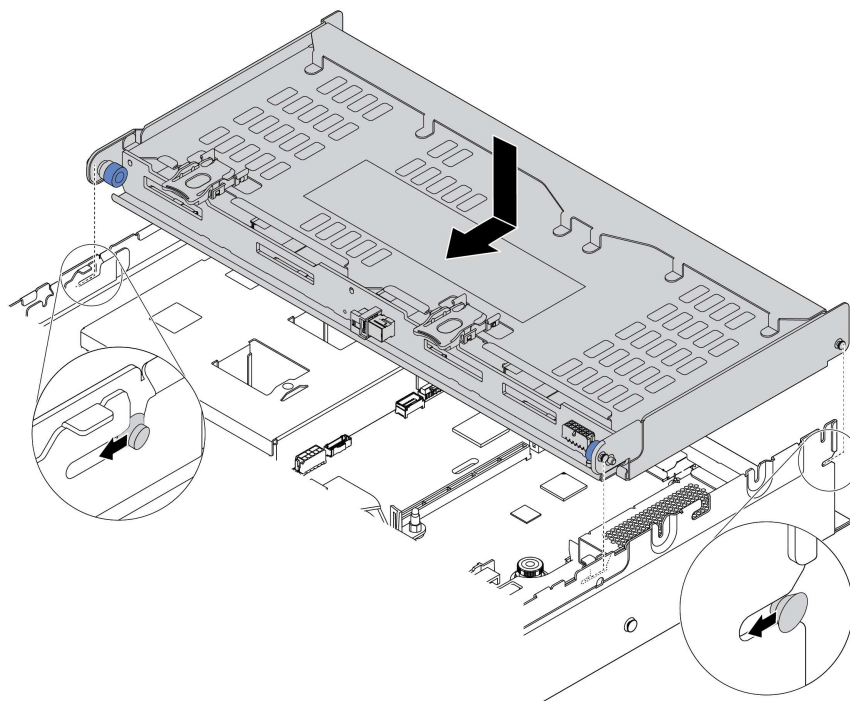


Figure 217. Installing the rear 3.5-inch drive cage

- Step 1. Align the rear drive cage with the chassis, and lower the drive cage into the chassis.
- Step 2. Move the rear drive cage forward until it clicks into position.
- Step 3. Check and ensure that the blue plungers are latched into place to secure the rear drive cage.

After installing the rear drive cage:

1. Reinstall the drives or drive fillers into the rear drive cage. See “Install a hot-swap drive” on page 179.
2. Connect cables to the rear drive cage. See “Backplanes” on page 51.
3. Complete the parts replacement. See “Complete the parts replacement” on page 274.

Hot-swap power supply replacement

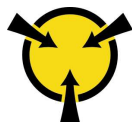
Use this information to remove and install a hot-swap power supply.

Remove a hot-swap power supply

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

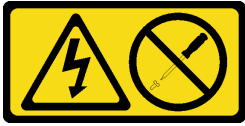


“Read the installation Guidelines” on page 121



“ATTENTION: Static Sensitive Device
Ground package before opening”
on page 124

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



Figure 218. 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 turn 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:

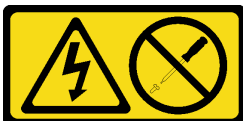
240 V dc input (input range: 180-300 V dc) is supported in Chinese Mainland ONLY. Power supply with 240 V dc input cannot support hot plugging power cord function. Before removing the power supply with dc input, please turn off server or disconnect dc power sources at the breaker panel or by turning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

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

- YouTube: <https://www.youtube.com/playlist?list=PLYV5R7hVcs-BYjgwMTzXbgbC6fhKRScdR>
- Youku: http://list.youku.com/albumlist/show/id_52222445.html

Step 1. If the server is in a rack, adjust the cable management arm (CMA) to gain access to the power supply bay.

If you have installed the 2U CMA Upgrade Kit for Toolless Slide Rail or Toolless Slide Rail Kit with 2U CMA, do the following:

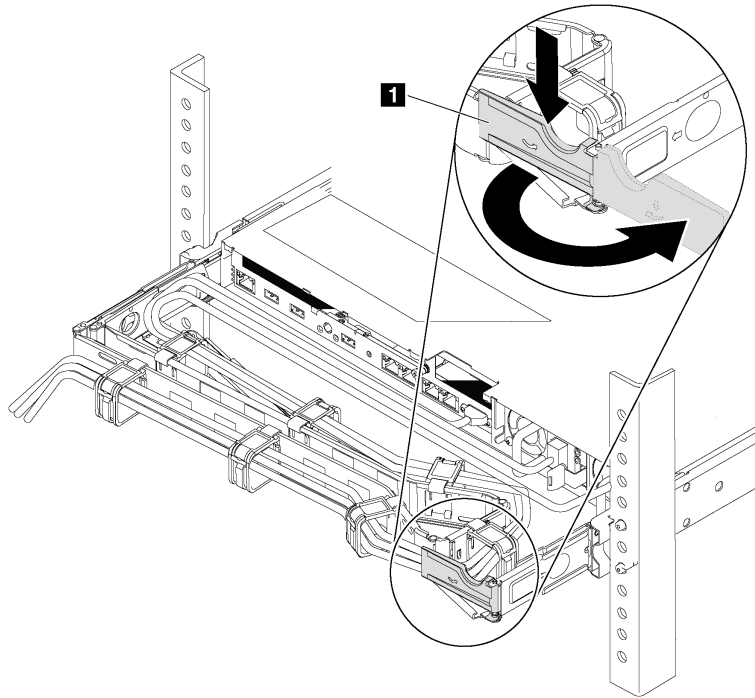


Figure 219. CMA adjustment

- a. Press down the stop bracket **1** and rotate it to the open position.
- b. Rotate the CMA out of the way to gain access to the power supply.

Step 2. Disconnect the power cord from the hot-swap power supply.

Note: If you are replacing two power supplies, do the power supply replacement one by one to ensure that the power supply to the server is not interrupted. Do not disconnect the power cord from the secondly replaced power supply until the power output LED for the firstly replaced power supply is lit. For the location of the power output LED, refer to “Rear view LEDs” on page 24.

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:

- 2U CMA Upgrade Kit for Toolless Slide Rail
- Toolless Slide Rail Kit with 2U CMA

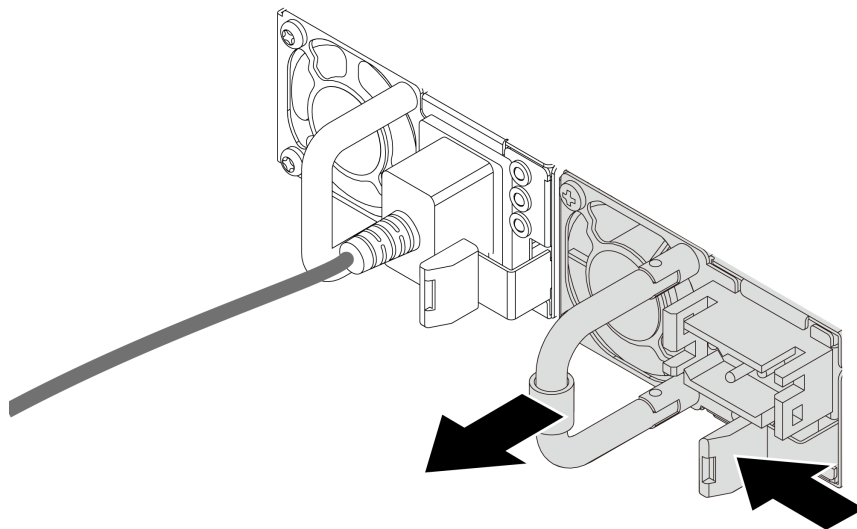


Figure 220. Hot-swap power supply removal

After removing the hot-swap power supply:

1. Install a new power supply or install the power-supply filler to cover the power supply bay. See “Install a hot-swap power supply” on page 248.

Important: To ensure proper cooling during normal server operation, both of the power supply bays must be occupied. This means that each bay must have a power supply installed; or one has a power supply installed and the other has a power supply filler installed.

2. If you are instructed to return the old hot-swap power supply, follow all packaging instructions and use any packaging materials that are provided.

Install a hot-swap power supply

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

	<p>“Read the installation Guidelines” on page 121</p>		<p>“ATTENTION: Static Sensitive Device Ground package before opening” on page 124</p>
--	---	--	---

The following tips describe the type of power supply that the server supports and other information that you must consider when you install a power supply:

- The standard shipping has only one power supply installed in the server. For redundancy and hot-swap support, you must install an additional hot-swap power supply. Certain customized models might be shipped with two power supplies installed.
- Ensure that the devices that you are installing are supported. For a list of supported optional devices for the server, go to:
<http://www.lenovo.com/us/en/serverproven/>

Notes:

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



Figure 221. 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





DANGER

Electrical current from power, telephone, and communication cables is hazardous.

To avoid a shock hazard:

- **Do not connect or disconnect any cables or perform installation, maintenance, or reconfiguration of this product during an electrical storm.**
- **Connect all power cords to a properly wired and grounded electrical outlet.**
- **Connect 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:

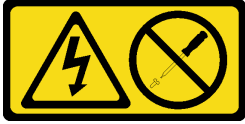
240 V dc input (input range: 180-300 V dc) is supported in Chinese Mainland ONLY. Power supply with 240 V dc input cannot support hot plugging power cord function. Before removing the power supply with dc input, please turn off server or disconnect dc power sources at the breaker panel or by turning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

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

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

- YouTube: <https://www.youtube.com/playlist?list=PLYV5R7hVcs-BYjgwMTzXbqbC6fhKRScdR>
- Youku: http://list.youku.com/albumlist/show/id_52222445.html

Step 1. If the server is in a rack, adjust the cable management arm (CMA) to gain access to the power supply bay.

If you have installed the 2U CMA Upgrade Kit for Toolless Slide Rail or Toolless Slide Rail Kit with 2U CMA, do the following:

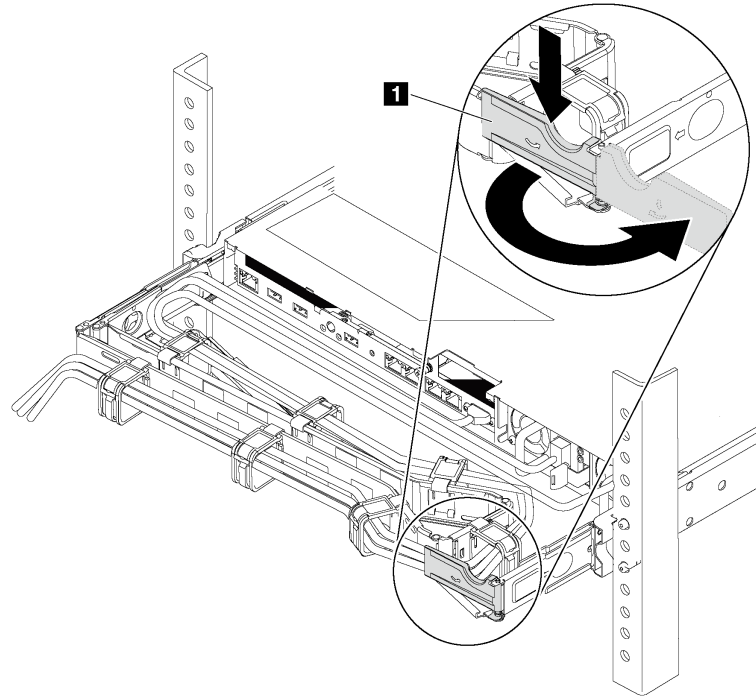


Figure 222. CMA adjustment

- 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. If there is a power-supply filler installed, remove it.

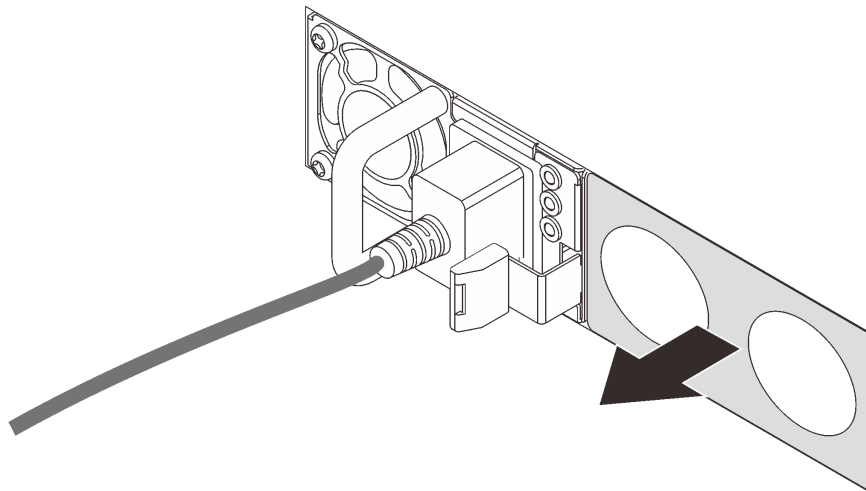


Figure 223. Hot-swap power supply filler removal

Step 3. Slide the new hot-swap power supply into the bay until it snaps into position.

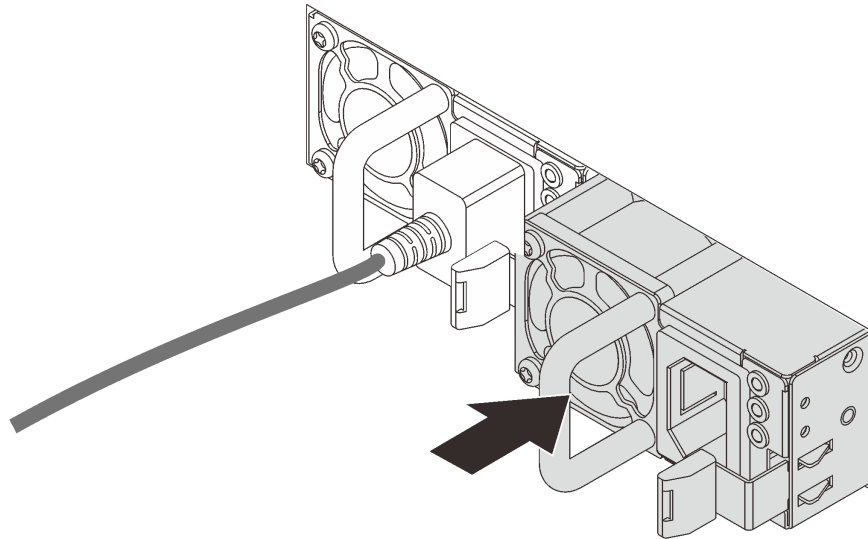


Figure 224. Hot-swap power supply installation

After installing the hot-swap power supply:

1. Connect one end of the power cord to the new power supply connector; then, connect the other end of the power cord into a properly grounded electrical outlet.
2. If the server is turned off, turn on the server. Ensure that both the power input LED and the power output LED on the power supply are lit, indicating that the power supply is operating properly.

Processor and heat sink replacement

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

The server supports the second-generation AMD EPYC family of processors.

The server supports three types of heat sinks. Depending on the specific type, the heat sink on your server might be different from that shown in the illustrations. For detailed information on heat sink selection, see “Technical rules for processor and heat sink” on page 127.

CAUTION:

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

Attention:


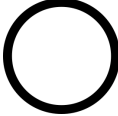

- Each processor socket must always contain a cover or a processor and heat sink. When removing or installing a processor and heat sink, protect empty processor sockets with a cover.
- Do not touch the processor socket or processor contacts. Processor-socket contacts are very fragile and easily damaged. Contaminants on the processor contacts, such as oil from your skin, can cause connection failures.
- Do not allow the thermal grease on the processor or heat sink to come in contact with anything. Contact with any surface can compromise the thermal grease, rendering it ineffective. Thermal grease can damage

components, such as electrical connectors in the processor socket. Do not remove the grease cover from a heat sink until you are instructed to do so.

- “Remove a heat sink” on page 254
- “Remove a processor” on page 255
- “Install a processor” on page 256
- “Install a heat sink” on page 258

Remove a heat sink

Use this information to remove a heat sink.

	“Read the installation Guidelines” on page 121		“Power off the server for this task” on page 11		“ATTENTION: Static Sensitive Device Ground package before opening” on page 124
---	--	---	---	--	--

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 142.
- Remove the air baffle. See “Remove the air baffle” on page 147.
- Remove any parts and disconnect any cables that might impede your access to the heat sink and processor.

To remove a heat sink, complete the following steps:

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

- YouTube: <https://www.youtube.com/playlist?list=PLYV5R7hVcs-BYjgwMTzXbgbC6fhKRcCdR>
- Youku: http://list.youku.com/albumlist/show/id_52222445.html

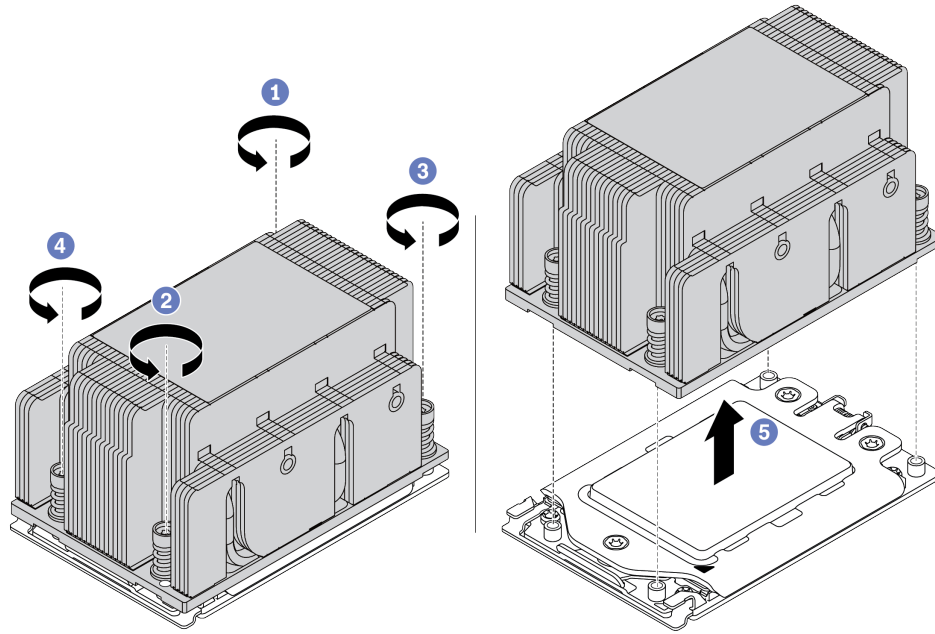


Figure 225. Removing a heat sink

Step 1. Use a Torx #T20 screwdriver to loosen all the captive screws in the *removal sequence* shown on the heat-sink label. After loosening each captive screw, wait for several seconds for the heat sink to loosen from the processor.


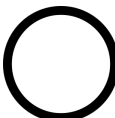

Step 2. Slightly lift the heat sink away from the system.

After removing a heat sink:

- If you are replacing a heat sink, install a new heat sink. See “Install a heat sink” on page 258.
- If you are replacing a processor, remove the processor. See “Remove a processor” on page 255.

Remove a processor

Use this information to remove a processor.

 <p>“Read the installation Guidelines” on page 121</p>	 <p>“Power off the server for this task” on page 11</p>	 <p>“ATTENTION: Static Sensitive Device Ground package before opening” on page 124</p>
---	--	--

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

- YouTube: <https://www.youtube.com/playlist?list=PLYV5R7hVcs-BYjqwMTzXbqbC6fhKRsCdR>
- Youku: http://list.youku.com/albumlist/show/id_52222445.html

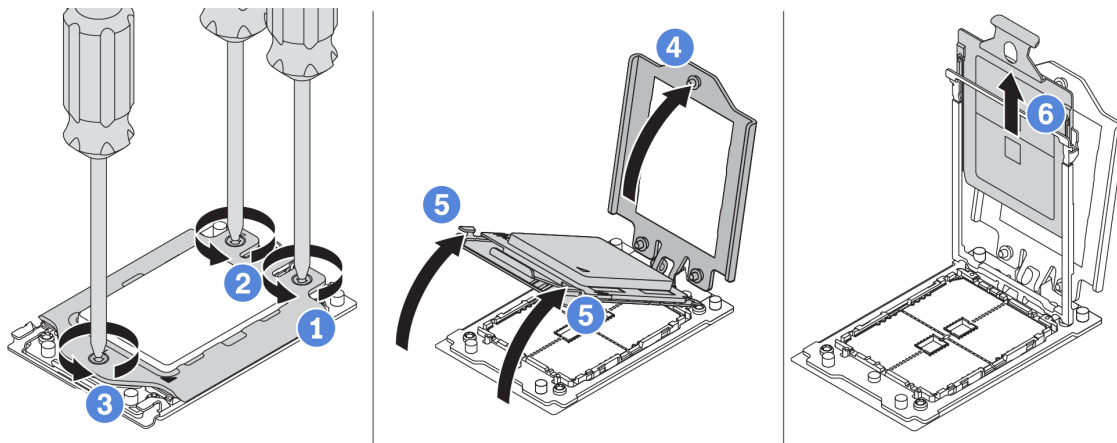


Figure 226. Removing a processor

- 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. Holding the blue tab of the processor carrier, slide the processor carrier out of the rail frame.

After removing the processor, install a new processor by referring to “Install a processor” on page 256.

Install a processor

Use this information to install a processor.

	<p>“Read the installation Guidelines” on page 121</p>		<p>“Power off the server for this task” on page 11</p>		<p>“ATTENTION: Static Sensitive Device Ground package before opening” on page 124</p>
--	---	--	--	--	---

Notes:

- See <http://www.lenovo.com/us/en/serverproven/> for a list of processors supported for your server. All processors on the system board must have the same speed, number of cores, and frequency.
- Before you install a new processor, update your system firmware to the latest level. See “Firmware updates” on page 8.
- Optional devices available for your system might have specific processor requirements. See “Technical rules” on page 125.

To install a processor, complete the following steps:

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

- YouTube: <https://www.youtube.com/playlist?list=PLYV5R7hVcs-BYjgwMTzXbgbC6fhKRcCdR>
- Youku: http://list.youku.com/albumlist/show/id_52222445.html

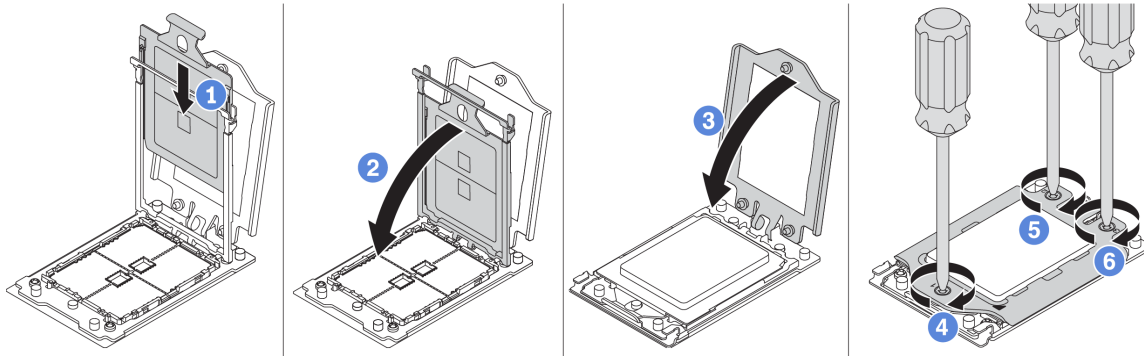



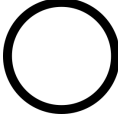

Figure 227. Installing a processor

- Step 1. Slide the processor carrier into the rail frame.
- Step 2. Push the rail frame down until the blue latches lock into place.
- Step 3. Close the force frame.
- Step 4. Tighten the screws in the *installation sequence* shown on the force frame.

After installing a processor, install the heat sink by referring to “Install a heat sink” on page 258.

Install a heat sink

This task has instructions for installing a heat sink.

 <p>“Read the installation Guidelines” on page 121</p>	 <p>“Power off the server for this task” on page 11</p>	 <p>“ATTENTION: Static Sensitive Device Ground package before opening” on page 124</p>
---	--	--

Before installing the heat sink:

- If you use the existing heat sink:
 1. Remove the thermal grease on the heat sink by using an alcohol cleaning pad.
 2. Apply new thermal grease (ShinEtsu 7783D) in a quadrilateral design on the top of the processor.

Note: Do not apply too much thermal grease. Too much thermal grease can result in excess grease coming in contact with and contaminating the processor socket.

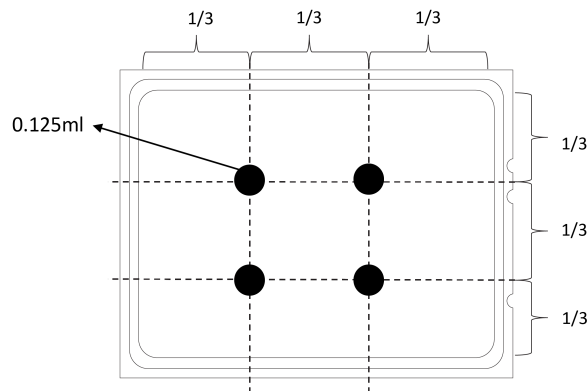


Figure 228. Applying thermal grease

- If you use a new heat sink, the thermal grease is pre-applied to the heat sink. Remove the protective cover and install the heat sink.

To install a heat sink, complete the following steps:

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

- YouTube: <https://www.youtube.com/playlist?list=PLYV5R7hVcs-BYjgwMTzXbqbC6fhKRcCdR>
- Youku: http://list.youku.com/albumlist/show/id_52222445.html

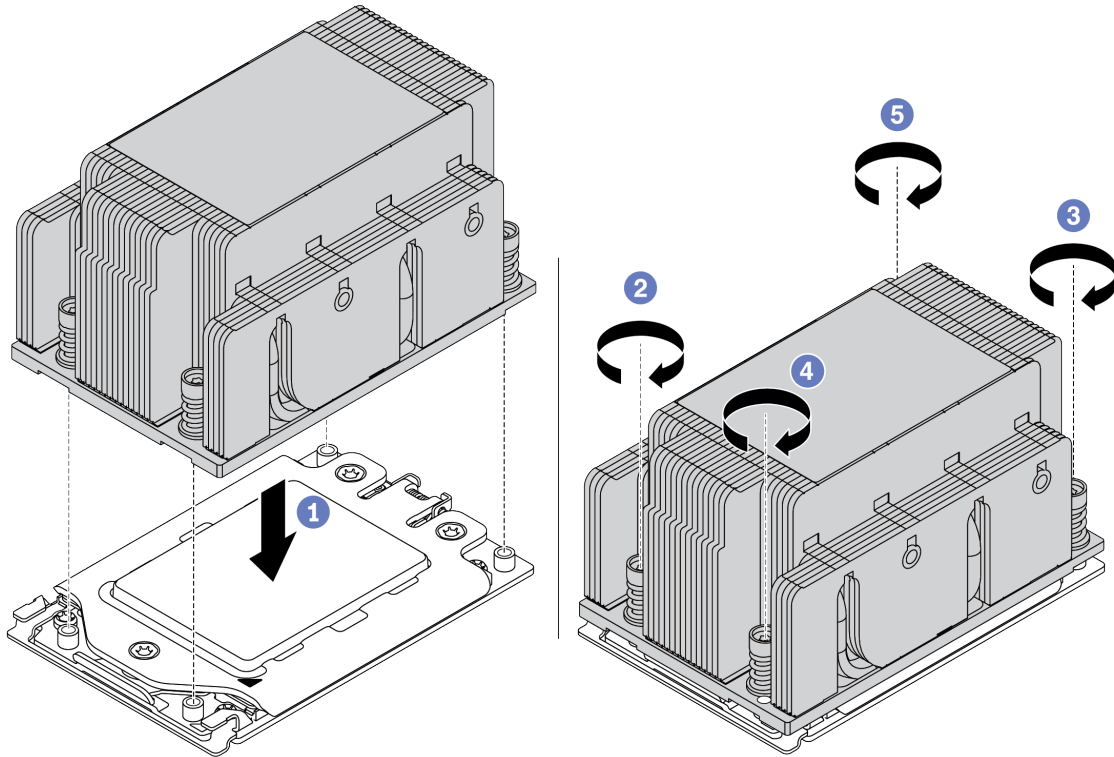


Figure 229. Installing a heat sink

- Step 1. Orient the heat sink with the screw holes on the processor plate. The captive screws on the heat sink should align with the screw holes on the processor plate.
- Step 2. Tighten all the captive screws in the *installation sequence* shown on the heat-sink label.

After installing a heat sink:


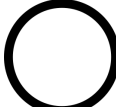

1. Install the air baffle. See “Install the air baffle” on page 148.
2. Install any parts that you have removed.
3. Complete the parts replacement. See “Complete the parts replacement” on page 274.

Fan board replacement

Use this information to remove and install the fan board.

Remove the fan board

Use this information to remove the fan board.

 <p>“Read the installation Guidelines” on page 121</p>	 <p>“Power off the server for this task” on page 11</p>	 <p>“ATTENTION: Static Sensitive Device Ground package before opening” on page 124</p>
---	--	--

Before removing the fan board:

1. Remove the top cover. See “Remove the top cover” on page 142.

2. If your server comes with an air baffle, remove it first. See “Remove the air baffle” on page 147.
3. If your server comes with a middle drive cage, remove it first. See “Middle drive cage replacement” on page 193.
4. Remove system fans. See “Remove a system fan” on page 169.
5. Remove the system fan cage. See “Remove the system fan cage” on page 172.
6. Disconnect fan power and fan sideband cables from the fan board.
7. Move or disconnect other cables that go right over the fan board.

To remove the fan board, complete the following steps:

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

- YouTube: <https://www.youtube.com/playlist?list=PLYV5R7hVcs-BYjgwMTzXbgbC6fhKRcCdR>
- Youku: http://list.youku.com/albumlist/show/id_52222445.html

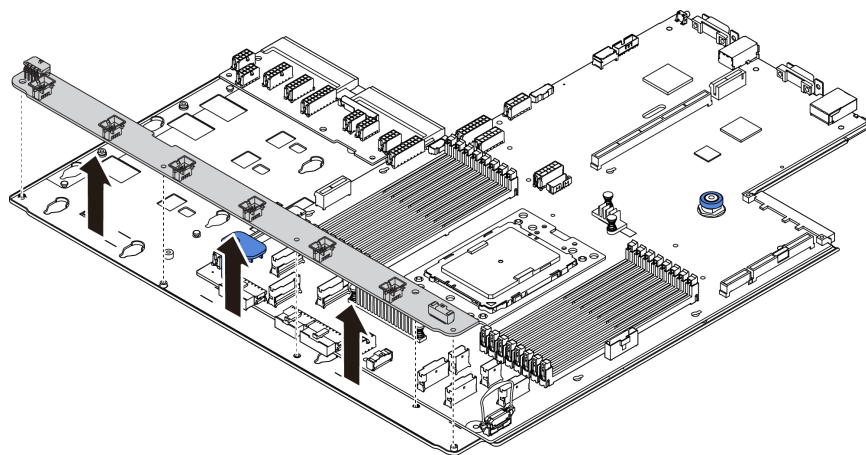



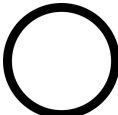

Figure 230. Fan board removal

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

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

Install the fan board

Use this information to install the fan board.

 <p>“Read the installation Guidelines” on page 121</p>	 <p>“Power off the server for this task” on page 11</p>	 <p>“ATTENTION: Static Sensitive Device Ground package before opening” on page 124</p>
---	--	--

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

To install the fan board, complete the following steps:

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

- YouTube: <https://www.youtube.com/playlist?list=PLYV5R7hVcs-BYigwMTzXbqbC6fhKRrCdR>
- Youku: http://list.youku.com/albumlist/show/id_52222445.html

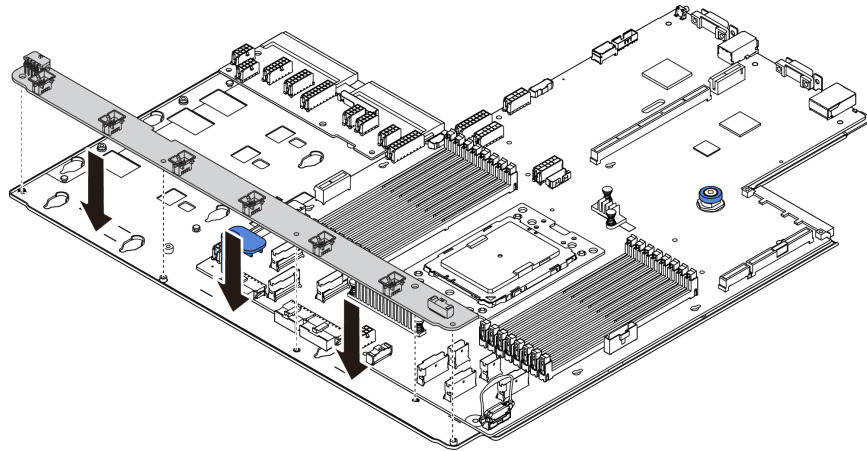


Figure 231. Fan board installation

- 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.
- Step 3. Connect the fan power and fan sideband cables. See “Connections between the system board, PIB board, and fan board” on page 119.

After installing the fan board:


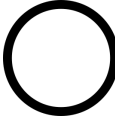

1. Install the fan cage. See “Install the system fan cage” on page 173.
2. Install the system fans. See “Install a system fan” on page 171.
3. Install the middle drive cage if you have removed it. See “Middle drive cage replacement” on page 193.
4. Install the air baffle if you have removed it. See “Install the air baffle” on page 148.
5. Complete the parts replacement. See “Complete the parts replacement” on page 274.

Power inverter board (PIB) replacement

Use this information to remove and install the power inverter board (PIB) replacement.

Remove the PIB board

Use this information to remove the PIB board.

	“Read the installation Guidelines” on page 121		“Power off the server for this task” on page 11		“ATTENTION: Static Sensitive Device Ground package before opening” on page 124
---	---	---	--	--	--

Before removing the PIB board:

1. Remove the top cover. See “Remove the top cover” on page 142.
2. If your server comes with an air baffle, remove it first. See “Remove the air baffle” on page 147.

3. If your server comes with a middle drive cage, remove it first. See “Middle drive cage replacement” on page 193.
4. Pull out the power supplies slightly. Ensure that they are disconnected from the system board.
5. Disconnect all cables from the PIB board.

To remove the PIB board, complete the following steps:

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

- YouTube: <https://www.youtube.com/playlist?list=PLYV5R7hVcs-BYjgwMTzXbgbC6fhKRcCdR>
- Youku: http://list.youku.com/albumlist/show/id_52222445.html

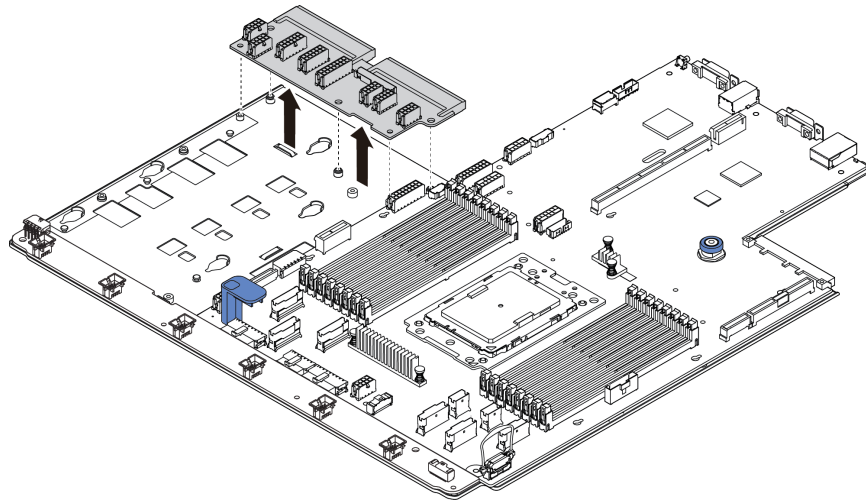



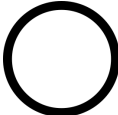

Figure 232. PIB board removal

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

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

Install the PIB board

Use this information to install the PIB board.

 <p>“Read the installation Guidelines” on page 121</p>	 <p>“Power off the server for this task” on page 11</p>	 <p>“ATTENTION: Static Sensitive Device Ground package before opening” on page 124</p>
---	--	---

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

To install the PIB board, complete the following steps:

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

- YouTube: <https://www.youtube.com/playlist?list=PLYV5R7hVcs-BYjgwMTzXbgbC6fhKRcCdR>

- Youku: http://list.youku.com/albumlist/show/id_52222445.html

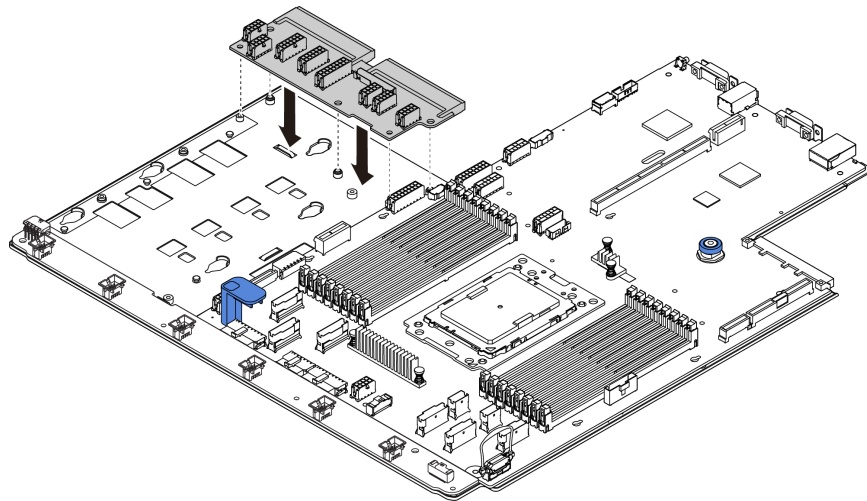


Figure 233. PIB board installation

- 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.
- Step 3. Connect cables to the PIB board. See “Connections between the system board, PIB board, and fan board” on page 119.

After installing the PIB board:

1. Install the middle drive cage if you have removed it. See “Middle drive cage replacement” on page 193.
2. Install the air baffle if you have removed it. See “Install the air baffle” on page 148.
3. Push the power supplies into the bays until they click into place.
4. Complete the parts replacement. See “Complete the parts replacement” on page 274.

System board replacement

Use this information to remove and install the system board.

S017



CAUTION:
Hazardous moving fan blades nearby.

S012

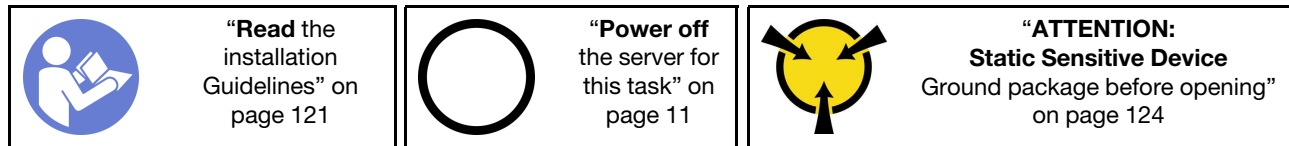


CAUTION:

Hot surface nearby.

Remove the system board

Use this information to remove the system board.



Before removing the system board:

1. Remove the top cover. See “Remove the top cover” on page 142.
2. If your server comes with an air baffle, remove it first. See “Remove the air baffle” on page 147.
3. If your server comes with a middle drive cage, remove it first. See “Middle drive cage replacement” on page 193.
4. If your server comes with a rear drive cage, remove it first. See “Rear drive cage replacement” on page 239.
5. 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.

6. 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 121.
 - Processor and heat sink
 - Memory modules
 - System fans
 - System fan cage
 - M.2 module
 - Internal riser kit
 - RAID super capacitor modules
 - Riser assemblies
 - CMOS battery
 - TPM adapter (only available in Chinese Mainland)
 - OCP 3.0 Ethernet adapter
 - Fan board
 - PIB board
7. Pull out the power supplies slightly. Ensure that they are disconnected from the system board.

To remove the system board, complete the following steps:

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

- YouTube: <https://www.youtube.com/playlist?list=PLYV5R7hVcs-BYjgwMTzXbqbC6fhKRrCdR>
- Youku: http://list.youku.com/albumlist/show/id_52222445.html

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

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.

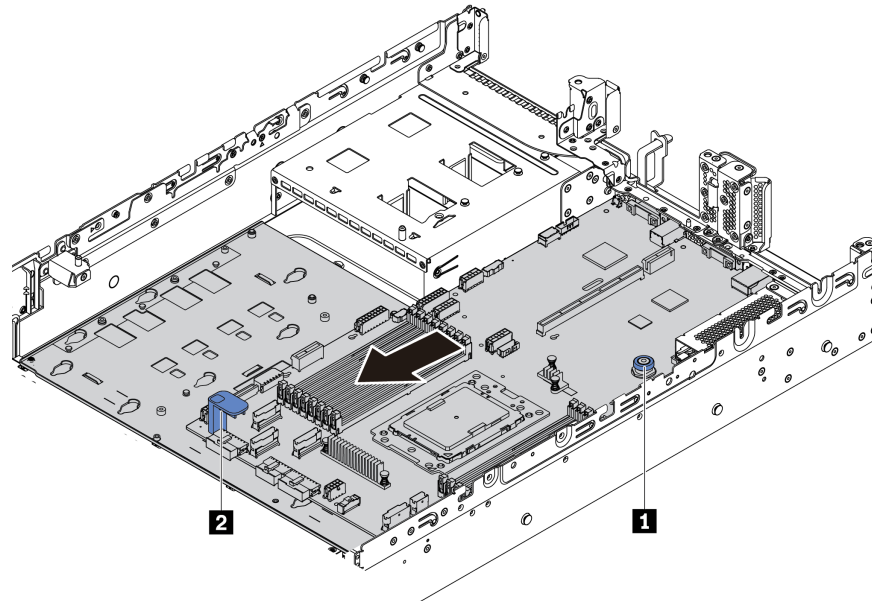


Figure 234. System board removal (1)

Step 2. Tilt and lift the system board out of the chassis.

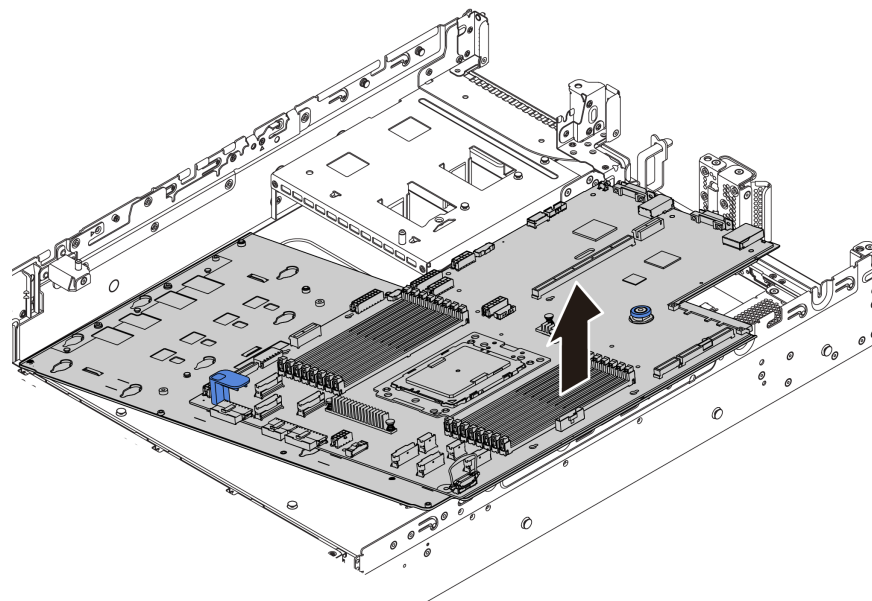


Figure 235. System board removal (2)




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

Important: Before you return the system board, make sure that the 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 293 for compliance with local regulations.

Install the system board

Use this information to install the system board.

 <p>“Read the installation Guidelines” on page 121</p>	 <p>“Power off the server for this task” on page 11</p>	 <p>“ATTENTION: Static Sensitive Device Ground package before opening” on page 124</p>
---	--	--

Before installing the system board: .

1. 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.
2. Install the fan board, which you have removed from the failing system board, on the new system board. See “Install the fan board” on page 260.
3. Install the PIB board, which you have removed from the failing system board, on the new system board. See “Install the PIB board” on page 262.

To install the system board, complete the following steps:

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

- YouTube: <https://www.youtube.com/playlist?list=PLYV5R7hVcs-BYjgwMTzXbqbC6fhKRrCdR>
- Youku: http://list.youku.com/albumlist/show/id_52222445.html

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

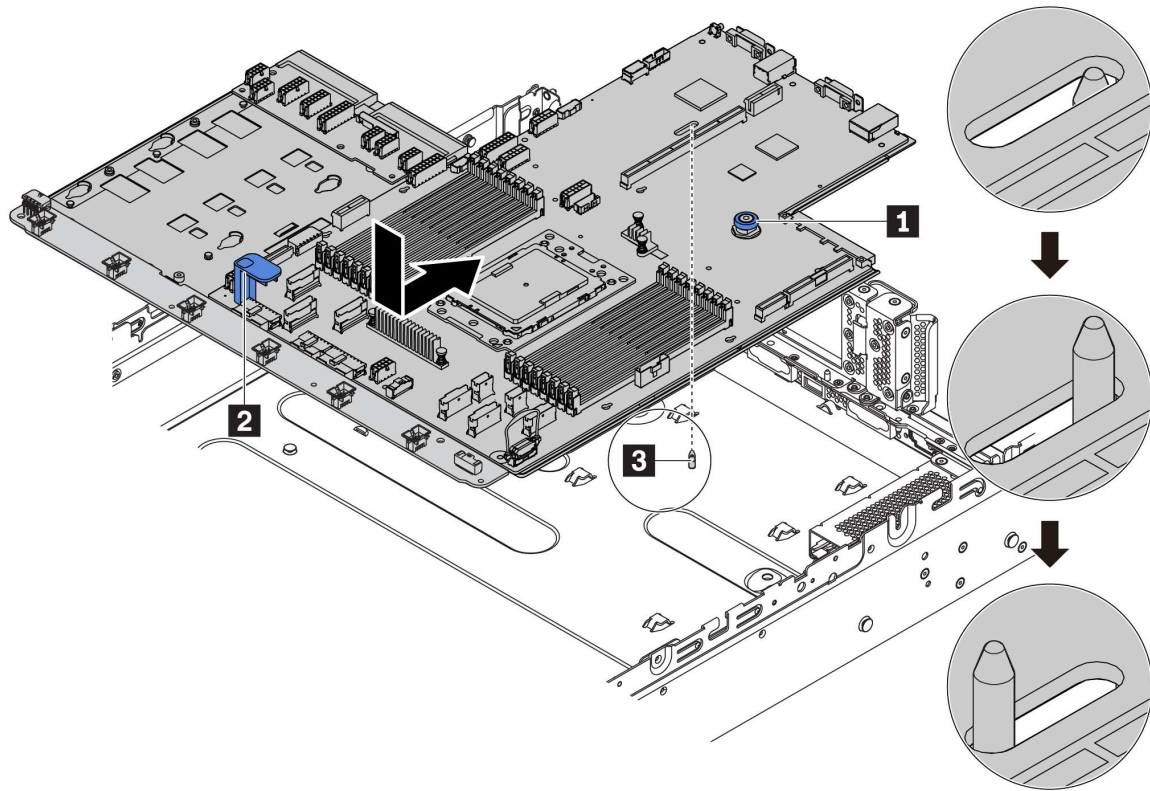


Figure 236. System board installation

- Step 1. Hold the release pin **1** and the lift handle **2** at the same time to lower the system board into the chassis.
- Step 2. Slide the system board to the rear of the server until the system board snaps into position. Ensure that:
- The new system board is engaged by the mounting stud **3** on the chassis.
 - The rear connectors on the new system board are inserted into the corresponding holes in the rear panel.
 - The release pin **1** secures the system board in place.

After installing the system board:

1. Install any components that you have removed from the failing system board. See the related topics in Chapter 3 “Hardware replacement procedures” on page 121.
 - Processor and heat sink
 - Memory modules
 - System fans
 - System fan cage
 - M.2 module
 - Internal riser kit
 - RAID super capacitor modules
 - Riser assemblies
 - CMOS battery

- TPM adapter (only available in Chinese Mainland)
 - OCP 3.0 Ethernet adapter
2. Update the VPD. See “Update the Vital Product Data (VPD)” on page 268.
 - (Required) Machine type
 - (Required) Serial number
 - (Optional) Asset tag
 - (Optional) UUID
 3. Configure the security settings. See “Configure security settings” on page 270.
 - (Required) Assert Physical Presence
 - (Required) Set the TPM policy
 - (Required) Lock the TPM policy
 - (Optional) Toggle the TPM version
 - (Optional) Enable UEFI secure boot

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 Lite V2
- Lenovo XClarity Essentials OneCLI commands

Using Lenovo XClarity Provisioning Manager Lite V2

Steps:

1. Start the server and press F11. The Lenovo XClarity Provisioning Manager Lite V2 interface is displayed by default.
2. Choose **System Summary**. The “System Summary” tab page is displayed.
3. Click **Update VPD**, then, follow on-screen instructions to update the VPD.

Using Lenovo XClarity Essentials OneCLI commands

- Updating **machine type**
`onecli config set SYSTEM_PROD_DATA.SysInfoProdName <m/t_model> [access_method]`
- Updating **serial number**
`onecli config set SYSTEM_PROD_DATA.SysInfoSerialNum <s/n> [access_method]`
- Updating **asset tag**
`onecli config set SYSTEM_PROD_DATA.SysEncloseAssetTag <asset_tag> [access_method]`
- Updating **UUID**
`onecli config set SYSTEM_PROD_DATA.SysInfoUUID <uuid_value> [access_method]`

Configure security settings

Use this section to configure security settings after the system board is replaced.

Security setting features	Outside Chinese Mainland		Chinese Mainland	
	7002 CPU	7003 CPU	7002 CPU	7003 CPU
Physical presence assertion ¹	Required	Required	Required	Required
TPM policy setting & locking	Required	Required	Required	Required
TPM version toggling	Optional ²	Optional ²	NA ³	NA ³

1. Support physical assertion through hardware jumper only.
2. Optional by server models and UEFI firmware levels. For details, see (Optional) Toggle the TPM version.
3. TPM chips shipped to Chinese Mainland do not support version toggling between 1.2 and 2.0. Only TPM 2.0 is supported.

- “(Required) Assert Physical Presence” on page 270
- “(Required) Set the TPM policy” on page 271
- “(Optional) Toggle the TPM version” on page 273
- “(Optional) Enable UEFI Secure Boot” on page 274

(Required) Assert Physical Presence

You can assert hardware Physical Presence through a jumper on the system board.

For details of the jumper, see “System board jumpers” on page 30.

(Required) Set the TPM policy

Use this topic to set the TPM policy.

Attention:

- Physical Presence must be asserted if you are going to set the TPM policy. See “(Required) Assert Physical Presence” on page 270.
- The policy to be set must match the TPM hardware device. For example, when the hardware device is an onboard chip for customers outside Chinese Mainland, if the policy is set to **NationZ TPM 2.0 enabled - China only**, the setting will fail.
- Once the policy is successfully set and locked, whether it be **Permanently disabled, TPM enabled - ROW**, or **NationZ TPM 2.0 enabled - China only**, the policy cannot be unlocked and modified on field sites, if required, a new FRU system board is needed.
- After the policy is locked using OneCLI commands, for security reasons, it must be locked on field sites.

Recommended tools

Lenovo XClarity Essentials OneCLI commands

Setting the policy

Note: Please note that a Local IPMI user and password must be setup in Lenovo XClarity Controller for remote accessing to the target system.

Steps:

1. Read TpmTcmPolicyLock to check whether the TPM_TCM_POLICY has been locked:

```
OneCli.exe config show bmc.TpmTcmPolicyLock --override --bmc  
<userid>:<password>@<ip_address>
```

Note: The bmc.TpmTcmPolicyLock value must be 'Disabled', which means TPM_TCM_POLICY is NOT locked and changes to the TPM_TCM_POLICY are permitted. If the return code is 'Enabled' then no changes to the policy are permitted. The planar may still be used if the desired setting is correct for the system being replaced.

2. Configure the TPM_TCM_POLICY into BMC:

- For customers in Chinese Mainland with no TPM, or customers that require to disable TPM:

```
OneCli.exe config set bmc.TpmTcmPolicy "NeitherTpmNorTcm" --override --bmc  
<userid>:<password>@<ip_address>
```

- For customers in Chinese Mainland that require to enable TPM:

```
OneCli.exe config set bmc.TpmTcmPolicy "NationZTPM200only" --override --bmc  
<userid>:<password>@<ip_address>
```

- For customers outside Chinese Mainland that require to enable TPM:

```
OneCli.exe config set bmc.TpmTcmPolicy "TpmOnly" --override --bmc  
<userid>:<password>@<ip_address>
```

3. Issue reset command to reset system:

```
OneCli.exe misc ospower reboot --bmc  
<userid>:<password>@<ip_address>
```

4. Read back the value to check whether the change has been accepted:

```
OneCli.exe config show bmc.TpmTcmPolicy --override --bmc  
<userid>:<password>@<ip_address>
```

Notes: If the read back value is matched it means the TPM_TCM_POLICY has been set correctly.

bmc.TpmTcmPolicy is defined as below:

- Value 0 use string “Undefined” , which means UNDEFINED policy.

- Value 1 use string “NeitherTpmNorTcm”, which means TPM_PERM_DISABLED.
- Value 2 use string “TpmOnly”, which means TPM_ALLOWED.
- Value 4 use string “NationZTPM20Only”, which means NationZTPM20_ALLOWED.

Locking the TPM policy

Steps:

1. Read TpmTcmPolicyLock to check whether the TPM_TCM_POLICY has been locked:

```
OneCli.exe config show bmc.TpmTcmPolicyLock --override
--bmc <userid>:<password>@<ip_address>
```

Note: The value must be “Disabled”, it means TPM_TCM_POLICY is NOT locked and must be set.

2. Lock the TPM_TCM_POLICY:

```
OneCli.exe config set bmc.TpmTcmPolicyLock "Enabled" --override
--bmc <userid>:<password>@<ip_address>
```

3. Issue reset command to reset system.

```
OneCli.exe misc ospower reboot --bmc
<userid>:<password>@<ip_address>
```

During the reset, UEFI will read the value from bmc.TpmTcmPolicyLock, if the value is 'Enabled' and the bmc.TpmTcmPolicy value is invalid, UEFI will lock the TPM_TCM_POLICY setting.

The valid value for bmc.TpmTcmPolicy includes “NeitherTpmNorTcm”, “TpmOnly”, and “NationZTPM20Only”.

If the bmc.TpmTcmPolicy is set as “Enabled” but bmc.TpmTcmPolicy value is invalid, UEFI will reject the “lock” request and change bmc.TpmTcmPolicy back to “Disabled”.

4. Read back the value to check whether the “Lock” is accepted or rejected.

```
OneCli.exe config show bmc.TpmTcmPolicy --override
--bmc <userid>:<password>@<ip_address>
```

Note: If the read back value is changed from “Disabled” to “Enabled” that means the TPM_TCM_POLICY has been locked successfully. There is no method to unlock a policy once it has been set other than replacing system board.

bmc.TpmTcmPolicyLock is defined as below:

Value 1 use string “Enabled”, which means lock the policy. Other values are not accepted.

Procedure also requires that Physical Presence is asserted. See “(Required) Assert Physical Presence” on page 270.

(Optional) Toggle the TPM version

Use this topic to toggle the TPM version.

Installing the corresponding UEFI firmware version is required before you can upgrade the TPM firmware to a certain version. Check the following table for the supported upgrade paths with different UEFI firmware versions and processors.

UEFI firmware	Processor	TPM 1.2 <-> TPM 2.0 (7.4.0.0<->7.2.1.0) ¹	TPM 1.2 upgrade (7.4.0.0->7.4.0.1)	TPM 2.0 upgrade (7.2.1.0->7.2.2.0)
Before v5.3.0	7002 series	√ ²		
v5.3.0	7002 series			√ ³
v6.0.0 and later	7002 series		√ ³	√ ³
v6.0.0 and later	7003 series			√ ³

1. Supports a maximum of 128 times toggling.
2. Toggling between TPM 1.2 and TPM 2.0 (7.4.0.0<->7.2.1.0) is supported when the server model is configured with the following at the same time:

- UEFI firmware before v5.3.0 installed.
- 7002 series processors installed.
- Original TPM firmware version is either 7.4.0.0 or 7.2.1.0.

3. Once the TPM firmware version has been upgraded, it cannot be rolled back.

Recommended tools:

Lenovo XClarity Essentials OneCLI commands

Using Lenovo XClarity Essentials OneCLI commands

Use the following commands to toggle the TPM firmware version.

TPM 1.2 (7.4.0.0) -> TPM 1.2 (7.4.0.1):

```
OneCli.exe config set TrustedComputingGroup.DeviceOperation "Update to TPM 2.0 firmware version 7.4.0.1"  
--bmc userid:password@ip_address
```

TPM 2.0 (7.2.1.0) -> TPM 1.2 (7.2.2.0):

```
OneCli.exe config set TrustedComputingGroup.DeviceOperation "Update to TPM 2.0 firmware version 7.2.2.0"  
--bmc userid:password@ip_address
```

TPM 2.0 (7.2.1.0) -> TPM 1.2 (7.4.0.0):

```
OneCli.exe config set TrustedComputingGroup.DeviceOperation "Update to TPM1.2 compliant"  
--bmc userid:password@ip_address
```

TPM 1.2 (7.4.0.0) -> TPM 2.0 (7.2.1.0):

```
OneCli.exe config set TrustedComputingGroup.DeviceOperation "Update to TPM2.0 compliant"  
--bmc userid:password@ip_address
```

where:

- `<userid>:<password>` are the credentials used to access the BMC (Lenovo ThinkSystem System Manager interface) of your server. The default user ID is USERID, and the default password is PASSWORD (zero, not an uppercase O)
- `<ip_address>` is the IP address of the BMC.

(Optional) 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 “(Required) Assert Physical Presence” on page 270.

You can enable UEFI Secure Boot from UEFI System Setup interface. To enable UEFI Secure Boot from System Setup interface:

1. Start the server and when prompted, press F1 to display System Setup interface.
2. From the UEFI Setup page, click **Security** → **Secure Boot**.
3. Enable Secure Boot and save the settings.

Complete the parts replacement

Use this information to complete the parts replacement.

To complete the parts replacement, do the following:

1. Ensure that all components have been reassembled correctly and that no tools or loose screws are left inside your server.
2. Properly route and secure the cables in the server. Refer to the cable connecting and routing information for each component.
3. If you have removed the top cover, reinstall it. See “Install the top cover” on page 144.
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 8.
 - Use the Lenovo XClarity Provisioning Manager Lite to configure the RAID if you have installed or removed a hot-swap drive, a RAID adapter, or the M.2 backplane and M.2 drive. For more information, see: https://sysmgt.lenovofiles.com/help/topic/ixpml_v2/Introduction.html

Chapter 4. Problem determination

Use the information in this section to isolate and resolve issues that you might encounter while using your server.

Lenovo servers can be configured to automatically notify Lenovo Support if certain events are generated. You can configure automatic notification, also known as Call Home, from management applications, such as the Lenovo XClarity Administrator. If you configure automatic problem notification, Lenovo Support is automatically alerted whenever a server encounters a potentially significant event.

To isolate a problem, you should typically begin with the event log of the application that is managing the server:

- If you are managing the server from the Lenovo XClarity Administrator, begin with the Lenovo XClarity Administrator event log.
- If you are using some other management application, begin with the Lenovo 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 Lenovo ThinkSystem System Manager or by UEFI in the servers. These alerts are stored in the Lenovo 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: http://thinksystem.lenovofiles.com/help/topic/7Y00/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.

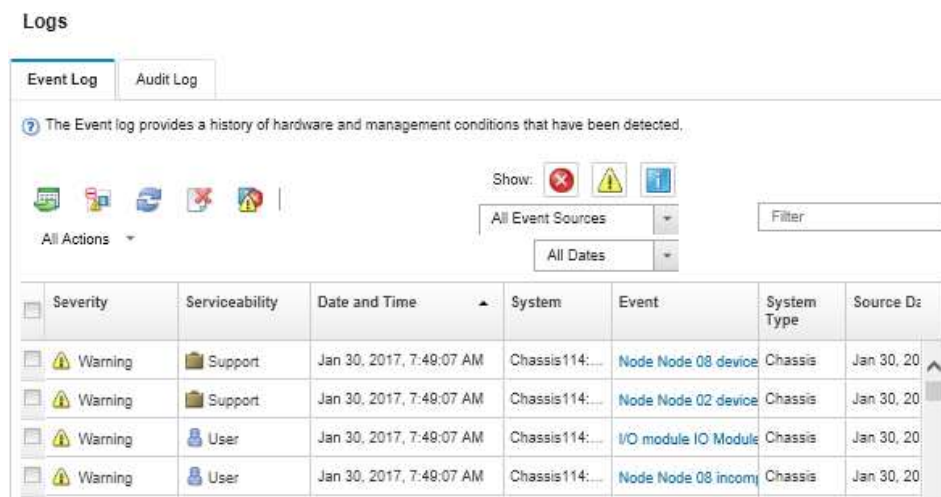
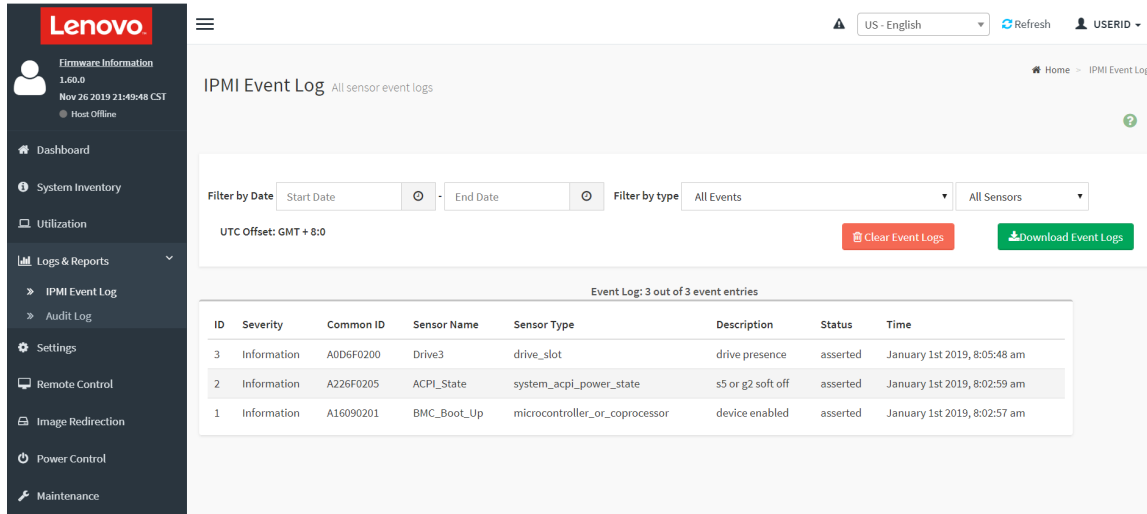


Figure 237. Lenovo XClarity Administrator event log

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

Lenovo ThinkSystem System Manager event log

The Lenovo 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 Lenovo 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.



The screenshot shows the IPMI Event Log interface. The sidebar on the left contains navigation options: Dashboard, System Inventory, Utilization, Logs & Reports (expanded to show IPMI Event Log and Audit Log), Settings, Remote Control, Image Redirection, Power Control, and Maintenance. The main content area is titled 'IPMI Event Log' and shows 'All sensor event logs'. It includes filters for 'Filter by Date' (Start Date and End Date) and 'Filter by type' (All Events). Below the filters, there are buttons for 'Clear Event Logs' and 'Download Event Logs'. The event log table shows 3 out of 3 event entries:

ID	Severity	Common ID	Sensor Name	Sensor Type	Description	Status	Time
3	Information	A0D6F0200	Drive3	drive_slot	drive presence	asserted	January 1st 2019, 8:05:48 am
2	Information	A226F0205	ACPI_State	system_acpi_power_state	s5 or g2 soft off	asserted	January 1st 2019, 8:02:59 am
1	Information	A16090201	BMC_Boot_Up	microcontroller_or_coprocessor	device enabled	asserted	January 1st 2019, 8:02:57 am

Figure 238. Lenovo ThinkSystem System Manager event log

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

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.

- “Front I/O assembly” on page 17
- “Rear view LEDs” on page 24
- “System board LEDs” on page 27

General problem determination procedures

Use the information in this section to resolve problems if the event log does not contain specific errors or the server is inoperative.

If you are not sure about the cause of a problem and the power supplies are working correctly, complete the following steps to attempt to resolve the problem:

1. Power off the server.
2. Make sure that the server is cabled correctly.

3. Remove or disconnect the following devices, one at a time, until you find the failure. Power on and configure the server each time you remove or disconnect a device.
 - Any external devices.
 - Surge-suppressor device (on the server).
 - Printer, mouse, and non-Lenovo devices.
 - Each adapter.
 - Hard disk drives.
 - Memory modules until you reach the minimum configuration that is supported for the server.

Note: For minimal configuration for debugging, see “Specifications” on page 3.

4. Power on the server.

If the problem is solved when you remove an adapter from the server, but the problem recurs when you install the same adapter again, suspect the adapter. If the problem recurs when you replace the adapter with a different one, try a different PCIe slot.

If the problem appears to be a networking problem and the server passes all system tests, suspect a network cabling problem that is external to the server.

Resolving suspected power problems

Power problems can be difficult to solve. For example, a short circuit can exist anywhere on any of the power distribution buses. Usually, a short circuit will cause the power subsystem to shut down because of an overcurrent condition.

Complete the following steps to diagnose and resolve a suspected power problem.

Step 1. Check the event log and resolve any errors related to the power.

Note: Start with the event log of the application that is managing the server.

Step 2. Check for short circuits, for example, if a loose screw is causing a short circuit on a circuit board.

Step 3. Remove the adapters and disconnect the cables and power cords to all internal and external devices until the server is at the minimum configuration that is required for the server to start. See “Specifications” on page 3 to determine the minimum configuration for your server.

Step 4. Reconnect all ac power cords and turn on the server. If the server starts successfully, reseal the adapters and devices one at a time until the problem is isolated.

If the server does not start from the minimum configuration, replace the components in the minimum configuration one at a time until the problem is isolated.

Resolving suspected Ethernet controller problems

The method that you use to test the Ethernet controller depends on which operating system you are using. See the operating-system documentation for information about Ethernet controllers, and see the Ethernet controller device-driver readme file.

Complete the following steps to attempt to resolve suspected problems with the Ethernet controller.

Step 1. Make sure that the correct device drivers, which come with the server are installed and that they are at the latest level.

Step 2. Make sure that the Ethernet cable is installed correctly.

- The cable must be securely attached at all connections. If the cable is attached but the problem remains, try a different cable.

- If you set the Ethernet controller to operate at 100 Mbps or 1000 Mbps, you must use Category 5 cabling.
- Step 3. Determine whether the hub supports auto-negotiation. If it does not, try configuring the integrated Ethernet controller manually to match the speed and duplex mode of the hub.
- Step 4. Check the Ethernet controller LEDs on the rear panel of the server. These LEDs indicate whether there is a problem with the connector, cable, or hub.
- The Ethernet link status LED is lit when the Ethernet controller receives a link pulse from the hub. If the LED is off, there might be a defective connector or cable or a problem with the hub.
 - The Ethernet transmit/receive activity LED is lit when the Ethernet controller sends or receives data over the Ethernet network. If the Ethernet transmit/receive activity is off, make sure that the hub and network are operating and that the correct device drivers are installed.
- Step 5. Check the LAN activity LED on the rear of the server. The LAN activity LED is lit when data is active on the Ethernet network. If the LAN activity LED is off, make sure that the hub and network are operating and that the correct device drivers are installed.
- Step 6. Check for operating-system-specific causes of the problem, and also make sure that the operating system drivers are installed correctly.
- Step 7. Make sure that the device drivers on the client and server are using the same protocol.

If the Ethernet controller still cannot connect to the network but the hardware appears to be working, the network administrator must investigate other possible causes of the error.

Troubleshooting by symptom

Use this information to find solutions to problems that have identifiable symptoms.

To use the symptom-based troubleshooting information in this section, complete the following steps:

1. Check the event log of the application that is managing the server and follow the suggested actions to resolve any event codes.
 - If you are managing the server from the Lenovo XClarity Administrator, begin with the Lenovo XClarity Administrator event log.
 - If you are using some other management application, begin with the Lenovo ThinkSystem System Manager event log.
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 296).

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 278
- “The power-control button does not work, and the reset button does work (server does not start)” on page 279
- “Server does not power on” on page 279
- “Server does not power off” on page 280

Embedded hypervisor is not in the boot list

Complete the following steps until the problem is solved.

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

For information about accessing the management controller user interface, see the TSM documentation:

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 a and b.
 - If the server starts, reseat the operator information panel.
 - If the problem remains, replace the operator information panel.
2. Make sure that:
 - The power cords are correctly connected to the server and to a working electrical outlet.
 - The LEDs on the power supply do not indicate a problem.
3. Reseat the power supplies.
4. Replace each power supply, restarting the server each time:
 - Memory modules
 - Power supplies
5. If you just installed an optional device, remove it, and restart the server. If the server starts, you might have installed more devices than the power supply supports.

Server does not power on

Complete the following steps until the problem is resolved:

1. Make sure that the ac power is applied correctly to the server. Make sure that the ac power cords are correctly connected to the server and to a working electrical outlet.
2. Check the event log for any events related to the server not powering on.
3. Check for any LEDs that are flashing amber.
4. Check the power LED on the system board.
5. Reseat the power supply.

6. Replace the power supply.

Server does not power off

Complete the following steps until the problem is resolved:

1. Determine whether you are using an Advanced Configuration and Power Interface (ACPI) or a non-ACPI operating system. If you are using a non-ACPI operating system, complete the following steps:
 - a. Press Ctrl+Alt+Delete.
 - b. Turn off the server by pressing the power-control button and holding it down for 5 seconds.
 - c. Restart the server.
 - d. If the server fails POST and the power-control button does not work, disconnect the power cord for 20 seconds; then, reconnect the power cord and restart the server.
2. If the problem remains or if you are using an ACPI-aware operating system, suspect the system board.

Memory problems

Use this information to resolve issues related to memory.

- “Displayed system memory less than installed physical memory” on page 280
- “Multiple rows of DIMMs in a branch identified as failing” on page 281

Displayed system memory less than installed physical memory

Complete the following steps until the problem is resolved:

Note: Each time you install or remove a DIMM, you must disconnect the server from the power source; then, wait 10 seconds before restarting the server.

1. Check and 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 event logs. If the problem is related to the memory module slot, replace the failing memory module.
3. Reseat the DIMMs, and then restart the server.
4. Run memory diagnostics. When you start a server and press F11, the Lenovo XClarity Provisioning Manager Lite V2 interface is displayed by default. You can perform memory diagnostics from this interface. From the Diagnostic page, click **Run Diagnostic → Memory test**.
5. Check the POST error log:
 - If a DIMM was disabled by a systems-management interrupt (SMI), replace the DIMM.

- If a DIMM was disabled by the user or by POST, reseat the DIMM; then, run the Setup utility and enable the DIMM.
6. Reseat the DIMM.
 7. Restart the server.

Multiple rows of DIMMs in a branch identified as failing

1. Reseat the DIMMs; then, restart the server.
2. Remove the lowest-numbered DIMM pair of those that are identified and replace it with an identical known good DIMM; then, restart the server. Repeat as necessary. If the failures continue after all identified DIMMs are replaced, go to step 4.
3. Return the removed DIMMs, one at a time, to their original connectors, restarting the server after each DIMM, until a DIMM fails. Replace each failing DIMM with an identical known good DIMM, restarting the server after each DIMM replacement. Repeat step 3 until you have tested all removed DIMMs.
4. Replace the lowest-numbered DIMM of those identified; then, restart the server. Repeat as necessary.
5. Reverse the DIMMs between the channels (of the same processor), and then restart the server. If the problem is related to a DIMM, replace the failing DIMM.
6. (Trained technician only) Replace the system board.

Hard disk drive problems

Use this information to resolve issues related to the hard disk drives.

- “Server cannot recognize a hard disk drive” on page 281
- “Multiple hard disk drives fail” on page 282
- “Multiple hard disk drives are offline” on page 282
- “A replacement hard disk drive does not rebuild” on page 282
- “Green hard disk drive activity LED does not represent actual state of associated drive” on page 282
- “Yellow hard disk drive status LED does not represent actual state of associated drive” on page 283

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 F1, the Lenovo XClarity Provisioning Manager Lite V2 interface is displayed by default. You can perform hard disk drive diagnostics from this interface. From the Diagnostic page, click **Run Diagnostic → HDD test**.
 - If the green activity LED is flashing and the yellow status LED is flashing slowly, the drive is recognized by the controller and is rebuilding.
 - If neither LED is lit or flashing, check the hard disk drive backplane.
 - If the green activity LED is flashing and the yellow status LED is lit, replace the drive. If the activity of the LEDs remains the same, go to step Hard disk drive problems. If the activity of the LEDs changes, return to step 1.

4. Make sure that the hard disk drive backplane is correctly seated. When it is correctly seated, the drive assemblies correctly connect to the backplane without bowing or causing movement of the backplane.
5. Reseat the backplane power cable and repeat steps 1 through 3.
6. Reseat the backplane signal cable and repeat steps 1 through 3.
7. Suspect the backplane signal cable or the backplane:
 - Replace the affected backplane signal cable.
 - Replace the affected backplane.
8. Run the diagnostics tests for the hard disk drives. When you start a server and press F11, the Lenovo XClarity Provisioning Manager Lite V2 interface is displayed by default. You can perform hard disk drive diagnostics from this interface. From the Diagnostic page, click **Run Diagnostic → HDD test**.

Based on those tests:

- If the adapter passes the test but the drives are not recognized, replace the backplane signal cable and run the tests again.
- Replace the backplane.
- If the adapter fails the test, disconnect the backplane signal cable from the adapter and run the tests again.
- If the adapter fails the test, replace the adapter.

Multiple hard disk drives fail

Complete the following steps until the problem is solved:

- View the Lenovo 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 Lenovo 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 F1, the Lenovo XClarity Provisioning Manager

Lite V2 interface is displayed by default. You can perform hard disk drive diagnostics from this interface. From the Diagnostic page, click **Run Diagnostic → HDD test**.

2. If the drive passes the test, replace the backplane.
3. If the drive fails the test, replace the drive.

Yellow hard disk drive status LED does not represent actual state of associated drive

Complete the following steps until the problem is solved:

1. Turn off the server.
2. Reseat the SAS/SATA adapter.
3. Reseat the backplane signal cable and backplane power cable.
4. Reseat the hard disk drive.
5. Turn on the server and observe the activity of the hard disk drive LEDs.

Monitor and video problems

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

- “Incorrect characters are displayed” on page 283
- “Screen is blank” on page 283
- “Screen goes blank when you start some application programs” on page 284
- “The monitor has screen jitter, or the screen image is wavy, unreadable, rolling, or distorted” on page 284
- “The wrong characters appear on the screen” on page 284

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 8.

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 8.
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 8.

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 284
- “Mouse does not work” on page 285
- “USB-device does not work” on page 285

All or some keys on the keyboard do not work

1. Make sure that:
 - The keyboard cable is securely connected.
 - The server and the monitor are turned on.
2. If you are using a USB keyboard, run the Setup utility and enable keyboardless operation.

3. If you are using a USB keyboard and it is connected to a USB hub, disconnect the keyboard from the hub and connect it directly to the server.
4. Replace the keyboard.

Mouse does not work

1. Make sure that:
 - The mouse cable is securely connected to the server.
 - The mouse device drivers are installed correctly.
 - The server and the monitor are turned on.
 - The mouse option is enabled in the Setup utility.
2. If you are using a USB mouse and it is connected to a USB hub, disconnect the mouse from the hub and connect it directly to the server.
3. Replace the mouse.

USB-device does not work

1. Make sure that:
 - The correct USB device driver is installed.
 - The operating system supports USB devices.
2. Make sure that the USB configuration options are set correctly in system setup.

Restart the server and press F1 to display the system setup interface. Then, click **Advanced → USB Configuration**.

3. If you are using a USB hub, disconnect the USB device from the hub and connect it directly to the server.

Optional-device problems

Use this information to solve problems related to optional devices.

- “External USB device not recognized” on page 285
- “A Lenovo optional device that worked previously does not work now” on page 286
- “A Lenovo optional device that was just installed does not work” on page 286
- “A Lenovo optional device that worked previously does not work now” on page 286

External USB device not recognized

Complete the following steps until the problem is resolved:

1. Make sure that the proper drivers are installed on the compute node. See the product documentation for the USB device for information about device drivers.
2. Use the Setup utility to make sure that the device is configured correctly.
3. If the USB device is plugged into a hub or the console breakout cable, unplug the device and plug it directly into the USB port on the front of the compute node.

PCIe adapter is not recognized or is not functioning

Complete the following steps until the problem is resolved:

1. Check the event log and resolve any issues related to the device.
2. Validate that the device is supported for the server (see <http://www.lenovo.com/us/en/serverproven/>).
3. Make sure that the adapter is installed in a correct slot.

4. Make sure that the proper device drivers are installed for the device.
5. Resolve any resource conflicts if running legacy mode (UEFI).
6. Check <http://datacentersupport.lenovo.com> for any tech tips (also known as retain tips or service bulletins) that might be related to the adapter.
7. Ensure any adapter external connections are correct and that the connectors are not physically damaged.

A Lenovo optional device that was just installed does not work

1. Make sure that:
 - The device is supported for the server (see <http://www.lenovo.com/us/en/serverproven/>).
 - You followed the installation instructions that came with the device and the device is installed correctly.
 - You have not loosened any other installed devices or cables.
 - You updated the configuration information in system setup. When you start a server and press F1 to display the system setup interface. Whenever memory or any other device is changed, you must update the configuration.
2. Reseat the device that you just installed.
3. Replace the device that you just installed.

A Lenovo optional device that worked previously does not work now

1. Make sure that all of the cable connections for the device are secure.
2. If the device comes with test instructions, use those instructions to test the device.
3. If the failing device is a SCSI device, make sure that:
 - The cables for all external SCSI devices are connected correctly.
 - The last device in each SCSI chain, or the end of the SCSI cable, is terminated correctly.
 - Any external SCSI device is turned on. You must turn on an external SCSI device before you turn on the server.
4. Reseat the failing device.
5. Replace the failing device.

Serial-device problems

Use this information to solve problems with serial ports or devices.

- “Number of displayed serial ports is less than the number of installed serial ports” on page 286
- “Serial device does not work” on page 286

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 287
- “Intermittent KVM problems” on page 287
- “Intermittent unexpected reboots” on page 288

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 website for documentation.
2. For a USB device:
 - a. Make sure that the device is configured correctly.

Restart the server and press F1 to display the system setup interface. Then, click **Advanced → USB Configuration**.
 - b. Connect the device to another port. If using a USB hub, remove the hub and connect the device directly to the compute node. Make sure that the device is configured correctly for the port.

Intermittent KVM problems

Complete the following steps until the problem is solved.

Video problems:

1. Make sure that all cables and the console breakout cable are properly connected and secure.
2. Make sure that the monitor is working properly by testing it on another compute node.
3. Test the console breakout cable on a working compute node to ensure that it is operating properly. Replace the console breakout cable if it is defective.

Keyboard problems:

Make sure that all cables and the console breakout cable are properly connected and secure.

Mouse problems:

Make sure that all cables and the console breakout cable are properly connected and secure.

Intermittent unexpected reboots

Note: Some correctable errors require that the server reboot so that it can disable a device, such as a memory module or a processor to allow the machine to boot up properly.

1. If the reset occurs after the operating system starts, disable any automatic server restart (ASR) utilities, such as the Automatic Server Restart IPMI Application for Windows, or any ASR devices that are installed.
2. See the management controller event log to check for an event code that indicates a reboot. See “Event logs” on page 275 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 288
- “Could not log in using LDAP account with SSL enabled” on page 288

Cannot wake server using Wake on LAN

Complete the following steps until the problem is resolved:

1. If you are using the dual-port network adapter and the server is connected to the network using Ethernet 5 connector, check the system-error log or TSM system event log, make sure:
 - a. Fan 3 is running in standby mode, if Emulex dual port 10GBase-T embedded adapter is installed.
 - b. The room temperature is not too high (see “Specifications” on page 3).
 - c. The air vents are not blocked.
 - d. The air baffle is installed securely.
2. Reseat the dual-port network adapter.
3. Turn off the server and disconnect it from the power source; then, wait 10 seconds before restarting the server.
4. If the problem still remains, replace the dual-port network adapter.

Could not log in using LDAP account with SSL enabled

Complete the following steps until the problem is resolved:

1. Make sure that the license key is valid.
2. Generate a new license key and log in again.

Observable problems

Use this information to solve observable problems.

- “The server immediately displays the POST Event Viewer when it is turned on” on page 289

- “Server is unresponsive (POST is complete and operating system is running)” on page 289
- “Server is unresponsive (cannot press F1 to start System Setup)” on page 290
- “Voltage system board fault is displayed in the event log” on page 290
- “Unusual smell” on page 290
- “Server seems to be running hot” on page 290
- “Cannot enter legacy mode after installing a new adapter” on page 290
- “Cracked parts or cracked chassis” on page 291

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 the UEFI firmware and BMC firmware are the latest version.
3. Revert the system to the minimum configuration.
4. Correct any errors that are indicated by the light path diagnostics LEDs.
5. Make sure that the server supports all the processors and that the processors match in speed and cache size.

You can view processor details from system setup.

To determine if the processor is supported for the server, see <http://www.lenovo.com/us/en/serverproven/>.

6. (Trained technician only) Make sure that the processor is seated correctly.
7. Replace the following components one at a time, in the order shown, restarting the server each time:
 - a. (Trained technician only) Processor
 - b. (Trained technician only) System board

Server is unresponsive (POST is complete and operating system is running)

Complete the following steps until the problem is solved.

- If you are in the same location as the compute node, complete the following steps:
 1. If you are using a KVM connection, make sure that the connection is operating correctly. Otherwise, make sure that the keyboard and mouse are operating correctly.
 2. If possible, log in to the compute node and verify that all applications are running (no applications are hung).
 3. Restart the compute node.
 4. If the problem remains, make sure that any new software has been installed and configured correctly.
 5. Contact your place of purchase of the software or your software provider.
- If you are accessing the compute node from a remote location, complete the following steps:
 1. Make sure that all applications are running (no applications are hung).
 2. Attempt to log out of the system and log back in.
 3. Validate the network access by pinging or running a trace route to the compute node from a command line.
 - a. If you are unable to get a response during a ping test, attempt to ping another compute node in the enclosure to determine whether it is a connection problem or compute node problem.
 - b. Run a trace route to determine where the connection breaks down. Attempt to resolve a connection issue with either the VPN or the point at which the connection breaks down.

4. Restart the compute node remotely through the management interface.
5. If the problem remains, verify that any new software has been installed and configured correctly.
6. Contact your place of purchase of the software or your software provider.

Server is unresponsive (cannot press F1 to start System Setup)

Configuration changes, such as added devices or adapter firmware updates, and firmware or application code problems can cause the server to fail POST (the power-on self-test).

If this occurs, the server responds in either of the following ways:

- The server restarts automatically and attempts POST again.
- The server hangs, and you must manually restart the server for the server to attempt POST again.

After a specified number of consecutive attempts (automatic or manual), the server reverts to the default UEFI configuration and starts System Setup so that you can make the necessary corrections to the configuration and restart the server. If the server is unable to successfully complete POST with the default configuration, there might be a problem with the system board.

Voltage system board fault is displayed in the event log

Complete the following steps until the problem is solved.

1. Check the 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.
2. Update the UEFI firmware and BMC firmware to the latest version.
3. Revert the system to the minimum configuration. See “Specifications” on page 3 for the minimally required number of processors and DIMMs.
4. Restart the system.
 - If the system restarts, add each of the items that you removed one at a time, restarting the system each time, until the error occurs. Replace the item for which the error occurs.
 - If the system does not restart, suspect the system board.

Unusual smell

Complete the following steps until the problem is solved.

1. An unusual smell might be coming from newly installed equipment.
2. If the problem remains, contact Lenovo Support.

Server seems to be running hot

Complete the following steps until the problem is solved.

Multiple compute nodes or chassis:

1. Make sure that the room temperature is within the specified range (see “Specifications” on page 3).
2. Check the management processor event log for rising temperature events. If there are no events, the compute node is running within normal operating temperatures. Note that you can expect some variation in temperature.

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.

Appendix A. Hardware disassembling for recycle

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

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 264).
2. Refer to local environmental, waste or disposal regulations to ensure compliance.

Complete the following steps to disassemble the system board:

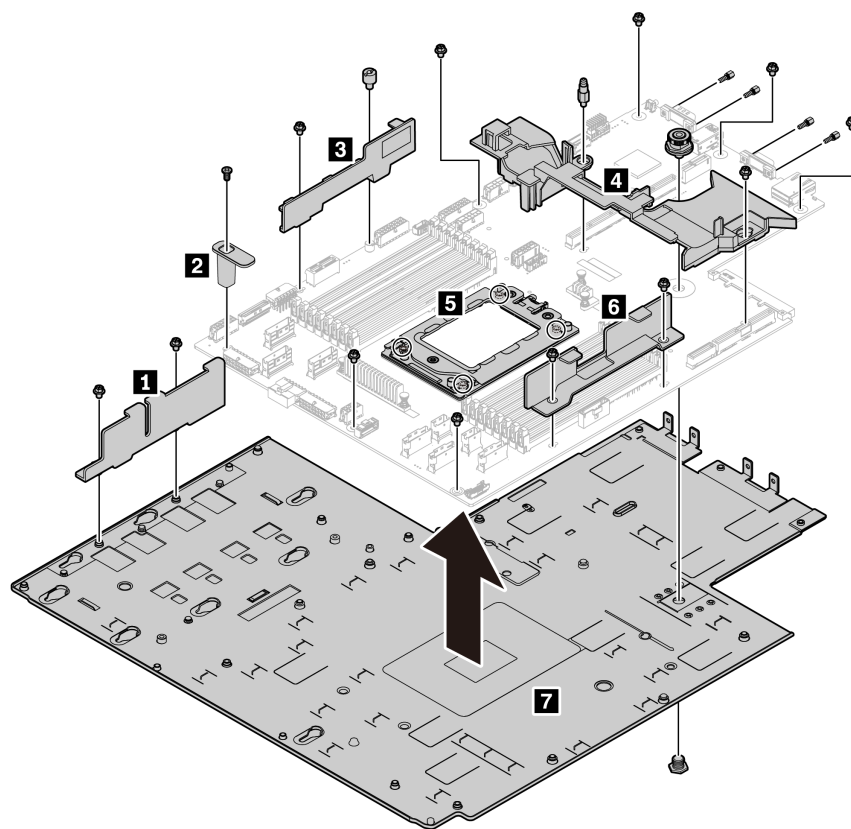


Figure 239. Disassembling the system board

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.

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.

Before you call

Before you call, there are several steps that you can take to try and solve the problem yourself. If you decide that you do need to call for assistance, gather the information that will be needed by the service technician to more quickly resolve your problem.

Attempt to resolve the problem yourself

You can solve many problems without outside assistance by following the troubleshooting procedures that Lenovo provides in the online help or in the Lenovo product documentation. The Lenovo product documentation also describes the diagnostic tests that you can perform. The documentation for most systems, operating systems, and programs contains troubleshooting procedures and explanations of error messages and error codes. If you suspect a software problem, see the documentation for the operating system or program.

You can find the product documentation for your ThinkSystem products at the following location:

<http://thinksystem.lenovofiles.com/help/index.jsp>

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

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

Collecting service data

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

Service data can be collected through the following tools:

- **Lenovo XClarity Provisioning Manager Lite V2**

Use the Collect Service Data function of Lenovo XClarity Provisioning Manager Lite V2 to collect system service data. You can collect existing system log data or run a new diagnostic to collect new data.

- **Lenovo ThinkSystem System Manager**

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.

Contacting Support

You can contact Support to obtain help for your issue.

You can receive hardware service through a Lenovo Authorized Service Provider. To locate a service provider authorized by Lenovo to provide warranty service, go to <https://datacentersupport.lenovo.com/serviceprovider> and use filter searching for different countries. For Lenovo support telephone numbers, see <https://datacentersupport.lenovo.com/supportphonenumber> for your region support details.

Appendix C. Notices

Lenovo may not offer the products, services, or features discussed in this document in all countries. Consult your local Lenovo representative for information on the products and services currently available in your area.

Any reference to a Lenovo product, program, or service is not intended to state or imply that only that Lenovo product, program, or service may be used. Any functionally equivalent product, program, or service that does not infringe any Lenovo intellectual property right may be used instead. However, it is the user's responsibility to evaluate and verify the operation of any other product, program, or service.

Lenovo may have patents or pending patent applications covering subject matter described in this document. The furnishing of this document is not an offer and does not provide a license under any patents or patent applications. You can send inquiries in writing to the following:

*Lenovo (United States), Inc.
8001 Development Drive
Morrisville, NC 27560
U.S.A.
Attention: Lenovo Director of Licensing*

LENOVO PROVIDES THIS PUBLICATION "AS IS" WITHOUT WARRANTY OF ANY KIND, EITHER EXPRESS OR IMPLIED, INCLUDING, BUT NOT LIMITED TO, THE IMPLIED WARRANTIES OF NON-INFRINGEMENT, MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE. Some jurisdictions do not allow disclaimer of express or implied warranties in certain transactions, therefore, this statement may not apply to you.

This information could include technical inaccuracies or typographical errors. Changes are periodically made to the information herein; these changes will be incorporated in new editions of the publication. Lenovo may make improvements and/or changes in the product(s) and/or the program(s) described in this publication at any time without notice.

The products described in this document are not intended for use in implantation or other life support applications where malfunction may result in injury or death to persons. The information contained in this document does not affect or change Lenovo product specifications or warranties. Nothing in this document shall operate as an express or implied license or indemnity under the intellectual property rights of Lenovo or third parties. All information contained in this document was obtained in specific environments and is presented as an illustration. The result obtained in other operating environments may vary.

Lenovo may use or distribute any of the information you supply in any way it believes appropriate without incurring any obligation to you.

Any references in this publication to non-Lenovo Web sites are provided for convenience only and do not in any manner serve as an endorsement of those Web sites. The materials at those Web sites are not part of the materials for this Lenovo product, and use of those Web sites is at your own risk.

Any performance data contained herein was determined in a controlled environment. Therefore, the result obtained in other operating environments may vary significantly. Some measurements may have been made on development-level systems and there is no guarantee that these measurements will be the same on generally available systems. Furthermore, some measurements may have been estimated through extrapolation. Actual results may vary. Users of this document should verify the applicable data for their specific environment.

Trademarks

LENOVO, THINKSYSTEM, and XCLARITY are trademarks of Lenovo.

AMD and EPYC are trademarks of AMD Corporation in United States. Microsoft and Windows are trademarks of the Microsoft group of companies. Linux is a registered trademark of Linus Torvalds. All other trademarks are the property of their respective owners. © 2021 Lenovo.

Important notes

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

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

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

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

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

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

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

Lenovo makes no representations or warranties with respect to non-Lenovo products. Support (if any) for the non-Lenovo products is provided by the third party, not Lenovo.

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

ASHRAE class compliance information

Your server complies with ASHRAE class A2 specifications. System performance may be impacted when operating temperature is outside ASHRAE A2 specification.

- 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)
 - Shipping or storage: 8%–90%

Depending on the hardware configuration, some server models comply with ASHRAE class A3 and class A4 specifications. To comply with ASHRAE class A3 and class A4 specifications, the server model must meet the following requirements at the same time:

- No NVMe drive, M.2 drive, middle bay, rear bay, GPU adapter, Ethernet adapter of 10 GbE or higher, or PCIe SSD adapter is installed.
- Required processor TDP for supported server models:
 - TDP ≤ 120 watts for server model with 24 x 2.5-inch front drive bays
 - TDP ≤ 155 watts for server model with 8 x 3.5-inch, 8 x 2.5-inch, or 16 x 2.5-inch front drive bays

Telecommunication regulatory statement

This product may not be certified in your country for connection by any means whatsoever to interfaces of public telecommunications networks. Further certification may be required by law prior to making any such connection. Contact a Lenovo representative or reseller for any questions.

Electronic emission notices

When you attach a monitor to the equipment, you must use the designated monitor cable and any interference suppression devices that are supplied with the monitor.

Additional electronic emissions notices are available at:

<http://thinksystem.lenovofiles.com/help/index.jsp>

Taiwan BSMI RoHS declaration

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

Taiwan import and export contact information

Contacts are available for Taiwan import and export information.

委製商/進口商名稱: 台灣聯想環球科技股份有限公司
 進口商地址: 台北市南港區三重路 66 號 8 樓
 進口商電話: 0800-000-702

Index

- 2.5-inch middle drive cage
 - installing 195
 - removing 193
- 2.5-inch or 3.5-inch middle drive cage
 - removing 193
- 2.5-inch or 3.5-inch rear drive cage
 - removing 239
- 2.5-inch rear drive cage
 - installing 240
 - removing 239
- 3.5-inch middle drive cage
 - installing 201
 - removing 199
- 3.5-inch rear drive cage
 - installing 242
 - removing 241

A

- air baffle
 - installing 148
 - removing 147
 - replacing 145
- ASHRAE class compliance information 299
- assert
 - physical presence 270

B

- backplane
 - installing 184, 187
 - removing 183, 186
 - replacing 183
- bezel
 - installing 134
 - removing 133
 - replacing 133

C

- cable routing
 - backplane 51
 - front I/O assembly 39
 - intrusion switch 46
 - VGA connector 38
- Cable routing for riser cards. 41, 46
- Cable routing for server model with one 12 x 3.5-inch AnyBay front backplane 65
- Cable routing for server model with one 12 x 3.5-inch SAS/SATA front backplane 59
- Cable routing for the GPU adapter 45
- Cable routing for the M.2 drives. 41
- Cable routing for the server model with one 8 x 2.5-inch SAS/SATA front backplane and one 8 x 2.5-inch NVMe front backplane 81
- Cable routing for the server model with one 8 x 2.5-inch SAS/SATA front backplane or one 8 x 2.5-inch NVMe front backplane 72
- Cable routing for the server model with one 8 x 3.5-inch SAS/SATA front backplane 56
- Cable routing for the server model with three 8 x 2.5-inch NVMe front backplanes 108
- Cable routing for the server model with three 8 x 2.5-inch SAS/SATA front drive backplanes 88

- Cable routing for the server model with two 8 x 2.5-inch NVMe front backplanes 85
- Cable routing for the server model with two 8 x 2.5-inch SAS/SATA front backplanes and one 8 x 2.5-inch NVMe front backplane 96
- Cable routing for the server model with two 8 x 2.5-inch SAS/SATA front drive backplanes 75
- CMOS battery
 - installing 211
 - removing 209
 - replacing 209
- collecting service data 296
- completing
 - parts replacement 274
- contamination, particulate and gaseous 7
- cover
 - installing 144
 - removing 142
 - replacing 142
- CPU
 - installing 256
 - replacing 253
- creating a personalized support web page 295
- custom support web page 295

D

- devices, static-sensitive
 - handling 124
- disassembling 293
- drive activity LED 13
- drive status LED 13

E

- Ethernet
 - controller
 - troubleshooting 277
- Ethernet controller problems
 - solving 277

F

- fan
 - installing 171
 - removing 169
 - replacing 169
- fan board
 - installing 260
 - replacing 259
- fan error LED 27
- firmware updates 8
- front 2.5-inch-drive backplane
 - installing 184
 - removing 183
- front 3.5-inch-drive backplane
 - installing 187
 - removing 186
- front I/O assembly 13, 17
 - installing 175
 - removing 174
 - replacing 174
- front view 13

G

- gaseous contamination 7
- Getting help 295
- GPU
 - installing 232
 - removing 230
 - replacing 230
- graphic processing unit
 - installing 232
 - removing 230
- guidelines
 - options installation 121
 - system reliability 123

H

- handling static-sensitive devices 124
- hard disk drive
 - replacing 176
- hard disk drive problems 281
- hardware service and support telephone numbers 296
- heat sink
 - installing 258
 - removing 254
 - replacing 253
- Heat sink and processor
 - replacing 253
- help 295
- hot-swap drive
 - installing 179
 - replacing 176
- hot-swap drives
 - removing 177
- hot-swap power supply
 - installing 248
 - removing 244
 - replacing 244

I

- ID label 1
- important notices 298
- installation
 - guidelines 121
- installation guidelines 121
- installing
 - 2.5-inch middle bay drive cage 195
 - 2.5-inch rear drive cage 240
 - 3.5-inch middle drive cage 201
 - 3.5-inch rear drive cage 242
 - air baffle 148
 - backplane 184, 187
 - CMOS battery 211
 - CPU 256
 - fan board 260
 - front I/O assembly 175
 - GPU 232
 - graphic processing unit 232
 - heat sink 258
 - hot-swap drive 179
 - hot-swap power supply 248
 - intrusion switch 223
 - memory module 207
 - microprocessor 256
 - middle drive cage 195, 201
 - middle or rear 2.5-inch-drive backplane 190
 - middle or rear 3.5-inch-drive backplane 192
 - OCP 3.0 Ethernet adapter 237
 - PIB board 262
 - processor 256, 258
 - rack latches 139

- rear drive cage 240, 242
- riser card 217, 219–220
- security bezel 134
- super capacitor module on the air baffle 152
- super capacitor module on the internal riser kit 156
- super capacitor module the middle 2.5-inch drive cage 154
- system board 266
- system fan 171
- system fan cage 173
- top cover 144
- TPM adapter 235
- insufficient PCIe resource
 - solving 285
- intermittent problems 287
- internal cable routing 37
- internal riser assembly
 - installing 160
 - replacing 158
- internal riser card
 - removing 158
- introduction 1
- intrusion switch
 - installing 223
 - removing 222
 - replacing 222

J

- jumper 30

K

- keyboard problems 284

L

- light path diagnostics 276

M

- M.2 adapter and M.2 drive
 - installing 166
 - replacing 162
- memory
 - problems 280
- memory module
 - removing 204
 - replacing 204
- memory module error LED 27
- memory module, install 207
- memory modules
 - removal 204
- memory modules installation rules 205
- microprocessor
 - installing 256
- middle drive cage
 - installing 195, 201
 - removing 193, 199
- middle or rear 2.5-inch-drive backplane
 - installing 190
 - removing 189
- middle or rear 3.5-inch-drive backplane
 - removing 191
- middle or rear backplane
 - removing 189
- monitor problems 283
- mouse problems 284

N

- network
 - problems 288
- network access label 1
- network activity LED 17
- notes, important 298
- notices 297

O

- observable problems 288
- OCP 3.0 Ethernet adapter
 - replacing 236
- optional-device problems 285

P

- particulate contamination 7
- parts list 31
- parts replacement, completing 274
- PCIe
 - troubleshooting 285
- PCIe adapter
 - replacing 225
- physical presence 270
- PIB board
 - installing 262
 - replacing 261
- power
 - problems 288
- power button 17
- Power connections for backplane power connections 52
- power cords 36
- power problems 277
- power status LED 17
- problems
 - Ethernet controller 277
 - hard disk drive 281
 - intermittent 287
 - keyboard 284
 - memory 280
 - monitor 283
 - mouse 284
 - network 288
 - observable 288
 - optional devices 285
 - PCIe 285
 - power 277, 288
 - power on and power off 278
 - serial-device 286
 - software 291
 - USB device 284
 - video 283
- processor
 - installing 254–256, 258
 - removing 255
 - replacing 253
- processor-heat-sink module
 - installing 256
- pull-out information tab 13

Q

- QR code 1

R

- rack latch 13

- rack latches
 - installing 139
 - removing 136
 - replacing 136
- RAID super capacitor module
 - replacing 149
- rear drive cage
 - installing 240, 242
 - removing 239, 241
- rear view 20
- rear view LED 24
- recycle 293
- recycling 293
- remove
 - fan board 259
 - M.2 adapter and M.2 drive 162
 - OCP 3.0 Ethernet adapter 237
 - PIB board 261
- removing
 - 2.5-inch or 3.5-inch middle drive cage 193
 - 2.5-inch or 3.5-inch rear drive cage 239
 - 2.5-inch rear drive cage 239
 - 3.5-inch rear drive cage 241
 - air baffle 147
 - backplane 183, 186
 - CMOS battery 209
 - front I/O assembly 174
 - GPU 230
 - graphic processing unit 230
 - heat sink 254
 - hot-swap drive 177
 - hot-swap power supply 244
 - internal riser card 158
 - intrusion switch 222
 - memory modules 204
 - middle 2.5-inch drive cage 193
 - middle 3.5-inch drive cage 199
 - middle drive cage 193, 199
 - middle or rear 2.5-inch-drive backplane 189
 - middle or rear 3.5-inch-drive backplane 191
 - middle or rear backplane 189
 - processor 254–255
 - rack latches 136
 - rear bay 239
 - rear drive cage 239, 241
 - riser card 213–214, 216
 - security bezel 133
 - super capacitor module from the air baffle 151
 - super capacitor module from the middle 2.5-inch drive cage 152
 - super capacitor module from the riser 4 kit 155
 - system board 264
 - system fan 169
 - system fan cage 172
 - top cover 142
 - TPM adapter 234
- removing, memory module 204
- replacing
 - air baffle 145
 - backplane 183
 - CMOS battery 209
 - CPU 253
 - fan board 259
 - front I/O assembly 174
 - GPU 230
 - graphics processing unit 230
 - hard disk drive 176
 - heat sink 253
 - Heat sink and processor 253
 - hot-swap drive 176
 - hot-swap power supply 244
 - internal riser assembly 158
 - intrusion switch 222
 - M.2 adapter and M.2 drive 162
 - memory module 204

- OCP 3.0 Ethernet adapter 236
- PCIe adapter 225
- PIB board 261
- processor 253
- rack latches 136
- RAID super capacitor module 149
- riser card 212
- security bezel 133
- solid-state drive 176
- system board 263
- system fan 169
- system fan cage 172
- top cover 142
- TPM adapter 234
- retainer on M.2 adapter
 - adjusting 165
- riser card
 - installing 217, 219–220
 - removing 213–214, 216
 - replacing 212

S

- safety v
- safety inspection checklist vi, 122
- Secure Boot 274
- security advisories 11
- security bezel
 - installing 134
 - removing 133
 - replacing 133
- security,
 - settings 270
- serial-device problems 286
- server components 13
- server power on or power off problems 278
- service and support
 - before you call 295
 - hardware 296
 - software 296
- service data 296
- software problems 291
- software service and support telephone numbers 296
- solid-state drive
 - replacing 176
- solving
 - Ethernet controller problems 277
 - insufficient PCIe resource 285
 - solving power problems 277
- static-sensitive devices
 - handling 124
- super capacitor module from the air baffle
 - removing 151
- super capacitor module from the internal riser kit
 - removing 155
- super capacitor module from the middle 2.5-inch drive cage
 - removing 152
- super capacitor module on the air baffle
 - installing 152
- super capacitor module on the internal riser kit
 - installing 156
- super capacitor module the middle 2.5-inch drive cage
 - installing 154
- support web page, custom 295
- supported drive bay combinations 125
- system board 293
 - installing 266
 - removing 264
 - replacing 263
- system board components 26
- system board LED 27
- system board replacement 270
- system error LED 17, 27

- system fan
 - installing 171
 - removing 169
 - replacing 169
- system fan cage
 - installing 173
 - removing 172
 - replacing 172
- system ID button 17
- system ID LED 17, 27
- system power LED 27
- system reliability guidelines 123

T

- Taiwan BSMI RoHS declaration 300
- Taiwan import and export contact information 300
- Tech Tips 10
- technical rules 125
- technical rules for GPU adapters 129
- Technical rules for HBA/RAID adapters 129
- Technical rules for OCP Ethernet adapters 131
- Technical rules for PCIe Flash storage adapters 132
- Technical rules for processors 127
- technical rules for system fans 128
- telecommunication regulatory statement 299
- telephone numbers 296
- top cover
 - installing 144
 - removing 142
 - replacing 142
- TPM adapter
 - installing 235
 - removing 234
 - replacing 234
- TPM version 273
- trademarks 298
- troubleshooting 283, 285, 291
 - by symptom 278
 - hard disk drive problems 281
 - intermittent problems 287
 - keyboard problems 284
 - memory problems 280
 - mouse problems 284
 - network problems 288
 - observable problems 288
 - power on and power off problems 278
 - power problems 288
 - serial-device problems 286
 - symptoms-based troubleshooting 278
 - USB-device problems 284
 - video 283
- turn off the server 11
- turn on the server 11

U

- UEFI Secure Boot 274
- update firmware 8
- updating
 - Update the Vital Product Data (VPD) 268
- USB-device problems 284

V

- VGA connector 13
- video problems 283

W

warranty 1

working inside the server
power on 123

Lenovo