



# ThinkSystem ST250 V2 Maintenance Manual



**Machine Types:** 7D8F and 7D8G

## 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](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>

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## Safety

Before installing this product, read the Safety Information.

قبل تركيب هذا المنتج، يجب قراءة الملاحظات الأمنية

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

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

安裝本產品之前，請先閱讀「安全資訊」。

Prije instalacije ovog produkta obavezno pročitajte Sigurnosne Upute.

Před instalací tohoto produktu si přečtěte příručku bezpečnostních instrukcí.

Læs sikkerhedsforskrifterne, før du installerer dette produkt.

Lees voordat u dit product installeert eerst de veiligheidsvoorschriften.

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

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

Vor der Installation dieses Produkts die Sicherheitshinweise lesen.

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

לפני שתתקינו מוצר זה, קראו את הוראות הבטיחות.

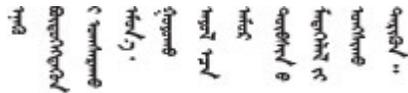
A termék telepítése előtt olvassa el a Biztonsági előírásokat!

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

製品の設置の前に、安全情報をお読みください。

본 제품을 설치하기 전에 안전 정보를 읽으십시오.

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



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

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

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

Перед установкой продукта прочтите инструкции по технике безопасности.

Pred inštaláciou tohto zariadenia si pečítajte Bezpečnostné predpisy.

Pred namestitvijo tega proizvoda preberite Varnostne informacije.

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

Läs säkerhetsinformationen innan du installerar den här produkten.

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

Bu ürünü kurmadan önce güvenlik bilgilerini okuyun.

مەزكۇر مەھسۇلاتنى ئورنىتىشتىن بۇرۇن بىخەتەرلىك ئۇچۇرلىرىنى ئوقۇپ چىقىڭ.

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

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## Safety inspection checklist

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

**Note:** This device is not intended for use in the direct field of view at visual display workplaces. To avoid incommoding reflections at visual display workplaces, this device must not be placed in the direct field of view.

**Attention:** This is a Class A product. In a domestic environment, this product may cause radio interference in which case the user may be required to take adequate measures.

### 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.**

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

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

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

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

- a. Go to:

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

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



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## Chapter 1. Introduction

The ThinkSystem ST250 V2 server is a 4U tower server designed for performance and expansion for various IT workloads. With the modular design, the server is flexible to be customized for maximum storage capacity or high storage density with selectable input/output options and tiered system management.

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

The server comes with a limited warranty. For details about the warranty, see: <https://support.lenovo.com/us/en/solutions/ht503310>

For details about your specific warranty, see: <http://datacentersupport.lenovo.com/warrantylookup>

### Identifying your server

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

The machine type and serial number are on the ID label on the front of the server.

The following illustration shows the location of the ID label.

**Note:** The illustrations in this document might differ slightly from your server.

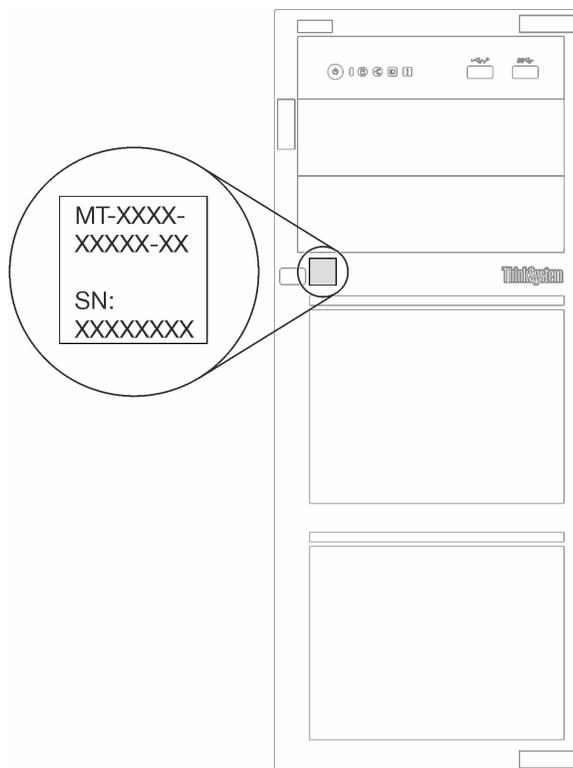
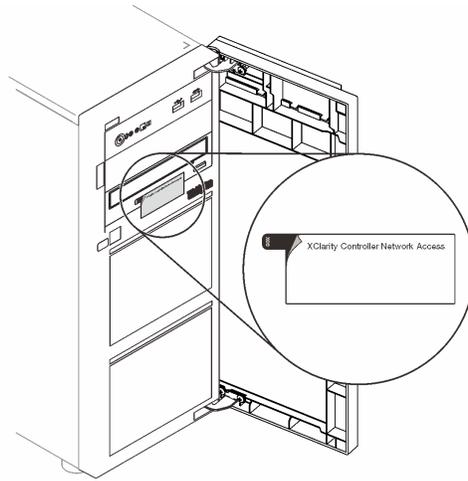


Figure 1. Location of the ID label

## XClarity Controller network access label

The XClarity Controller network access label is attached on the front bezel as shown. After you get the server, peel the XClarity Controller network access label away and store it in a safe place for future use.



*Figure 2. Location of the XClarity Controller network access label*

## Quick response code

The system service label, which is on the inside of the server 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 web site provides additional information for parts installation and replacement videos, and error codes for server support.

The following illustration shows the QR code.

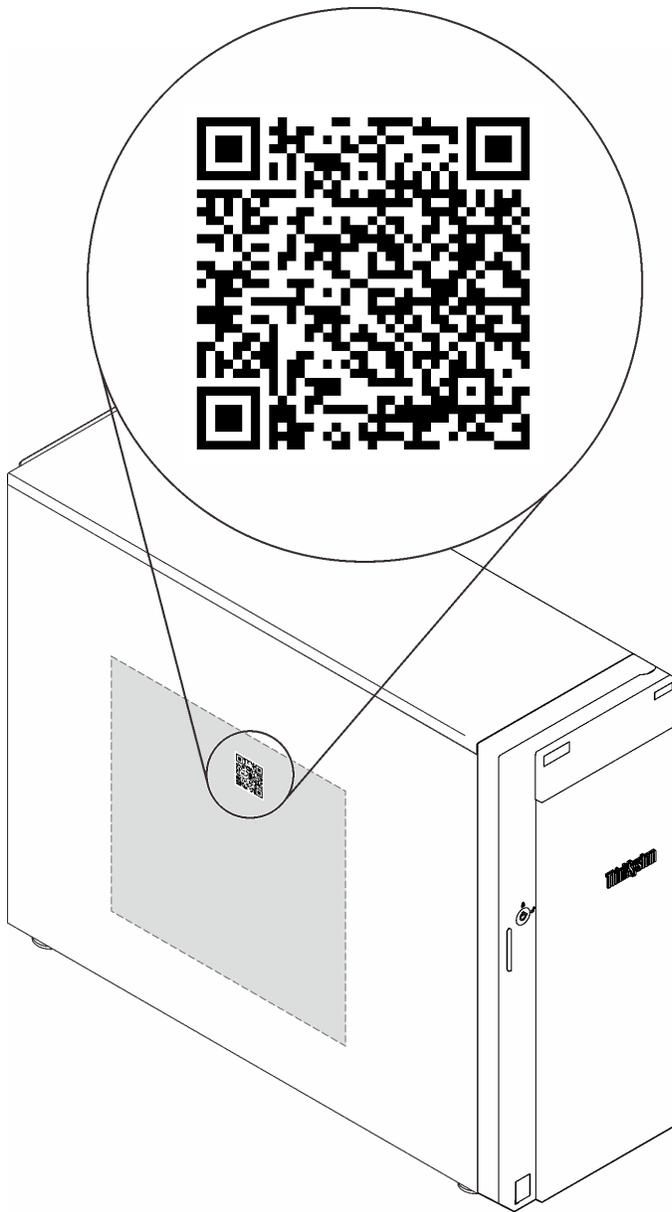


Figure 3. QR code

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## Server form factor

The ThinkSystem ST250 V2 server is designed to support both tower and rack form factors.

You can change the server from tower form factor to rack form factor by installing the tower-to-rack conversion kit. For instructions on how to install the tower-to-rack conversion kit, refer to the documentation that comes with the conversion kit.

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## 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. Specifications

Specification	Description
<b>Dimension</b>	4U server <ul style="list-style-type: none"> <li>• Height: 175 mm (6.89 inches)</li> <li>• Width: 430 mm (16.93 inches)</li> <li>• Depth: 565.7 mm (22.27 inches)</li> </ul>
<b>Weight (depending on the configuration)</b>	<ul style="list-style-type: none"> <li>• Maximum without package:                             <ul style="list-style-type: none"> <li>– 2.5-inch drive configuration: 21.98 kg (48.46 lb)</li> <li>– 3.5-inch drive configuration: 24.28 kg (53.53 lb)</li> </ul> </li> <li>• Minimum with package:                             <ul style="list-style-type: none"> <li>– 2.5-inch drive configuration: 17.96 kg (39.60 lb)</li> <li>– 3.5-inch drive configuration: 20.04 kg (44.18 lb)</li> </ul> </li> </ul>
<b>Processor</b>	This server comes with one LGA 1200 socket that supports one of the following Intel® processors scalable up to eight cores: <ul style="list-style-type: none"> <li>• Xeon® E</li> <li>• Pentium®</li> </ul> For a list of supported processors, see: <a href="http://datacentersupport.lenovo.com">http://datacentersupport.lenovo.com</a> .
<b>Memory</b>	See “Memory module installation rules and orders” on page 149 for detailed information about memory configuration and setup. <ul style="list-style-type: none"> <li>• Minimum: 8 GB</li> <li>• Maximum: 128 GB</li> <li>• Slots: four DIMM slots (two channels, two DIMMs per channel)</li> <li>• Supports 8 GB, 16 GB, and 32 GB TruDDR4 3200 MHz ECC UDIMMs</li> </ul>
<b>Drive bays (varies by model)</b>	Available drive bays might vary by model. <ul style="list-style-type: none"> <li>• Storage drive bays:                             <ul style="list-style-type: none"> <li>– 3.5-inch simple-swap drive configurations                                     <ul style="list-style-type: none"> <li>– Eight 3.5-inch drives   <ul style="list-style-type: none"> <li>• Bay 0 to 6 support SATA drives</li> <li>• Bay 7 supports one of the following:   <ul style="list-style-type: none"> <li>– SATA drive</li> <li>– NVMe drive</li> </ul> </li> </ul> </li> <li>– Six 3.5-inch SATA drives   <ul style="list-style-type: none"> <li>• Bay 0 to 3, 4 and 5 support SATA drives</li> <li>• Optical-drive bay 1 (lower bay) supports one of the following:   <ul style="list-style-type: none"> <li>– Optical drive</li> <li>– Tape drive (RDX or LTO)</li> </ul> </li> <li>• Optical-drive bay 2 (upper bay) supports one optional optical drive</li> </ul> </li> </ul> </li> <li>– 2.5/3.5-inch hot-swap drive configurations                                     <ul style="list-style-type: none"> <li>– Eight 3.5-inch SAS/SATA drives (Bay 0 to 3 and Bay 4 to 7)</li> <li>– Sixteen 2.5-inch SAS/SATA drives (Bay 0 to 7 and Bay 8 to 15)</li> <li>– Four 3.5-inch (Bay 0 to 3) and eight 2.5-inch SAS/SATA drives (Bay 4 to 11)</li> <li>– Optical/tape drive bays   <ul style="list-style-type: none"> <li>• Optical-drive bay 1 (lower bay) supports one of the following:   <ul style="list-style-type: none"> <li>– Optical drive</li> <li>– Tape drive (RDX or LTO)</li> </ul> </li> <li>• Optical-drive bay 2 (upper bay) supports one optional optical drive</li> </ul> </li> </ul> </li> </ul> </li> </ul>

Table 1. Specifications (continued)

Specification	Description
<b>M.2 drive</b>	<p>Supports up to two SATA M.2 drives of the following drive form factors:</p> <ul style="list-style-type: none"> <li>• 42 mm (2242)</li> <li>• 60 mm (2260)</li> <li>• 80 mm (2280)</li> <li>• 110 mm (22110)</li> </ul> <p>Supports the following M.2 drive capacity:</p> <ul style="list-style-type: none"> <li>• 128 GB</li> <li>• 240 GB</li> <li>• 480 GB (supported only when the ambient temperature is below 30°C)</li> </ul>
<b>Expansion slots</b>	<p>Four PCIe expansion slots are available:</p> <ul style="list-style-type: none"> <li>• Slot 1: PCIe Gen3 x4 lane in x4 slot, FH/HL</li> <li>• Slot 2: PCIe Gen4 x16 lane in x16 slot, FH/HL</li> <li>• Slot 3: PCIe Gen3 x4 lane in x4 slot, FH/HL</li> <li>• Slot 4: PCIe Gen3 x4 lane in x8 slot, FH/HL</li> </ul> <p><b>Notes:</b></p> <ol style="list-style-type: none"> <li>1. PCIe slot 4 supports an M.2 module.</li> <li>2. Slot 1 and Slot 3 in the ST250 V2 are open-end design, which means that the slots can accept adapters with a longer edge connector than the physical length of the slot connector. For example, if a x8 adapter is installed in the x4 slot 3 of the server, half of the edge connector will not be connected to the slot. The adapter will still function, however performance will be impacted.</li> </ol>
<b>Input/Output (I/O) features</b>	<ul style="list-style-type: none"> <li>• Front panel <ul style="list-style-type: none"> <li>– One Lenovo XClarity Controller USB 2.0 connector</li> <li>– One USB 3.2 Gen 1 (5Gb) connector</li> </ul> </li> <li>• Rear panel <ul style="list-style-type: none"> <li>– One Video Graphics Array (VGA) connector</li> <li>– One serial connector</li> <li>– One Lenovo XClarity Controller network connector</li> <li>– Two Ethernet connectors (shared with Lenovo XClarity Controller network connector)</li> <li>– Four USB 3.2 Gen 2 (10Gb) connectors</li> </ul> </li> </ul>
<b>Network</b>	<ul style="list-style-type: none"> <li>• Two 1Gbps RJ45 with BCM 5720</li> <li>• One 1Gbps Management RJ45</li> </ul>
<b>RAID (depending on model)</b>	<p>The following options are available:</p> <ul style="list-style-type: none"> <li>• Hardware RAID (RAID level 0, 1, 5, and 10): <ul style="list-style-type: none"> <li>– ThinkSystem RAID 9350-16i 4GB Flash PCIe 12Gb Adapter (with flash power module)</li> <li>– ThinkSystem RAID 9350-8i 2GB Flash PCIe 12Gb Adapter (with flash power module)</li> <li>– ThinkSystem RAID 5350-8i PCIe 12Gb Adapter</li> <li>– ThinkSystem 4350-8i SAS/SATA 12Gb HBA</li> <li>– ThinkSystem M.2 SATA 2-Bay RAID Enablement Kit</li> </ul> </li> </ul> <p><b>Note:</b> When ThinkSystem 4350/5350/9350 series RAID adapters are installed, drive number starts from 1 instead of from 0.</p> <ul style="list-style-type: none"> <li>• Software RAID (RAID level 0, 1, 5, and 10): <ul style="list-style-type: none"> <li>– Intel VROC SATA RAID</li> </ul> </li> </ul> <p>For a list of supported adapters, see:</p> <p><a href="http://datacentersupport.lenovo.com">http://datacentersupport.lenovo.com</a></p>

Table 1. Specifications (continued)

Specification	Description
<b>System fans</b>	This server comes with the following fans: <ul style="list-style-type: none"> <li>• One heat sink and fan assembly (80 x 80 x 25 mm)</li> <li>• Two front system fans for drives (92 x 92 x 25 mm)</li> <li>• One rear system fan (120 x 120 x 25 mm)</li> </ul>
<b>Electrical input</b>	Universal input: <ul style="list-style-type: none"> <li>• Low range: 100 to 127 Vac</li> <li>• High range: 200 to 240 Vac</li> <li>• Input frequency range: 50 to 60 Hz</li> </ul> <b>Note:</b> ThinkSystem ST250 V2 only supports AC input power. <b>Do not use 240 VDC input.</b>
<b>Power supply</b>	Depending on your configuration, the server comes with one of the following power supply configurations: <ul style="list-style-type: none"> <li>• One 250W or 300W fixed power supply</li> <li>• One or two 550W redundant power supplies</li> </ul>
<b>Acoustical noise emissions</b>	The server has the following acoustical noise emissions declaration: <ul style="list-style-type: none"> <li>• Sound power level (<math>L_{WA(d)}</math>):                             <ul style="list-style-type: none"> <li>– Idling: 4.3 Bel (Typical), 4.4 Bel (Max)</li> <li>– Operating: 4.3 Bel (Typical), 4.5 Bel (Max)</li> </ul> </li> <li>• Sound pressure level (<math>L_{p(Am)}</math>):                             <ul style="list-style-type: none"> <li>– Idling: 27.4 dBA (Typical), 28.6 dBA (Max)</li> <li>– Operating: 27.6 dBA (Typical), 29.0 dBA (Max)</li> </ul> </li> </ul> <b>Notes:</b> <ul style="list-style-type: none"> <li>• These sound levels were measured in controlled acoustical environments according to procedures specified by ISO7779 and are reported in accordance with ISO 9296, SPL is measured by bystander position(1m).</li> <li>• The declared acoustic sound levels are based on the following configurations, which may change depending on configuration/conditions, for example M.2 drive, Broadcom 57414 25Gb NIC, Broadcom 57416 10Gb NIC, T1000, etc.                             <ul style="list-style-type: none"> <li>– Typical: 1x 80W CPU, 4x 32GB DIMM, 2x HDD or SSD, RAID 5350-8i, 1x 300W PSU</li> <li>– Max: 1x 95W CPU, 4x 32GB DIMM, 2x HDD or SSD, 2x 550W PSU</li> </ul> </li> </ul>
<b>Approximate heat output</b>	<ul style="list-style-type: none"> <li>• Minimum configuration: 358.05 BTU per hour (105 watts)</li> <li>• Maximum configuration: 1029.82 BTU per hour (302 watts)</li> </ul>

Table 1. Specifications (continued)

Specification	Description
<b>Ambient temperature management</b>	<p>Adjust ambient temperature when specific configuration is applied:</p> <ul style="list-style-type: none"> <li>• Eight 3.5-inch drives               <ul style="list-style-type: none"> <li>– When a 95W TDP CPU and a 95W performance heatsink are installed:                   <ul style="list-style-type: none"> <li>– Keep ambient temperature to 35°C or lower. M.2 drives (up to 240GB) are supported in this configuration.</li> <li>– Keep ambient temperature to 30°C or lower when a 480GB M.2 drive is installed.</li> </ul> </li> <li>– When an 80W (or lower) TDP CPU and an 80W heatsink are installed:                   <ul style="list-style-type: none"> <li>– Keep ambient temperature to 35°C or lower. M.2 drives (up to 240GB) are supported in this configuration.</li> <li>– Keep ambient temperature to 30°C or lower when a 480GB M.2 drive is installed.</li> </ul> </li> </ul> </li> <li>• Sixteen 2.5-inch drives               <ul style="list-style-type: none"> <li>– When a 95W TDP CPU and a 95W performance heatsink are installed:                   <ul style="list-style-type: none"> <li>– Keep ambient temperature to 35°C or lower. M.2 drives (up to 240GB) are supported in this configuration.</li> <li>– Keep ambient temperature to 30°C or lower when a 480GB M.2 drive is installed.</li> </ul> </li> <li>– When an 80W (or lower) TDP CPU and an 80W heatsink are installed:                   <ul style="list-style-type: none"> <li>– Keep ambient temperature to 35°C or lower. M.2 drives (up to 240GB) are supported in this configuration.</li> <li>– Keep ambient temperature to 30°C or lower when a 480GB M.2 drive is installed.</li> </ul> </li> </ul> </li> <li>• Eight 2.5-inch drives and four 3.5-inch drives               <ul style="list-style-type: none"> <li>– When an 80W TDP CPU and an 80W heatsink are installed:                   <ul style="list-style-type: none"> <li>– Keep ambient temperature to 40°C or lower.</li> <li>– M.2 drives, 10/25GbE Ethernet adapters, and redundant power supplies should not be installed in this configuration.</li> </ul> </li> <li>– When a 70W (or lower) TDP CPU and an 80W heatsink are installed:                   <ul style="list-style-type: none"> <li>– Keep ambient temperature to 45°C or lower.</li> <li>– M.2 drives, 10/25GbE Ethernet adapters, and redundant power supplies should not be installed in this configuration.</li> </ul> </li> </ul> </li> </ul>
<b>Environment</b>	<p>The ThinkSystem ST250 V2 server complies with ASHRAE Class A2 specifications. Depending on the hardware configurations, some models comply with ASHRAE Class A3 and A4 specifications. System performance may be impacted when operating temperature is outside ASHRAE A2 specification.</p> <ul style="list-style-type: none"> <li>• Air temperature:               <ul style="list-style-type: none"> <li>– Operating                   <ul style="list-style-type: none"> <li>– ASHRAE Class A2: 10°C to 35°C (50°F to 95°F); the maximum ambient temperature decreases by 1°C for every 300 m (984 ft) increase in altitude above 900 m (2,953 ft).</li> <li>– ASHRAE Class A3: 5°C to 40°C (41°F to 104°F); the maximum ambient temperature decreases by 1°C for every 175 m (574 ft) increase in altitude above 900 m (2,953 ft).</li> <li>– ASHRAE Class A4: 5°C to 45°C (41°F to 113°F); the maximum ambient temperature decreases by 1°C for every 125 m (410 ft) increase in altitude above 900 m (2,953 ft).</li> </ul> </li> </ul> </li> </ul>

Table 1. Specifications (continued)

Specification	Description
	<ul style="list-style-type: none"> <li>– Server off: 5°C to 45°C (41°F to 113°F)</li> <li>– Shipment/storage: -40°C to 60°C (-40°F to 140°F)</li> <li>• Maximum altitude: 3,050 m (10,000 ft)</li> <li>• Relative Humidity (non-condensing):               <ul style="list-style-type: none"> <li>– Operating                   <ul style="list-style-type: none"> <li>– ASHRAE Class A2: 8% to 80%; maximum dew point: 21°C (70°F)</li> <li>– ASHRAE Class A3: 8% to 85%; maximum dew point: 24°C (75°F)</li> <li>– ASHRAE Class A4: 8% to 90%; maximum dew point: 24°C (75°F)</li> </ul> </li> <li>– Shipment/storage: 8% to 90%</li> </ul> </li> <li>• Particulate contamination</li> </ul> <p><b>Attention:</b> Airborne particulates and reactive gases acting alone or in combination with other environmental factors such as humidity or temperature might pose a risk to the server. For information about the limits for particulates and gases, see “Particulate contamination” on page 8.</p>
<b>Operating systems</b>	<p>Supported and certified operating systems:</p> <ul style="list-style-type: none"> <li>• Microsoft Windows Server 2019, 2022</li> <li>• VMware ESXi 7.0 U3 or later versions</li> <li>• Red Hat Enterprise Linux 8.4 or later versions</li> <li>• SUSE Linux Enterprise Server 15 SP3 or later versions</li> </ul> <p>References:</p> <ul style="list-style-type: none"> <li>• Complete list of available operating systems: <a href="https://lenovopress.com/osig">https://lenovopress.com/osig</a>.</li> <li>• OS deployment instructions: See “Deploy the operating system” in <i>Setup Guide</i>.</li> </ul>
<b>Minimal configuration for debugging</b>	<ul style="list-style-type: none"> <li>• One processor</li> <li>• One UDIMM in slot 3</li> <li>• One power supply unit</li> <li>• One drive with RAID adapter and backplane or backplate (if OS is needed for debugging)</li> <li>• One system fan, one processor and heat sink fan, and one front system fan for drives</li> </ul>

## Particulate contamination

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

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

Table 2. Limits for particulates and gases

Contaminant	Limits
Reactive gases	<p>Severity level G1 as per ANSI/ISA 71.04-1985<sup>1</sup>:</p> <ul style="list-style-type: none"> <li>The copper reactivity level shall be less than 300 Angstroms per month (<math>\text{Å}/\text{month} \approx 0.0039 \mu\text{g}/\text{cm}^2\text{-hour}</math> weight gain).<sup>2</sup></li> <li>The silver reactivity level shall be less than 200 <math>\text{Å}/\text{month}</math> (<math>\text{Å}/\text{month} \approx 0.0035 \mu\text{g}/\text{cm}^2\text{-hour}</math> weight gain).<sup>3</sup></li> <li>The reactive monitoring of gaseous corrosivity must be conducted approximately 5 cm (2 in.) in front of the rack on the air inlet side at one-quarter and three-quarter frame height off the floor or where the air velocity is much higher.</li> </ul>
Airborne particulates	<p>Data centers must meet the cleanliness level of ISO 14644-1 class 8.</p> <p>For data centers without airside economizer, the ISO 14644-1 class 8 cleanliness might be met by choosing one of the following filtration methods:</p> <ul style="list-style-type: none"> <li>The room air might be continuously filtered with MERV 8 filters.</li> <li>Air entering a data center might be filtered with MERV 11 or preferably MERV 13 filters.</li> </ul> <p>For data centers with airside economizers, the choice of filters to achieve ISO class 8 cleanliness depends on the specific conditions present at that data center.</p> <ul style="list-style-type: none"> <li>The deliquescent relative humidity of the particulate contamination should be more than 60% RH.<sup>4</sup></li> <li>Data centers must be free of zinc whiskers.<sup>5</sup></li> </ul>

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

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

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

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

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

## Firmware updates

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

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

- Best practices related to updating firmware is available at the following site:
  - <http://lenovopress.com/LP0656>
- The latest firmware can be found at the following site:
  - <http://datacentersupport.lenovo.com/us/en/products/servers/thinksystem/st250v2/7D8F/downloads>
- You can subscribe to product notification to stay up to date on firmware updates:
  - <https://datacentersupport.lenovo.com/tw/en/solutions/ht509500>

## Update method terminology

- **In-band update.** The installation or update is performed using a tool or application within an operating system that is executing on the server's core CPU.
- **Out-of-band update.** The installation or update is performed by the Lenovo XClarity Controller collecting the update and then directing the update to the target subsystem or device. Out-of-band updates have no dependency on an operating system executing on the core CPU. However, most out-of-band operations do require the server to be in the S0 (Working) power state.
- **On-Target update.** The installation or update is initiated from an 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 Lenovo XClarity Controller.
- **UpdateXpress System Packs (UXSPs).** UXSPs are bundled updates designed and tested to provide the interdependent level of functionality, performance, and compatibility. UXSPs are server machine-type specific and are built (with firmware and device driver updates) to support specific Windows Server, Red Hat Enterprise Linux (RHEL) and SUSE Linux Enterprise Server (SLES) operating system distributions. Machine-type-specific firmware-only UXSPs are also available.

## Firmware updating tools

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

Tool	Update Methods Supported	Core System Firmware Updates	I/O Devices Firmware Updates	Graphical user interface	Command line interface	Supports UXSPs
<b>Lenovo XClarity Provisioning Manager (LXPM)</b>	In-band <sup>2</sup> On-Target	√		√		
<b>Lenovo XClarity Controller (XCC)</b>	Out-of-band Off-Target	√	Selected I/O devices	√		
<b>Lenovo XClarity Essentials OneCLI (OneCLI)</b>	In-band Out-of-band On-Target Off-Target	√	All I/O devices		√	√
<b>Lenovo XClarity Essentials UpdateXpress (LXCE)</b>	In-band Out-of-band On-Target Off-Target	√	All I/O devices	√		√
<b>Lenovo XClarity Essentials Bootable Media Creator (BoMC)</b>	In-band Out-of-band Off-Target	√	All I/O devices	√ (BoMC application)	√ (BoMC application)	√

Tool	Update Methods Supported	Core System Firmware Updates	I/O Devices Firmware Updates	Graphical user interface	Command line interface	Supports UXSPs
<b>Lenovo XClarity Administrator (LXCA)</b>	In-band <sup>1</sup> Out-of-band <sup>2</sup> Off-Target	√	All I/O devices	√		√
<b>Lenovo XClarity Integrator (LXCI) for VMware vCenter</b>	Out-of-band Off-Target	√	Selected I/O devices	√		
<b>Lenovo XClarity Integrator (LXCI) for Microsoft Windows Admin Center</b>	In-band Out-of-band On-Target Off-Target	√	All I/O devices	√		√
<b>Lenovo XClarity Integrator (LXCI) for Microsoft System Center Configuration Manager</b>	In-band On-Target	√	All I/O devices	√		√
<b>Notes:</b>						
1. For I/O firmware updates.						
2. For BMC and UEFI firmware updates.						

- **Lenovo XClarity Provisioning Manager**

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

**Note:** By default, the Lenovo XClarity Provisioning Manager Graphical User Interface is displayed when you press F1. If you have changed that default to be the text-based system setup, you can bring up the Graphical User Interface from the text-based system setup interface.

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

“Firmware Update” section in the LXPM documentation compatible with your server at [https://sysmgt.lenovofiles.com/help/topic/lxpm\\_frontend/lxpm\\_product\\_page.html](https://sysmgt.lenovofiles.com/help/topic/lxpm_frontend/lxpm_product_page.html)

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

- **Lenovo XClarity Controller**

If you need to install a specific update, you can use the Lenovo XClarity Controller interface for a specific server.

**Notes:**

- To perform an in-band update through Windows or Linux, the operating system driver must be installed and the Ethernet-over-USB (sometimes called LAN over USB) interface must be enabled.

For additional information about configuring Ethernet over USB, see:

“Configuring Ethernet over USB” section in the XCC documentation version compatible with your server at [https://sysmgt.lenovofiles.com/help/topic/lxcc\\_frontend/lxcc\\_overview.html](https://sysmgt.lenovofiles.com/help/topic/lxcc_frontend/lxcc_overview.html)

- If you update firmware through the Lenovo XClarity Controller, make sure that you have downloaded and installed the latest device drivers for the operating system that is running on the server.

For specific details about updating firmware using Lenovo XClarity Controller, see:

“Updating Server Firmware” section in the XCC documentation compatible with your server at [https://sysmgt.lenovofiles.com/help/topic/lxcc\\_frontend/lxcc\\_overview.html](https://sysmgt.lenovofiles.com/help/topic/lxcc_frontend/lxcc_overview.html)

**Important:** Lenovo XClarity Controller (XCC) supported version varies by product. All versions of Lenovo XClarity Controller are referred to as Lenovo XClarity Controller and XCC in this document, unless specified otherwise. To see the XCC version supported by your server, go to [https://sysmgt.lenovofiles.com/help/topic/lxcc\\_frontend/lxcc\\_overview.html](https://sysmgt.lenovofiles.com/help/topic/lxcc_frontend/lxcc_overview.html).

- **Lenovo XClarity Essentials OneCLI**

Lenovo XClarity Essentials OneCLI is a collection of command line applications that can be used to manage Lenovo servers. Its update application can be used to update firmware and device drivers for your servers. The update can be performed within the host operating system of the server (in-band) or remotely through the BMC of the server (out-of-band).

For specific details about updating firmware using Lenovo XClarity Essentials OneCLI, see:

[http://sysmgt.lenovofiles.com/help/topic/toolstr\\_cli\\_lenovo/onecli\\_c\\_update.html](http://sysmgt.lenovofiles.com/help/topic/toolstr_cli_lenovo/onecli_c_update.html)

- **Lenovo XClarity Essentials UpdateXpress**

Lenovo XClarity Essentials UpdateXpress provides most of OneCLI update functions through a graphical user interface (GUI). It can be used to acquire and deploy UpdateXpress System Pack (UXSP) update packages and individual updates. UpdateXpress System Packs contain firmware and device driver updates for Microsoft Windows and for Linux.

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

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

- **Lenovo XClarity Essentials Bootable Media Creator**

You can use Lenovo XClarity Essentials Bootable Media Creator to create bootable media that is suitable for firmware updates, VPD updates, inventory and FFDC collection, advanced system configuration, FoD Keys management, secure erase, RAID configuration, and diagnostics on supported servers.

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

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

- **Lenovo XClarity Administrator**

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

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

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

- **Lenovo XClarity Integrator offerings**

Lenovo XClarity Integrator offerings can integrate management features of Lenovo XClarity Administrator and your server with software used in a certain deployment infrastructure, such as VMware vCenter, Microsoft Admin Center, or Microsoft System Center.

For specific details about updating firmware using Lenovo XClarity Integrator offerings, see:

[https://sysmgmt.lenovofiles.com/help/topic/lxci/lxci\\_product\\_page.html](https://sysmgmt.lenovofiles.com/help/topic/lxci/lxci_product_page.html)

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## Tech Tips

Lenovo continually updates the support website with the latest tips and techniques that you can use to solve issues that your server might encounter. These Tech Tips (also called retain tips or service bulletins) provide procedures to work around issues or solve problems related to the operation of your server.

To find the Tech Tips available for your server:

1. Go to <http://datacentersupport.lenovo.com> and navigate to the support page for your server.
2. Click on the documentation icon  from the navigation pane.
3. Click **Documentation Type** → **Solution** from the drop-down menu.

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

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## Security advisories

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

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

[https://datacentersupport.lenovo.com/product\\_security/home](https://datacentersupport.lenovo.com/product_security/home)

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## Power on the server

After the server performs a short self-test (power status LED flashes quickly) when connected to input power, it enters a standby state (power status LED flashes once per second).

The server can be turned on (power LED on) in any of the following ways:

- You can press the power button.
- The server can restart automatically after a power interruption.
- The server can respond to remote power-on requests sent to the Lenovo XClarity Controller.

For information about powering off the server, see “Power off the server” on page 13.

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## Power off the server

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

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

**Note:** The Lenovo XClarity Controller can place the server in a standby state as an automatic response to a critical system failure.

- Start an orderly shutdown using the operating system (if supported by your operating system).
- Press the power-on 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 XClarity Controller. For information about powering on the server, see “Power on the server” on page 13.

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## Chapter 2. Server components

This section provides information that helps locate the server components.

### Identifying your server

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

The model number and serial number are on the ID label on the front of the server. The following illustration shows the location of the ID label containing the machine type, model, and serial number.

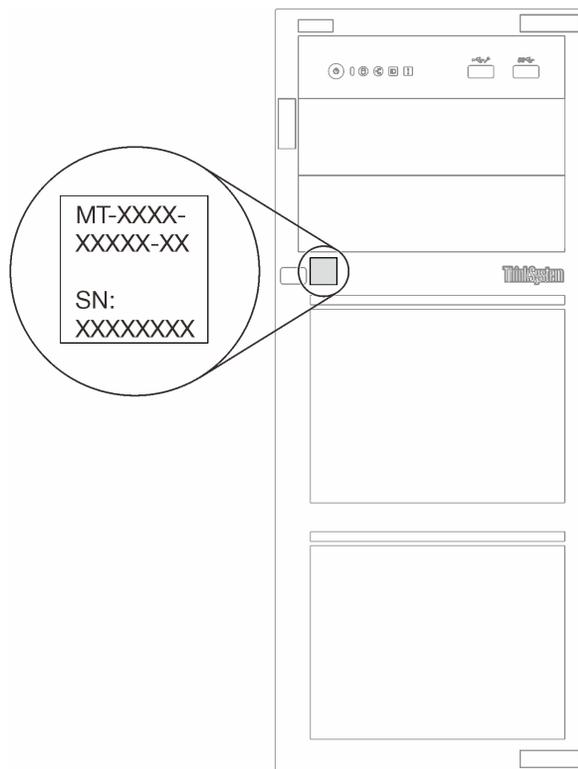
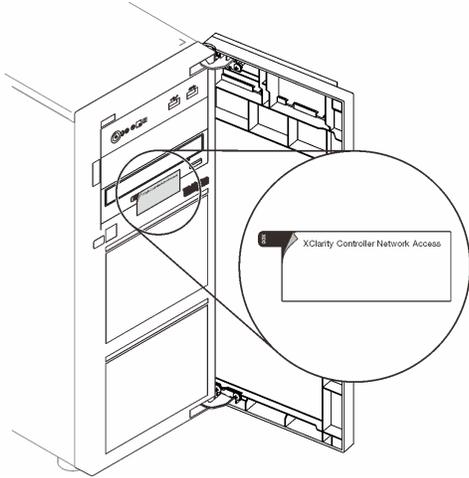


Figure 4. Location of the machine type, model, and serial number

### XClarity Controller network access label

The XClarity Controller network access label is attached on the front of the server. After you get the server, peel the XClarity Controller network access label away and store it in a safe place for future use.

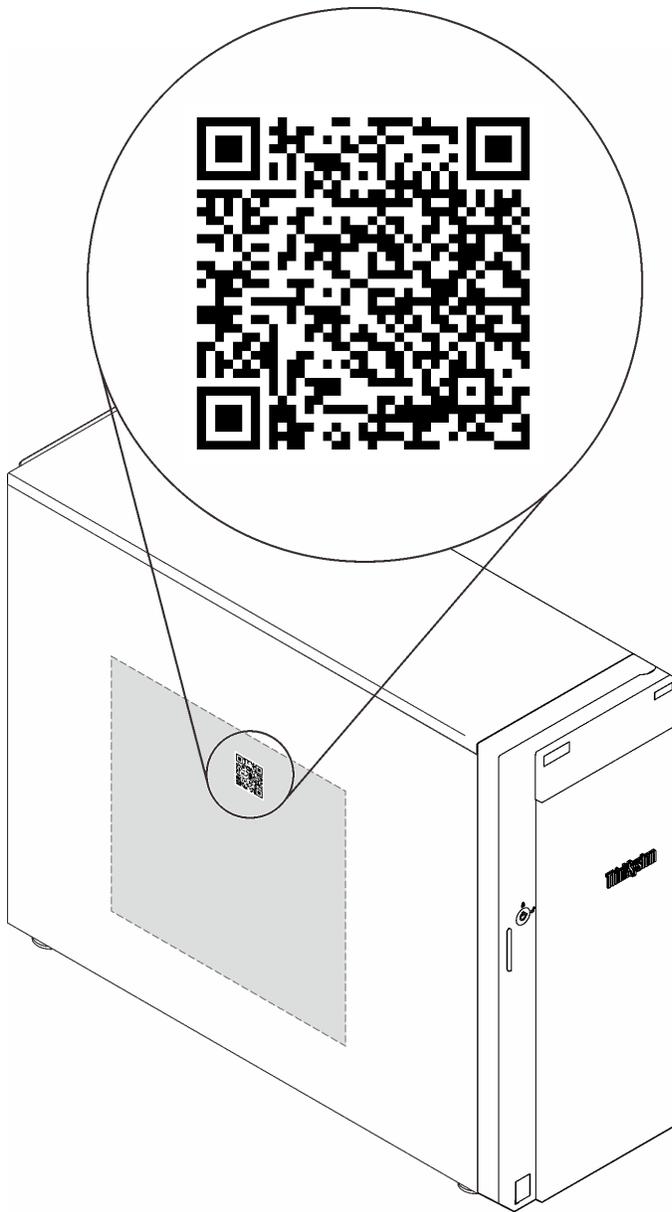


*Figure 5. Location of XClarity Controller network access label*

### **QR code**

The system service label on the inside of the server cover provides a QR code for mobile access to service information. You can scan the QR code with a mobile device for quick access to additional information including parts installation, replacement, and error codes.

The following illustration shows the QR code.



*Figure 6. Location of QR code*

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## **Front view**

The front view of the server varies by model.

The following illustration shows the server components that may appear on the front of this server model.

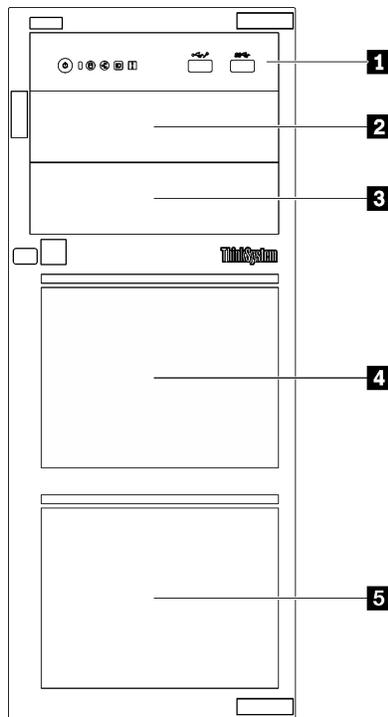


Figure 7. Front view of the server components

Table 3. Components on the front of server models

Item	Description
<b>1</b> Front panel	See “Front panel” on page 19
<b>2</b> Optical-drive bay 2	The optical drive bay 2 supports an optical drive.
<b>3</b> Optical-drive bay 1	The optical drive bay 1 supports an optical drive or a tape drive (RDX or LTO).
<b>4 5</b> Storage drive bays	The number of available drive bays varies by model. See “Drive configurations” on page 18 for the complete configuration table. The vacant drive bays must be installed with drive fillers.

### Drive configurations

Item	Eight 3.5-inch simple-swap drives	Six 3.5-inch simple-swap drives + Optical/tape drives	Eight 3.5-inch hot-swap drives + Optical/tape drives	Sixteen 2.5-inch hot-swap drives + Optical/tape drives	Four 3.5-inch hot-swap drives + Eight 2.5-inch hot-swap drives + Optical/tape drives
<b>2</b>	N/A	Optical-drive bay 2: Optical drive	Optical-drive bay 2: Optical drive	Optical-drive bay 2: Optical drive	Optical-drive bay 2: Optical drive

<b>3</b>	N/A	Optical-drive bay 1: Optical/tape drive			
<b>4</b>	Three SATA drives (Bay 4, 5, 6) and one SATA/NVMe drive (Bay 7)	Two SATA drives (Bay 4, 5)	Four SAS/SATA drives (Bay 4 to 7)	Eight SAS/SATA drives (Bay 8 to 15)	Eight SAS/SATA drives (Bay 4 to 11)
<b>5</b>	Four SATA drives (Bay 0 to 3)	Four SATA drives (Bay 0 to 3)	Four SAS/SATA drives (Bay 0 to 3)	Eight SAS/SATA drives (Bay 0 to 7)	Four SAS/SATA drives (Bay 0 to 3)

**Note:** When ThinkSystem 4350/5350/9350 series RAID adapters are installed, drive number starts from 1 instead of from 0.

## Front panel

The front panel of the server provides controls, connectors, and LEDs.

The following illustration shows the control, connectors, and LEDs on the front panel of the server.

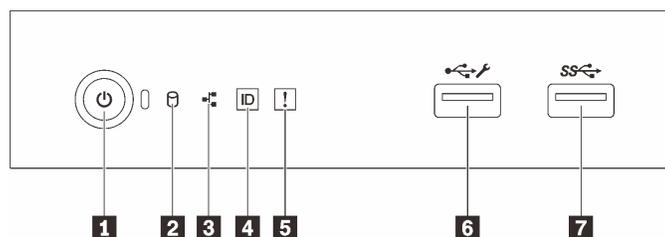


Figure 8. Front panel

Table 4. Components on the front panel

Callout	Callout
<b>1</b> Power button with power status LED (green)	<b>5</b> System error LED (yellow)
<b>2</b> Drive activity LED (green) <b>Note:</b> For onboard SATA indication only	<b>6</b> XClarity Controller USB 2.0 connector
<b>3</b> Network activity LED (green) <b>Note:</b> For onboard LAN indication only	<b>7</b> USB 3.2 Gen 1 connector
<b>4</b> System ID button with system ID LED (blue)	

### 1 Power button with power status LED

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

Status	Color	Description
Solid on	Green	The server is on and running.
Slow blinking (about one flash per second)	Green	The server is off and is ready to be powered on (standby state).

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

## 2 Drive activity LED

The drive activity LED helps you to determine the status of the drive activity.

**Note:** The drive activity LED only indicates the activities of drives that are connected to the SATA ports on the system board.

Status	Color	Description
Solid on	Green	The drive is active.
Flashing	Green	The drive is being accessed.
Off	None	The drive is not active.

## 3 Network activity LED

The network activity LED 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.

## 4 System ID button with system ID LED

Use this system ID button and the blue system ID LED to visually locate the server. Each time you press the system ID button, the state of the system ID LED changes. The LED can be changed to on, blinking, or off. You can also use the Lenovo XClarity Controller or a remote management program to change the state of the system ID LED to assist in visually locating the server among other servers.

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

## 5 System error LED

The system error LED provides basic diagnostic functions for your server.

Status	Color	Description	Action
On	Yellow	<p>An error has been detected on the server. Causes might include one or more of the following errors:</p> <ul style="list-style-type: none"> <li>• The temperature of the server reached the non-critical temperature threshold.</li> <li>• The voltage of the server reached the non-critical voltage threshold.</li> <li>• A fan has been detected to be running at low speed.</li> <li>• A fan has been removed.</li> <li>• The power supply has a critical error.</li> <li>• The power supply is not connected to the power.</li> </ul>	Check the event log to determine the exact cause of the error.
Off	None	The server is off or the server is on and is working correctly.	None.

### **6 XClarity Controller USB connector**

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

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

### **7 USB 3.2 Gen 1 connector**

Used to attach a device that requires a USB 2.0 or 3.0 connection, such as a keyboard, a mouse, or a USB flash drive.

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## **Side view**

Use this information to locate the components from the side of the server.

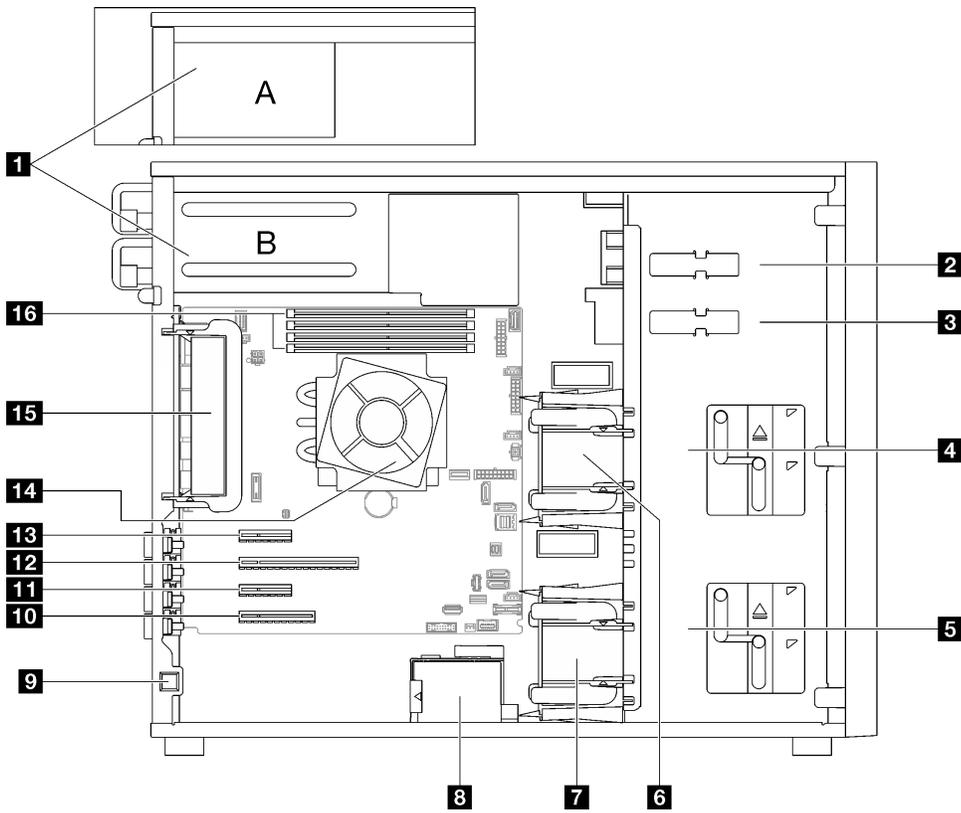


Table 5. Components on the server models side view

<b>1</b>	Power supply cage	<b>9</b>	Intrusion switch
<b>2</b>	Upper ODD drive bay	<b>10</b>	PCIe Slot 4
<b>3</b>	Lower ODD/tape drive bay	<b>11</b>	PCIe Slot 3
<b>4</b>	Upper storage drive cage	<b>12</b>	PCIe Slot 2
<b>5</b>	Lower storage drive cage	<b>13</b>	PCIe Slot 1
<b>6</b>	Front system fan 1	<b>14</b>	Processor and heat sink
<b>7</b>	Front system fan 2	<b>15</b>	Rear system fan
<b>8</b>	RAID flash power module holder	<b>16</b>	DIMM slots

## Rear view

Use this information to locate the connectors and components on the rear of the server.

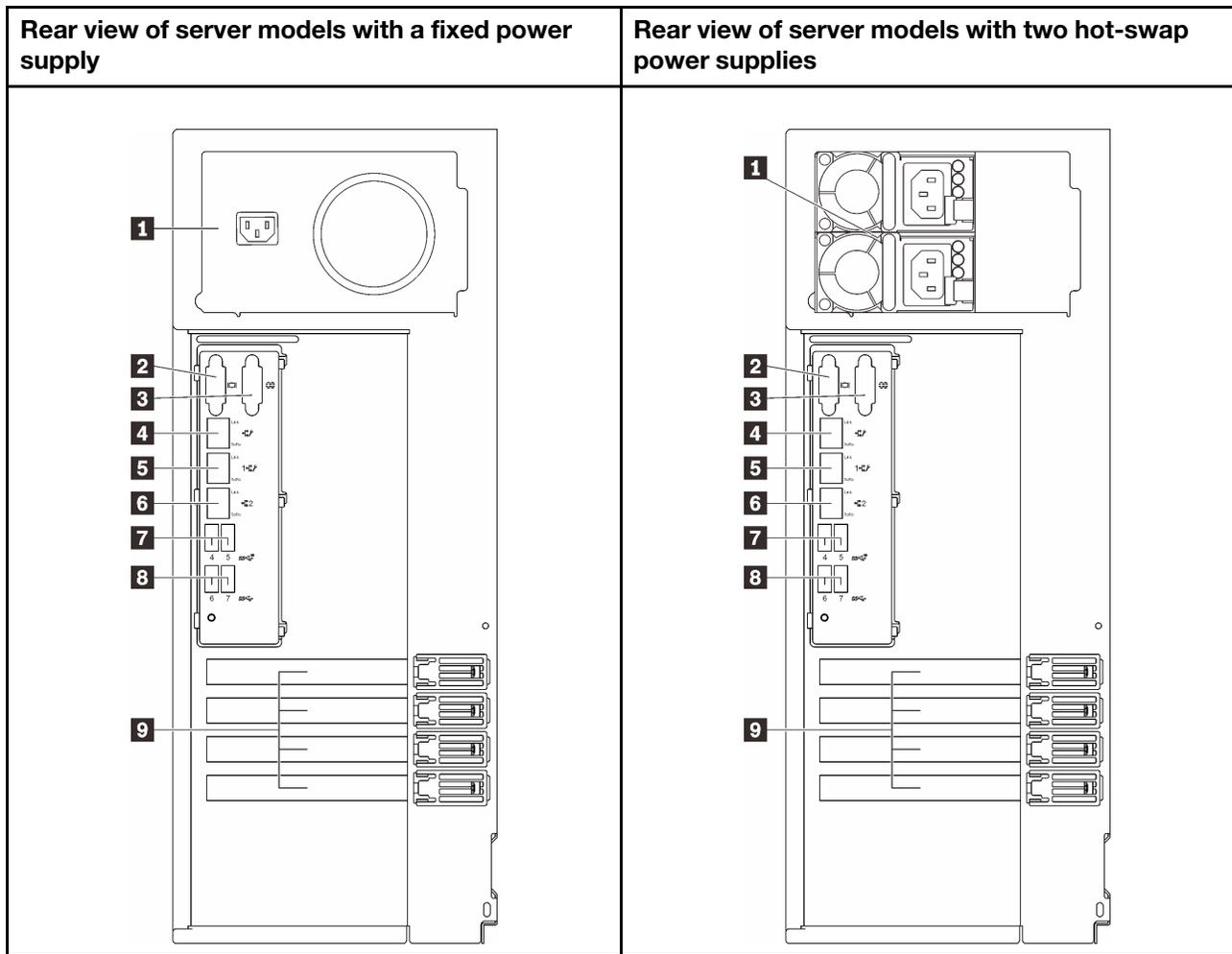


Figure 9. Rear view

Table 6. Components on the rear of server models with a fixed power supply or two hot-swap power supplies

<b>1</b> Power cord connector	<b>6</b> Ethernet connector 2
<b>2</b> VGA connector	<b>7</b> USB 3.2 Gen 2 connectors
<b>3</b> Serial connector	<b>8</b> USB 3.2 Gen 2 connectors
<b>4</b> Dedicated XClarity Controller (XCC) network connector	<b>9</b> PCIe slots
<b>5</b> Ethernet connector 1 (shared with XCC network port)	

### **1** Power cord connector

Connect the power cord to this component.

### **2** VGA connector

Used to attach a VGA-compatible video device, such as a VGA monitor.

### **3** Serial connector

Connect a 9-pin serial device to this connector. The serial port is shared with XClarity Controller. XClarity Controller can take control of the shared serial port to redirect serial traffic, using Serial over LAN (SOL).

#### **4 Dedicated XClarity Controller (XCC) network connector**

Used to attach an Ethernet cable to manage the system using XClarity Controller.

#### **5 6 Ethernet connectors 1 and 2**

Used to attach an Ethernet cable for a LAN. Each Ethernet connector has two status LEDs to help you identify the Ethernet connectivity and activity. For more information, see “Rear view LEDs” on page 24. Ethernet 1 connector can be set as XClarity Controller Network connector.

To set Ethernet 1 connector as XClarity Controller Network connector, start Setup Utility and select **BMC Settings → Network Settings → Network Settings Network Interface Port : Shared**. Then, click **Shared NIC on** and select **Onboard Port 1**.

#### **7 8 USB 3.2 Gen 2 connectors**

Used to attach a device that requires a USB 2.0 or 3.0 connection, such as a keyboard, a mouse, or a USB flash drive.

#### **9 PCIe slots**

There are four PCIe slots on the system board to install appropriate PCIe adapters. For information about the PCIe slots, see “Specifications” on page 3.

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## **Rear view LEDs**

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

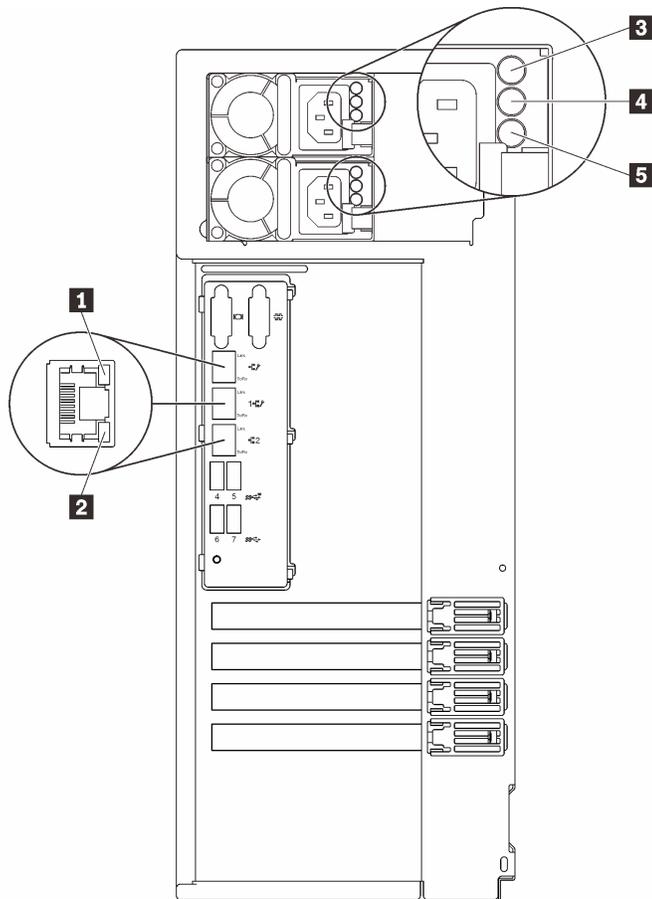


Figure 10. Rear view LEDs of the server

Table 7. LEDs on the rear of the server

Callout	Callout
<b>1</b> Ethernet link LED (green)	<b>4</b> Power output LED (green)
<b>2</b> Ethernet activity LED (green)	<b>5</b> Power supply error LED (yellow)
<b>3</b> Power input LED (green)	

### **1 2** Ethernet status LEDs

Each network connector has two status LEDs.

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

- 3** Power input LED
- 4** Power output LED
- 5** Power supply error LED

Each hot-swap power supply has three status LEDs.

LED	Description
<b>3</b> Power input LED	<ul style="list-style-type: none"> <li>• Off: The power supply is disconnected from the ac power source or a power problem occurs.</li> <li>• Green: The power supply is connected to the ac power source.</li> </ul>
<b>4</b> Power output LED	<ul style="list-style-type: none"> <li>• Green: The server is on and the power supply is working normally.</li> <li>• Blinking green: The power supply is in 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 <b>System Settings → Power → Zero Output</b> and select <b>Disable</b>. If you disable zero-output mode, both power supplies will be in the active state.</li> <li>• Off: The server is powered off, or the power supply is not working properly. If the server is powered on but the power output LED is off, replace the power supply.</li> </ul>
<b>5</b> Power supply error LED	<ul style="list-style-type: none"> <li>• Off: The power supply is working normally.</li> <li>• Yellow: The power supply has failed. To resolve the issue, replace the power supply.</li> </ul>

## System-board components

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

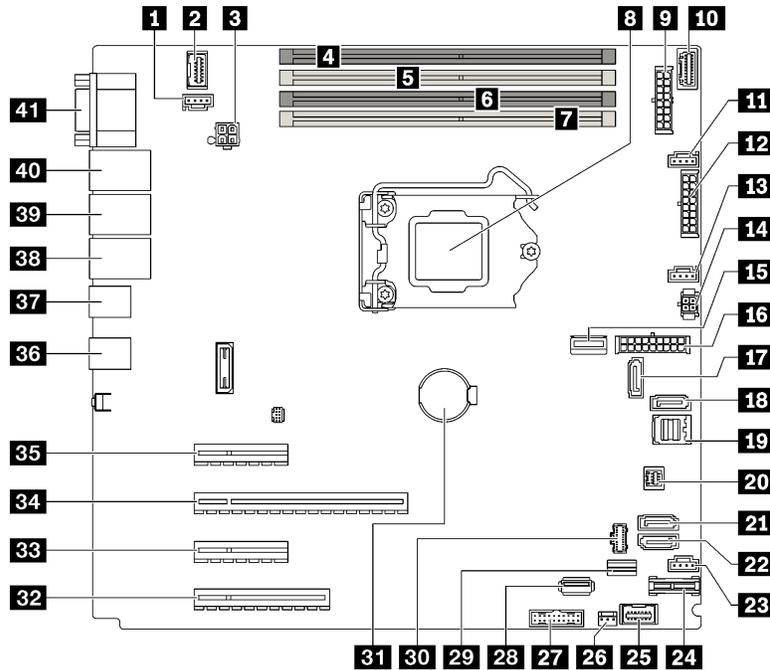


Figure 11. System board components

Table 8. Components on the system board

Callout	Callout
<b>1</b> Rear fan connector	<b>22</b> SATA 4
<b>2</b> Front VGA connector	<b>23</b> Fan 4 connector for front fan
<b>3</b> Processor power connector	<b>24</b> TPM/TCM connector
<b>4</b> DIMM Slot 1	<b>25</b> Front panel connector
<b>5</b> DIMM Slot 2	<b>26</b> Intrusion switch connector
<b>6</b> DIMM Slot 3	<b>27</b> Front USB connector
<b>7</b> DIMM Slot 4	<b>28</b> Internal USB 3.2 Gen 1 connector
<b>8</b> Processor socket	<b>29</b> M.2 signal connector
<b>9</b> Backplane 1 power connector	<b>30</b> M.2 power connector
<b>10</b> Power distribution board side band connector	<b>31</b> CMOS battery
<b>11</b> Fan 1 connector for front fan	<b>32</b> PCIe Slot 4
<b>12</b> Backplane 2 power connector	<b>33</b> PCIe Slot 3
<b>13</b> Fan 2 connector for processor	<b>34</b> PCIe Slot 2
<b>14</b> Optical/tape drive power connector	<b>35</b> PCIe Slot 1
<b>15</b> System power connector	<b>36</b> Two USB 3.2 Gen 2 connectors

Table 8. Components on the system board (continued)

Callout	Callout
<b>16</b> MCIO x4 connector for NVMe	<b>37</b> Two USB 3.2 Gen 2 connectors
<b>17</b> SATA 6	<b>38</b> Ethernet connector 2
<b>18</b> SATA 7	<b>39</b> Ethernet connector 1 (shared with XCC network port)
<b>19</b> SATA 0 to 3	<b>40</b> Lenovo XClarity Controller(XCC) management port
<b>20</b> SGPIO1 connector	<b>41</b> VGA and serial port connector
<b>21</b> SATA 5	

## System-board LED

The illustration in this section shows the light-emitting diode (LED) on the system board.

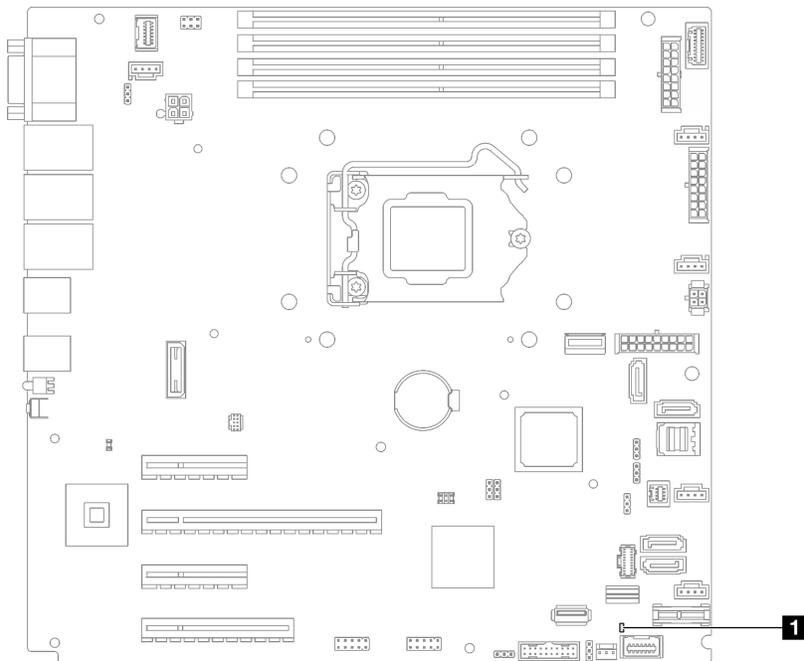


Figure 12. System-board LED

Table 9. System-board LED

<b>1</b> System error LED (amber)
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## System-board jumpers and buttons

The illustration in this section shows the location of the jumpers and buttons on the server.

**Note:** If there is a clear protective sticker on the top of the switch blocks, you must remove and discard it to access the switches.

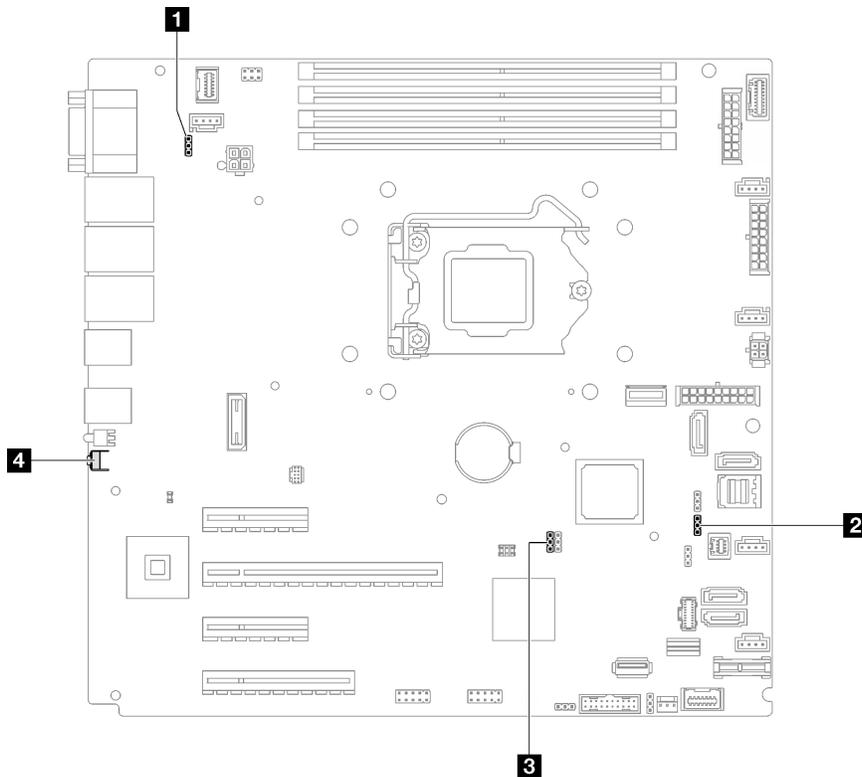


Figure 13. System-board jumpers and buttons

The following table describes the jumpers and buttons on the system board.

Table 10. System-board jumpers and buttons

Jumper and button name	Jumper setting / Button function
<b>1</b> Power permission override jumper	<ul style="list-style-type: none"> <li>• Pins 1 and 2: Normal (default).</li> <li>• Pins 2 and 3: Override the power-on permission.</li> </ul>
<b>2</b> Force Lenovo XClarity Controller update jumper	<ul style="list-style-type: none"> <li>• Pins 1 and 2: Normal (default).</li> <li>• Pins 2 and 3: Force the Lenovo XClarity Controller to update to the latest version.</li> </ul>
<b>3</b> Clear CMOS jumper	<ul style="list-style-type: none"> <li>• Pins 1 and 2: Normal (default).</li> <li>• Pins 2 and 3: Clear the real-time clock (RTC) registry.</li> </ul>
<b>4</b> Force NMI button	This button is on the rear of the server. Press this button to force a nonmaskable interrupt to the processor. You might have to use a pen or the end of a straightened paper clip to press the button. You can also use it to force a blue-screen memory dump (use this button only when you are directed to do so by Lenovo Support).

**Important:**

1. Before you change any switch settings or move any jumpers, turn off the server; then, disconnect all power cords and external cables. Review the information in [http://thinksystem.lenovofiles.com/help/topic/safety\\_documentation/pdf\\_files.html](http://thinksystem.lenovofiles.com/help/topic/safety_documentation/pdf_files.html), “Installation guidelines” on page 85, “Handling static-sensitive devices” on page 88, and “Power off the server” on page 13.

2. Any system-board switch or jumper block that is not shown in the illustrations in this document are reserved.

## Drive backplates/backplanes

The illustrations in this section identify the connectors on the drive backplates/backplanes.

Following are the drive backplate/backplanes that are supported by this server:

- **Simple-swap drive backplates**
  - “3.5-inch simple-swap backplate (Bay 0-3)” on page 30
  - “3.5-inch simple-swap backplate (Bay 4-7 without optical disk drive)” on page 31
  - “3.5-inch simple-swap backplate (Bay 4-5 with optical disk drive)” on page 31
- **Hot-swap drive backplanes**
  - “3.5-inch hot-swap backplane” on page 32
  - “2.5-inch hot-swap backplane” on page 32

### 3.5-inch simple-swap backplate (Bay 0-3)

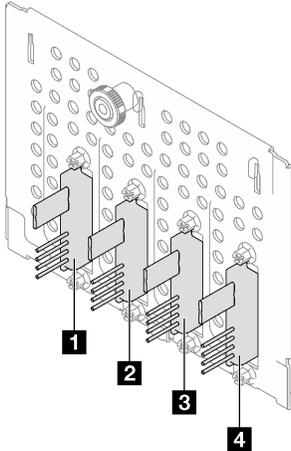


Table 11. 3.5-inch simple-swap backplate (Bay 0-3)

	Bay number in the lower drive cage
<b>1</b> Signal/SATA connector	SATA 3
<b>2</b> Signal/SATA connector	SATA 2
<b>3</b> Signal/SATA connector	SATA 1
<b>4</b> Signal/SATA connector	SATA 0

### 3.5-inch simple-swap backplate (Bay 4-7 without optical disk drive)

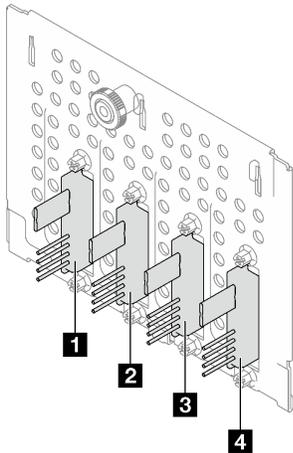


Table 12. 3.5-inch simple-swap backplate (Bay 4-7 without optical disk drive)

	Bay number in the lower drive cage
<b>1</b> Signal/SATA connector	SATA 7
<b>2</b> Signal/SATA connector	SATA 6
<b>3</b> Signal/SATA connector	SATA 5
<b>4</b> Signal/SATA connector	SATA 4

### 3.5-inch simple-swap backplate (Bay 4-5 with optical disk drive)

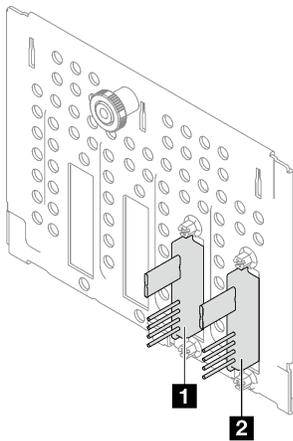


Table 13. 3.5-inch simple-swap backplate (Bay 4-5 with optical disk drive)

	Bay number in the lower drive cage
<b>1</b> Signal/SATA connector	SATA 5
<b>2</b> Signal/SATA connector	SATA 4

### 3.5-inch hot-swap backplane

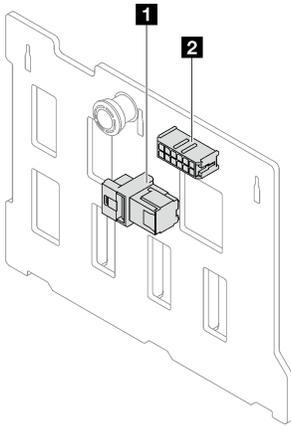


Table 14. 3.5-inch hot-swap backplane connectors

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

### 2.5-inch hot-swap backplane

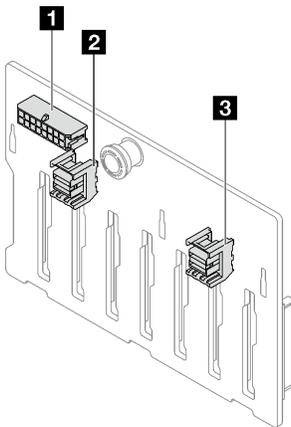


Table 15. 2.5-inch hot-swap backplane connectors

<b>1</b> Power connector	<b>3</b> SAS/SATA 0 connector
<b>2</b> SAS/SATA 1 connector	

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## Power distribution board

The illustrations in this section identify the connectors on the power distribution boards.

Two types of power distribution boards are supported by this server:

- “Power distribution board for the fixed power supply” on page 33
- “Power distribution board for hot-swap power supplies” on page 33

### Power distribution board for the fixed power supply

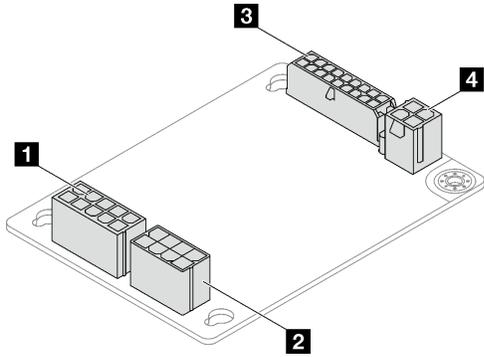


Figure 14. Power distribution board for the fixed power supply

Table 16. Power distribution board for the fixed power supply

<b>1</b> Power supply system power connector	<b>3</b> System power connector
<b>2</b> Power supply processor power connector	<b>4</b> Processor power connector

### Power distribution board for hot-swap power supplies

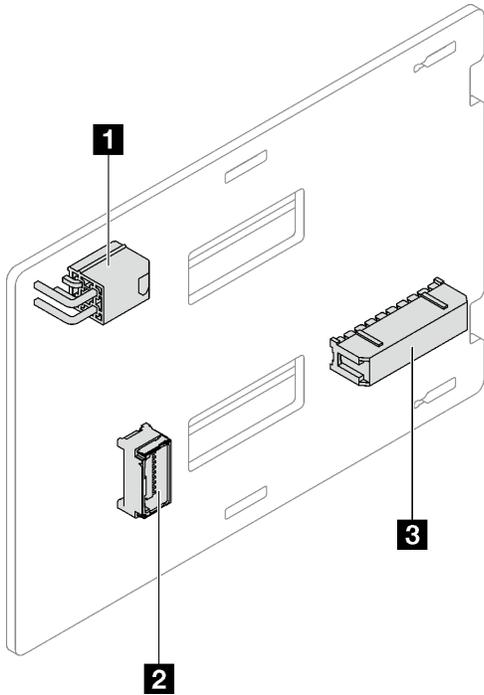


Figure 15. Power distribution board for hot-swap power supplies

Table 17. Power distribution board for hot-swap power supplies

<b>1</b> Processor power connector	<b>3</b> System power connector
<b>2</b> Side band connector	

## RAID adapters

The illustrations in this section identify the connectors on the RAID adapters.

Following are the RAID adapters that are supported by this server:

- “9350-8i” on page 34
- “9350-16i” on page 34
- “4350/5350-8i” on page 35

### 9350-8i

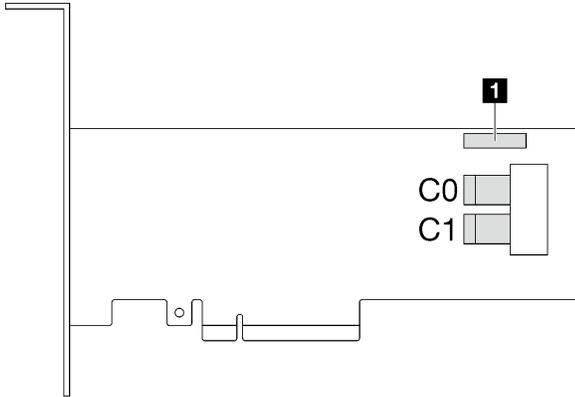


Figure 16. 9350-8i connectors

Table 18. 9350-8i connectors

<b>1</b> RAID flash power module connector
--

### 9350-16i

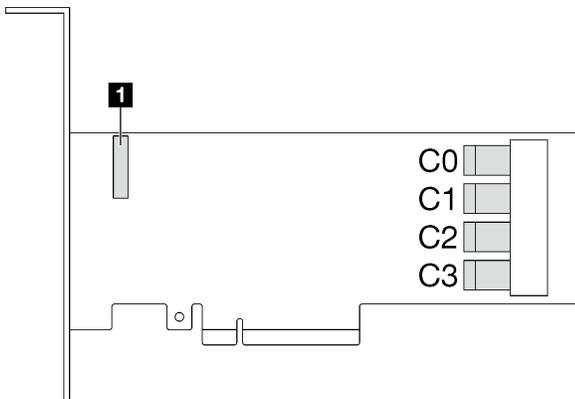


Figure 17. 9350-8i connectors

Table 19. 9350-8i connectors

<b>1</b> RAID flash power module connector
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## 4350/5350-8i

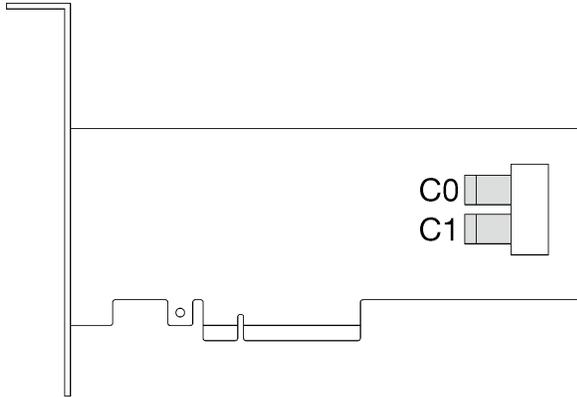


Figure 18. 4350/5350-8i connectors

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## Server locks

Locking the server cover prevents unauthorized access to the inside of your server. Locking the front door (available on some models) prevents unauthorized access to the installed drives.

### Padlock

Your server comes with a padlock loop. When a padlock is installed, the server cover cannot be removed.

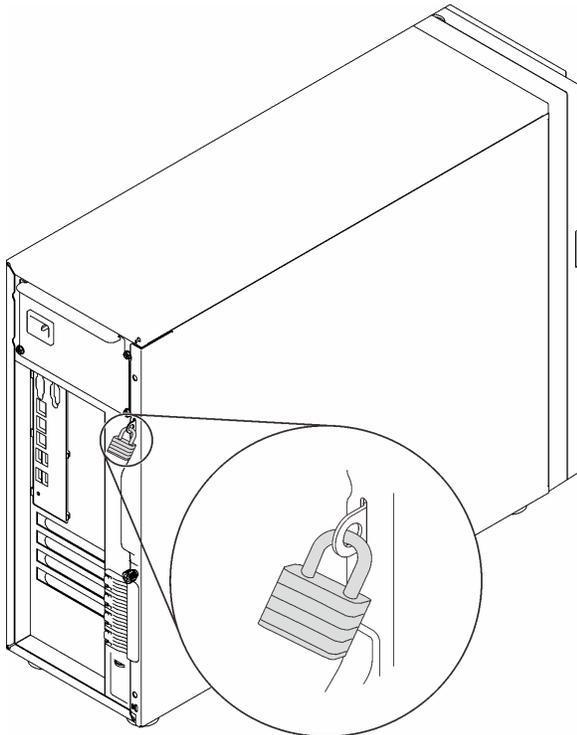


Figure 19. Padlock

### Kensington-style cable lock

You can use a Kensington-style cable lock to secure your server to a desk, table, or other non-permanent fixture. The cable lock attaches to the security-lock slot at the rear of your server and is operated with a key

or combination depending on the type selected. The cable lock also locks the server cover. This is the same type of lock used with many notebook computers. You can order such a cable lock directly from Lenovo by searching for **Kensington** at: <http://www.lenovo.com/support>

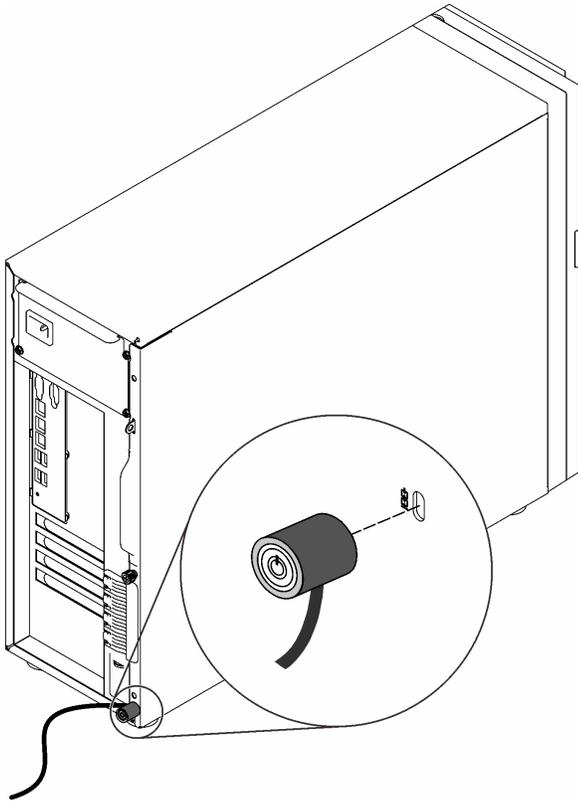


Figure 20. Kensington-style cable lock

### Front door lock

You can remove the key attached on the rear of the server and use it to open or lock the front door of the server. The front door protects the drive cage and prevents unauthorized access to the installed drives.

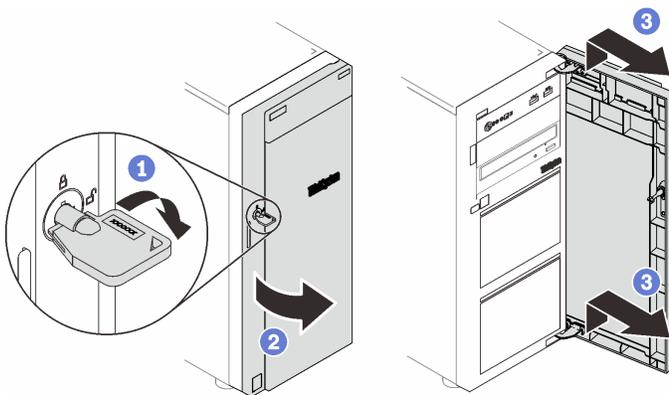


Figure 21. Front door lock

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## Internal cable routing

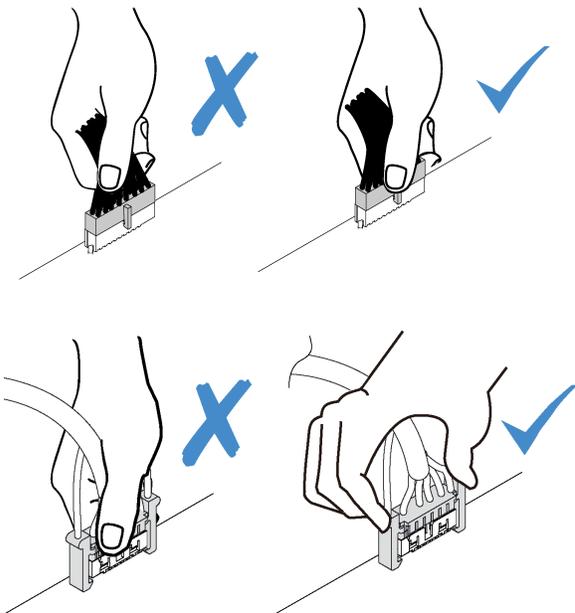
Some of the components in the server come with internal cables meant for specific connectors.

Before connecting the cables, read the following guidelines carefully:

- Turn off the server before you connect or disconnect any internal cables.
- Refer to the documentation that comes with any external devices for additional cabling instructions.
- Make use of the identifiers printed on the cables to locate the proper connectors.
- Ensure that the cable is not pinched and does not cover any connectors or obstruct any components on the system board.

### Notes:

1. 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.



2. When installing the front system fan into the chassis, make sure the cables do not interfere with the two posts and the fan is firmly seated.

## Fan power cable

Use the section to understand the internal routing and connectors for the fan power cables.

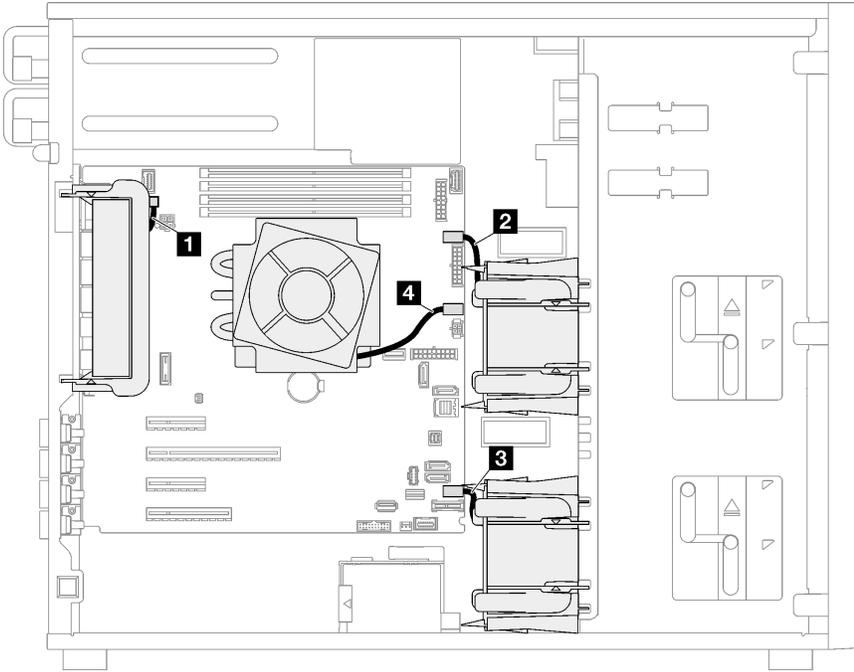


Figure 22. Fan power cable routing

Table 20. Location of fan power connectors on the system board

	From	To
<b>1</b>	Rear system fan	Rear fan connector
<b>2</b>	Front system fan 1	Fan 1 connector for front fan
<b>3</b>	Front system fan 2	Fan 4 connector for front fan
<b>4</b>	Heat sink fan	Fan 2 connector for processor

## Front panel

Use the section to understand the cable routing for the front panel.

**Note:** Ensure that all cables are routed through the correct cable clips.

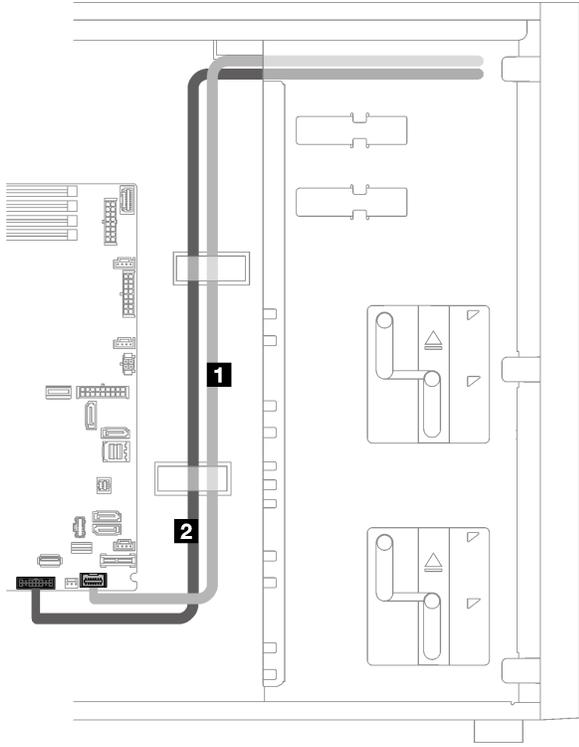


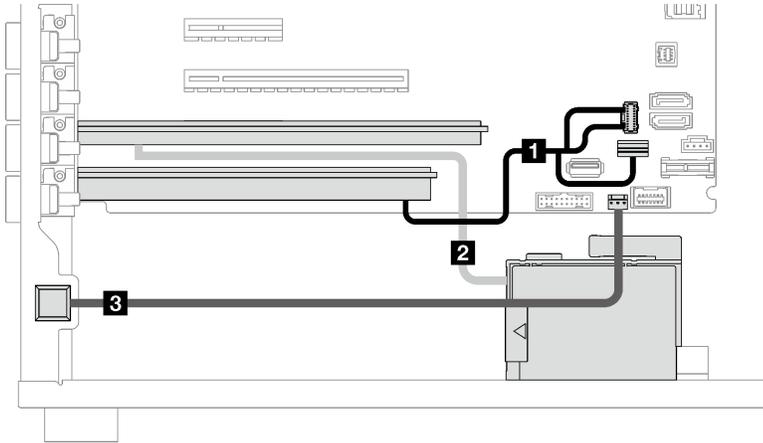
Figure 23. Cable routing for the front panel

Cable	From	To
<b>1</b> Operator-information-panel cable	Front panel	Front-panel connector on the system board
<b>2</b> USB cable	Front panel	Front USB connector on the system board

## M.2 adapter, intrusion switch, and RAID flash power module

Use this section to understand the cable routing for M.2 adapter, intrusion switch, and RAID flash power module.

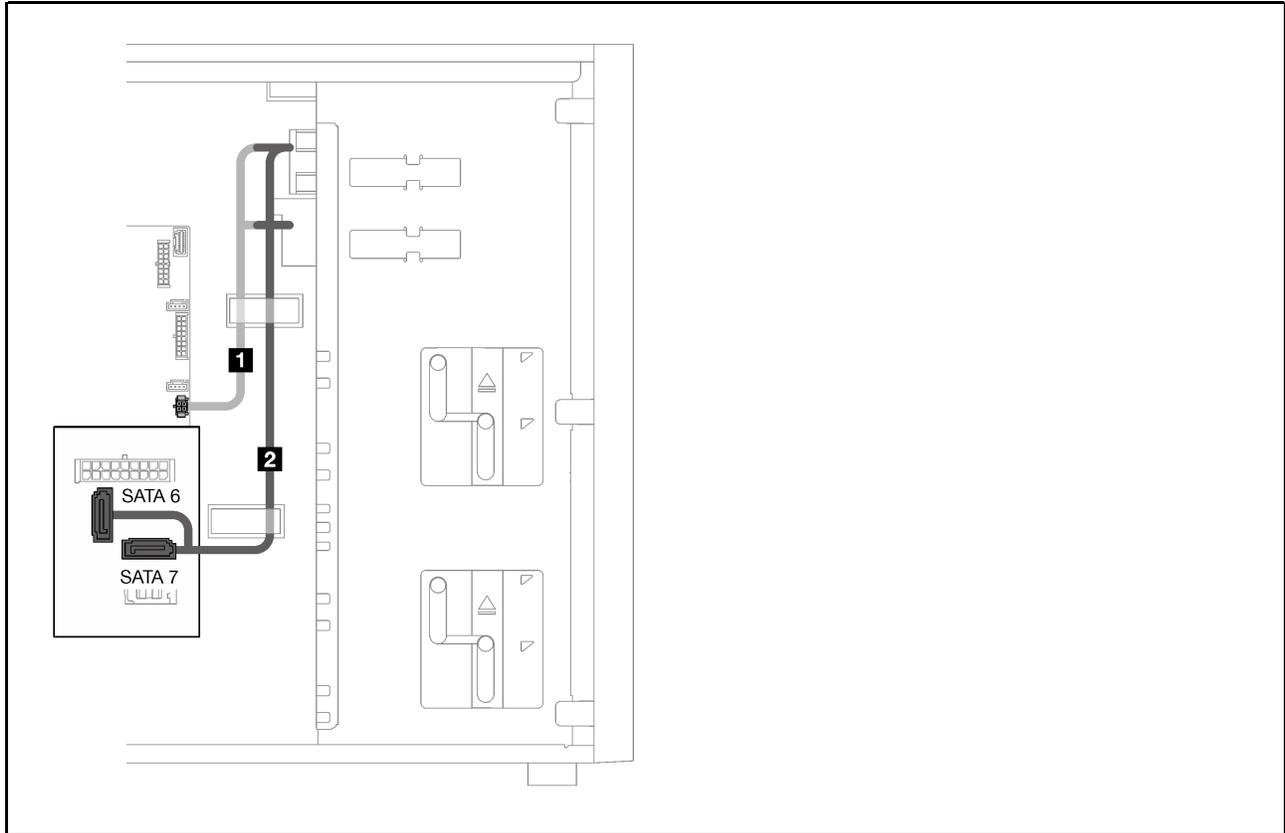
•



Cable	From	To
<b>1</b> M.2 cable	M.2 adapter	M.2 signal and power connector on the system board
<b>2</b> RAID flash power module cable	Flash power module connector on the RAID adapter	RAID Flash power module
<b>3</b> Intrusion switch cable	Intrusion switch	Intrusion switch connector on the system board

## Optical/tape drives

Use this section to understand the cable routing for server models with optical/tape drives.



	From	To
<b>1</b>	ODD/Tape drive power connectors	ODD/tape drive power connector on the system board
<b>2</b>	ODD/Tape drive SATA connectors	SATA 6, 7

## Fixed power supply

Use the section to understand the cable routing for the fixed power supply.

### Notes:

- Ensure that all cables are routed through the correct cable clips.
- As the processor power connectors on the power distribution board may look similar in appearance, make sure that the **2** power supply processor power cable and **3** processor power cable are routed correctly as illustrated.

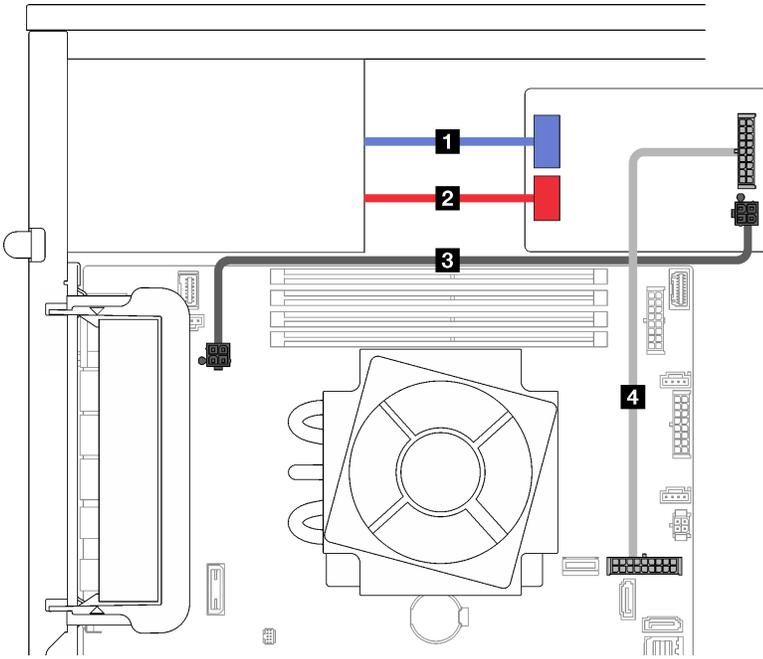


Figure 24. Cable routing for the fixed power supply

Cable	From (power distribution board)	To
<b>1</b> Power supply system power cable	Power supply system power connector	System power connector on the fixed power supply
<b>2</b> Power supply processor power cable	Power supply processor power connector	Processor power connector on the fixed power supply
<b>3</b> Processor power cable	Processor power connector	Processor power connector on the system board
<b>4</b> System power cable	System power connector	System power connector on the system board

## Redundant power supplies

Use the section to understand the cable routing for the redundant power supplies.

**Note:** Ensure that all cables are routed through the correct cable clips

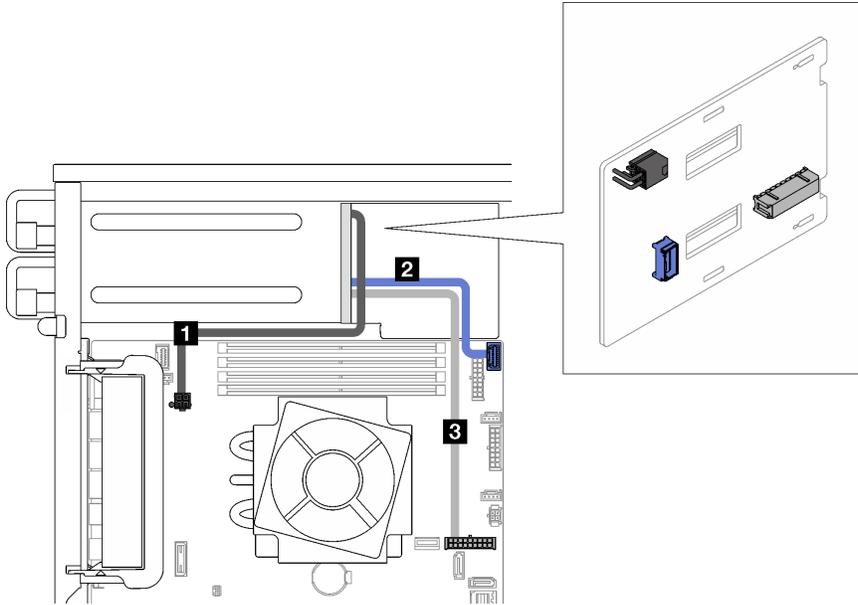


Figure 25. Cable routing for the redundant power supplies

Cable	From (power distribution board)	To
<b>1</b> Processor power cable	Processor power connector	Processor power connector on the system board
<b>2</b> Side band connector	Side band connector	Power distribution board side band connector on the system board
<b>3</b> Power cable	System power connector	System power connector on the system board

## Simple-swap drives

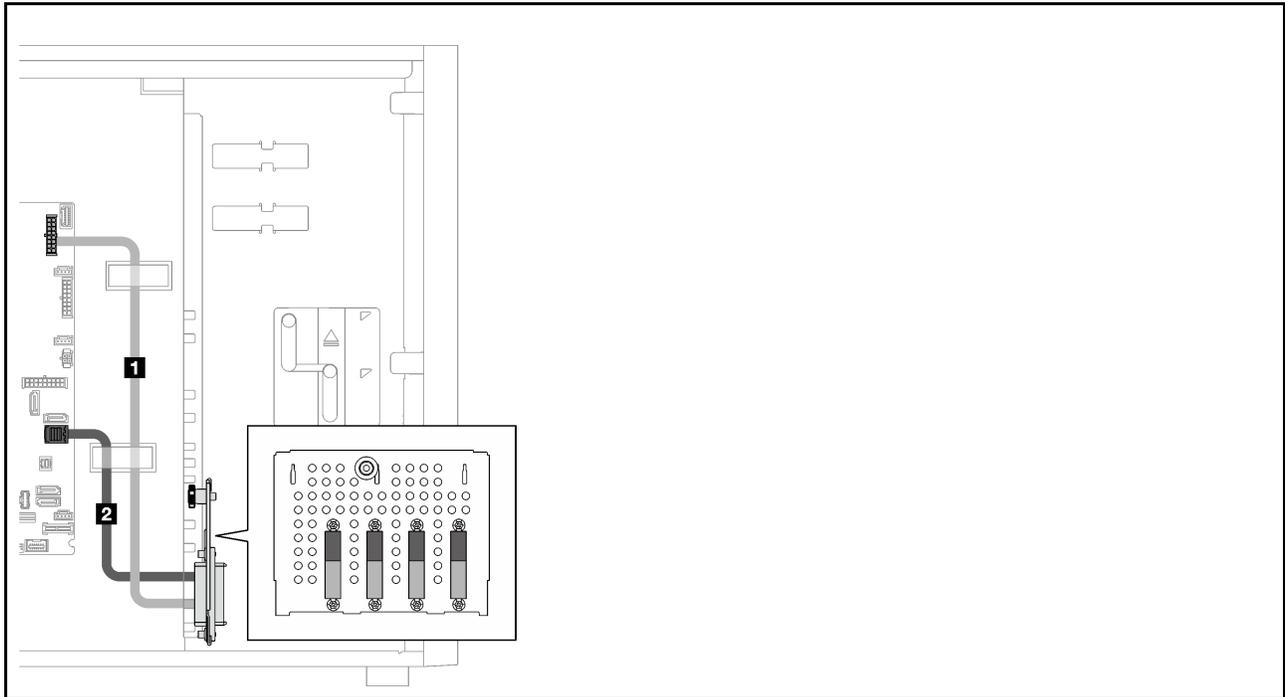
Use this section to understand the cable routing for server models with simple-swap drives.

See the configuration that is applied to the server.

- “Four 3.5-inch SATA drives” on page
- “Eight 3.5-inch SATA drives” on page 45
- “Seven SATA drives and one NVMe drive” on page 46
- “Six 3.5-inch SATA drives with ODD/tape drives” on page

### Four 3.5-inch simple-swap drives

Use this section to understand the cable routing for server models with four 3.5-inch simple-swap drives (software RAID).



	From	To
<b>1</b>	Lower backplate	Backplane 1 power connector
<b>2</b>		SATA 0-3

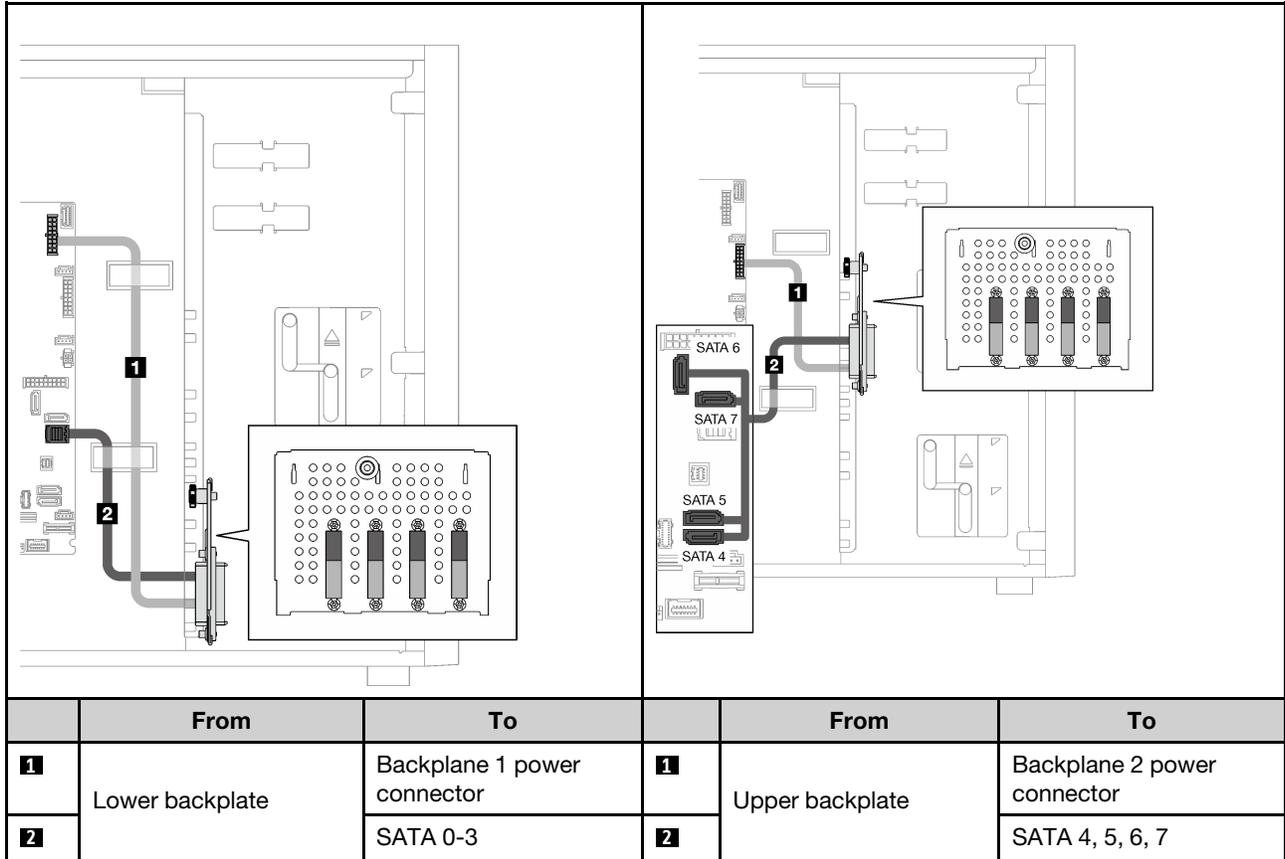
## Eight 3.5-inch simple-swap drives

Use this section to understand the cable routing for server models with eight 3.5-inch simple-swap drives (software RAID).

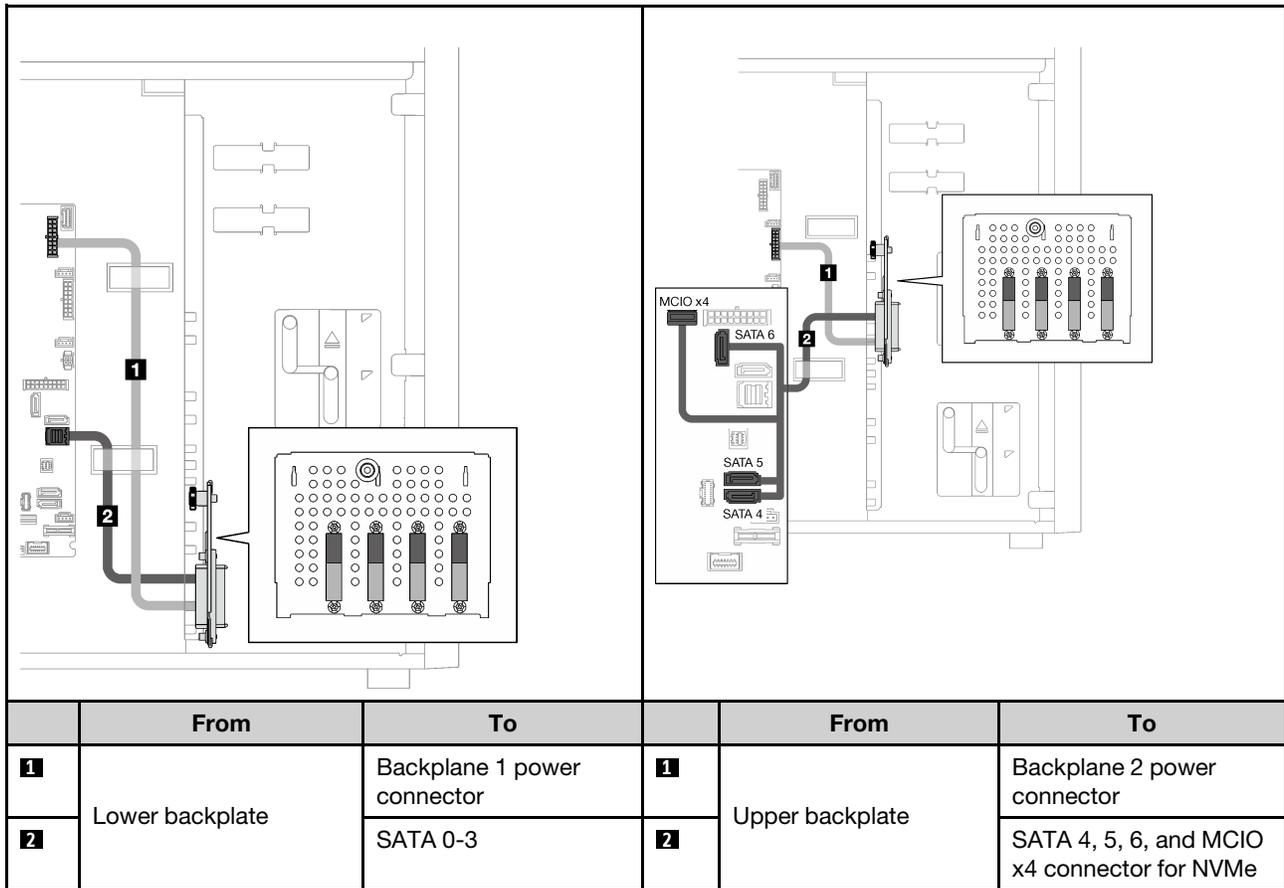
Following are the options available for this configuration:

- “Eight SATA drives” on page 45
- “Seven SATA drives and one NVMe drive” on page 46

### Eight SATA drives

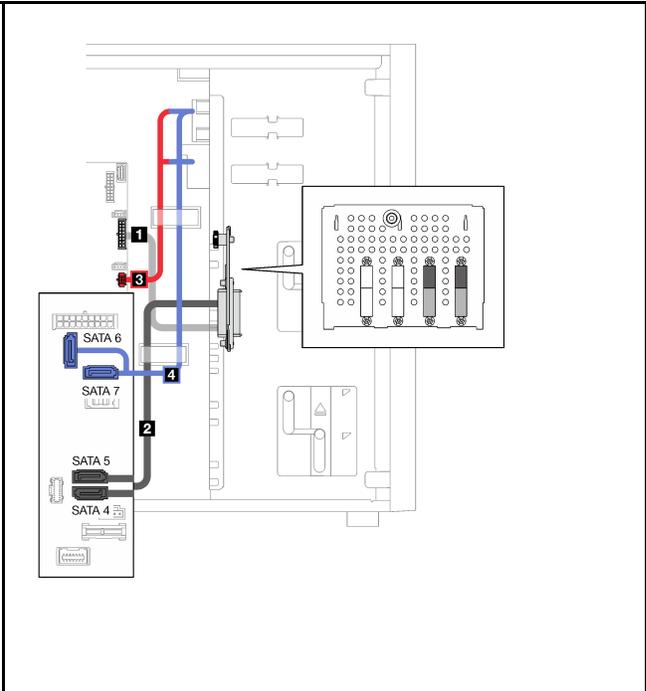
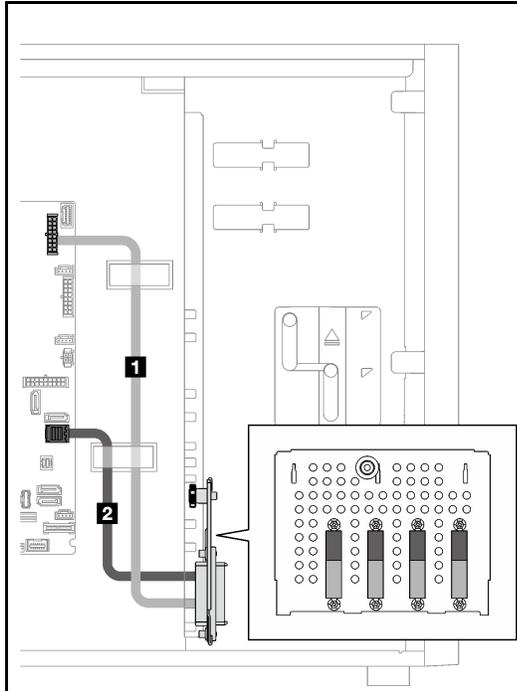


### Seven SATA drives and one NVMe drive



### Six 3.5-inch simple-swap drives with ODD/tape drives

Use this section to understand the cable routing for server models with six 3.5-inch simple-swap drives and ODD/tape drives (software RAID).



	From	To		From	To
<b>1</b>	Lower backplate	Backplane 1 power connector	<b>1</b>	Upper backplate	Backplane 2 power connector
<b>2</b>		SATA 0-3	<b>2</b>		SATA 4, 5
			<b>3</b>	ODD/Tape drive power connectors	ODD/tape drive power connector on the system board
			<b>4</b>	ODD/Tape drive SATA connectors	SATA 6, 7

## Hot-swap drives

Use this section to understand the cable routing for server models with hot-swap drives.

See the configuration that is applied to the server.

- Software RAID
  - “Four 3.5-inch drives” on page 49
  - “Eight 3.5-inch drives” on page 51
  - “Eight 2.5-inch drives” on page 53
- Hardware RAID
  - “Four 3.5-inch drives with one 8i RAID adapter” on page 50
  - “Eight 3.5-inch drives with one 8i RAID adapter” on page 52
  - “Eight 2.5-inch drives with one 8i RAID adapter” on page 54
  - “Sixteen 2.5-inch drives with one 16i RAID adapter” on page 55
  - “Sixteen 2.5-inch drives with two 8i RAID adapters” on page 56
  - “Four 3.5-inch and eight 2.5-inch drives with one 16i RAID adapter” on page 57
  - “Four 3.5-inch and eight 2.5-inch drives with two 8i RAID adapters” on page 58

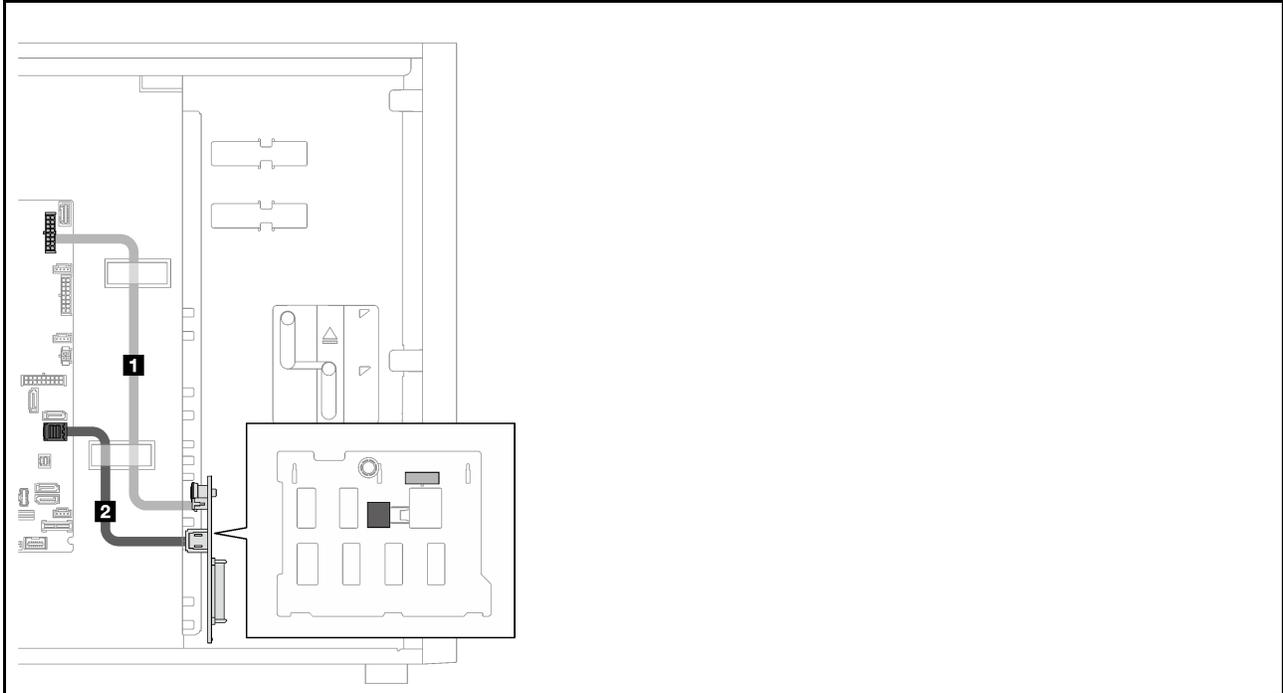
### Four 3.5-inch hot-swap drives

Use this section to understand the cable routing for server models with four 3.5-inch hot-swap drives.

Following are the options available for this configuration:

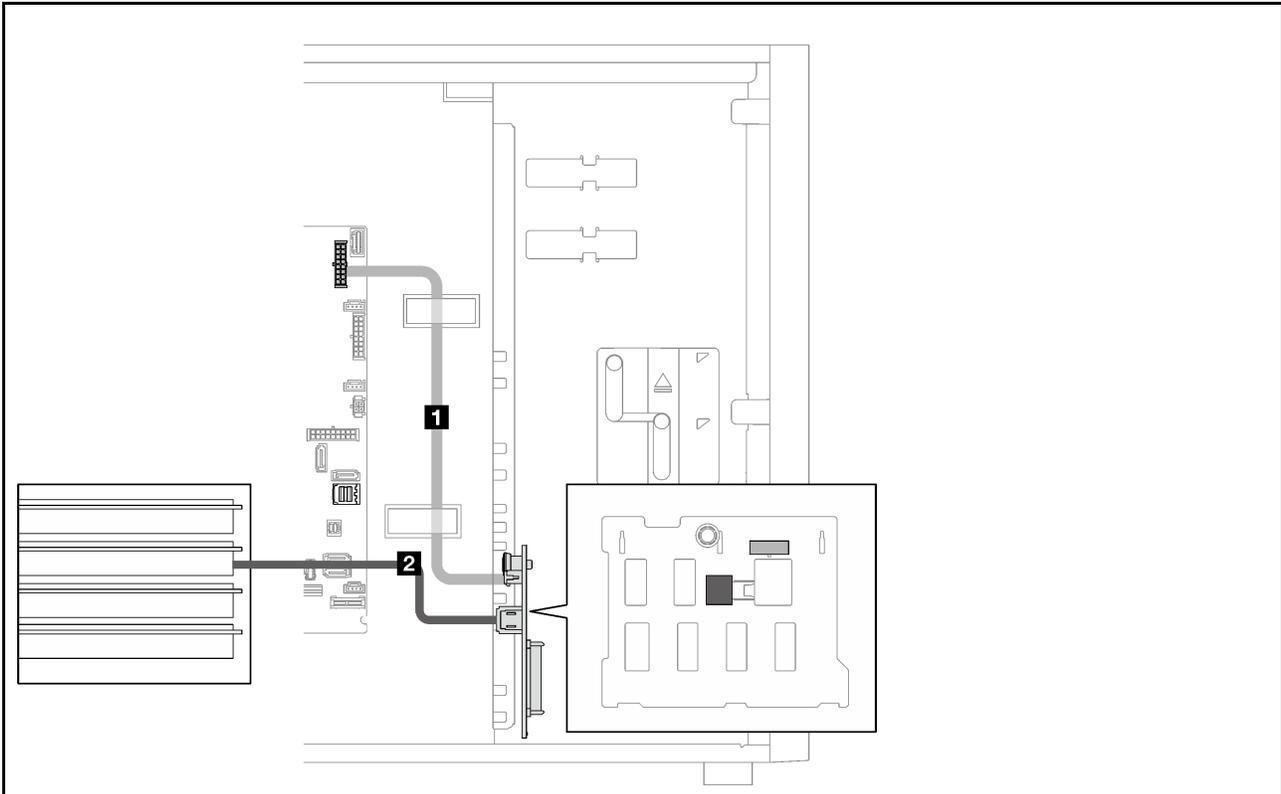
- “Software RAID” on page 49
- “One 8i RAID adapter” on page 50

## Software RAID



	From	To
<b>1</b>	Lower backplane power connector	Backplane 1 power connector
<b>2</b>	Lower backplane SAS/SATA connector	SATA 0-3

## One 8i RAID adapter



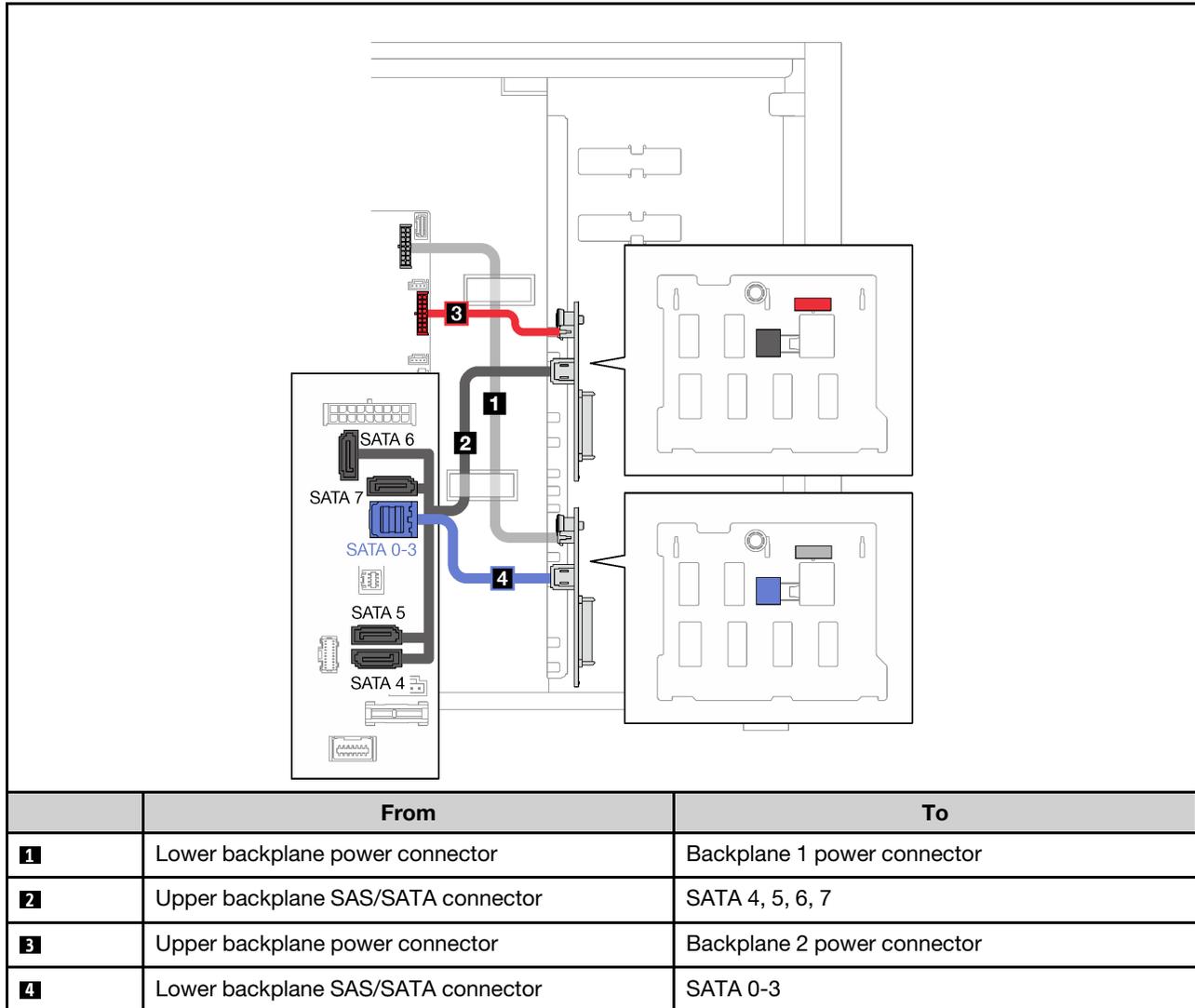
	From	To
<b>1</b>	Lower backplane power connector	Backplane 1 power connector
<b>2</b>	Lower backplane SAS/SATA connector	C0

## Eight 3.5-inch hot-swap drives

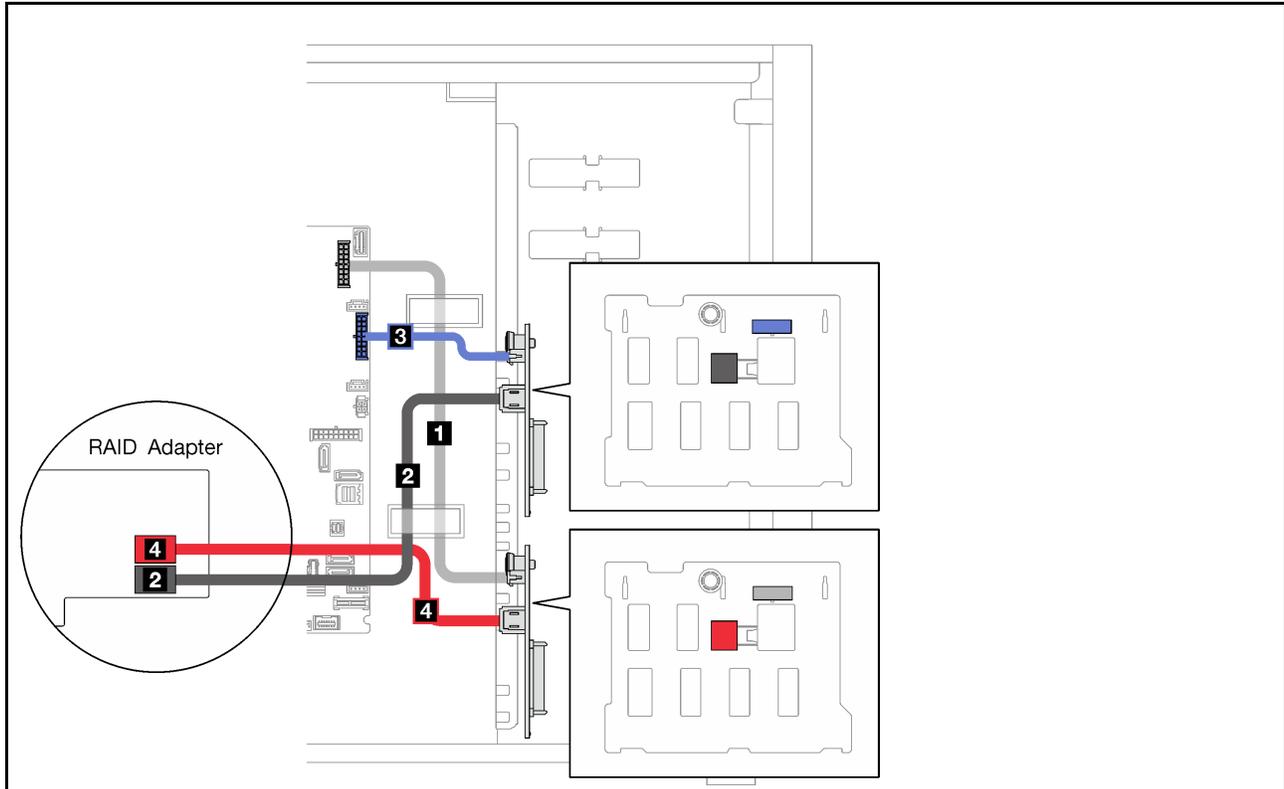
Use this section to understand the cable routing for server models with eight 3.5-inch hot-swap drives.

- “Software RAID” on page 51
- “One 8i RAID adapter” on page 52

### Software RAID



## One 8i RAID adapter



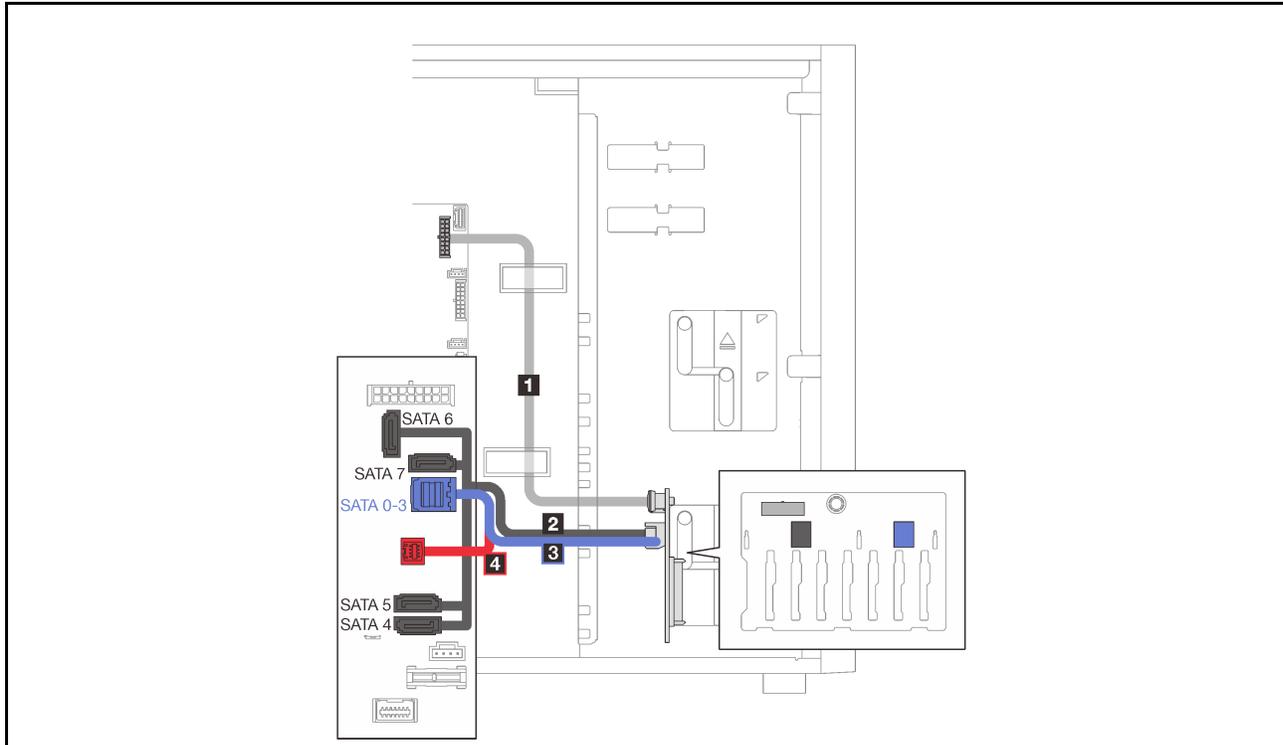
	From	To
<b>1</b>	Lower backplane power connector	Backplane 1 power connector
<b>2</b>	Upper backplane SAS/SATA connector	X350-8i: C1
<b>3</b>	Upper backplane power connector	Backplane 2 power connector
<b>4</b>	Lower backplane SAS/SATA connector	C0

## Eight 2.5-inch hot-swap drives

Use this section to understand the cable routing for server models with eight 2.5-inch hot-swap drives.

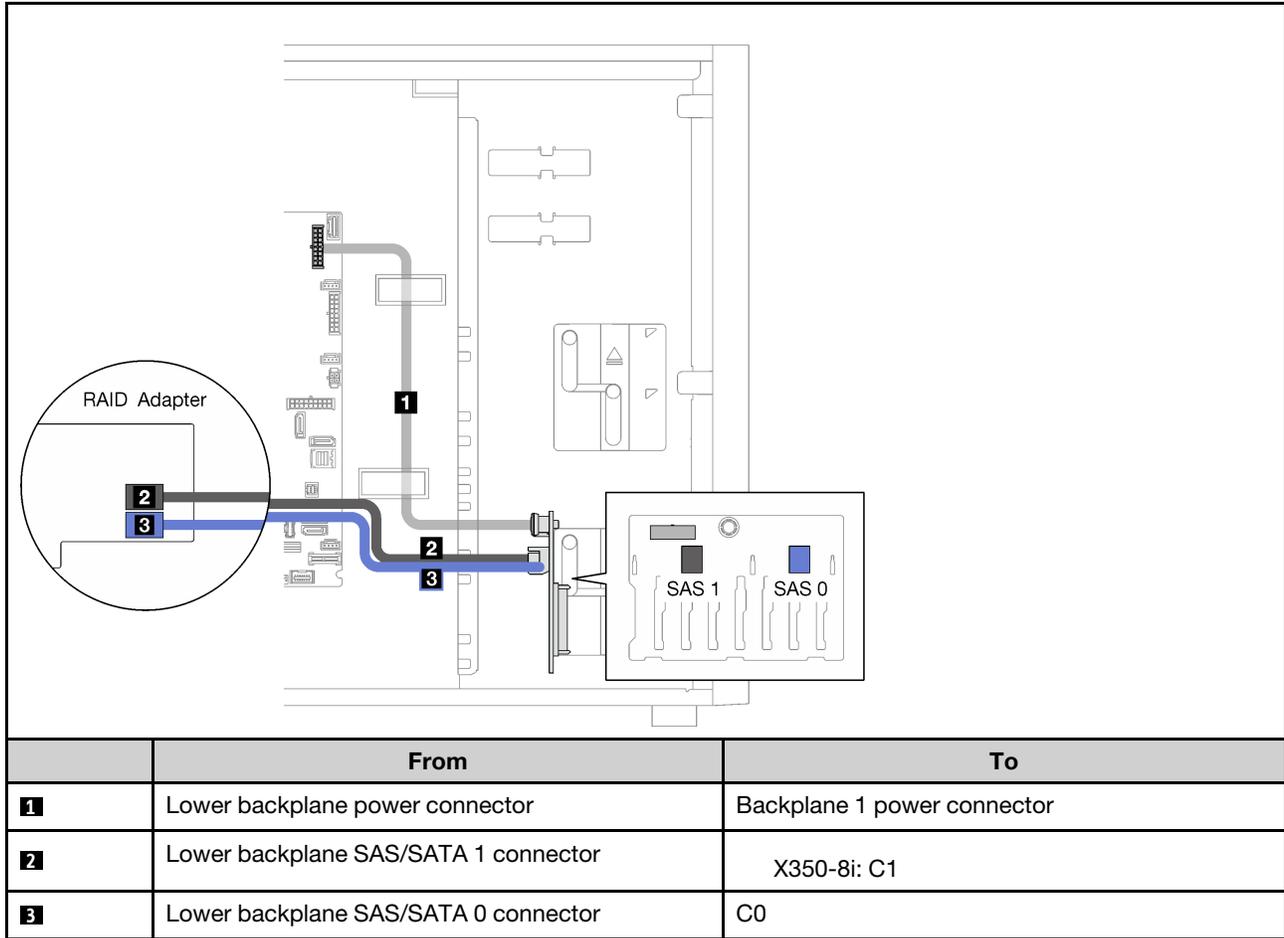
- “Software RAID” on page 53
- “One 8i RAID adapter” on page 54

## Software RAID



	From	To
<b>1</b>	Lower backplane power connector	Backplane 1 power connector
<b>2</b>	Lower backplane SAS/SATA 1 connector	SATA 4, 5, 6, 7
<b>3</b>	Lower backplane SAS/SATA 0 connector	SATA 0-3
<b>4</b>	Lower backplane	SGPIO1 connector

## One 8i RAID adapter

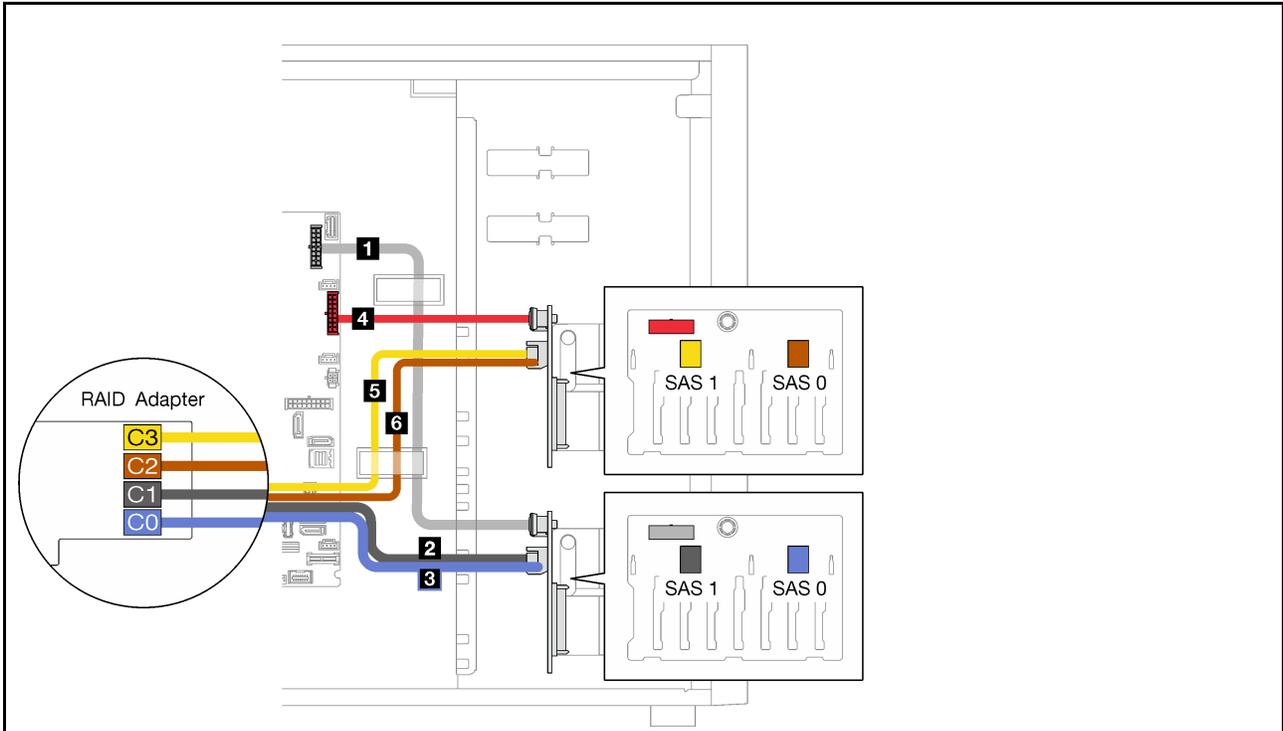


## Sixteen 2.5-inch hot-swap drives

Use this section to understand the cable routing for server models with sixteen 2.5-inch hot-swap drives.

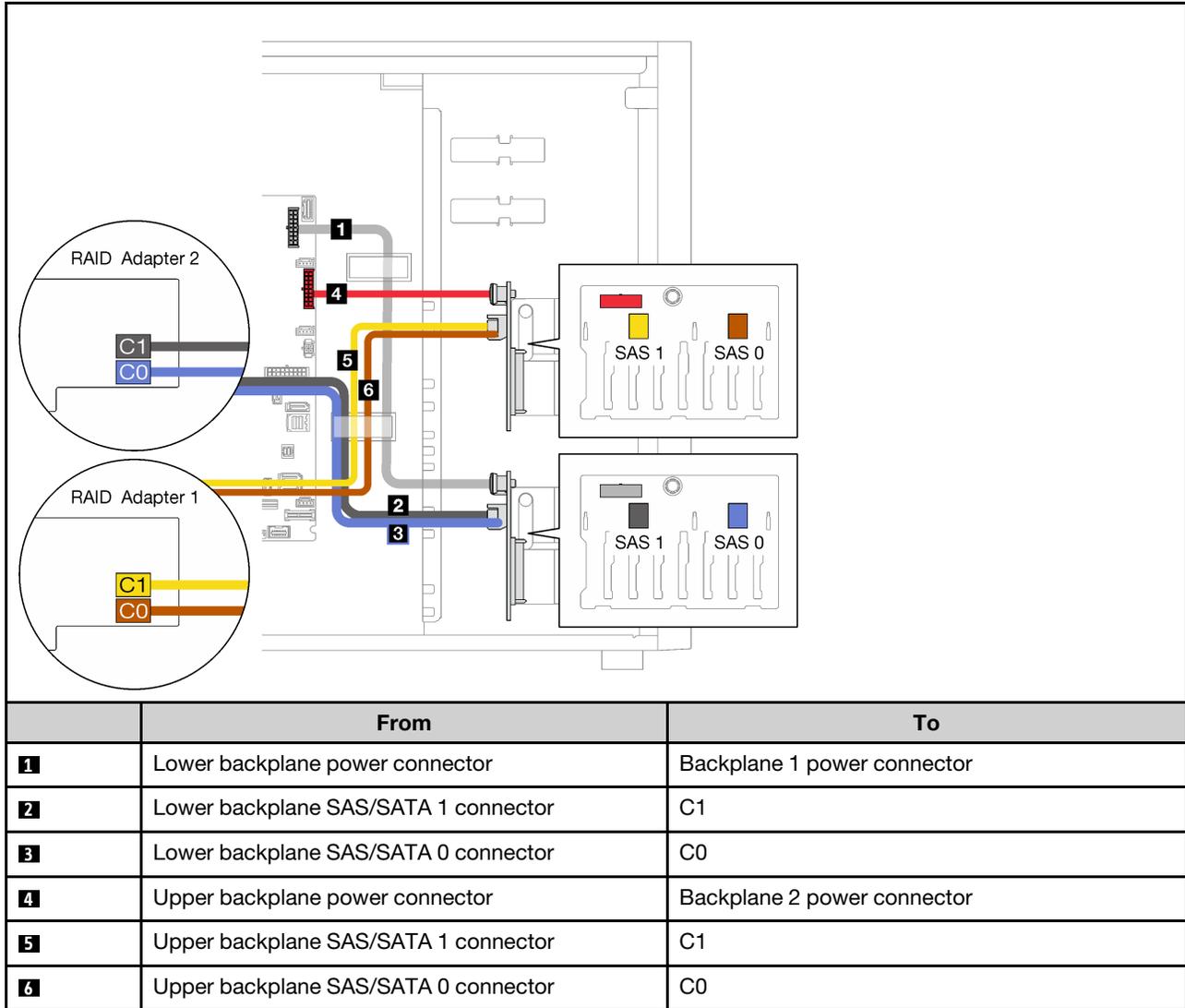
- “One 9350-16i RAID adapter” on page 55
- “Two 4350/5350-8i RAID adapters” on page 56

One 9350-16i RAID adapter



	From	To
<b>1</b>	Lower backplane power connector	Backplane 1 power connector
<b>2</b>	Lower backplane SAS/SATA 1 connector	C1
<b>3</b>	Lower backplane SAS/SATA 0 connector	C0
<b>4</b>	Upper backplane power connector	Backplane 2 power connector
<b>5</b>	Upper backplane SAS/SATA 1 connector	C3
<b>6</b>	Upper backplane SAS/SATA 0 connector	C2

## Two 4350/5350-8i RAID adapters

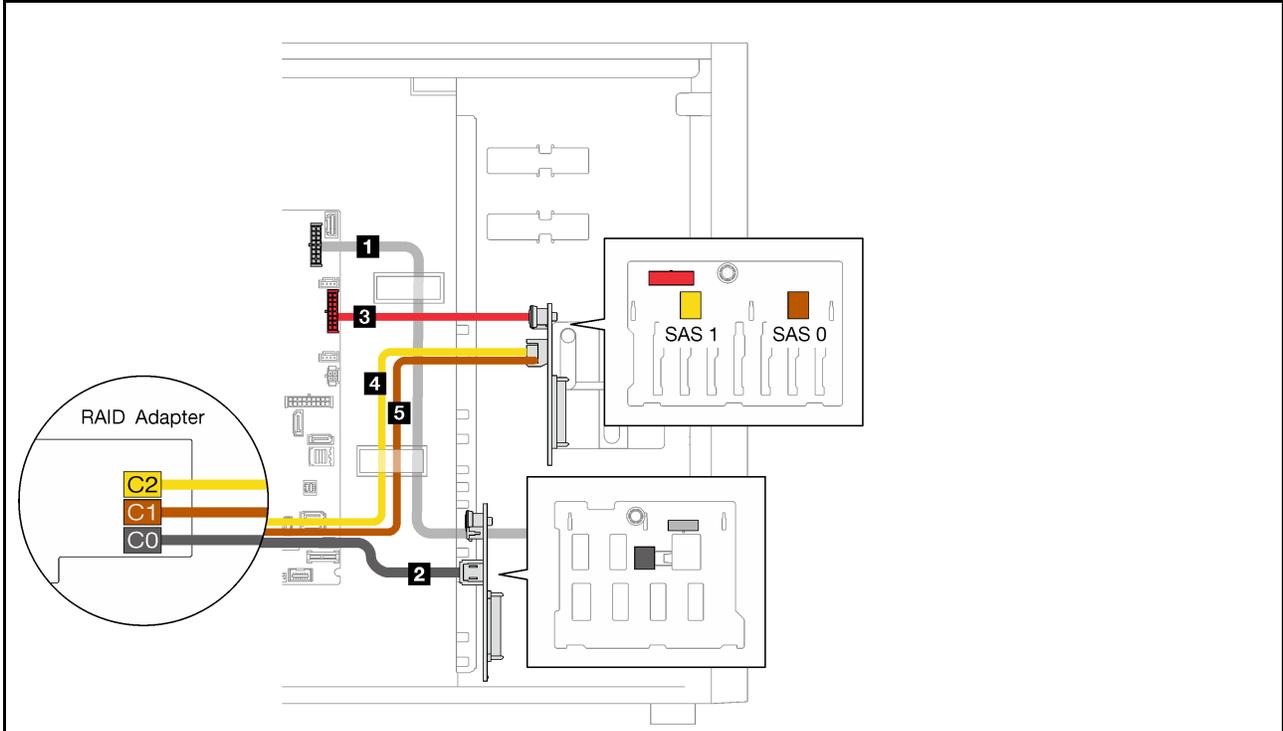


## Four 3.5-inch and eight 2.5-inch hot-swap drives

Use this section to understand the cable routing for server models with four 3.5-inch and eight 2.5-inch hot-swap drives.

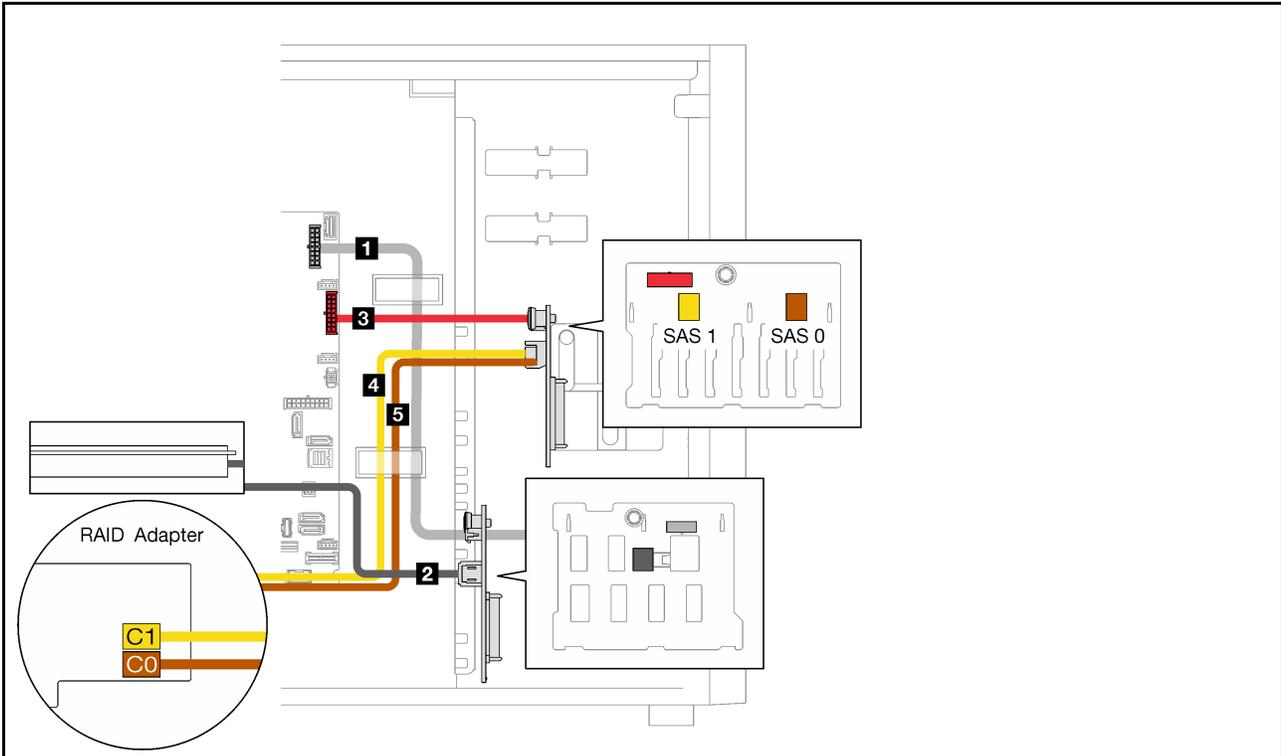
- “One 9350-16i RAID adapter” on page 57
- “Two 4350/5350-8i RAID adapters” on page 58

One 9350-16i RAID adapter



	From	To
<b>1</b>	Lower backplane power connector	Backplane 1 power connector
<b>2</b>	Lower backplane SAS/SATA connector	C0
<b>3</b>	Upper backplane power connector	Backplane 2 power connector
<b>4</b>	Upper backplane SAS/SATA 1 connector	C2
<b>5</b>	Upper backplane SAS/SATA 0 connector	C1

## Two 4350/5350-8i RAID adapters



	From	To
<b>1</b>	Lower backplane power connector	Backplane 1 power connector
<b>2</b>	Lower backplane SAS/SATA connector	C0, Slot 2
<b>3</b>	Upper backplane power connector	Backplane 2 power connector
<b>4</b>	Upper backplane SAS/SATA 1 connector	C1, Slot 4
<b>5</b>	Upper backplane SAS/SATA 0 connector	C0, Slot 4

## 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 26 “Server components” on page 59:

<http://datacentersupport.lenovo.com/us/en/products/servers/thinksystem/st250v2/7D8F/parts>

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

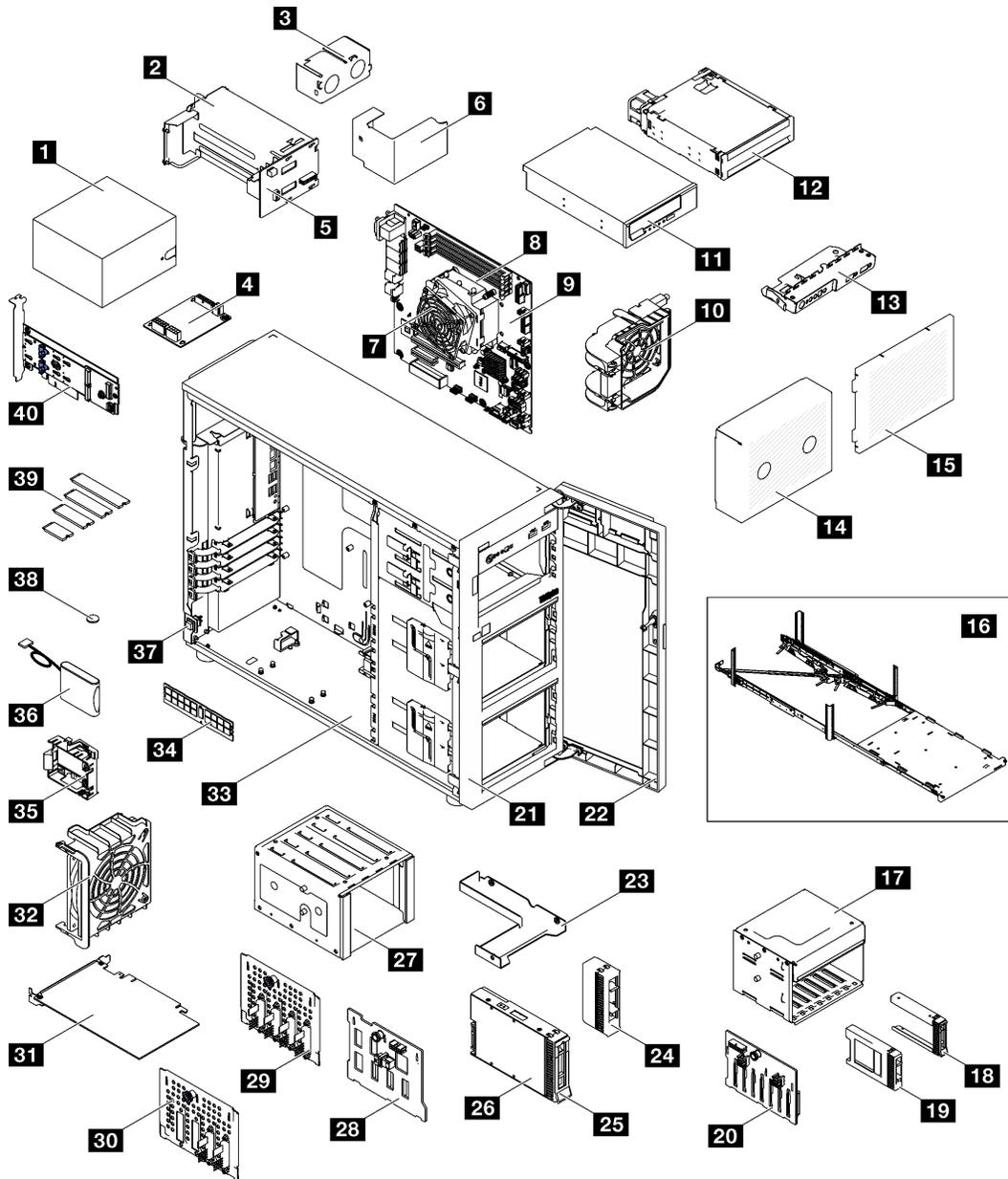


Figure 26. Server components

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 21. Parts listing

Index	Description	Tier 1 CRU	Tier 2 CRU	FRU	Consumable and Structural parts
For more information about ordering the parts shown in Figure 26 “Server components” on page 59: <a href="http://datacentersupport.lenovo.com/us/en/products/servers/thinksystem/st250v2/7D8F/parts">http://datacentersupport.lenovo.com/us/en/products/servers/thinksystem/st250v2/7D8F/parts</a>					
1	Fixed power supply	√			
2	Hot-swap power supply	√			
3	Hot-swap power supply filler				√
4	Power distribution board for fixed power supply				√
5	Power distribution board for hot-swap power supplies		√		
6	Power distribution board cover	√			
7	Heat sink and fan			√	
8	Processor			√	
9	System board		√		
10	Front system fan	√			
11	5.25-inch LTO/RDX tape drive	√			
12	5.25-inch optical disk drive			√	
13	Front panel board assembly	√			
14	Drive cage filler				√
15	Drive cage cover		√		
16	Tower-to-rack conversion kit	√			
17	2.5-inch drive cage	√			
18	2.5-inch drive filler	√			
19	2.5-inch drive	√			
20	2.5-inch hot-swap drive backplane		√		
21	Front bezel			√	
22	Front door	√			
23	2.5-inch to 3.5-inch drive adapter	√			
24	3.5-inch drive filler	√			
25	3.5-inch drive carrier			√	
26	3.5-inch drive	√			
27	3.5-inch drive cage			√	
28	3.5-inch hot-swap drive backplane		√		

Table 21. Parts listing (continued)

Index	Description	Tier 1 CRU	Tier 2 CRU	FRU	Consumable and Structural parts
29	3.5-inch simple-swap drive backplate			√	
30	3.5-inch simple-swap drive backplate with ODD			√	
31	PCIe adapter	√			
32	Rear system fan	√			
33	Chassis	√			
34	Memory module	√			
35	RAID flash power module holder				√
36	RAID flash power module	√			
37	Intrusion switch		√		
38	CMOS battery (CR2032)	√			
39	M.2 drive	√			
40	M.2 boot adapter		√		

## Power cords

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

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

1. Go to:

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

2. Click **Preconfigured Model** or **Configure to order**.

3. Enter the machine type and model for your server to display the configurator page.

4. Click **Power** → **Power Cables** to see all line cords.

### Notes:

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

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## Chapter 3. Internal cable routing

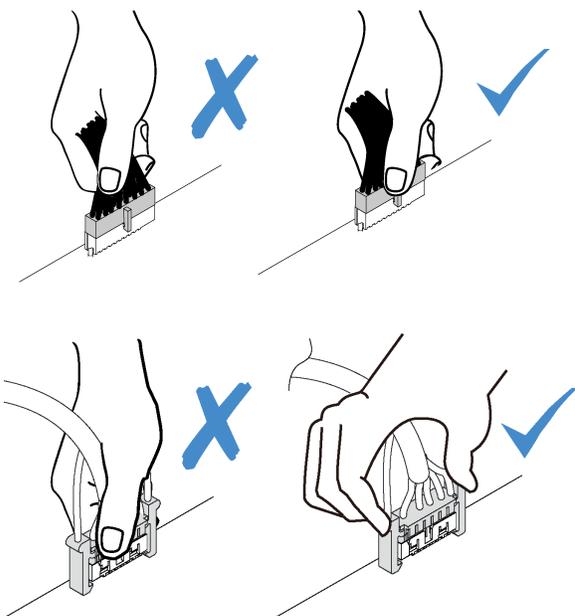
Some of the components in the server come with internal cables meant for specific connectors.

Before connecting the cables, read the following guidelines carefully:

- Turn off the server before you connect or disconnect any internal cables.
- Refer to the documentation that comes with any external devices for additional cabling instructions.
- Make use of the identifiers printed on the cables to locate the proper connectors.
- Ensure that the cable is not pinched and does not cover any connectors or obstruct any components on the system board.

### Notes:

1. 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.



2. When installing the front system fan into the chassis, make sure the cables do not interfere with the two posts and the fan is firmly seated.

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### Fan power cable

Use the section to understand the internal routing and connectors for the fan power cables.

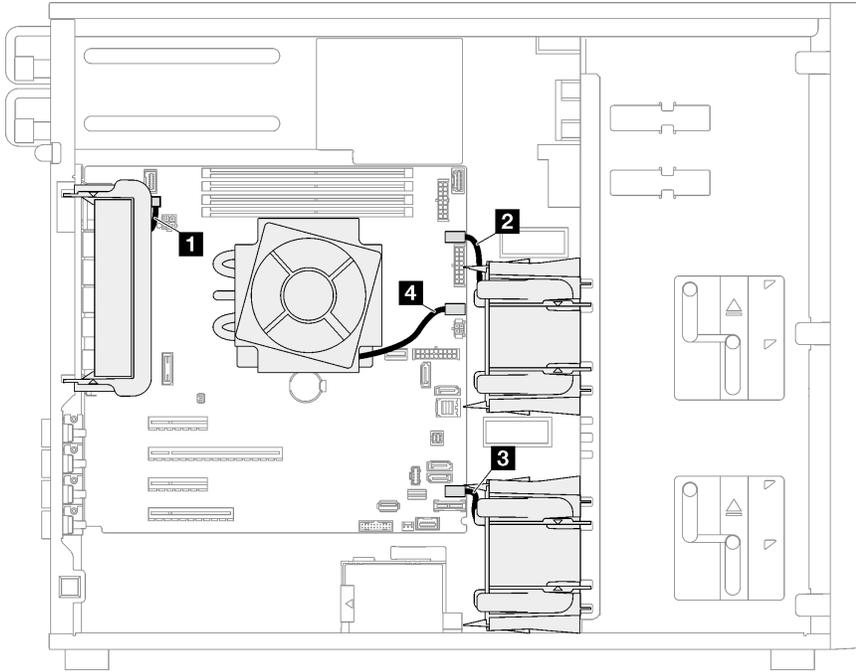


Figure 27. Fan power cable routing

Table 22. Location of fan power connectors on the system board

	From	To
<b>1</b>	Rear system fan	Rear fan connector
<b>2</b>	Front system fan 1	Fan 1 connector for front fan
<b>3</b>	Front system fan 2	Fan 4 connector for front fan
<b>4</b>	Heat sink fan	Fan 2 connector for processor

## Front panel

Use the section to understand the cable routing for the front panel.

**Note:** Ensure that all cables are routed through the correct cable clips.

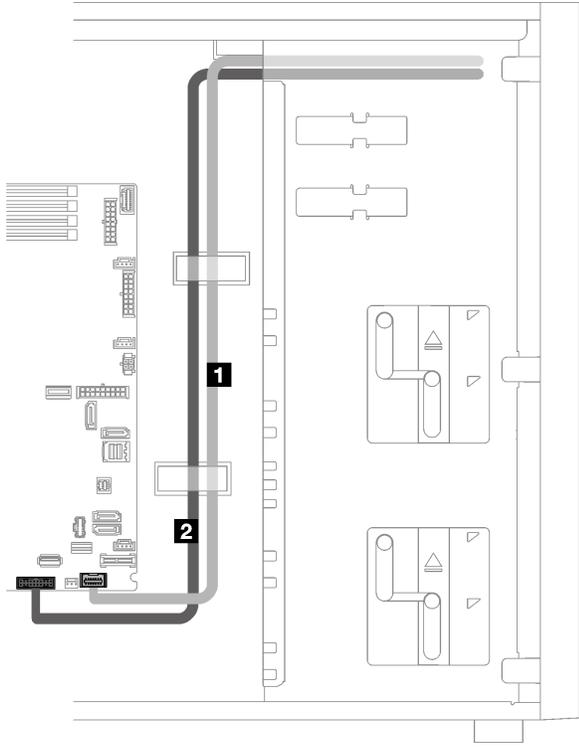


Figure 28. Cable routing for the front panel

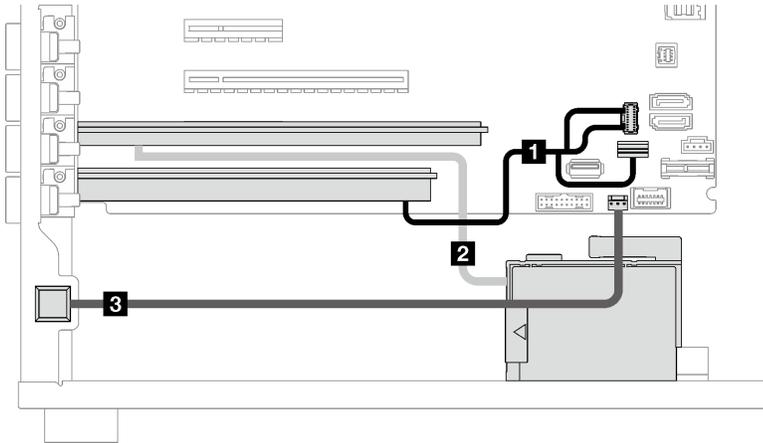
Cable	From	To
<b>1</b> Operator-information-panel cable	Front panel	Front-panel connector on the system board
<b>2</b> USB cable	Front panel	Front USB connector on the system board

---

## M.2 adapter, intrusion switch, and RAID flash power module

Use this section to understand the cable routing for M.2 adapter, intrusion switch, and RAID flash power module.

•

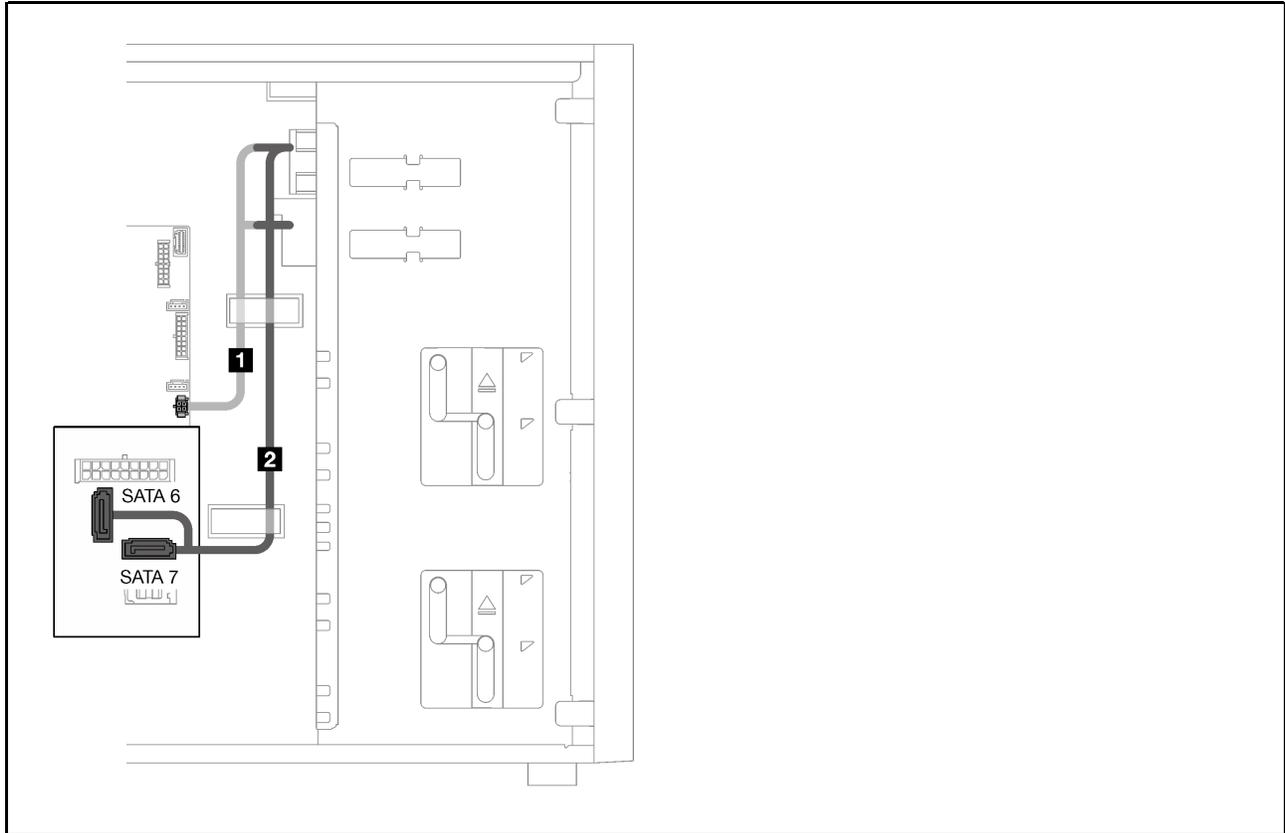


Cable	From	To
<b>1</b> M.2 cable	M.2 adapter	M.2 signal and power connector on the system board
<b>2</b> RAID flash power module cable	Flash power module connector on the RAID adapter	RAID Flash power module
<b>3</b> Intrusion switch cable	Intrusion switch	Intrusion switch connector on the system board

---

## Optical/tape drives

Use this section to understand the cable routing for server models with optical/tape drives.



	From	To
<b>1</b>	ODD/Tape drive power connectors	ODD/tape drive power connector on the system board
<b>2</b>	ODD/Tape drive SATA connectors	SATA 6, 7

## Fixed power supply

Use the section to understand the cable routing for the fixed power supply.

### Notes:

- Ensure that all cables are routed through the correct cable clips.
- As the processor power connectors on the power distribution board may look similar in appearance, make sure that the **2** power supply processor power cable and **3** processor power cable are routed correctly as illustrated.

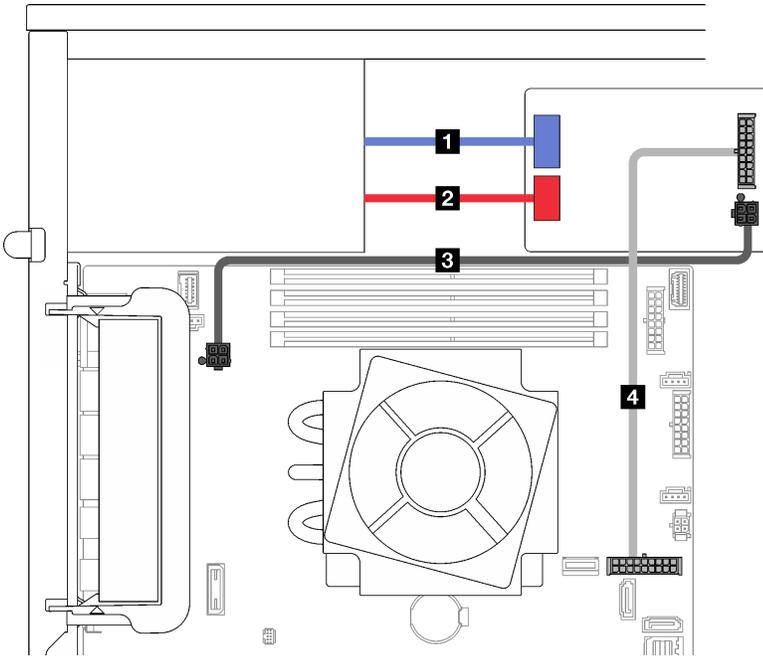


Figure 29. Cable routing for the fixed power supply

Cable	From (power distribution board)	To
<b>1</b> Power supply system power cable	Power supply system power connector	System power connector on the fixed power supply
<b>2</b> Power supply processor power cable	Power supply processor power connector	Processor power connector on the fixed power supply
<b>3</b> Processor power cable	Processor power connector	Processor power connector on the system board
<b>4</b> System power cable	System power connector	System power connector on the system board

## Redundant power supplies

Use the section to understand the cable routing for the redundant power supplies.

**Note:** Ensure that all cables are routed through the correct cable clips

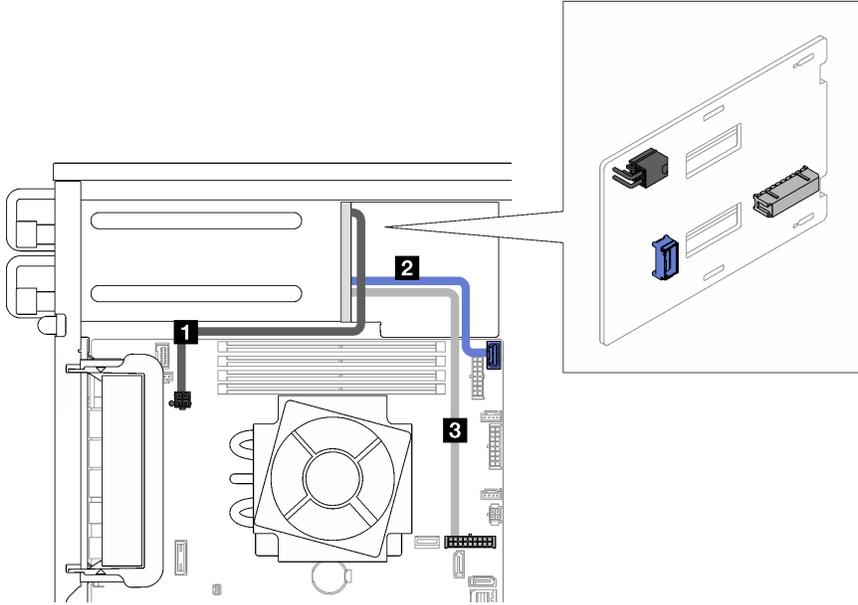


Figure 30. Cable routing for the redundant power supplies

Cable	From (power distribution board)	To
<b>1</b> Processor power cable	Processor power connector	Processor power connector on the system board
<b>2</b> Side band connector	Side band connector	Power distribution board side band connector on the system board
<b>3</b> Power cable	System power connector	System power connector on the system board

## Simple-swap drives

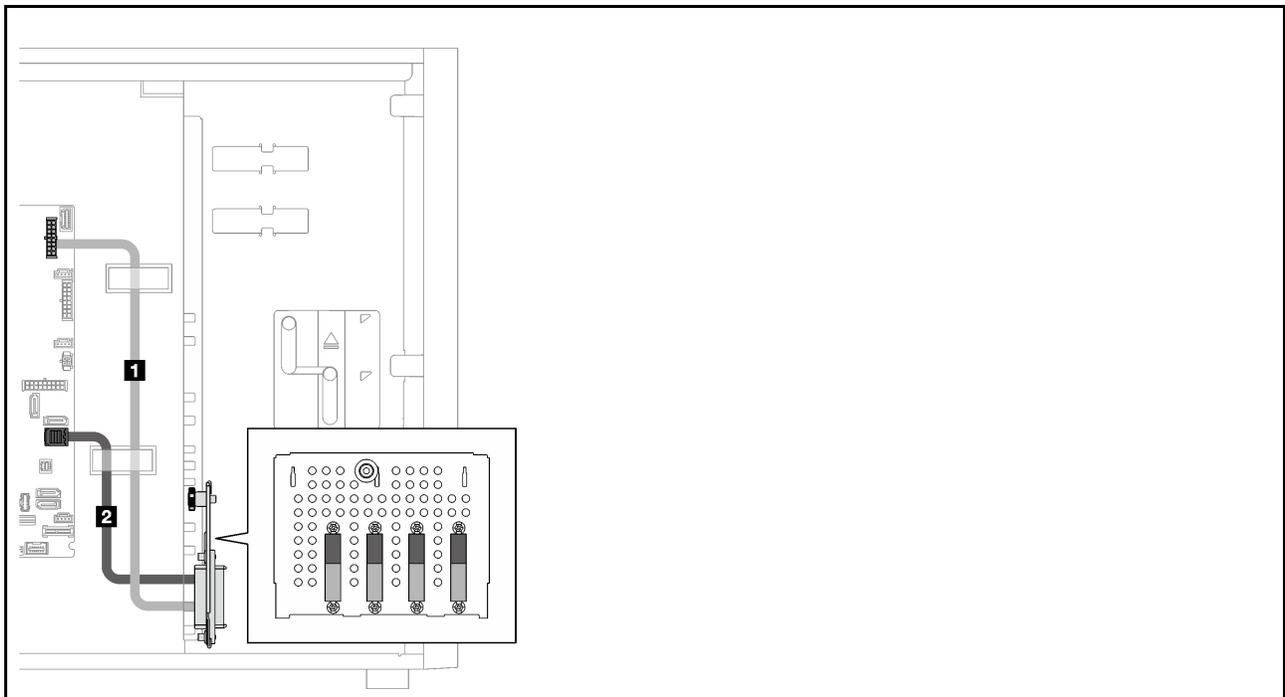
Use this section to understand the cable routing for server models with simple-swap drives.

See the configuration that is applied to the server.

- “Four 3.5-inch SATA drives” on page
- “Eight 3.5-inch SATA drives” on page 71
- “Seven SATA drives and one NVMe drive” on page 72
- “Six 3.5-inch SATA drives with ODD/tape drives” on page

### Four 3.5-inch simple-swap drives

Use this section to understand the cable routing for server models with four 3.5-inch simple-swap drives (software RAID).



	From	To
<b>1</b>	Lower backplate	Backplane 1 power connector
<b>2</b>		SATA 0-3

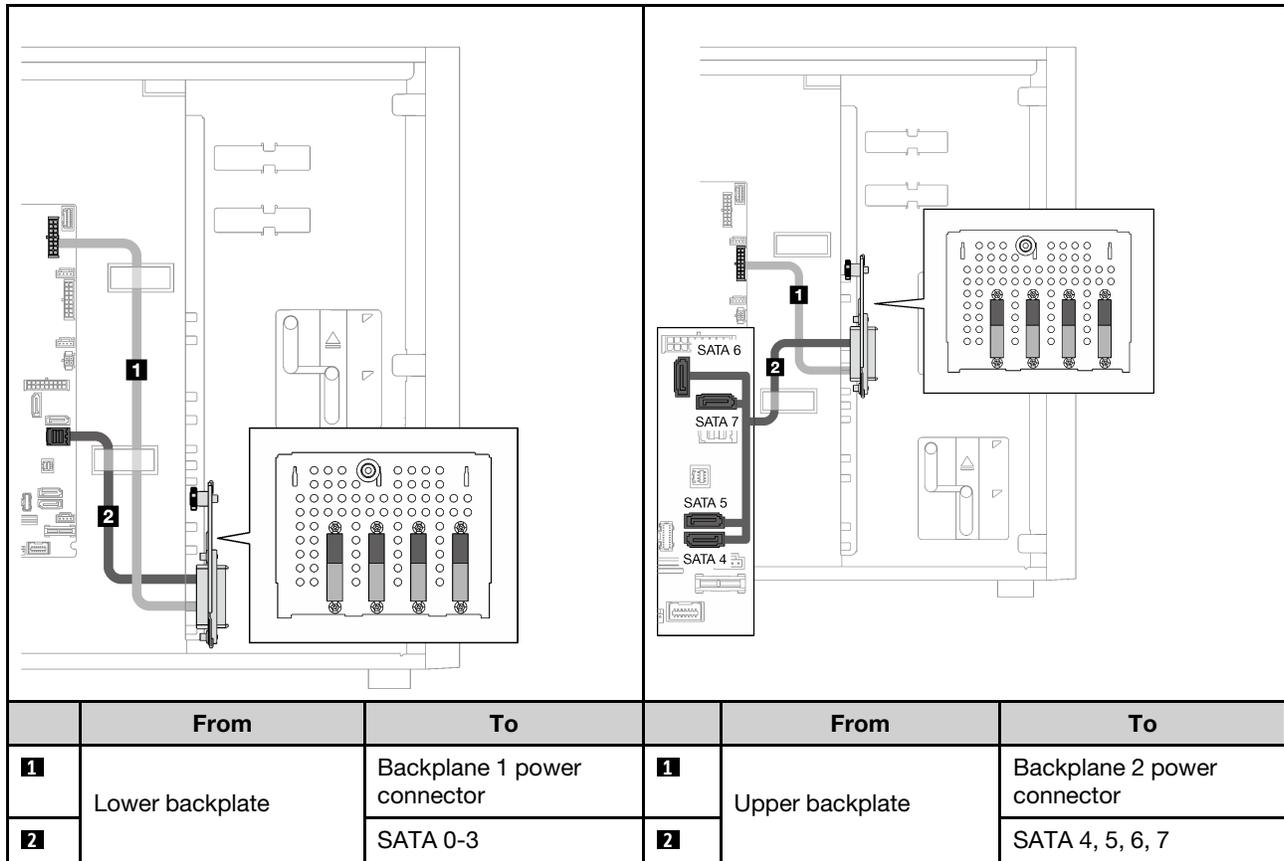
## Eight 3.5-inch simple-swap drives

Use this section to understand the cable routing for server models with eight 3.5-inch simple-swap drives (software RAID).

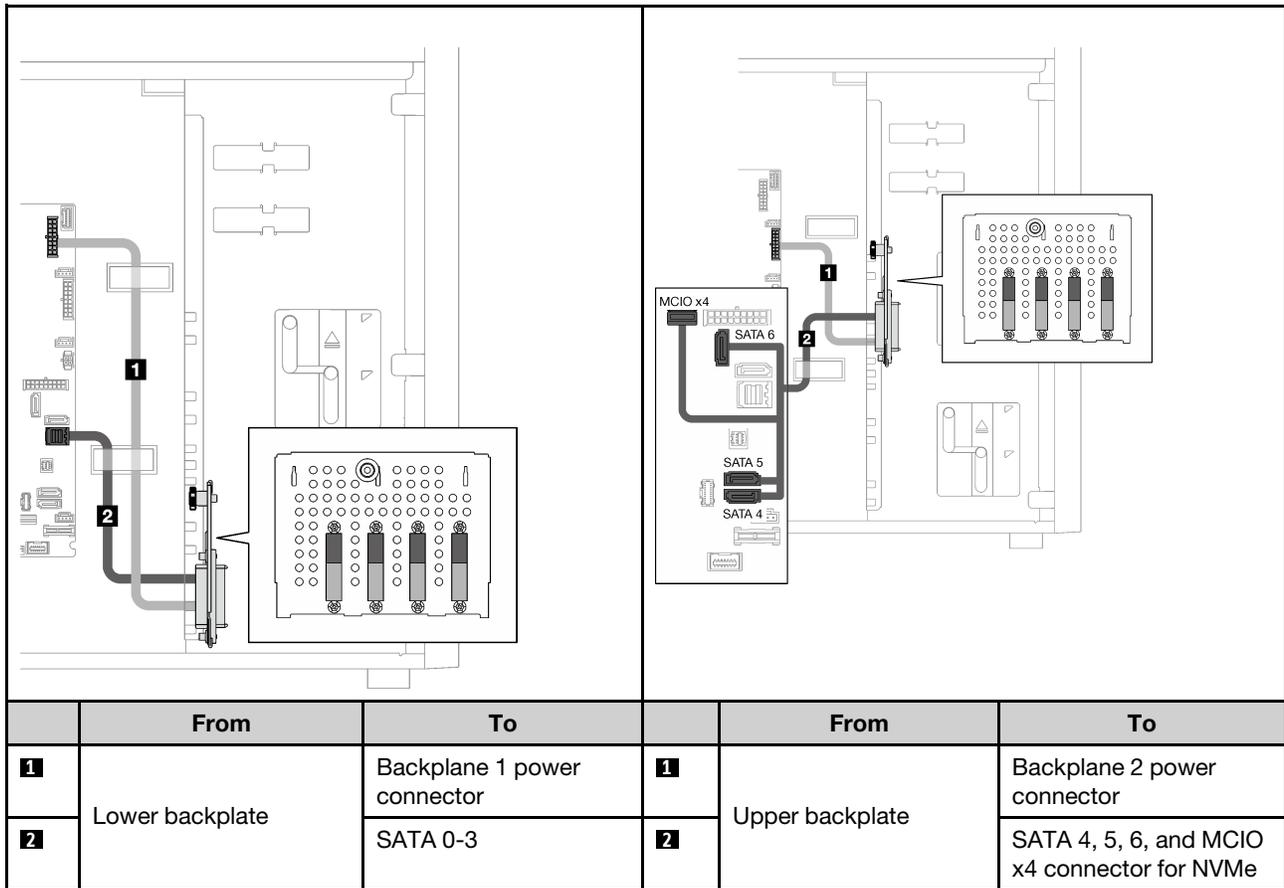
Following are the options available for this configuration:

- “Eight SATA drives” on page 71
- “Seven SATA drives and one NVMe drive” on page 72

### Eight SATA drives

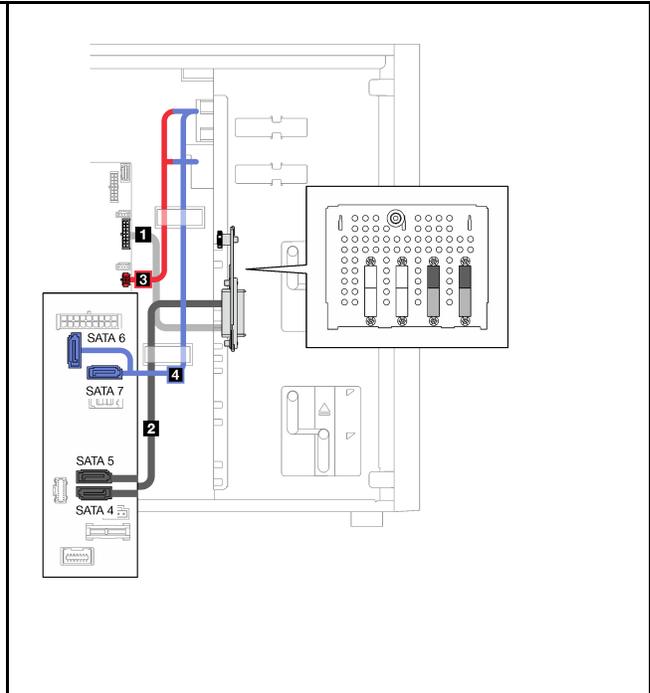
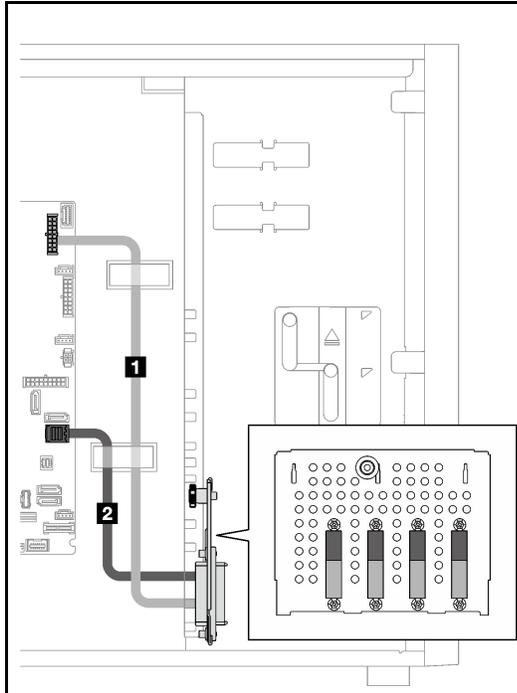


## Seven SATA drives and one NVMe drive



## Six 3.5-inch simple-swap drives with ODD/tape drives

Use this section to understand the cable routing for server models with six 3.5-inch simple-swap drives and ODD/tape drives (software RAID).



	From	To		From	To
<b>1</b>	Lower backplate	Backplane 1 power connector	<b>1</b>	Upper backplate	Backplane 2 power connector
		SATA 0-3	<b>2</b>		SATA 4, 5
<b>2</b>	Lower backplate	SATA 0-3	<b>3</b>	ODD/Tape drive power connectors	ODD/tape drive power connector on the system board
			<b>4</b>	ODD/Tape drive SATA connectors	SATA 6, 7

---

## Hot-swap drives

Use this section to understand the cable routing for server models with hot-swap drives.

See the configuration that is applied to the server.

- Software RAID
  - “Four 3.5-inch drives” on page 75
  - “Eight 3.5-inch drives” on page 77
  - “Eight 2.5-inch drives” on page 79
- Hardware RAID
  - “Four 3.5-inch drives with one 8i RAID adapter” on page 76
  - “Eight 3.5-inch drives with one 8i RAID adapter” on page 78
  - “Eight 2.5-inch drives with one 8i RAID adapter” on page 80
  - “Sixteen 2.5-inch drives with one 16i RAID adapter” on page 81
  - “Sixteen 2.5-inch drives with two 8i RAID adapters” on page 82
  - “Four 3.5-inch and eight 2.5-inch drives with one 16i RAID adapter” on page 83
  - “Four 3.5-inch and eight 2.5-inch drives with two 8i RAID adapters” on page 84

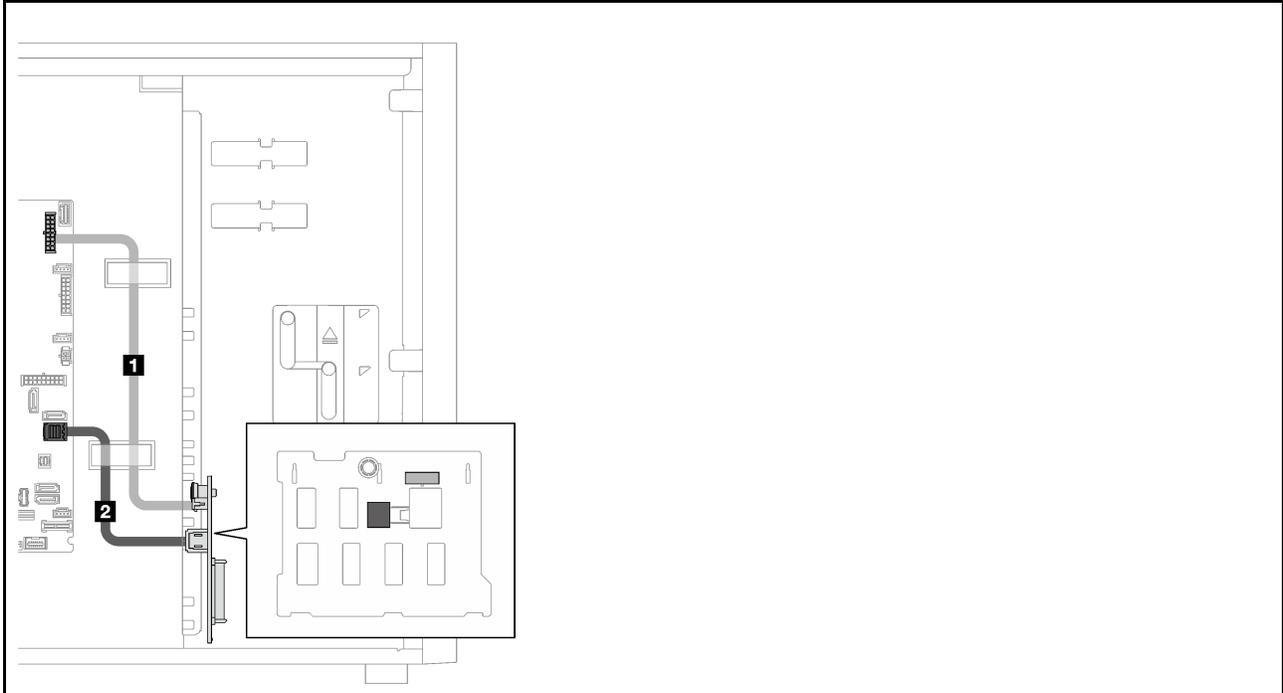
### Four 3.5-inch hot-swap drives

Use this section to understand the cable routing for server models with four 3.5-inch hot-swap drives.

Following are the options available for this configuration:

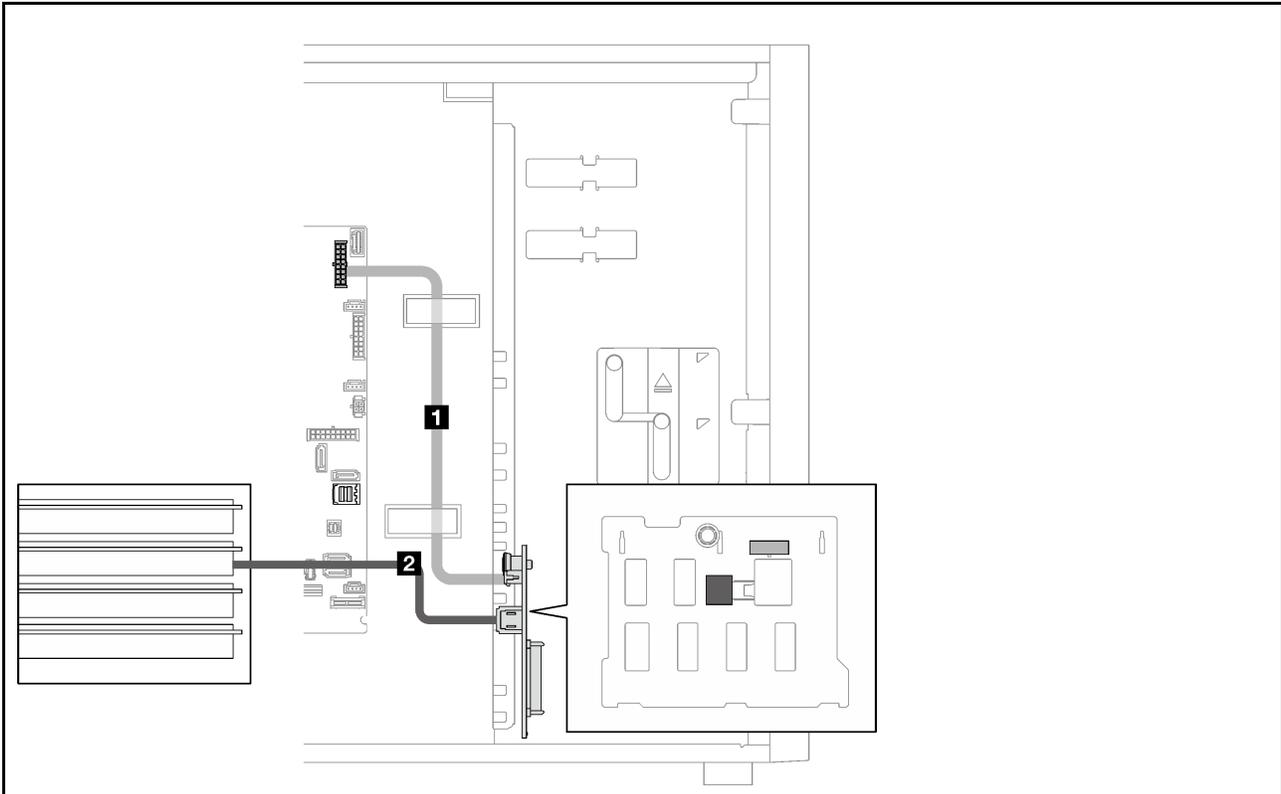
- “Software RAID” on page 75
- “One 8i RAID adapter” on page 76

## Software RAID



	From	To
<b>1</b>	Lower backplane power connector	Backplane 1 power connector
<b>2</b>	Lower backplane SAS/SATA connector	SATA 0-3

## One 8i RAID adapter



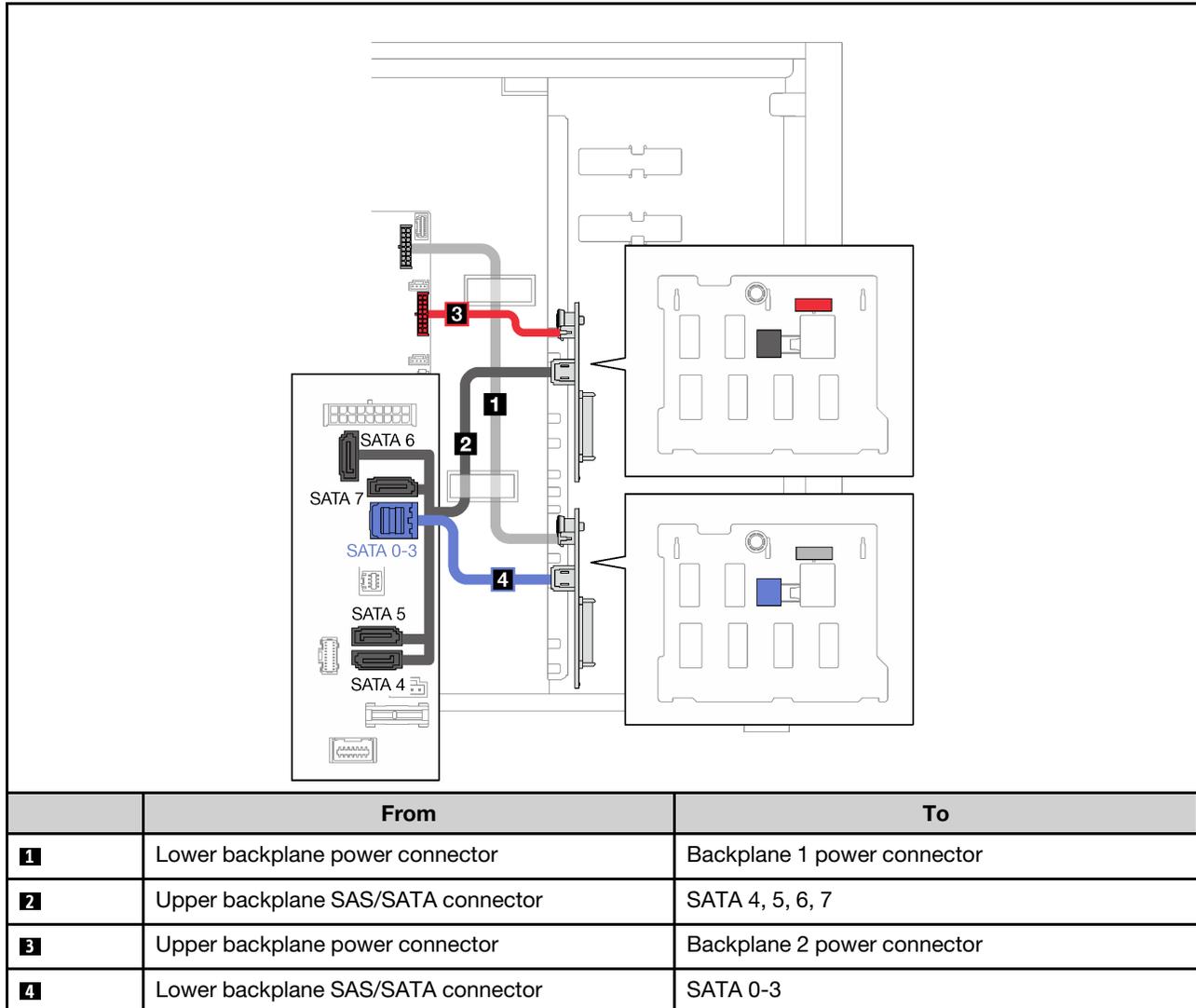
	From	To
<b>1</b>	Lower backplane power connector	Backplane 1 power connector
<b>2</b>	Lower backplane SAS/SATA connector	C0

## Eight 3.5-inch hot-swap drives

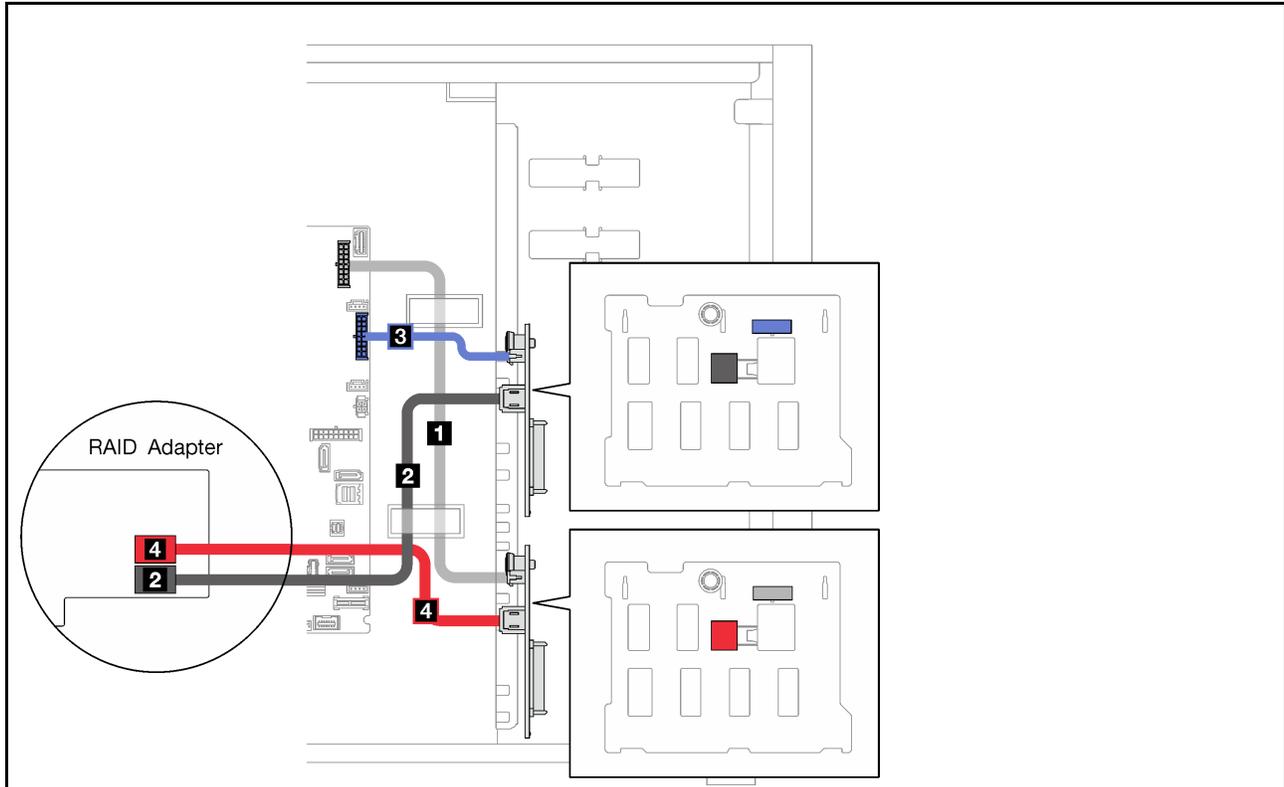
Use this section to understand the cable routing for server models with eight 3.5-inch hot-swap drives.

- “Software RAID” on page 77
- “One 8i RAID adapter” on page 78

### Software RAID



## One 8i RAID adapter



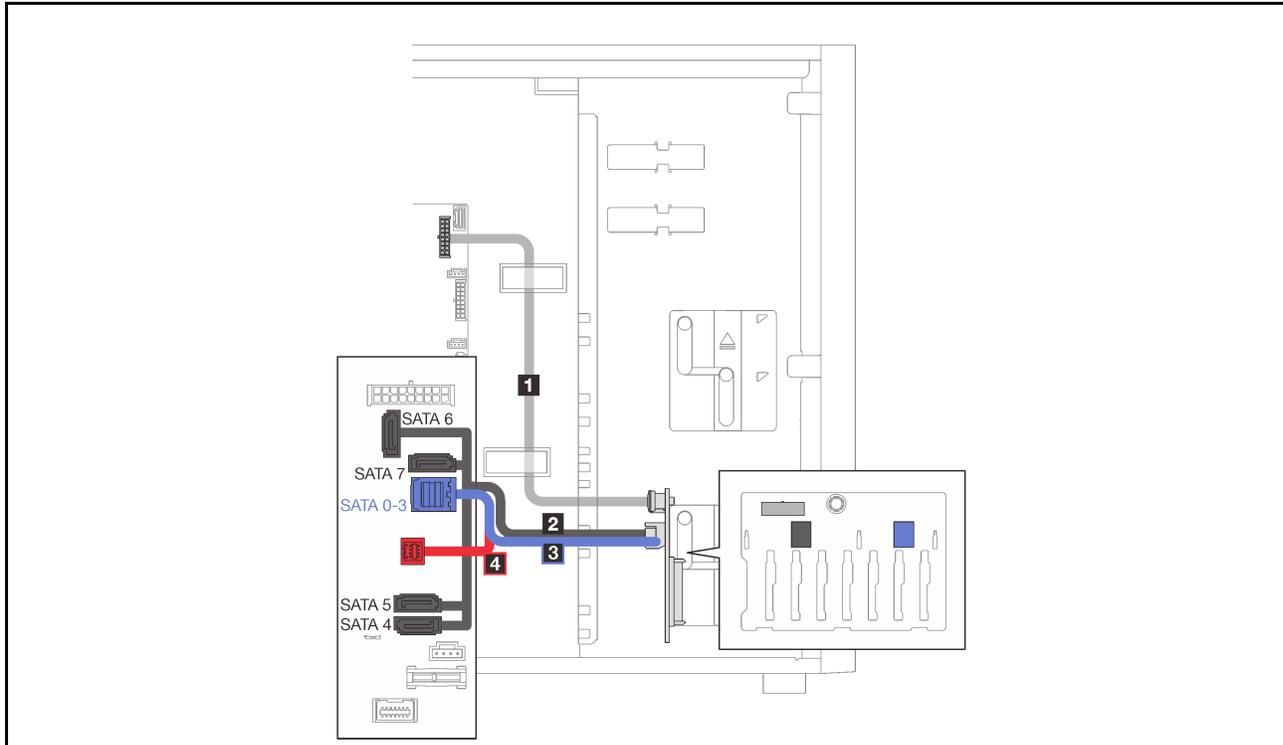
	From	To
<b>1</b>	Lower backplane power connector	Backplane 1 power connector
<b>2</b>	Upper backplane SAS/SATA connector	X350-8i: C1
<b>3</b>	Upper backplane power connector	Backplane 2 power connector
<b>4</b>	Lower backplane SAS/SATA connector	C0

## Eight 2.5-inch hot-swap drives

Use this section to understand the cable routing for server models with eight 2.5-inch hot-swap drives.

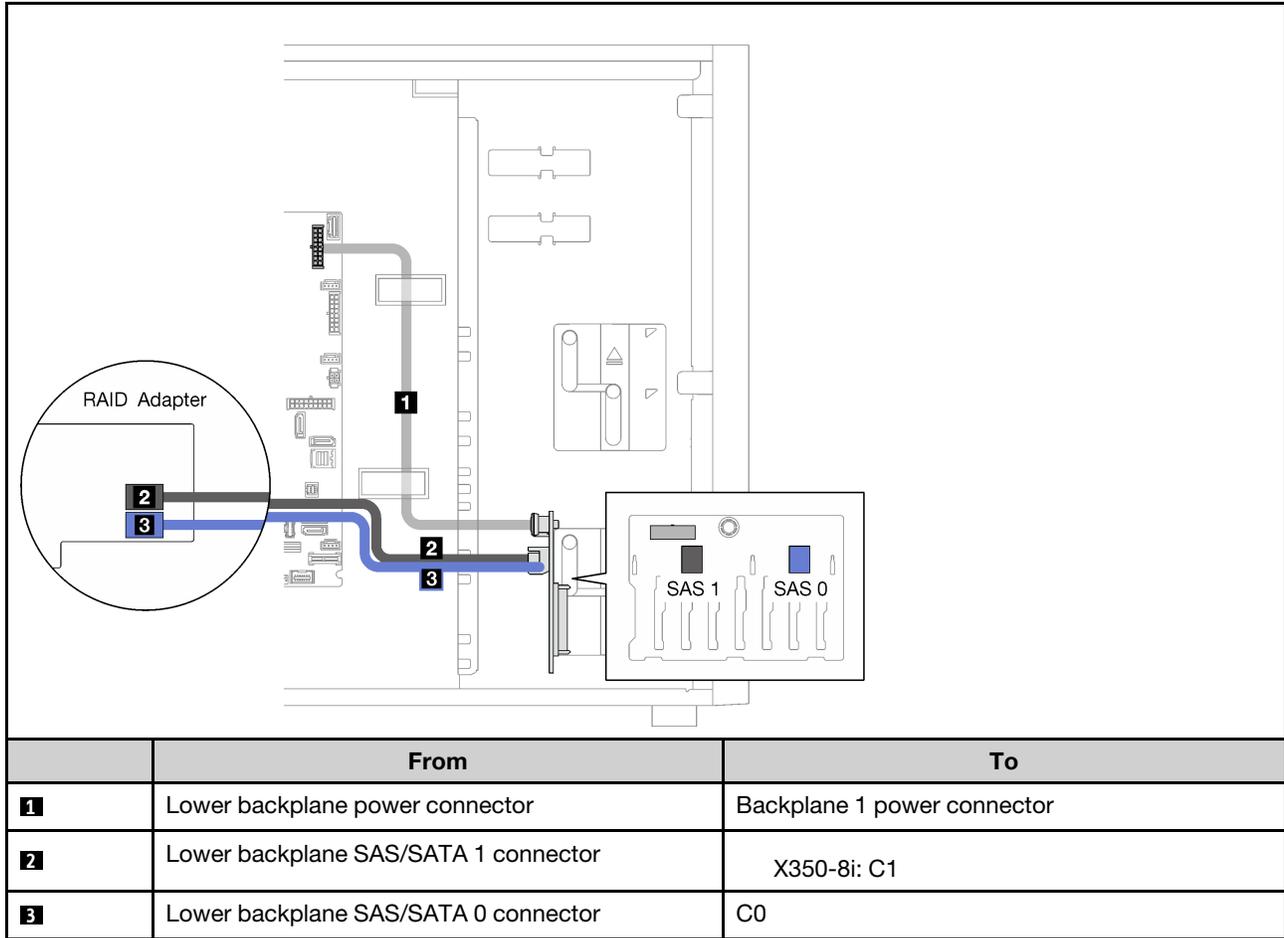
- “Software RAID” on page 79
- “One 8i RAID adapter” on page 80

## Software RAID



	From	To
<b>1</b>	Lower backplane power connector	Backplane 1 power connector
<b>2</b>	Lower backplane SAS/SATA 1 connector	SATA 4, 5, 6, 7
<b>3</b>	Lower backplane SAS/SATA 0 connector	SATA 0-3
<b>4</b>	Lower backplane	SGPIO1 connector

## One 8i RAID adapter

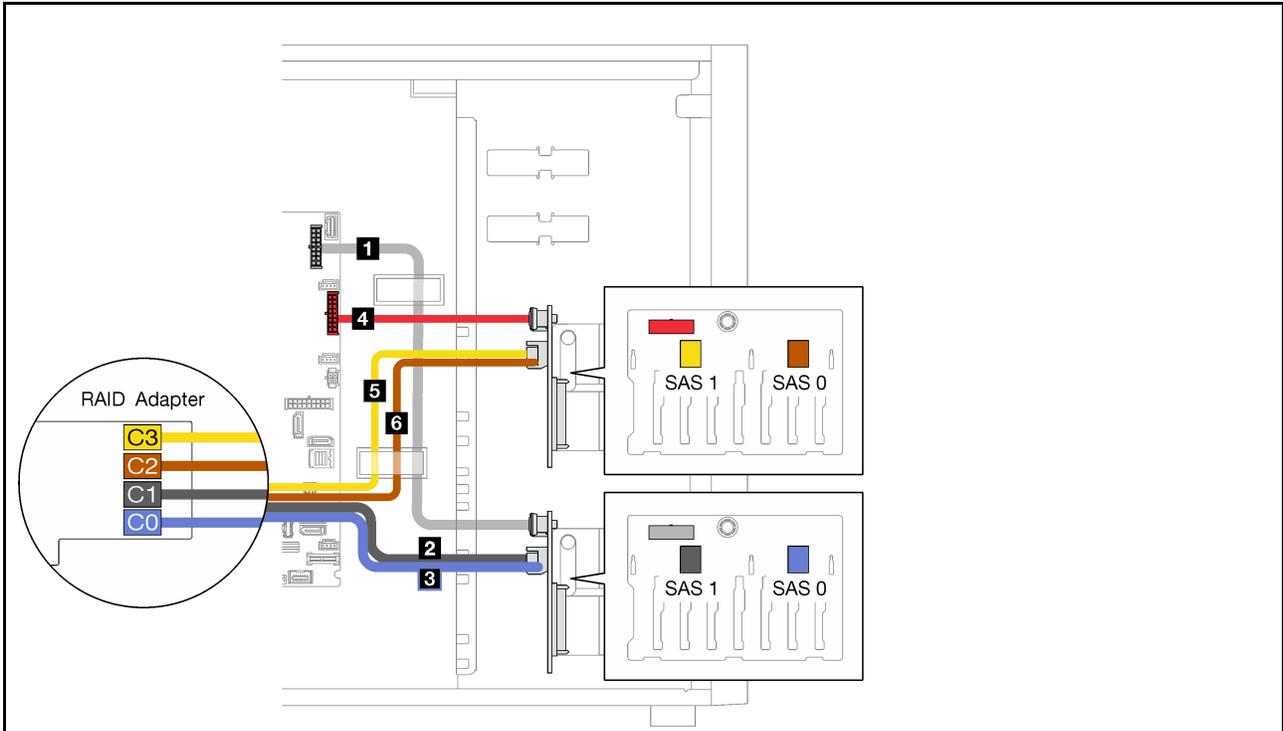


## Sixteen 2.5-inch hot-swap drives

Use this section to understand the cable routing for server models with sixteen 2.5-inch hot-swap drives.

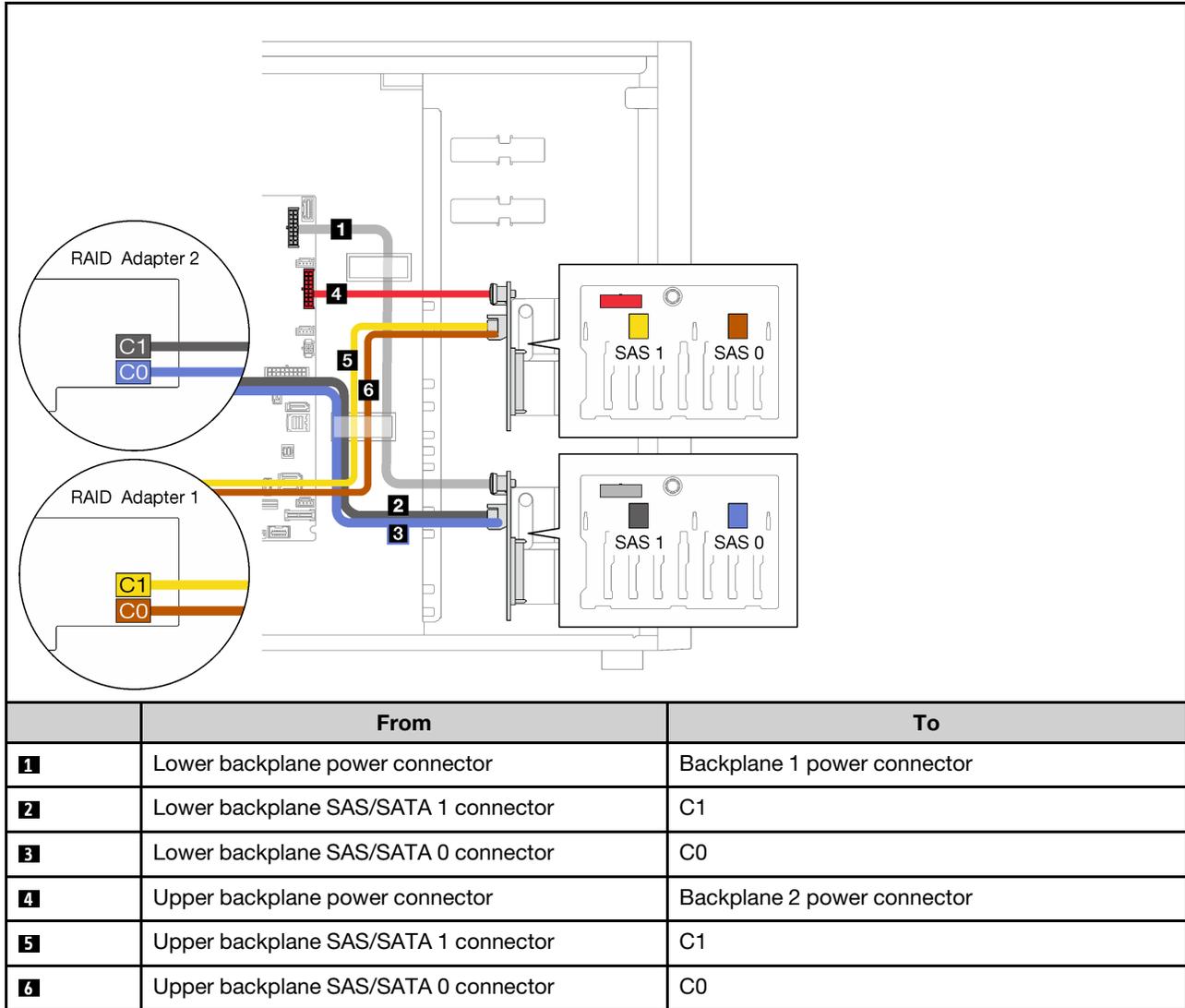
- “One 9350-16i RAID adapter” on page 81
- “Two 4350/5350-8i RAID adapters” on page 82

One 9350-16i RAID adapter



	From	To
<b>1</b>	Lower backplane power connector	Backplane 1 power connector
<b>2</b>	Lower backplane SAS/SATA 1 connector	C1
<b>3</b>	Lower backplane SAS/SATA 0 connector	C0
<b>4</b>	Upper backplane power connector	Backplane 2 power connector
<b>5</b>	Upper backplane SAS/SATA 1 connector	C3
<b>6</b>	Upper backplane SAS/SATA 0 connector	C2

## Two 4350/5350-8i RAID adapters

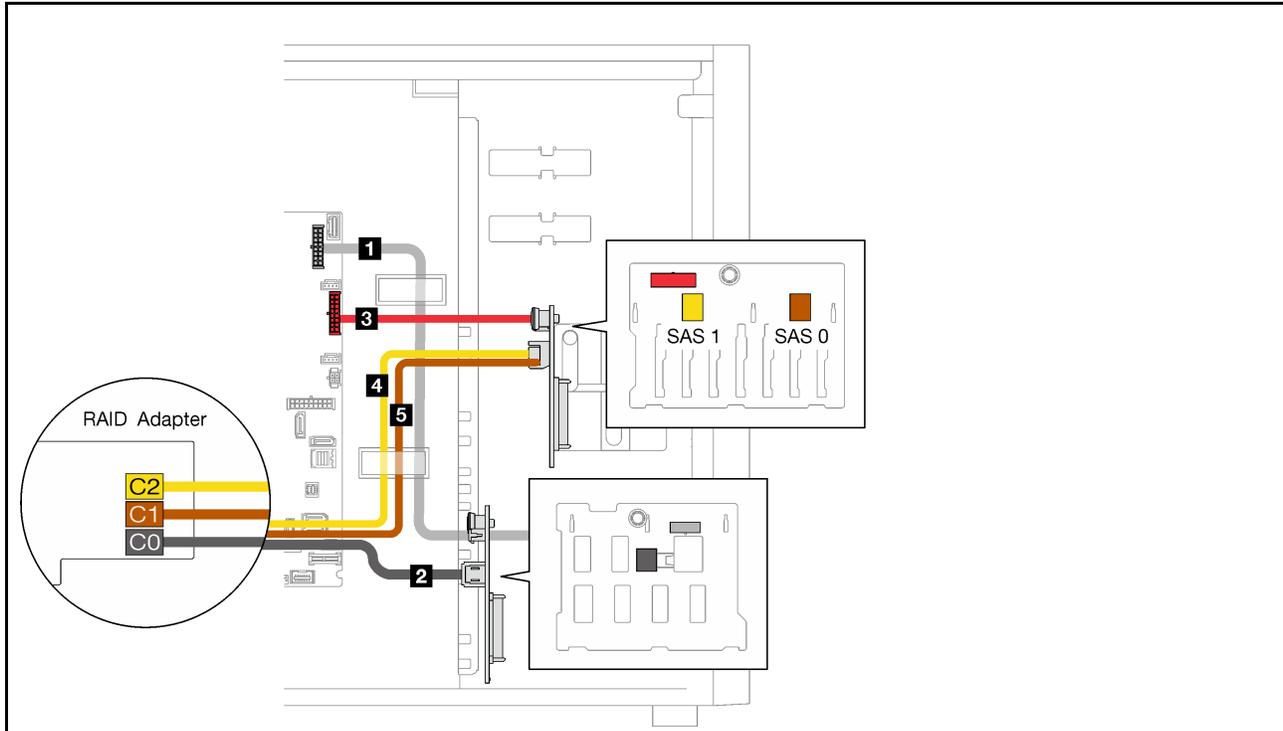


## Four 3.5-inch and eight 2.5-inch hot-swap drives

Use this section to understand the cable routing for server models with four 3.5-inch and eight 2.5-inch hot-swap drives.

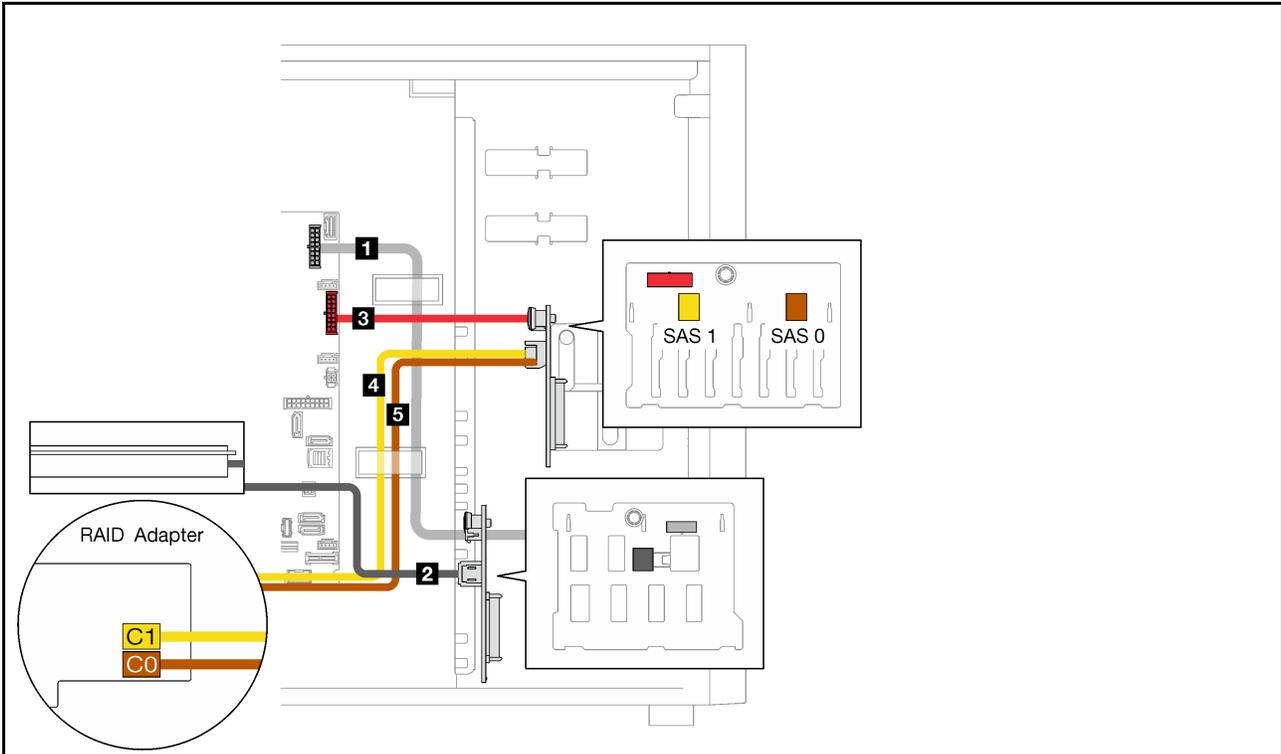
- “One 9350-16i RAID adapter” on page 83
- “Two 4350/5350-8i RAID adapters” on page 84

### One 9350-16i RAID adapter



	From	To
<b>1</b>	Lower backplane power connector	Backplane 1 power connector
<b>2</b>	Lower backplane SAS/SATA connector	C0
<b>3</b>	Upper backplane power connector	Backplane 2 power connector
<b>4</b>	Upper backplane SAS/SATA 1 connector	C2
<b>5</b>	Upper backplane SAS/SATA 0 connector	C1

## Two 4350/5350-8i RAID adapters



	From	To
<b>1</b>	Lower backplane power connector	Backplane 1 power connector
<b>2</b>	Lower backplane SAS/SATA connector	C0, Slot 2
<b>3</b>	Upper backplane power connector	Backplane 2 power connector
<b>4</b>	Upper backplane SAS/SATA 1 connector	C1, Slot 4
<b>5</b>	Upper backplane SAS/SATA 0 connector	C0, Slot 4

---

## Chapter 4. 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:

1. Go to <http://datacentersupport.lenovo.com> and navigate to the support page for your server.
2. Click **Parts**.
3. Enter the serial number to view a listing of parts for your server.

**Note:** If you replace a part, such as an adapter, that contains firmware, you might also need to update the firmware for that part. For more information about updating firmware, see “Firmware updates” on page 9.

---

### Installation guidelines

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

Before installing optional devices, read the following notices carefully:

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

- Read the safety information and guidelines to ensure that you work safely.
  - A complete list of safety information for all products is available at: [http://thinksystem.lenovofiles.com/help/topic/safety\\_documentation/pdf\\_files.html](http://thinksystem.lenovofiles.com/help/topic/safety_documentation/pdf_files.html)
  - The following guidelines are available as well: “Handling static-sensitive devices” on page 88.
- Make sure the components you are installing are supported by the server. For a list of supported optional components for the server, see <https://static.lenovo.com/us/en/serverproven/index.shtml>.
- 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 ST250 V2 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.

- Make sure that you have an adequate number of properly grounded electrical outlets for the server, monitor, and other devices.
- Back up all important data before you make changes related to the disk drives.
- Have a small flat-blade screwdriver and a small Phillips screwdriver available.
- You do not have to turn off the server to remove or install hot-swap power supplies 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 DIMM.
- 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.
- Orange on a component or an orange label on or near a component indicates that the component can be hot-swapped if the server and operating system support hot-swap capability, which means that you can remove or install the component while the server is still running. (Orange can also indicate touch points on hot-swap components.) See the instructions for removing or installing a specific hot-swap component for any additional procedures that you might have to perform before you remove or install the component.
- 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.

**Note:** This device is not intended for use in the direct field of view at visual display workplaces. To avoid incommoding reflections at visual display workplaces, this device must not be placed in the direct field of view.

**Attention:** This is a Class A product. In a domestic environment, this product may cause radio interference in which case the user may be required to take adequate measures.

### 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.**

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

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

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

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

a. Go to:

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

b. Click **Preconfigured Model** or **Configure to order**.

c. Enter the machine type and model for your server to display the configurator page.

d. Click **Power → Power Cables** to see all line cords.

- Make sure that the insulation is not frayed or worn.
- 3. Check for any obvious non-Lenovo alterations. Use good judgment as to the safety of any non-Lenovo alterations.
- 4. Check inside the server for any obvious unsafe conditions, such as metal filings, contamination, water or other liquid, or signs of fire or smoke damage.
- 5. Check for worn, frayed, or pinched cables.
- 6. Make sure that the power-supply cover fasteners (screws or rivets) have not been removed or tampered with.

## System reliability guidelines

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

Make sure the following requirements are met:

- When the server comes with redundant power, a power supply must be installed in each power-supply bay.
- Adequate space around the server must be spared to allow server cooling system to work properly. Leave approximately 50 mm (2.0 in.) of open space around the front and rear of the server. Do not place any object in front of the fans.
- For proper cooling and airflow, refit the server cover before you turn the power on. Do not operate the server for more than 30 minutes with the server cover removed, for it might damage server components.
- Cabling instructions that come with optional components must be followed.
- A failed fan must be replaced within 48 hours since malfunction.
- A removed hot-swap 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 on 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.
- While the device is still in its static-protective package, touch it to an unpainted metal surface on the outside of the server for at least two seconds. This drains static electricity from the package and from your body.
- Remove the device from the package and install it directly into the server without putting it down. If it is necessary to put the device down, put it back into the static-protective package. Never place the device on the server or on any metal surface.
- When handling a device, carefully hold it by the edges or the frame.
- Do not touch solder joints, pins, or exposed circuitry.
- Keep the device from others' reach to prevent possible damages.

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## 3.5-inch/2.5-inch drive cage replacement

Follow instructions in this section to remove and install the 3.5-inch/2.5-inch drive cage.

### Remove the 3.5-inch/2.5-inch drive cage

Follow instructions in this section to remove the 3.5-inch/2.5-inch drive cage.

#### About this task

To avoid potential danger, read and follow the following safety statements.

- **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.**

**Attention:**

- Read the “Installation guidelines” on page 85 to ensure that you work safely.
- Turn off the server and peripheral devices, and disconnect the power cords and all external cables (see “Power off the server” on page 13).
- If the server is in a rack, remove it from the rack.
- Remove any locking device that secures the server cover, such as a Kensington lock or a pad lock.

**Watch the procedure**

A video of this procedure is available at YouTube: <https://youtube.com/playlist?list=PLYV5R7hVcs-DoEcXrm2zKNpaK0dZ3f8Qc>.

**Procedure**

Step 1. Make preparations for this task.

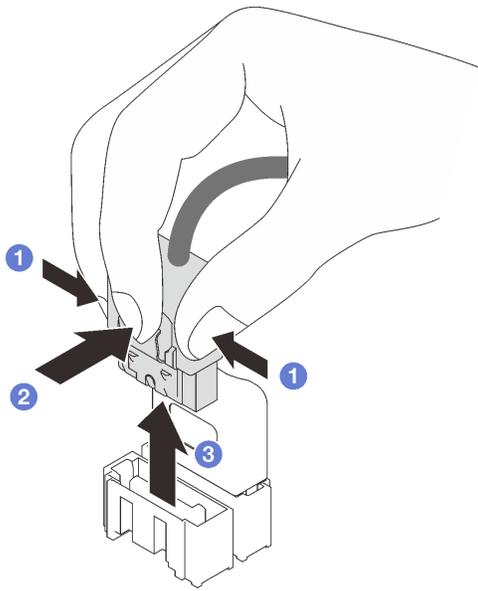
- a. Remove the server cover (see “Remove the server cover” on page 199).
- b. Remove the front door (see “Remove the front door” on page 124).
- c. Remove the front bezel (see “Remove the front bezel” on page 122).
- d. Remove any drives or drive bay fillers and set them aside on a static-protective surface (see “Remove a hot-swap drive” on page 102 or “Remove a simple-swap drive” on page 106).
- e. Remove the system fan (see “Remove the front system fan” on page 113).

Step 2. Disconnect the cables from the backplane or backplate.

**Attention:** Follow the instructions below to disconnect the cable from the SATA hard disk drive connector (especially SATA hard disk drive **4** and **5** connectors):

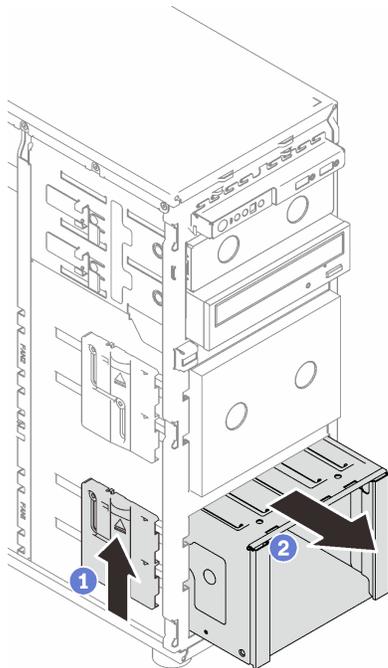
1. ① Press on the sides of the connector on the cable with your thumb and middle finger.
2. ② Release the latch with your index finger as illustrated.
3. ③ Carefully pull the cable out of the connector on the system board.

Figure 31. Disconnecting the cable from the SATA hard disk drive connector



- Step 3. Remove the drive cage from the chassis.
- 1 Press and hold the drive cage release latch.
  - 2 Carefully slide the drive cage out of the chassis.

Figure 32. Removing the drive cage



- Step 4. Remove the backplane or backplate (see “Remove the 3.5-inch/2.5-inch hot-swap drive backplane” on page 92 or “Remove the 3.5-inch simple-swap drive backplate” on page 96).

### After this task is completed

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

## Install the 3.5-inch/2.5-inch drive cage

Follow instructions in this section to install the 3.5-inch/2.5-inch drive cage.

### About this task

To avoid potential danger, read and follow the following safety statements.

- **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.

#### Attention:

- Read the “Installation guidelines” on page 85 to ensure that you work safely.
- Touch the static-protective package that contains the component to any unpainted metal surface on the server; then, remove it from the package and place it on a static-protective surface.

#### Watch the procedure

A video of this procedure is available at YouTube: <https://youtube.com/playlist?list=PLYV5R7hVcs-DoEcxrm2zKNpaK0dZ3f8Qc>.

### Procedure

- Step 1. Install the backplane or backplate (see “Install the 3.5-inch/2.5-inch hot-swap drive backplane” on page 95 or “Install the 3.5-inch simple-swap drive backplate” on page 98 ).
- Step 2. Slide the drive cage in until the release latch clicks into place.

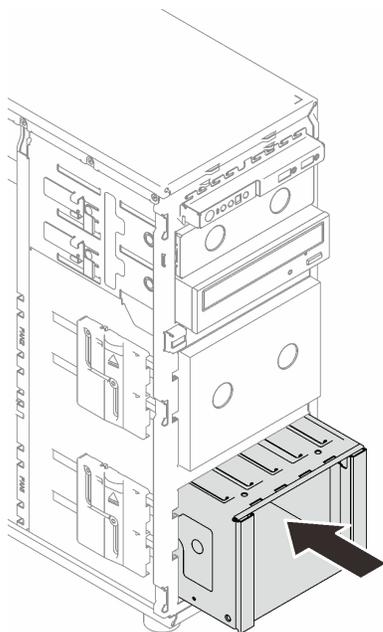


Figure 33. Installing the drive cage

### After this task is completed

1. Install the system fan (see “Install the front system fan” on page 115).
2. Reinstall all the drives and drive bay fillers (if any) into the drive cage (see “Install a hot-swap drive” on page 104 or “Install a 2.5-inch drive into a 3.5-inch drive bay” on page 111).
3. Reconnect the cables to the backplane or backplate.
4. Complete the parts replacement. See “Complete the parts replacement” on page 217.

---

## 3.5-inch/2.5-inch hot-swap drive backplane replacement

Follow instructions in this section to remove and install a 3.5-inch/2.5-inch hot-swap drive backplane.

This topic applies only to server models that have hot-swap drives installed.

### Remove the 3.5-inch/2.5-inch hot-swap drive backplane

Follow instructions in this section to remove the 3.5-inch/2.5-inch hot-swap drive backplane.

#### About this task

To avoid potential danger, read and follow the following safety statements.

- **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.**

**Attention:**

- Read the “Installation guidelines” on page 85 to ensure that you work safely.
- Turn off the server and peripheral devices, and disconnect the power cords and all external cables (see “Power off the server” on page 13).
- If the server is in a rack, remove it from the rack.
- Remove any locking device that secures the server cover, such as a Kensington lock or a pad lock.

**Watch the procedure**

A video of this procedure is available at YouTube: <https://youtube.com/playlist?list=PLYV5R7hVcs-DoEcXrm2zKNpaK0dZ3f8Qc>.

**Procedure**

Step 1. Make preparations for this task.

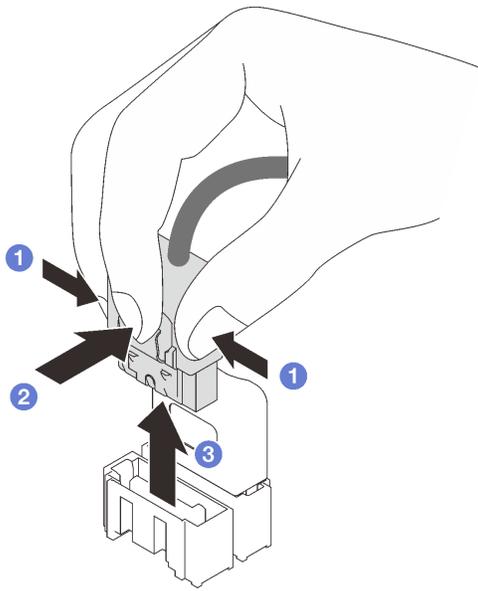
- a. Remove the server cover (see “Remove the server cover” on page 199).
- b. Remove the front door (see “Remove the front door” on page 124).
- c. Remove the front bezel (see “Remove the front bezel” on page 122).
- d. Remove all of the installed drives or drive bay fillers from the drive cage and set them aside on a static-protective surface (see “Remove a hot-swap drive” on page 102 or “Remove a simple-swap drive” on page 106).
- e. Remove the system fan (see “Remove the front system fan” on page 113).

Step 2. Disconnect the cables from the backplane.

**Attention:** Follow the instructions below to disconnect the cable from the SATA hard disk drive connector (especially SATA hard disk drive **4** and **5** connectors):

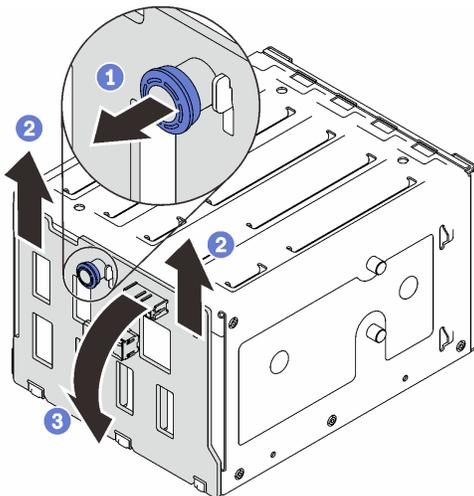
1. ① Press on the sides of the connector on the cable with your thumb and middle finger.
2. ② Release the latch with your index finger as illustrated.
3. ③ Carefully pull the cable out of the connector on the system board.

Figure 34. Disconnecting the cable from the SATA hard disk drive connector



- Step 3. Remove the drive cage from the chassis (see “Remove the 3.5-inch/2.5-inch drive cage” on page 88).
- Step 4. Remove the hot-swap drive backplane.
- 1 Pull out the blue plunger that secures the backplane.
  - 2 Slightly lift the backplane to disengage it from the drive cage.
  - 3 Remove the backplane from the drive cage.

Figure 35. Removing the hot-swap drive backplane



### After this task is completed

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

## Install the 3.5-inch/2.5-inch hot-swap drive backplane

Follow instructions in this section to install the 3.5-inch/2.5-inch hot-swap drive backplane.

### About this task

To avoid potential danger, read and follow the following safety statements.

- **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.

#### Attention:

- Read the “Installation guidelines” on page 85 to ensure that you work safely.
- Touch the static-protective package that contains the component to any unpainted metal surface on the server; then, remove it from the package and place it on a static-protective surface.

#### Watch the procedure

A video of this procedure is available at YouTube: <https://youtube.com/playlist?list=PLYV5R7hVcs-DoEcxrm2zKNpaKOdZ3f8Qc>.

### Procedure

- Step 1. Align the slots on the backplane with the tabs on the drive cage, and insert the tabs into the slots.
- Step 2. While pulling the plunger, slide down the backplane until it clicks into place; then, close the plunger to secure the backplane.

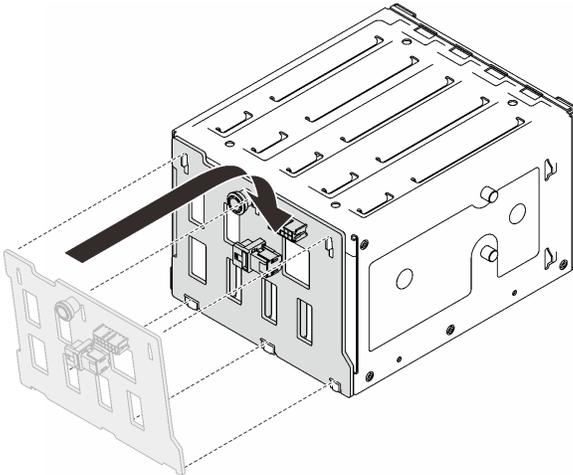


Figure 36. Installing the hot-swap drive backplane

### After this task is completed

1. Reinstall the drive cage into the chassis (see “Install the 3.5-inch/2.5-inch drive cage” on page 91).
2. Reinstall all the hot-swap drives and drive bay fillers (if any) into the drive cage (see “Install a hot-swap drive” on page 104 or “Install a 2.5-inch drive into a 3.5-inch drive bay” on page 111).
3. Reconnect the cables to the backplane.
4. Reinstall the system fan (see “Install the front system fan” on page 115).
5. Complete the parts replacement. See “Complete the parts replacement” on page 217.

---

## 3.5-inch simple-swap drive backplate replacement

Follow instructions in this section to remove and install a 3.5-inch simple-swap drive backplate.

**Note:** This section applies only to server models that have 3.5-inch simple-swap drive backplates installed.

### Remove the 3.5-inch simple-swap drive backplate

Follow instructions in this section to remove the 3.5-inch simple-swap drive backplate.

#### About this task

To avoid potential danger, read and follow the following safety statements.

- **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.

#### Attention:

- Read the “Installation guidelines” on page 85 to ensure that you work safely.
- Turn off the server and peripheral devices, and disconnect the power cords and all external cables (see “Power off the server” on page 13).
- If the server is in a rack, remove it from the rack.
- Remove any locking device that secures the server cover, such as a Kensington lock or a pad lock.

#### Watch the procedure

A video of this procedure is available at YouTube: <https://youtube.com/playlist?list=PLYV5R7hVcs-DoEcxrm2zKNpaKOdZ3f8Qc>.

#### Procedure

- Step 1. Make preparations for this task.
- a. Remove the server cover (see “Remove the server cover” on page 199).
  - b. Remove the front door (see “Remove the front door” on page 124).
  - c. Remove the front bezel (see “Remove the front bezel” on page 122).

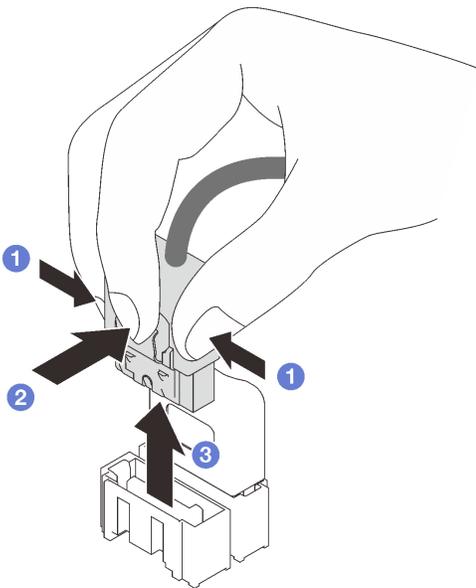
- d. Remove all of the installed simple-swap drives and drive bay fillers from the drive cage and set them aside on a static-protective surface (see “Remove a simple-swap drive” on page 106 or “Remove a 2.5-inch drive from a 3.5-inch drive bay” on page 110).
- e. Remove the system fan (see “Remove the front system fan” on page 113).

Step 2. Disconnect the cables from the backplate.

**Attention:** Follow the instructions below to disconnect the cable from the SATA hard disk drive connector (especially SATA hard disk drive 4 and 5 connectors):

1. ① Press on the sides of the connector on the cable with your thumb and middle finger.
2. ② Release the latch with your index finger as illustrated.
3. ③ Carefully pull the cable out of the connector on the system board.

Figure 37. Disconnecting the cable from the SATA hard disk drive connector



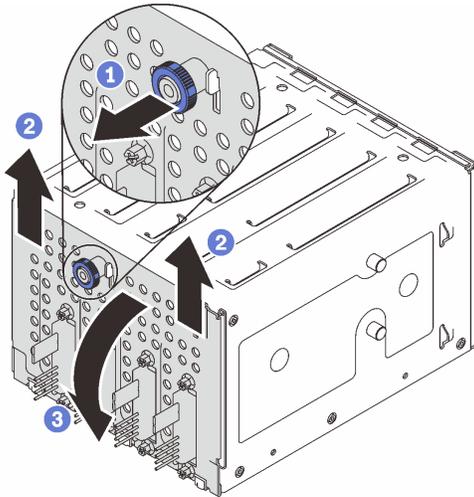
Step 3. Remove the drive cage from the chassis (see “Remove the 3.5-inch/2.5-inch drive cage” on page 88).

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

Step 4. Remove the simple-swap drive backplate.

- a. ① Pull out the blue plunger that secures the backplate.
- b. ② Slightly lift the backplate to disengage it from the drive cage.
- c. ③ Remove the backplate from the drive cage.

Figure 38. Removing the simple-swap drive backplate



### After this task is completed

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

### Install the 3.5-inch simple-swap drive backplate

Follow instructions in this section to install the 3.5-inch simple-swap drive backplate.

### About this task

To avoid potential danger, read and follow the following safety statements.

- **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.

#### Attention:

- Read the “Installation guidelines” on page 85 to ensure that you work safely.
- Touch the static-protective package that contains the component to any unpainted metal surface on the server; then, remove it from the package and place it on a static-protective surface.

#### Watch the procedure

A video of this procedure is available at YouTube: <https://youtube.com/playlist?list=PLYV5R7hVcs-DoEcxrm2zKNpaKODZ3f8Qc>.

### Procedure

- Step 1. Position the backplate on the drive cage so that the tabs on the drive cage are inserted into the corresponding slots on the backplate.
- Step 2. Close the plunger to secure the backplate in place.

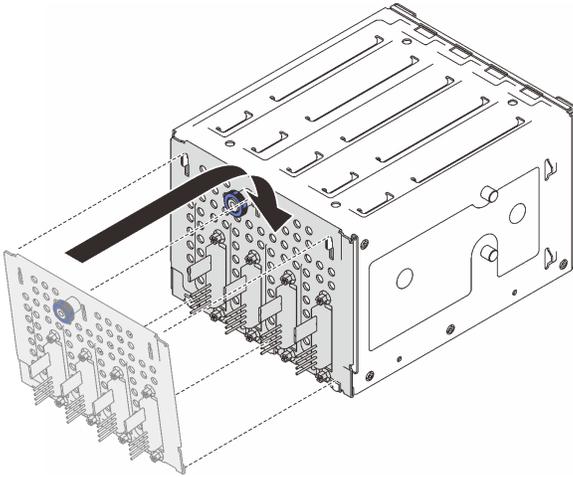


Figure 39. Installing the simple-swap drive backplate

### After this task is completed

1. Reinstall the drive cage into the chassis (see “Install the 3.5-inch/2.5-inch drive cage” on page 91).
2. Reinstall all the simple-swap drives and drive bay fillers (if any) into the drive cage (see “Install a simple-swap drive” on page 107 or “Install a 2.5-inch drive into a 3.5-inch drive bay” on page 111).
3. Reconnect the cables to the backplate.
4. Reinstall the system fan (see “Install the front system fan” on page 115).
5. Complete the parts replacement. See “Complete the parts replacement” on page 217.

---

## CMOS battery (CR2032) replacement

Follow instructions in this section to remove and install the CMOS battery (CR2032).

### Remove the CMOS battery (CR2032)

Follow instructions in this section to remove the CMOS battery (CR2032).

### About this task

To avoid potential danger, read and follow the following safety statements.

- **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.

- **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.

- **S005**



**CAUTION:**

The battery is a lithium ion battery. To avoid possible explosion, do not burn the battery. Exchange it only with the approved part. Recycle or discard the battery as instructed by local regulations.

Make sure to read the following notes carefully before replacing the CMOS battery in the server.

- Read the “Installation guidelines” on page 85 to ensure that you work safely.
- Turn off the server and peripheral devices, and disconnect the power cords and all external cables (see “Power off the server” on page 13).
- If the server is in a rack, remove it from the rack.
- Remove any locking device that secures the server cover, such as a Kensington lock or a pad lock.
- Do not make CMOS battery in contact with any metal surface during the replacement. Any contact with a metal surface can cause damages to the battery.
- When replacing the battery, you must replace it with another CMOS battery of the exact same type (CR2032) made by the same manufacturer.
- After you replace the battery, you must reconfigure the solution and reset the system date and time.

## Procedure

Step 1. Remove the server cover (see “Remove the server cover” on page 199).

Step 2. Locate the CMOS battery on the system board (see “System-board components” on page 27).

Step 3. Remove the CMOS battery.

- a.  Gently push on one side of the battery until it leaves the socket.

- b. ② Lift the battery out of the socket with your thumb and index finger.

**Attention:** Do not lift the battery with excessive force, as it may cause damages to the socket on the system board. Any damage to the socket may require replacing the system board.

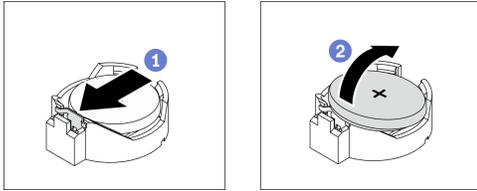


Figure 40. Removing the CMOS battery

### After this task is completed

1. Install a new CMOS battery. See “Install the CMOS battery (CR2032)” on page 101.
2. Dispose the component with compliance to local regulations.

### Install the CMOS battery (CR2032)

Follow instructions in this section to install the CMOS battery (CR2032).

### About this task

To avoid potential danger, read and follow the following safety statements.

- **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.

- **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.

• **S005**



**CAUTION:**

**The battery is a lithium ion battery. To avoid possible explosion, do not burn the battery. Exchange it only with the approved part. Recycle or discard the battery as instructed by local regulations.**

Make sure to read the following notes carefully before replacing the CMOS battery in the server.

- Read the “Installation guidelines” on page 85 to ensure that you work safely.
- Do not make CMOS battery in contact with any metal surface during the replacement. Any contact with a metal surface can cause damages to the battery.
- When replacing the battery, you must replace it with another CMOS battery of the exact same type (CR2032) made by the same manufacturer.
- After you replace the battery, you must reconfigure the solution and reset the system date and time.

**Procedure**

Step 1. Follow any special handling and installation instructions that come with the CMOS battery.

Step 2. Locate the battery socket on the system board (see “System-board components” on page 27).

Step 3. Install the new CMOS battery into the server.

- a. ① Orient the battery so that the positive (+) side faces up; then, tilt the battery to insert it into the socket.
- b. ② Gently press the battery into the socket until it clicks in place.

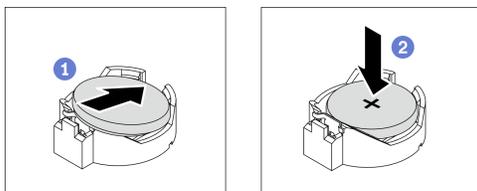


Figure 41. Installing the CMOS battery

**After this task is completed**

1. Complete the parts replacement. See “Complete the parts replacement” on page 217.
2. Reconfigure the server and reset the system date, time and passwords.

---

**Drive replacement**

Follow instructions in this section to remove and install drives.

**Remove a hot-swap drive**

Follow instructions in this section to remove a hot-swap drive.

## About this task

### Attention:

- Read the “Installation guidelines” on page 85 to ensure that you work safely.
- If the server is installed in a rack, extend the server from the rack.
- Use the front door key to unlock the front door, and then open the front door.
- To make sure that there is adequate system cooling, do not operate the server for more than two minutes without either a drive or a filler installed in each bay.
- Before you remove or make changes to drives, drive controllers (including controllers that are integrated on the system board), drive backplanes or drive cables, back up all important data that is stored on drives.
- Before you remove any component of a RAID array (drive, RAID card, etc.), back up all RAID configuration information.

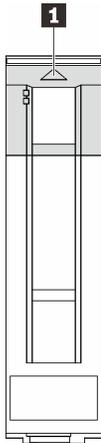
### Watch the procedure

A video of this procedure is available at YouTube: <https://youtube.com/playlist?list=PLYV5R7hVcs-DoEcxrm2zKNpaKOdZ3f8Qc>.

## Procedure

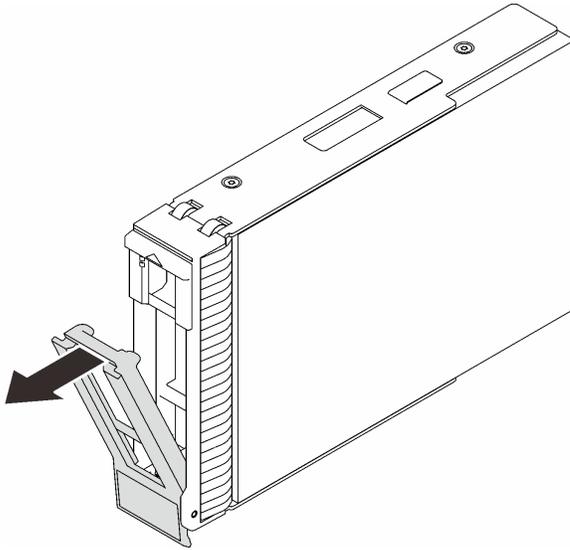
- Step 1. Locate the drive you want to remove, and press the release button **1** to unlock the drive tray handle.

Figure 42. Unlocking the drive tray handle



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

Figure 43. Removing the hot-swap drive from the drive tray



### After this task is completed

1. Install a new drive or drive filler into the vacant drive bay (see “Install a hot-swap drive” on page 104).

**Note:** 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.

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

### Install a hot-swap drive

Follow instructions in this section to install a hot-swap drive.

#### About this task

##### Attention:

- Read the “Installation guidelines” on page 85 to ensure that you work safely.
- Touch the static-protective package that contains the component to any unpainted metal surface on the server; then, remove it from the package and place it on a static-protective surface.
- To avoid damage to the drive connectors, make sure that the server top cover is in place and fully closed whenever you install or remove a hot-swap drive.
- To make sure that there is adequate system cooling, do not operate the server for more than two minutes without either a drive or a filler installed in each bay.
- Before you remove or make changes to drives, drive controllers (including controllers that are integrated on the system board), drive backplanes or drive cables, back up all important data that is stored on drives.
- Before you remove any component of a RAID array (drive, RAID card, etc.), back up all RAID configuration information.

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

- Locate the documentation that comes with the drive and follow those instructions in addition to the instructions in this chapter.

- Depending on your server models, your server supports the following drive types:
  - Up to sixteen 2.5-inch hot-swap SATA/SAS drives
  - Up to eight 3.5-inch hot-swap SATA/SAS drives
  - Up to four 3.5-inch hot-swap SATA/SAS drives and eight 2.5-inch hot-swap SATA/SAS drives
- For a complete list of supported drives and optional devices for the server, see: <https://static.lenovo.com/us/en/serverproven/index.shtml>
- 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 17.
- The drives in a single RAID array must be the same type, same size, and same capacity.

### Watch the procedure

A video of this procedure is available at YouTube: <https://youtube.com/playlist?list=PLYV5R7hVcs-DoEcxrm2zKNpaKOdZ3f8Qc>.

### Procedure

- Step 1. If a drive filler is installed in this drive bay, remove it first. Keep the drive filler in a safe place for future use.
- Step 2. Make sure that the drive tray handle is in the open position. Slide the drive into the drive bay until it clicks in place.
- Step 3. Rotate the drive handle to the fully closed position.

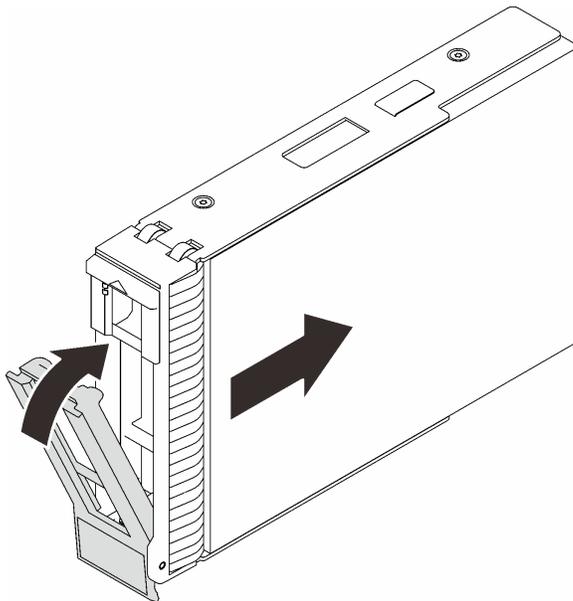


Figure 44. Installing the hot-swap drive

### After this task is completed

1. If you have additional drives to install, do so now; if any of the drive bays is left empty, fill it with a drive bay filler.
2. Complete the parts replacement. See “Complete the parts replacement” on page 217.
3. Check the drive activity LED to verify that the drive is operating correctly. See “Front panel” on page 19 for details.

4. If the server is configured for RAID operation through a ThinkSystem RAID adapter, you might have to reconfigure your disk arrays after you install drives. See ThinkSystem RAID adapter documentation for additional information about RAID operation and complete instructions for using ThinkSystem RAID adapter.

## Remove a simple-swap drive

Follow instructions in this section to remove a simple-swap drive.

### About this task

To avoid potential danger, read and follow the following safety statements.

- **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.**

#### Attention:

- Read the “Installation guidelines” on page 85 to ensure that you work safely.
- Turn off the server and peripheral devices, and disconnect the power cords and all external cables (see “Power off the server” on page 13).
- If the server is installed in a rack, extend the server from the rack.
- Use the front door key to unlock the front door, and then open the front door.
- To make sure that there is adequate system cooling, do not operate the server for more than two minutes without either a drive or a filler installed in each bay.
- Before you remove or make changes to drives, drive controllers (including controllers that are integrated on the system board), drive backplanes or drive cables, back up all important data that is stored on drives.
- If an NVMe drive is to be removed, it is recommended to disable it beforehand via the operating system.
- Before you remove any component of a RAID array (drive, RAID card, etc.), back up all RAID configuration information.

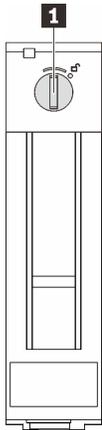
#### Watch the procedure

A video of this procedure is available at YouTube: <https://youtube.com/playlist?list=PLYV5R7hVcs-DoEcxrm2zKNpaKOdZ3f8Qc>.

### Procedure

- Step 1. Locate the simple-swap drive you want to remove.
- Step 2. Use a screwdriver to turn the tray handle lock **1** to the unlocked position. The tray handle opens automatically.

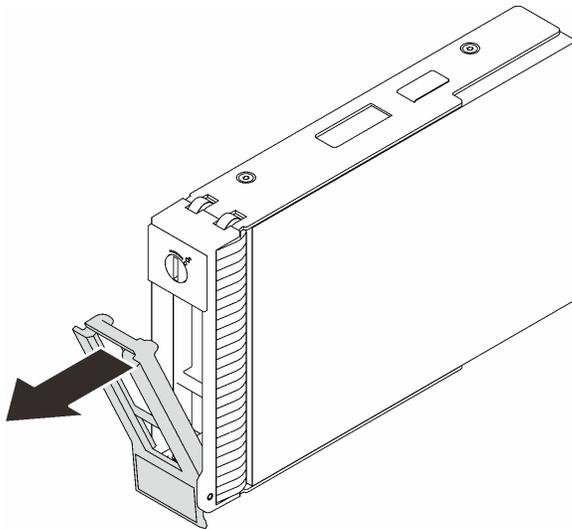
Figure 45. Unlocking the drive tray handle



Step 3. Pull the handle and carefully slide the simple-swap drive out of the chassis.

**Note:** Install a drive bay filler or replacement drive as soon as possible. See “Install a simple-swap drive” on page 107.

Figure 46. Removing the simple-swap drive



### After this task is completed

1. Install a new drive or drive filler into the vacant drive bay (see “Install a simple-swap drive” on page 107).

**Note:** 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.

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

### Install a simple-swap drive

Follow instructions in this section to install a simple-swap drive.

### About this task

To avoid potential danger, read and follow the following safety statements.

- **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.

**Attention:**

- Read the “Installation guidelines” on page 85 to ensure that you work safely.
- Touch the static-protective package that contains the component to any unpainted metal surface on the server; then, remove it from the package and place it on a static-protective surface.
- To avoid damage to the drive connectors, make sure that the server top cover is in place and fully closed whenever you install or remove a simple-swap drive.
- To make sure that there is adequate system cooling, do not operate the server for more than two minutes without either a drive or a filler installed in each bay.
- Before you remove or make changes to drives, drive controllers (including controllers that are integrated on the system board), drive backplanes or drive cables, back up all important data that is stored on drives.
- If an NVMe drive is to be removed, it is recommended to disable it beforehand via the operating system.
- Before you remove any component of a RAID array (drive, RAID card, etc.), back up all RAID configuration information.

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

- Locate the documentation that comes with the drive and follow those instructions in addition to the instructions in this chapter.
- Depending on your server models, your server supports the following drive types:
  - Up to four 3.5-inch simple-swap SATA drives
  - Up to three 3.5-inch simple-swap SATA drives and one NVMe drive
- For a complete list of supported drives and optional devices for the server, see: <https://static.lenovo.com/us/en/serverproven/index.shtml>
- 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 17.
- The drives in a single RAID array must be the same type, same size, and same capacity.

**Watch the procedure**

A video of this procedure is available at YouTube: <https://youtube.com/playlist?list=PLYV5R7hVcs-DoEcxrm2zKNpaK0dZ3f8Qc>.

**Procedure**

Step 1. If the drive bay has a drive filler installed, remove it. Keep the drive filler in a safe place for future use.

- Step 2. Ensure that the drive tray handle is in the open position. Align the drive with the guide rails in the bay; then, gently push the drive into the bay until the drive stops.
- Step 3. Rotate the drive handle to the fully closed position to lock the drive in place.

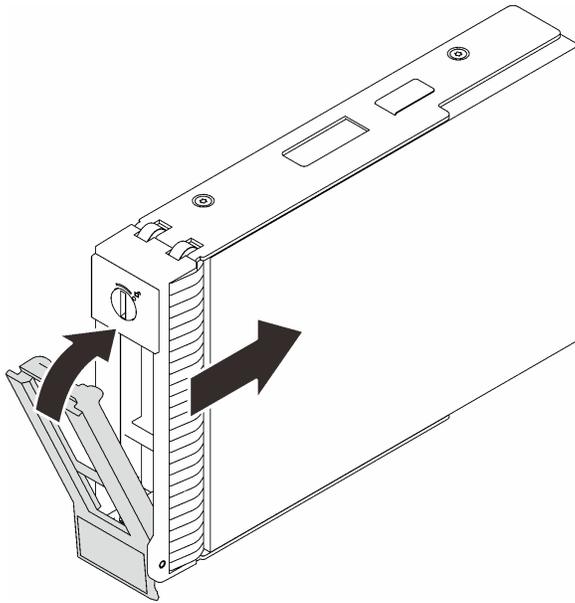


Figure 47. Installing the simple-swap drive

### After this task is completed

1. If you have additional drives to install, do so now; if any of the drive bays is left empty, fill it with a drive bay filler.
2. Complete the parts replacement. See “Complete the parts replacement” on page 217.
3. Check the drive activity LED to verify that the drive is operating correctly. See “Front panel” on page 19 for details.
4. If the server is configured for RAID operation through a ThinkSystem RAID adapter, you might have to reconfigure your disk arrays after you install drives. See the ThinkSystem RAID adapter documentation for additional information about RAID operation and complete instructions for using ThinkSystem RAID adapter.

## 2.5-inch drive replacement from 3.5-inch drive bay

Follow instructions in this section to remove and install a 2.5-inch drive from a 3.5-inch drive bay.

The EMI integrity and cooling of the server are protected by having all drive bays covered or occupied. The number of the installed simple-swap disk drives in your server varies depending on the server model. The vacant bays are occupied by dummy trays. When you install a drive, save the removed dummy tray from the drive bay in case you later remove the drive and need the dummy tray to cover the place.

**Attention:** An unoccupied drive bay without any other protection might impact the EMI integrity and cooling of the server, which might result in overheating or component damage. To maintain the EMI integrity and cooling of the server, install a new drive as soon as you remove the failing one or the dummy tray.

Before you begin, review the following drive installation rules:

- Follow the order of the disk drive bays when installing a drive. See Chapter 2 “Server components” on page 15 to locate the disk drive bays in your server.

- For drives with different capacities, install the drive by following the order of the disk drive bays as well as the order from the lowest capacity to the highest capacity.

## Remove a 2.5-inch drive from a 3.5-inch drive bay

Follow instructions in this section to remove a 2.5-inch drive from a 3.5-inch drive bay.

### About this task

To avoid potential danger, read and follow the following safety statements.

- **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.

#### Attention:

- Read the “Installation guidelines” on page 85 to ensure that you work safely.
- Turn off the server and peripheral devices, and disconnect the power cords and all external cables (see “Power off the server” on page 13).
- Use the front door key to unlock the front door, and then open the front door.

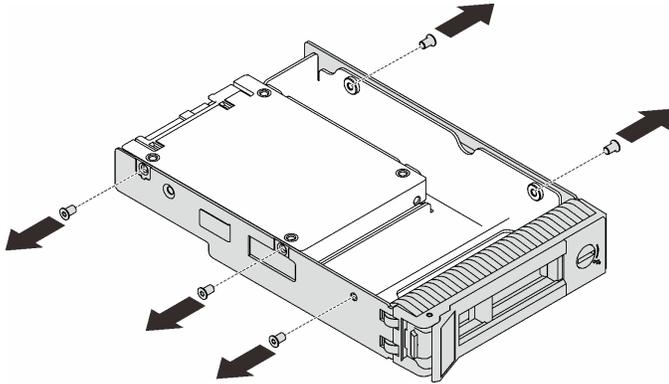
#### Watch the procedure

A video of this procedure is available at YouTube: <https://youtube.com/playlist?list=PLYV5R7hVcs-DoEcxrm2zKNpaK0dZ3f8Qc>.

### Procedure

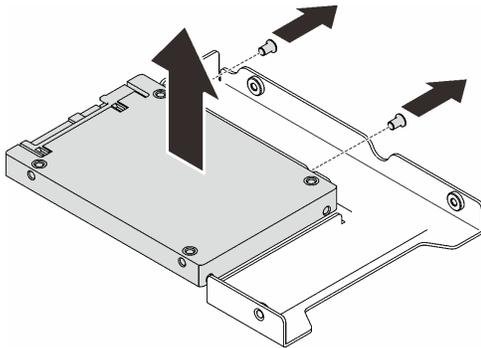
- Step 1. Locate the drive you want to remove.
- Step 2. Remove the 3.5-inch drive tray in which the 2.5-inch drive has been installed (see “Remove a simple-swap drive” on page 106).
- Step 3. Remove the five screws that secure the 2.5-inch drive and the drive adapter; then, remove the 2.5-inch drive and the drive adapter from the tray.

Figure 48. Removing the screws that secure the 2.5-inch drive and the drive adapter



Step 4. Remove the two screws that secure the 2.5-inch drive; then, lift the drive to remove it from the drive adapter.

Figure 49. Removing the 2.5-inch drive from the drive adapter



### After this task is completed

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

### Install a 2.5-inch drive into a 3.5-inch drive bay

Follow instructions in this section to install a 2.5-inch drive into a 3.5-inch drive bay.

### About this task

To avoid potential danger, read and follow the following safety statements.

- **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.

**Attention:**

- Read the “Installation guidelines” on page 85 to ensure that you work safely.
- Touch the static-protective package that contains the component to any unpainted metal surface on the server; then, remove it from the package and place it on a static-protective surface.

**Watch the procedure**

A video of this procedure is available at YouTube: <https://youtube.com/playlist?list=PLYV5R7hVcs-DoEcxrm2zKNpaK0dZ3f8Qc>.

**Procedure**

Step 1. Position the 2.5-inch drive into the 2.5-inch to 3.5-inch drive adapter.

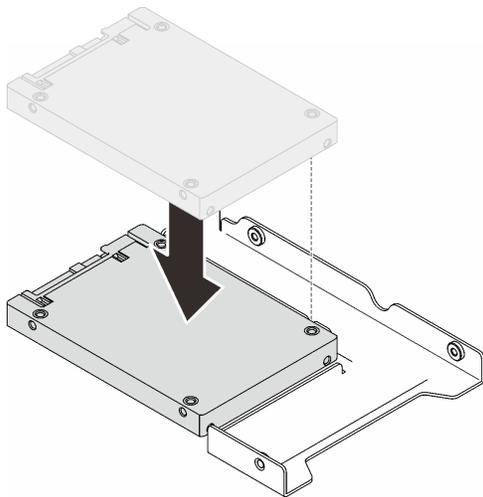


Figure 50. Positioning the 2.5-inch drive into the drive adapter

Step 2. Align the two screw holes in the drive with the corresponding holes in the drive adapter; then, secure the drive to the drive adapter with the two screws.

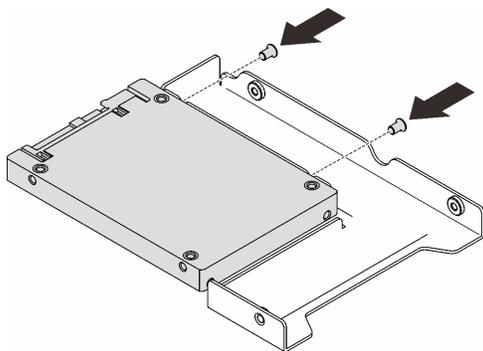


Figure 51. Installing the screws to secure the drive to the drive adapter

Step 3. Locate the drive bay to install the drive tray.

Step 4. Align the screw holes on the drive adapter and the drive with the corresponding holes in the tray; then, secure the drive adapter and the drive into the tray with the five screws.

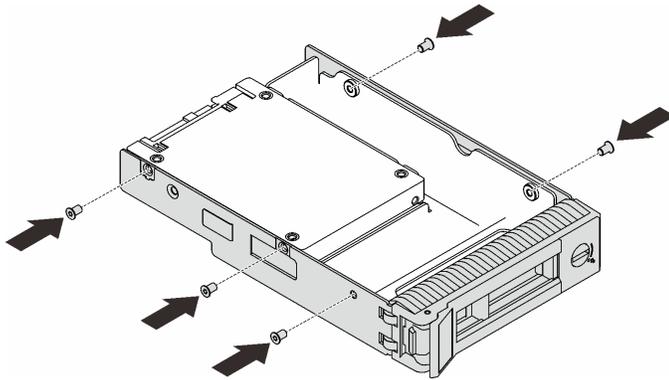


Figure 52. Installing the screws to secure the drive adapter and the drive to the drive tray

Step 5. Slide the tray into the drive bay from the front until it snaps into place, and then completely close the handle.

### After this task is completed

1. If you have additional drives to install, do so now; if any of the drive bays is left empty, fill it with a drive bay filler.
2. Complete the parts replacement. See “Complete the parts replacement” on page 217.

---

## Fan replacement

Follow instructions in this section to remove and install the front or rear fan.

**Note:** For processor fan replacement, see “Heat sink and fan module replacement” on page 130.

### Remove the front system fan

Follow instructions in this section to remove the front system fan.

#### About this task

To avoid potential danger, read and follow the following safety statements.

- **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.

- **S009**



**CAUTION:**

To avoid personal injury, disconnect the fan cables before removing the fan from the device.

- **S017**



**CAUTION:**

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

- **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.

**Attention:**

- Read the “Installation guidelines” on page 85 to ensure that you work safely.
- Turn off the server and peripheral devices, and disconnect the power cords and all external cables (see “Power off the server” on page 13).
- If the server is in a rack, remove it from the rack.
- Remove any locking device that secures the server cover, such as a Kensington lock or a pad lock.

**Watch the procedure**

A video of this procedure is available at YouTube: <https://youtube.com/playlist?list=PLYV5R7hVcs-DoEcxrm2zKNpaKOdZ3f8Qc>.

**Procedure**

- Step 1. Remove the server cover (see “Remove the server cover” on page 199).
- Step 2. Disconnect the fan cable from the system board (see “System-board components” on page 27).
- Step 3. Remove the front system fan from the chassis.
  - a. ① Press the two tabs on the front system fan towards each other.
  - b. ② Carefully slide the fan out of the chassis.

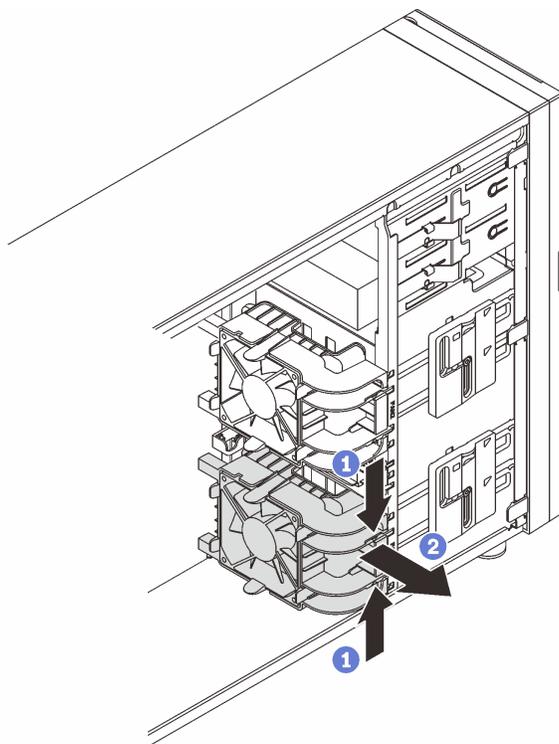


Figure 53. Removing the front system fan

### After this task is completed

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

### Install the front system fan

Follow instructions in this section to install the front system fan.

### About this task

To avoid potential danger, read and follow the following safety statements.

- **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.

- **S009**



**CAUTION:**

To avoid personal injury, disconnect the fan cables before removing the fan from the device.

- S017



**CAUTION:**

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

- 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.

**Attention:**

- Read the “Installation guidelines” on page 85 to ensure that you work safely.
- Touch the static-protective package that contains the component to any unpainted metal surface on the server; then, remove it from the package and place it on a static-protective surface.

**Watch the procedure**

A video of this procedure is available at YouTube: <https://youtube.com/playlist?list=PLYV5R7hVcs-DoEcxrm2zKNpaK0dZ3f8Qc>.

**Procedure**

- Step 1. Align the four tabs of the front system fan with the corresponding slots in the mounting area, and align the two posts of the fan with the corresponding slots in the inner side of the chassis.
- Step 2. Carefully slide the front system fan into the chassis until it snaps into place.

**Note:** Make sure the cables do not interfere with the two posts of the front system fan.

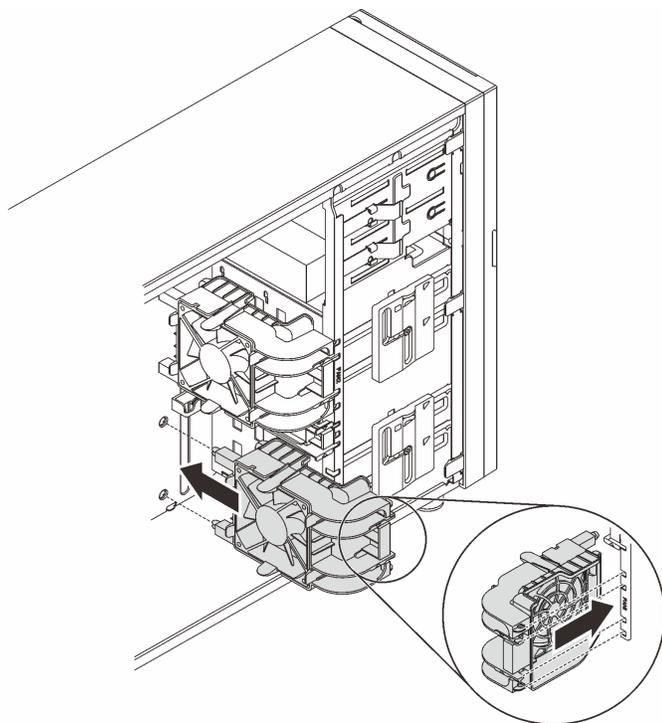


Figure 54. Installing the front system fan

- Step 3. Connect the front system fan power cable to the Fan 1 or Fan 4 connector on the system board. See “System-board components” on page 27 and “Fan power cable” on page 63.

### After this task is completed

Complete the parts replacement. See “Complete the parts replacement” on page 217.

### Remove the rear system fan

Follow instructions in this section to remove the rear system fan.

### About this task

To avoid potential danger, read and follow the following safety statements.

- **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.

- **S009**



**CAUTION:**

To avoid personal injury, disconnect the fan cables before removing the fan from the device.

- **S017**



**CAUTION:**

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

- **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.

**Attention:**

- Read the “Installation guidelines” on page 85 to ensure that you work safely.
- Turn off the server and peripheral devices, and disconnect the power cords and all external cables (see “Power off the server” on page 13).
- If the server is in a rack, remove it from the rack.
- Remove any locking device that secures the server cover, such as a Kensington lock or a pad lock.

**Watch the procedure**

A video of this procedure is available at YouTube: <https://youtube.com/playlist?list=PLYV5R7hVcs-DoEcxrm2zKNpaKOdZ3f8Qc>.

**Procedure**

- Step 1. Remove the server cover (see “Remove the server cover” on page 199).
- Step 2. Disconnect the fan cable from the system board (see “System-board components” on page 27).
- Step 3. Remove the rear system fan from the chassis.
  - a. ① Press the two tabs of the rear system fan towards each other.
  - b. ② Carefully slide the fan out of the chassis.

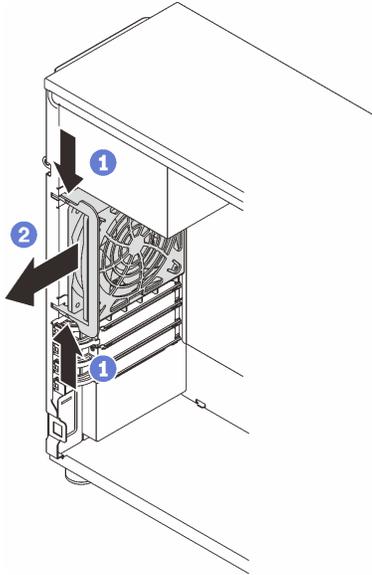


Figure 55. Removing the rear system fan

### After this task is completed

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

### Install the rear system fan

Follow instructions in this section to install the rear system fan.

### About this task

To avoid potential danger, read and follow the following safety statements.

- **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.

- **S009**



**CAUTION:**

To avoid personal injury, disconnect the fan cables before removing the fan from the device.

- **S017**



**CAUTION:**

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

- **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.

**Attention:**

- Read the “Installation guidelines” on page 85 to ensure that you work safely.
- Touch the static-protective package that contains the component to any unpainted metal surface on the server; then, remove it from the package and place it on a static-protective surface.

**Watch the procedure**

A video of this procedure is available at YouTube: <https://youtube.com/playlist?list=PLYV5R7hVcs-DoEcxrm2zKNpaKOdZ3f8Qc>.

**Procedure**

Step 1. Align the four tips on the rear system fan with the corresponding slots in the mounting area.

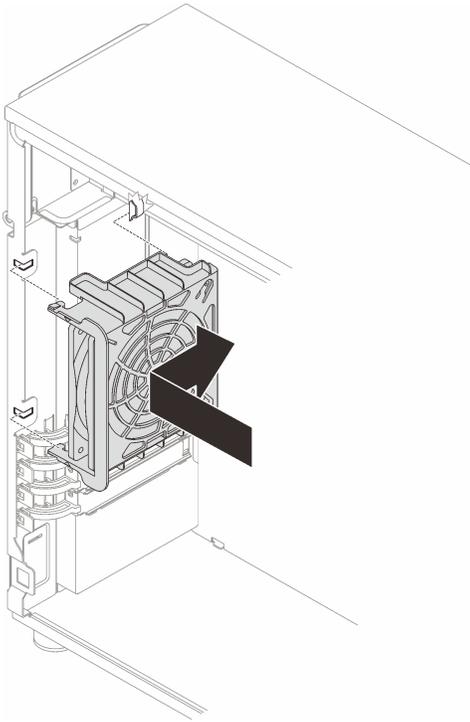


Figure 56. Positioning the rear system fan into the chassis

Step 2. Slide the rear system fan until it snaps into place. Ensure that all four tips on the fan are inserted into the corresponding slots as demonstrated.

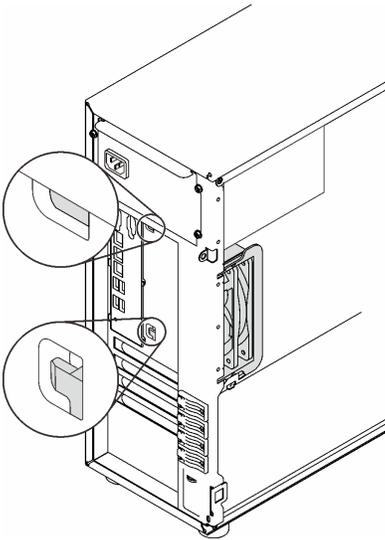


Figure 57. Installing the rear system fan

Step 3. Connect the fan power cable to the Rear fan connector on the system board. See “System-board components” on page 27 and “Fan power cable” on page 63.

### **After this task is completed**

Complete the parts replacement. See “Complete the parts replacement” on page 217.

---

## Front bezel replacement

Follow instructions in this section to remove and install the front bezel.

### Remove the front bezel

Follow instructions in this section to remove the front bezel.

#### About this task

To avoid potential danger, read and follow the following safety statements.

- **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.

#### Attention:

- Read the “Installation guidelines” on page 85 to ensure that you work safely.
- Turn off the server and peripheral devices, and disconnect the power cords and all external cables (see “Power off the server” on page 13).
- If the server is in a rack, remove it from the rack.
- Remove any locking device that secures the server cover, such as a Kensington lock or a pad lock.

#### Watch the procedure

A video of this procedure is available at YouTube: <https://youtube.com/playlist?list=PLYV5R7hVcs-DoEcxrm2zKNpaK0dZ3f8Qc>.

### Procedure

Step 1. Make preparations for this task.

- a. Remove the server cover (see “Remove the server cover” on page 199).
- b. Remove the front door (see “Remove the front door” on page 124).

Step 2. Remove the front bezel.

- a. ① Lift the three plastic tabs to release left side of the bezel from the chassis.
- b. ② Pivot the bezel as shown to remove it from the chassis.

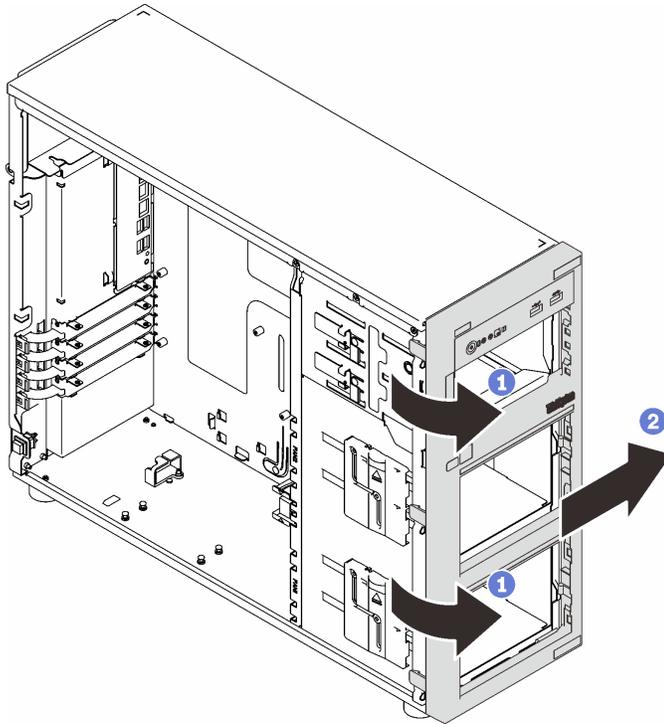


Figure 58. Removing the front bezel

### After this task is completed

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

### Install the front bezel

Follow instructions in this section to install the front bezel.

### About this task

To avoid potential danger, read and follow the following safety statements.

- **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.

#### Attention:

- Read the “Installation guidelines” on page 85 to ensure that you work safely.

## Watch the procedure

A video of this procedure is available at YouTube: <https://youtube.com/playlist?list=PLYV5R7hVcs-DoEcxrm2zKNpaK0dZ3f8Qc>.

## Procedure

Step 1. Install the front bezel.

- a. 1 Align the three plastic tabs on the right side of the front bezel with the corresponding holes on the chassis.
- b. 2 Pivot the front bezel and front door inward until the front bezel snaps into place on the left side.

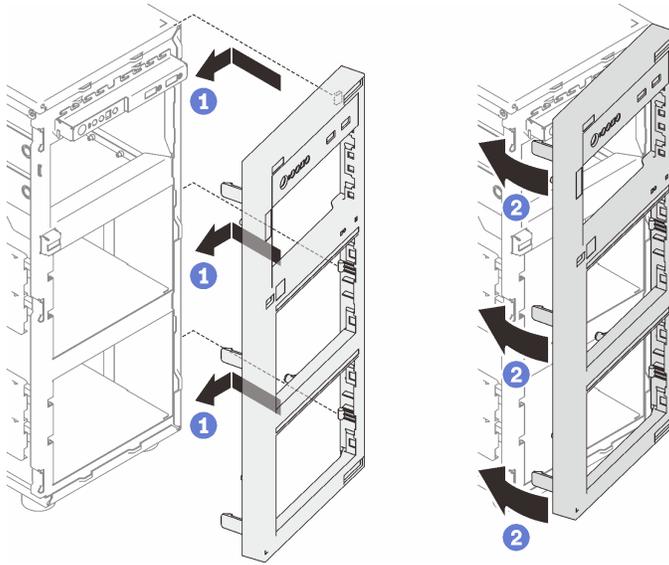


Figure 59. Installing the front bezel

## After this task is completed

Complete the parts replacement. See “Complete the parts replacement” on page 217.

---

## Front door replacement

Follow instructions in this section to remove and install the front door.

**Note:** This section applies only to server models that have a front door installed.

## Remove the front door

Follow instructions in this section to remove the front door.

## About this task

To avoid potential danger, read and follow the following safety statements.

- **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.**

**Attention:**

- Read the “Installation guidelines” on page 85 to ensure that you work safely.
- Turn off the server and peripheral devices, and disconnect the power cords and all external cables (see “Power off the server” on page 13).
- If the server is in a rack, remove it from the rack.
- Remove any locking device that secures the server cover, such as a Kensington lock or a pad lock.

**Watch the procedure**

A video of this procedure is available at YouTube: <https://youtube.com/playlist?list=PLYV5R7hVcs-DoEcxrm2zKNpaKOdZ3f8Qc>.

**Procedure**

Step 1. Remove the front door.

- 1 Turn the cover lock to the unlocked position with the front door key.
- 2 Open the front door.
- 3 Lift the front door slightly until you can completely remove it.

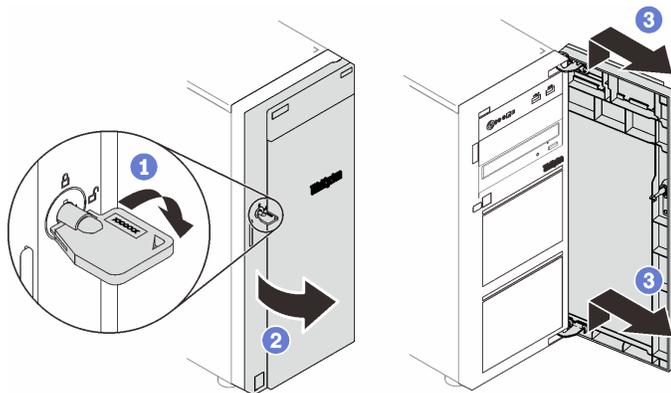


Figure 60. Removing the front door

**After this task is completed**

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

**Install the front door**

Follow instructions in this section to install the front door.

**About this task**

To avoid potential danger, read and follow the following safety statements.

- **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.**

**Attention:**

- Read the “Installation guidelines” on page 85 to ensure that you work safely.
- Before installing the front door, if the server comes with rubber blocks to cover the holes for installing the front door, remove the rubber blocks first. Store the rubber blocks in case that you later remove the front door and need the rubber blocks to cover the holes in the front bezel.

**Watch the procedure**

A video of this procedure is available at YouTube: <https://youtube.com/playlist?list=PLYV5R7hVcs-DoEcxrm2zKNpaKOdZ3f8Qc>.

**Procedure**

Step 1. Install the front door.

- 1 Align the two hooks on the front door with the corresponding holes on the front bezel; then, move the front door in and down until it is secured in place by the hooks.
- 2 Close the front door.
- 3 Turn the cover lock to the locked position with the front door key.

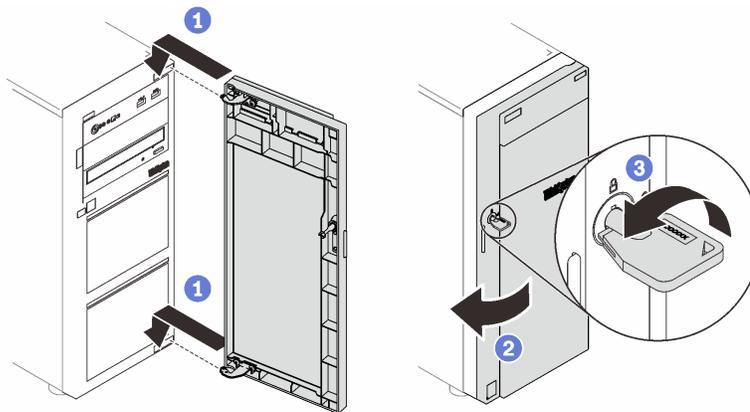


Figure 61. Installing the front door

**After this task is completed**

Complete the parts replacement. See “Complete the parts replacement” on page 217.

---

## Front panel board assembly replacement

Follow instructions in this section to remove and install the front panel board assembly.

### Remove the front panel board assembly

Follow instructions in this section to remove the front panel board assembly.

#### About this task

To avoid potential danger, read and follow the following safety statements.

- **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.**

#### Attention:

- Read the “Installation guidelines” on page 85 to ensure that you work safely.
- Turn off the server and peripheral devices, and disconnect the power cords and all external cables (see “Power off the server” on page 13).
- If the server is in a rack, remove it from the rack.
- Remove any locking device that secures the server cover, such as a Kensington lock or a pad lock.

#### Watch the procedure

A video of this procedure is available at YouTube: <https://youtube.com/playlist?list=PLYV5R7hVcs-DoEcxrm2zKNpaKOdZ3f8Qc>.

### Procedure

Step 1. Make preparations for this task.

- a. Remove the server cover (see “Remove the server cover” on page 199).
- b. Remove the front door (see “Remove the front door” on page 124).
- c. Remove the front bezel (see “Remove the front bezel” on page 122).

Step 2. Locate the front panel board assembly and disconnect the cables from the system board. See “System-board components” on page 27.

Step 3. Remove the front panel board assembly.

- a. ① Press the release tab in the direction as shown in the illustration.
- b. ② Pivot the front panel board assembly outwards. Pull the cables out to completely remove the front panel board assembly from the chassis.

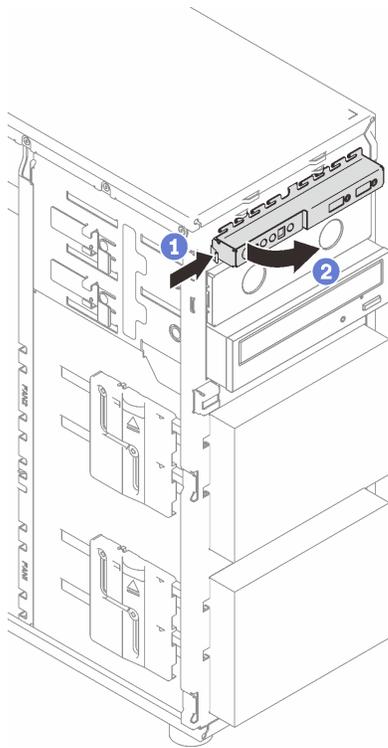


Figure 62. Removing the front panel board assembly

Step 4. Disconnect cables from the front panel board assembly.

### After this task is completed

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

### Install the front panel board assembly

Follow instructions in this section to install the front panel board assembly.

### About this task

To avoid potential danger, read and follow the following safety statements.

- **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.

#### Attention:

- Read the “Installation guidelines” on page 85 to ensure that you work safely.
- Touch the static-protective package that contains the component to any unpainted metal surface on the server; then, remove it from the package and place it on a static-protective surface.

### Watch the procedure

A video of this procedure is available at YouTube: <https://youtube.com/playlist?list=PLYV5R7hVcs-DoEcxm2zKNpaK0dZ3f8Qc>.

### Procedure

- Step 1. Connect cables to the new front panel board assembly and route the cables through the corresponding hole on the chassis.
- Step 2. Install the front panel board assembly.
  - a. ① Align the tab on the top and on the right side of the front panel board assembly with the side of the corresponding hole in the chassis.
  - b. ② Pivot the front panel board assembly in until it clicks into place.

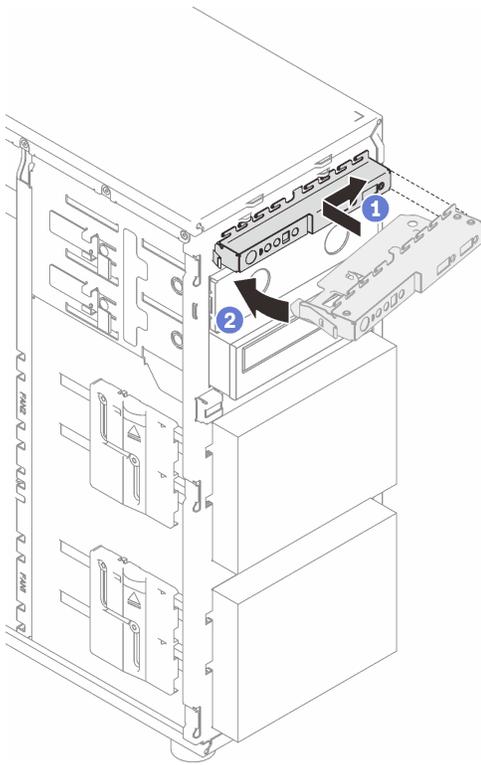


Figure 63. Installing the front panel board assembly

- Step 3. Connect the respective cables to the Front panel connector and the Front USB connector on the system board. See “System-board components” on page 27 and “Front panel” on page 64.

### After this task is completed

Complete the parts replacement. See “Complete the parts replacement” on page 217.

---

## Heat sink and fan module replacement

Follow instructions in this section to remove and install the heat sink and fan module.

### 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.**

## Remove the heat sink and fan module

Follow instructions in this section to remove the heat sink and fan module. This procedure must be executed by a trained technician

### About this task

To avoid potential danger, read and follow the following safety statements.

- 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.**

- S009



#### **CAUTION:**

**To avoid personal injury, disconnect the fan cables before removing the fan from the device.**

- 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.**

- **S017**



**CAUTION:**

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

- **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.**

**Attention:**

- Read the “Installation guidelines” on page 85 to ensure that you work safely.
- Turn off the server and peripheral devices, and disconnect the power cords and all external cables (see “Power off the server” on page 13).
- If the server is in a rack, remove it from the rack.
- Remove any locking device that secures the server cover, such as a Kensington lock or a pad lock.

**Watch the procedure**

A video of this procedure is available at YouTube: <https://youtube.com/playlist?list=PLYV5R7hVcs-DoEcXrm2zKNpaK0dZ3f8Qc>.

**Procedure**

Step 1. Remove the server cover (see “Remove the server cover” on page 199).

**CAUTION:**

**The heat sinks and processor could be very hot. To avoid from burning yourself, wait for a few minutes before removing the server cover after turning off the server.**

Step 2. Disconnect the heat sink and fan module cable from the system board.

Step 3. Remove the heat sink and fan module.

**Important:**

1. Gently remove the four screws to avoid any possible damage to the system board.
2. Always keep the four screws attached to the heat sink and fan module.
3. Do not touch the thermal grease while handling the heat sink and fan module.

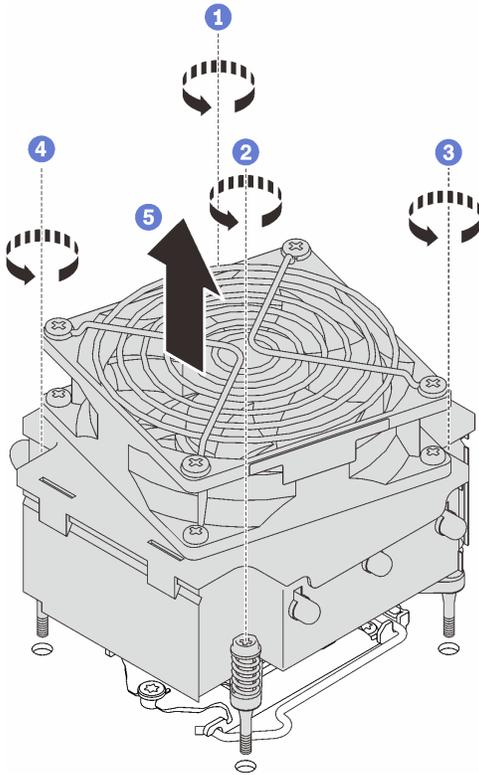


Figure 64. Removing the heat sink and fan module

- a. ① & ② Loosen screw 1 and 2: First, partially loosen screw 1; then, fully loosen screw 2. Finally, fully loosen screw 1.
- b. ③ & ④ Loosen screw 3 and 4: First, partially loosen screw 3; then, fully loosen screw 4. Finally, fully loosen screw 3.
- c. ⑤ Lift evenly and remove the heat sink and fan module from the server.

### After this task is completed

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

### Install the heat sink and the fan module

Follow instructions in this section to install the heat sink and the fan module. This procedure must be executed by a trained technician.

### About this task

To avoid potential danger, read and follow the following safety statements.

- **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.

- **S009**



**CAUTION:**

To avoid personal injury, disconnect the fan cables before removing the fan from the device.

- **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.

- **S017**



**CAUTION:**

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

- **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.

**Attention:**

- Read the “Installation guidelines” on page 85 to ensure that you work safely.
- Touch the static-protective package that contains the component to any unpainted metal surface on the server; then, remove it from the package and place it on a static-protective surface.

**Watch the procedure**

A video of this procedure is available at YouTube: <https://youtube.com/playlist?list=PLYV5R7hVcs-DoEcXrm2zKNpaKOdZ3f8Qc>.

**Procedure**

- Step 1. Install the processor if one is not yet installed (see “Install the processor ” on page 185).
- Step 2. Align the four screws on the heat sink and fan assembly with the corresponding screw holes on the system board.

**Note:** Make sure that the “Front” label is facing the front of the server.

- Step 3. Install the heat sink and fan module.

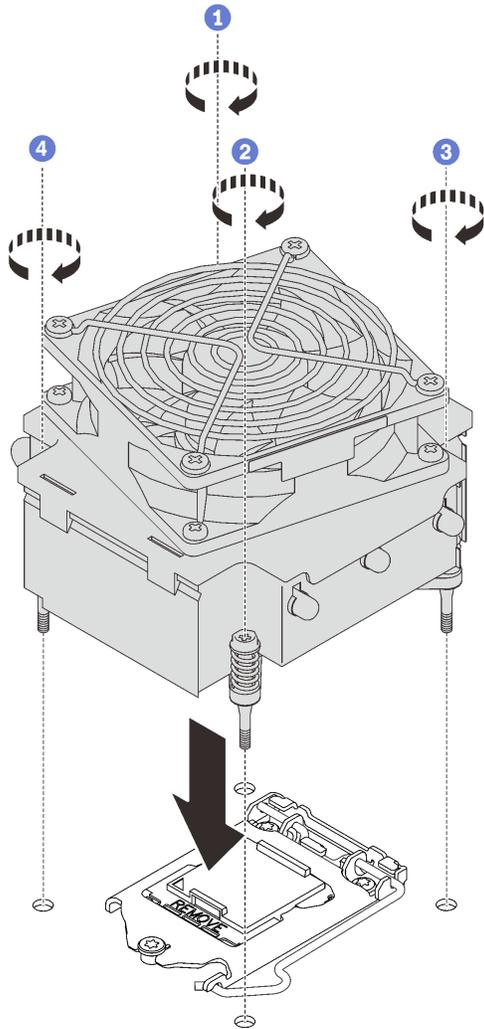


Figure 65. Installing the heat sink and the fan module

- a. **1 & 2** Tighten screw 1 and 2: First, partially tighten screw 1; then, fully tighten screw 2. Finally, fully tighten screw 1.
  - b. **3 & 4** Tighten screw 3 and 4: First, partially tighten screw 3; then, fully tighten screw 4. Finally, fully tighten screw 3.
- Step 4. Connect the fan power cable to the Fan 2 connector on the system board. See “System-board components” on page 27 and “Fan power cable” on page 63

### After this task is completed

Complete the parts replacement. See “Complete the parts replacement” on page 217.

---

## Intrusion switch replacement

Follow instructions in this section 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).

### Remove the intrusion switch

Follow instructions in this section to remove the intrusion switch.

#### About this task

To avoid potential danger, read and follow the following safety statements.

- **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.**

#### Attention:

- Read the “Installation guidelines” on page 85 to ensure that you work safely.
- Turn off the server and peripheral devices, and disconnect the power cords and all external cables (see “Power off the server” on page 13).
- If the server is in a rack, remove it from the rack.
- Remove any locking device that secures the server cover, such as a Kensington lock or a pad lock.

#### Watch the procedure

A video of this procedure is available at YouTube: <https://youtube.com/playlist?list=PLYV5R7hVcs-DoEcxrm2zKNpaKOdZ3f8Qc>.

#### Procedure

- Step 1. Remove the server cover (see “Remove the server cover” on page 199).
- Step 2. Disconnect the cable of the intrusion switch from the system board (see “System-board components” on page 27).
- Step 3. Pinch the two tabs on the intrusion switch towards each other, and pull the intrusion switch out.

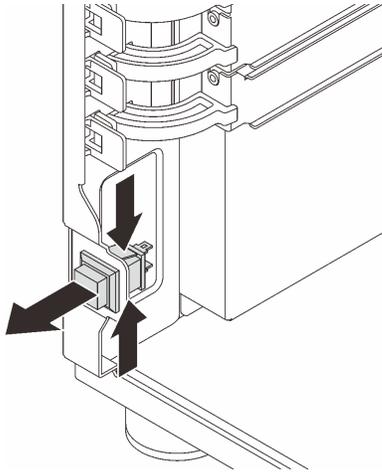


Figure 66. Removing the intrusion switch

### After this task is completed

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

### Install the intrusion switch

Follow instructions in this section to install the intrusion switch.

### About this task

To avoid potential danger, read and follow the following safety statements.

- **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.

#### Attention:

- Read the “Installation guidelines” on page 85 to ensure that you work safely.
- Touch the static-protective package that contains the component to any unpainted metal surface on the server; then, remove it from the package and place it on a static-protective surface.

### Watch the procedure

A video of this procedure is available at YouTube: <https://youtube.com/playlist?list=PLYV5R7hVcs-DoEcxrm2zKNpaK0dZ3f8Qc>.

### Procedure

Step 1. Push the intrusion switch in the slot until it clicks into place.

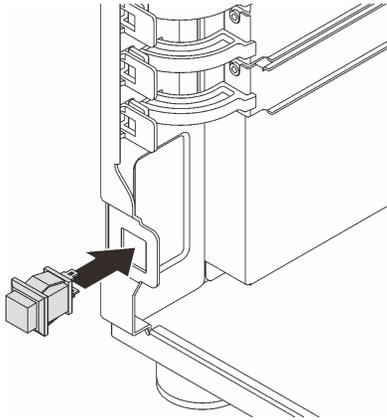


Figure 67. Installing the intrusion switch

Step 2. Connect the cable to the corresponding connector on the system board. See “System-board components” on page 27 and “M.2 adapter, intrusion switch, and RAID flash power module” on page 66.

### After this task is completed

Complete the parts replacement. See “Complete the parts replacement” on page 217.

---

## M.2 boot adapter replacement

Follow instructions in this section to remove and install the M.2 boot adapter.

### Remove the M.2 boot adapter

Follow instructions in this section to remove the M.2 boot adapter.

### About this task

To avoid potential danger, read and follow the following safety statements.

- **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.

#### Attention:

- Read the “Installation guidelines” on page 85 to ensure that you work safely.

- Turn off the server and peripheral devices, and disconnect the power cords and all external cables (see “Power off the server” on page 13).
- If the server is in a rack, remove it from the rack.
- Remove any locking device that secures the server cover, such as a Kensington lock or a pad lock.

### Watch the procedure

A video of this procedure is available at YouTube: <https://youtube.com/playlist?list=PLYV5R7hVcs-DoEcxrm2zKNpaK0dZ3f8Qc>.

### Procedure

Step 1. Make preparations for this task.

- Remove the server cover (see “Remove the server cover” on page 199).
- Remove all the M.2 drives from the M.2 boot adapter (see “Remove an M.2 drive” on page 142).
- Disconnect the M.2 boot adapter cables from the system board.

Step 2. Remove the PCIe adapter that secures the M.2 boot adapter from the chassis.

- 1 Open the retaining clip as shown in the illustration.
- 2 Grasp the PCIe adapter by its edges, and carefully pull it out of the slot.

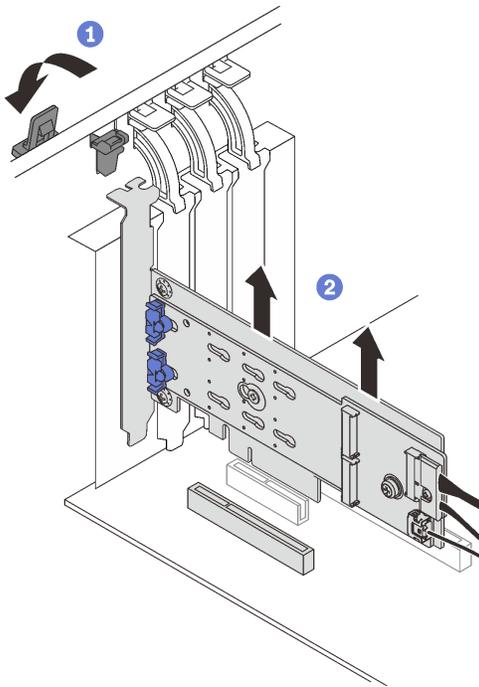


Figure 68. Removing the PCIe adapter that secures the M.2 boot adapter

Step 3. Disconnect the power and signal cables from the M.2 boot adapter.

- 1 Loosen the screw that secures the power and signal cables to the M.2 boot adapter.
- 2 Disconnect all the cables.

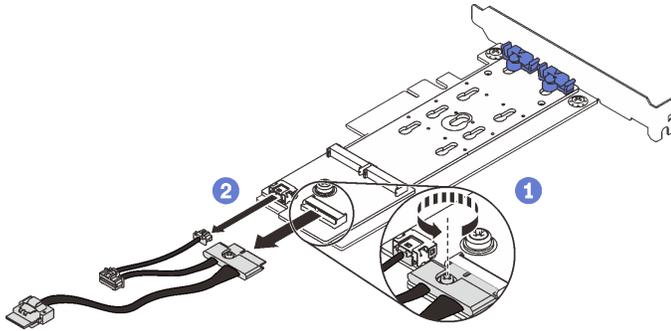


Figure 69. Disconnecting the power and signal cables

Step 4. Remove the M.2 boot adapter.

- a. 1 Remove the screw that secures the M.2 boot adapter to the PCIe adapter.
- b. 2 Loosen the captive screw on the M.2 boot adapter.
- c. 3 Slightly slide the M.2 boot adapter as illustrated and carefully separate it from the PCIe adapter.

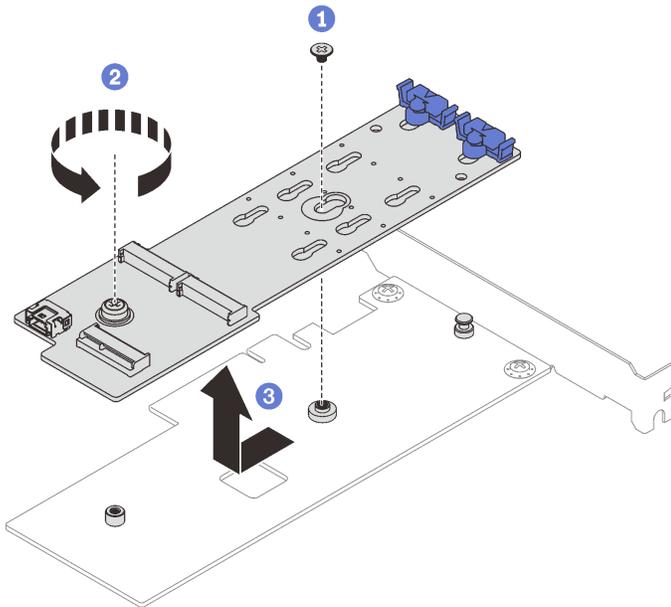


Figure 70. Removing the M.2 boot adapter

### After this task is completed

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

### Install the M.2 boot adapter

Follow instructions in this section to install the M.2 boot adapter.

### About this task

To avoid potential danger, read and follow the following safety statements.

- **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.

**Attention:**

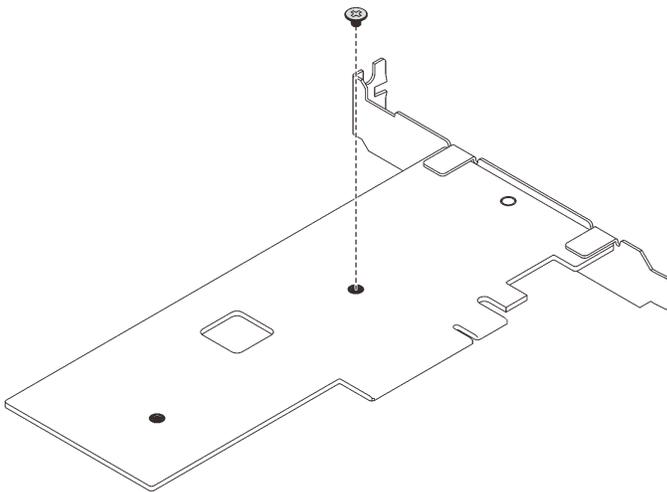
- Read the “Installation guidelines” on page 85 to ensure that you work safely.
- Touch the static-protective package that contains the component to any unpainted metal surface on the server; then, remove it from the package and place it on a static-protective surface.

**Watch the procedure**

A video of this procedure is available at YouTube: <https://youtube.com/playlist?list=PLYV5R7hVcs-DoEcXrm2zKNpaK0dZ3f8Qc>.

**Procedure**

Step 1. Remove the screw on the back of the PCIe adapter.



*Figure 71. Removing the screw on the back of the PCIe adapter*

Step 2. Secure the M.2 boot adapter to the PCIe adapter.

- a. ① Align the M.2 boot adapter with the T-head pin on the PCIe adapter as illustrated, and slide it into place.
- b. ② Tighten the captive screw on the M.2 boot adapter.
- c. ③ Tighten the screw from Step 1 to secure the M.2 boot adapter to the PCIe adapter.

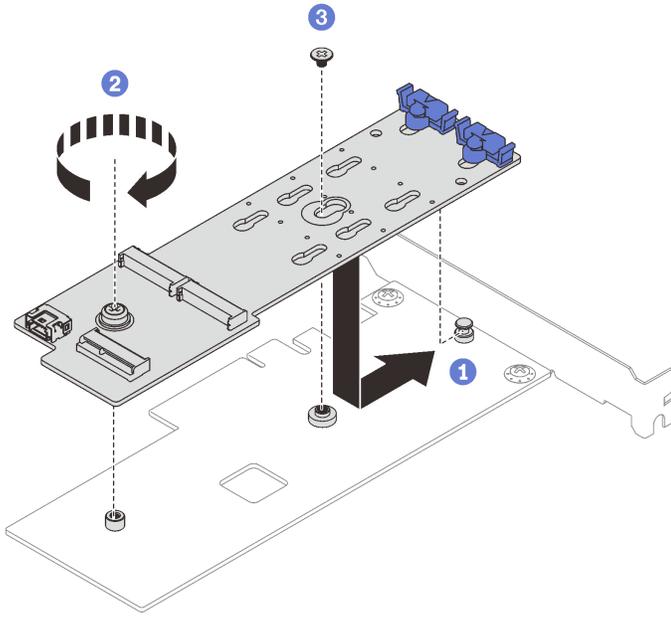


Figure 72. Securing the M.2 boot adapter to the PCIe adapter

Step 3. Install the power and signal cables to the M.2 boot adapter.

- a. ① Connect all the cables.
- b. ② Fasten the screw that secures the power and signal cables to the M.2 boot adapter.

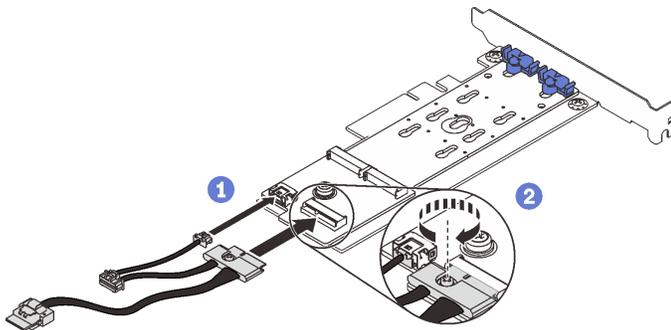


Figure 73. Installing the M.2 power and signal cables

Step 4. Install the PCIe adapter into the chassis.

- a. ① Open the retaining clip and position the PCIe adapter over the PCIe slot; then, carefully press the adapter straight down into the slot.

**Note:** The M.2 boot adapter can only be installed in **PCIe slot 4**.

- b. ② Close the retaining clip to secure the PCIe adapter in place.

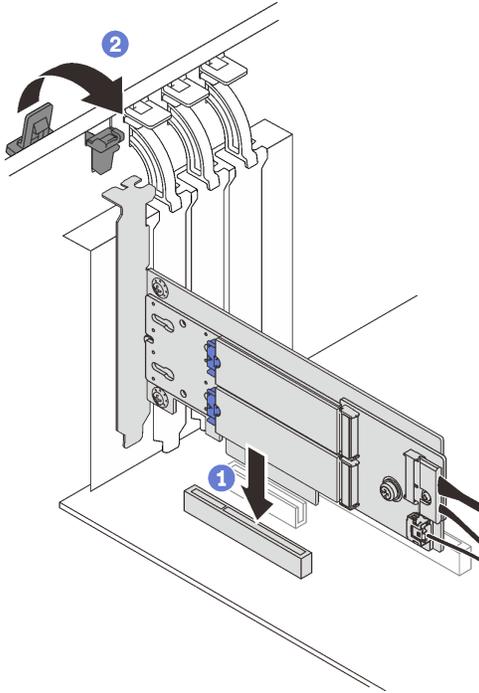


Figure 74. Installing the PCIe adapter into the chassis

Step 5. Connect the power cable and the signal cable to the system board. See “M.2 adapter, intrusion switch, and RAID flash power module” on page 66.

### After this task is completed

1. Reinstall the M.2 drives to the M.2 boot adapter. See “Install an M.2 drive” on page 145.
2. Complete the parts replacement. See “Complete the parts replacement” on page 217.

---

## M.2 drive replacement

Follow instructions in this section to remove and install the M.2 drive.

### Remove an M.2 drive

Follow instructions in this section to remove an M.2 drive.

### About this task

To avoid potential danger, read and follow the following safety statements.

- **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.

**Attention:**

- Read the “Installation guidelines” on page 85 to ensure that you work safely.
- Turn off the server and peripheral devices, and disconnect the power cords and all external cables (see “Power off the server” on page 13).
- If the server is in a rack, remove it from the rack.
- Remove any locking device that secures the server cover, such as a Kensington lock or a pad lock.

**Watch the procedure**

A video of this procedure is available at YouTube: <https://youtube.com/playlist?list=PLYV5R7hVcs-DoEcxm2zKNpaK0dZ3f8Qc>.

**Procedure**

- Step 1. Remove the server cover (see “Remove the server cover” on page 199).
- Step 2. Remove an M.2 drive.
- a. 1 Press both sides of the retainers.
  - b. 2 Slide the retainer backwards to loosen the M.2 drive from the M.2 boot adapter.
  - c. 3 Pivot the M.2 drive away from the M.2 boot adapter.
  - d. 4 Pull the M.2 drive away from the connector at an angle.

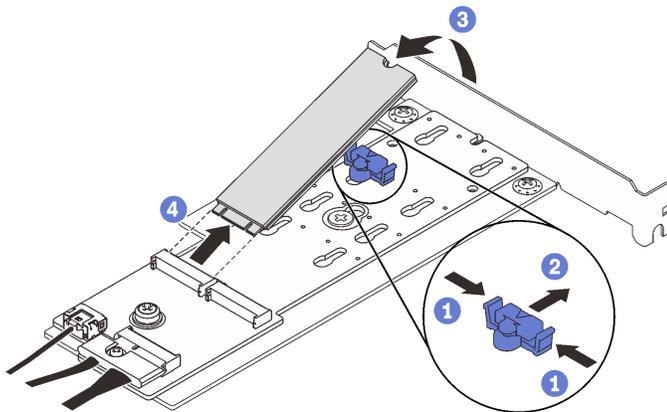


Figure 75. Removing an M.2 drive

**After this task is completed**

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

**Adjust the retainer on the M.2 boot adapter**

Follow instructions in this section to adjust the retainer on the M.2 boot adapter.

**About this task**

To avoid potential danger, read and follow the following safety statements.

- **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.

**Attention:**

- Read the “Installation guidelines” on page 85 to ensure that you work safely.
- Turn off the server and peripheral devices, and disconnect the power cords and all external cables (see “Power off the server” on page 13).
- If the server is in a rack, remove it from the rack.
- Remove any locking device that secures the server cover, such as a Kensington lock or a pad lock.

**Watch the procedure**

A video of this procedure is available at YouTube: <https://youtube.com/playlist?list=PLYV5R7hVcs-DoEcXrm2zKNpaK0dZ3f8Qc>.

**Procedure**

Step 1. Before adjusting the retainer on the M.2 boot 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.

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

Step 2. Adjust the retainer on the M.2 boot adapter.

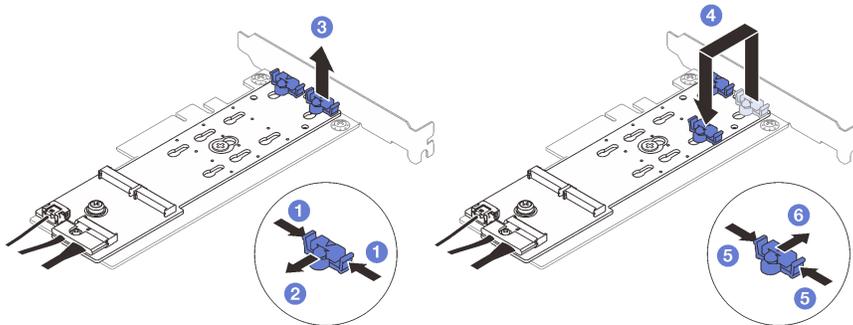


Figure 76. Adjusting the M.2 retainer

- a. ① Press both sides of the retainers.
- b. ② Move the retainer forward until it is in the large opening of the keyhole.
- c. ③ Take the retainer out of the keyhole.
- d. ④ Insert the retainer into the correct keyhole to accommodate the particular size of the M.2 drive you wish to install.
- e. ⑤ Press both sides of the retainer.

- f. 6 Slide the retainer backwards until it is seated in place.

## Install an M.2 drive

Follow instructions in this section to install an M.2 drive.

### About this task

To avoid potential danger, read and follow the following safety statements.

- **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.

#### Attention:

- Read the “Installation guidelines” on page 85 to ensure that you work safely.
- Touch the static-protective package that contains the component to any unpainted metal surface on the server; then, remove it from the package and place it on a static-protective surface.

#### Watch the procedure

A video of this procedure is available at YouTube: <https://youtube.com/playlist?list=PLYV5R7hVcs-DoEcxrm2zKNpaK0dZ3f8Qc>.

### Procedure

Step 1. Locate the M.2 drive slot on the M.2 boot adapter.

**Note:** As ThinkSystem ST250 V2 supports two M.2 drives, install your M.2 drive in **slot 0** first.

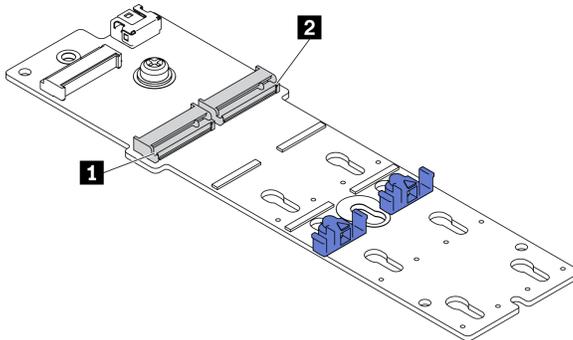


Figure 77. M.2 drive slots

Table 23. M.2 drive slot locations on M.2 boot adapter

1 M.2 drive slot 0	2 M.2 drive slot 1
--------------------	--------------------

Step 2. Install an M.2 drive.

- a. ① Insert the M.2 drive at an angle into the connector.
- b. ② Pivot the M.2 drive down until the notch catches on the lip of the retainer.
- c. ③ Slide the retainer forward (towards the connector) to secure the M.2 drive into place.

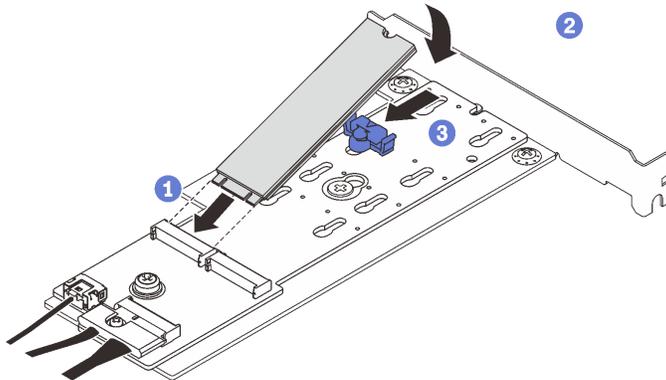


Figure 78. Installing an M.2 drive

### After this task is completed

- Complete the parts replacement. See “Complete the parts replacement” on page 217.
- Use the Lenovo XClarity Provisioning Manager to configure the RAID. For more information, see: [http://sysmgt.lenovofiles.com/help/topic/LXPM/RAID\\_setup.html](http://sysmgt.lenovofiles.com/help/topic/LXPM/RAID_setup.html)

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## Memory module replacement

Follow instructions in this section to remove and install a memory module.

### Remove a memory module

Follow instructions in this section to remove a memory module.

### About this task

To avoid potential danger, read and follow the following safety statements.

- **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.

#### Attention:

- Read the “Installation guidelines” on page 85 to ensure that you work safely.

- Turn off the server and peripheral devices, and disconnect the power cords and all external cables (see “Power off the server” on page 13).
- If the server is in a rack, remove it from the rack.
- Remove any locking device that secures the server cover, such as a Kensington lock or a pad lock.
- Memory modules are sensitive to static discharge and require special handling. Refer to the standard guidelines for “Handling static-sensitive devices” on page 88.
  - 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.

### Watch the procedure

A video of this procedure is available at YouTube: <https://youtube.com/playlist?list=PLYV5R7hVcs-DoEcxrm2zKNpaKOdZ3f8Qc>.

### Procedure

- Step 1. Remove the server cover (see “Remove the server cover” on page 199).
- Step 2. Determine which memory module you want to remove from the server, and locate its corresponding connector on the system board.

The following illustration shows the location of memory module slots on the system board.

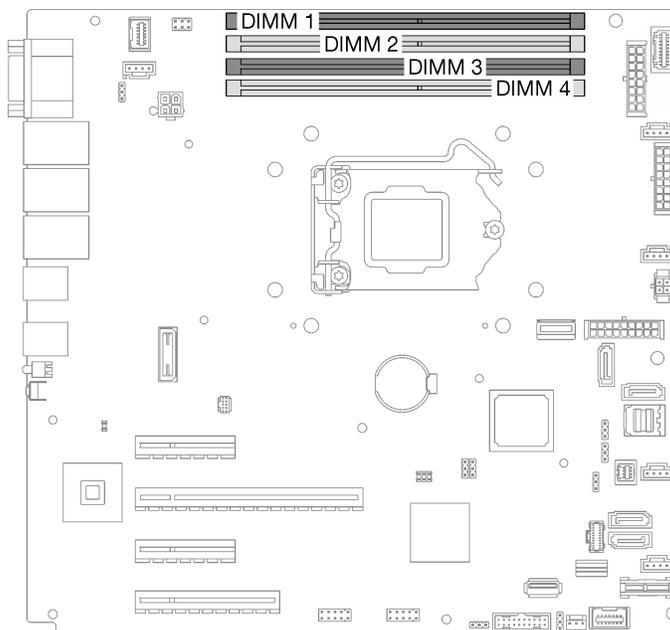


Figure 79. Memory module slots on the system board

- Step 3. Open the retaining clips on each end of the memory module slot. If necessary, you can use a pointed tool to open the retaining clips due to space constraints. Pencils are not recommended as a tool as they may not be strong enough.
- a. ① Place the tip of the tool in the recess on the top of the retaining clip.
  - b. ② Carefully rotate the retaining clip away from the memory module slot.

**Attention:**

- To avoid breaking the retaining clips or damaging the memory module slots, handle the clips gently.
- If necessary, you can use a pointed tool to open the retaining clips due to space constraints. Pencils are not recommended as a tool as they may not be strong enough.

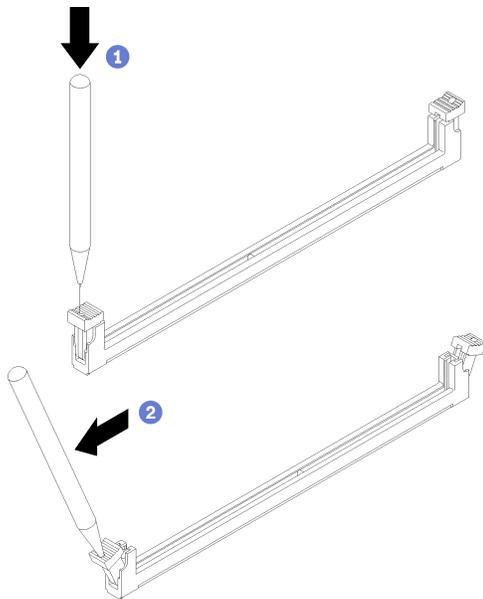


Figure 80. Opening retaining clips

- Step 4. Remove the memory module.
- a. 1 Make sure that the retaining clips are in the fully open position.
  - b. 2 Pull the memory module out of the slot with both hands.

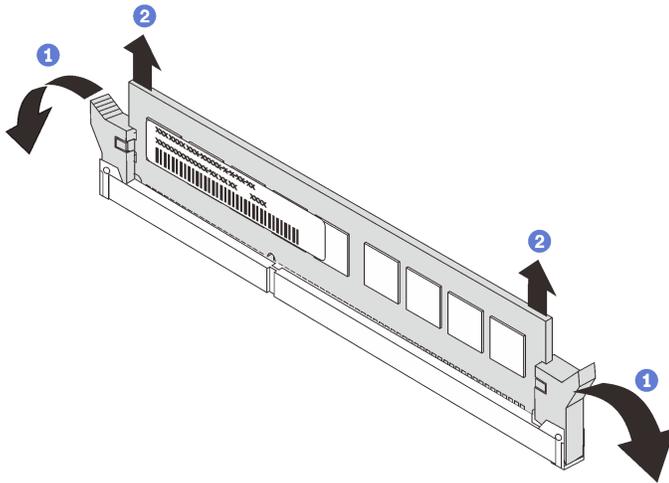


Figure 81. Removing a memory module

### After this task is completed

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

### Memory module installation rules and orders

Memory modules must be installed in a specific order based on the memory configuration of the server.

The following illustration shows the location of the memory module slots on the system board.

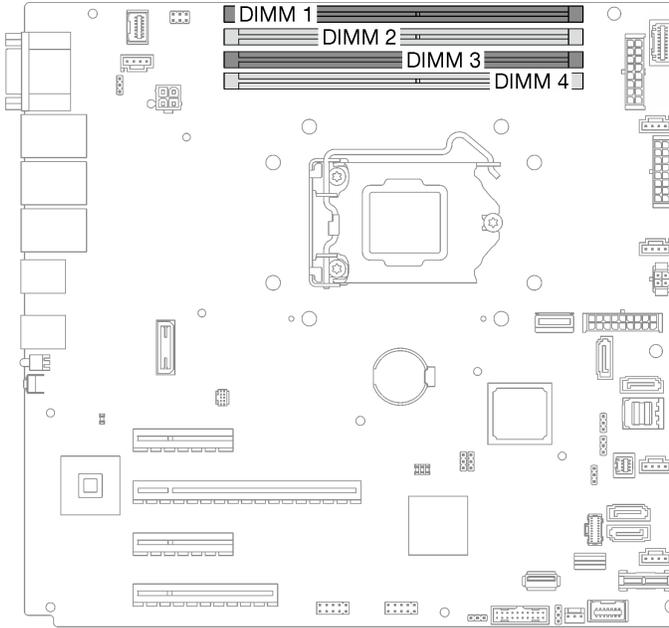


Figure 82. Memory module slots on the system board

This server comes with four memory module slots.

For a list of supported memory module options, see: <https://static.lenovo.com/us/en/serverproven/index.shtml>

Before installing a memory module, ensure that all memory modules to be installed must be the same type. This server supports the following type of memory modules:

- Industry-standard double-data-rate 4 (DDR4) UDIMM with 3200MHz error-correcting code (ECC) technology

Your server supports the “Independent mode” on page 150.

### Independent mode

Independent mode provides high performance memory capability. You can populate all channels with no matching requirements. Individual channels can run at different DIMM timings, but all channels must run at the same interface frequency.

The following table shows the memory module installation order.

Table 24. Memory module installation order

Number of Memory Modules	Memory Module Slot Number			
	1	2	3	4
1			X	
2	X		X	
4	X	X	X	X

## Install a memory module

Follow instructions in this section to install a memory module.

## About this task

To avoid potential danger, read and follow the following safety statements.

- **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.

**Attention:**

- Read the “Installation guidelines” on page 85 to ensure that you work safely.
- Make sure to adopt one of the supported configurations listed in “Memory module installation rules and orders” on page 149.
- Touch the static-protective package that contains the component to any unpainted metal surface on the server; then, remove it from the package and place it on a static-protective surface.
- Memory modules are sensitive to static discharge and require special handling. Refer to the standard guidelines for “Handling static-sensitive devices” on page 88.
  - 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.

**Watch the procedure**

A video of this procedure is available at YouTube: <https://youtube.com/playlist?list=PLYV5R7hVcs-DoEcxrm2zKNpaKOdZ3f8Qc>.

## Procedure

Step 1. Locate the memory module slot on the system board.

The following illustration shows the location of memory module slots on the system board.

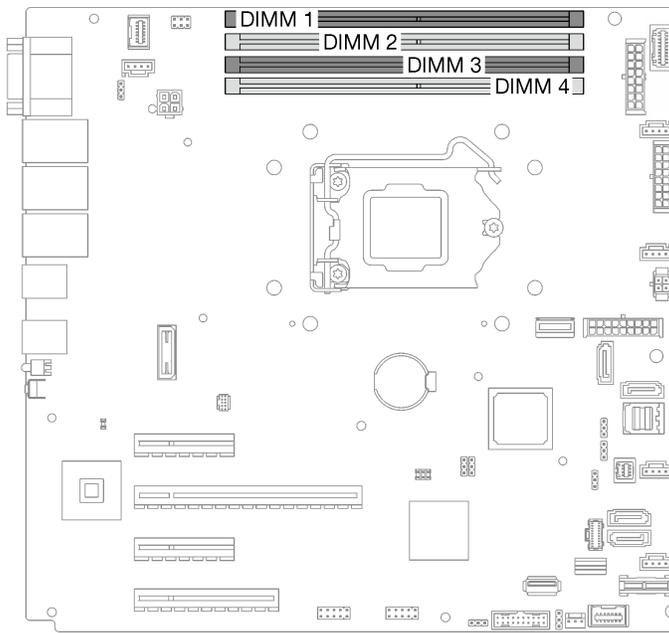


Figure 83. Memory module slots on the system board

- Step 2. Open the retaining clips on each end of memory module slot.
- a. ① Place the tip of the tool in the recess on the top of the retaining clip.
  - b. ② Carefully rotate the retaining clip away from the memory module slot.

**Attention:**

- To avoid breaking the retaining clips or damaging the memory module slots, handle the clips gently.
- If necessary, you can use a pointed tool to open the retaining clips due to space constraints. Pencils are not recommended as a tool as they may not be strong enough.

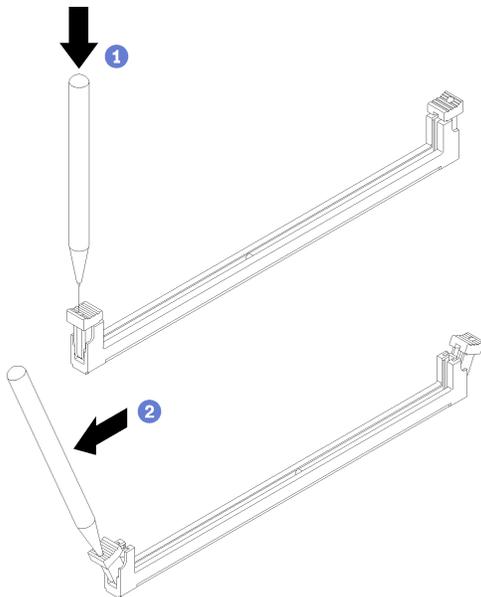


Figure 84. Opening retaining clips

Step 3. Touch the static-protective package that contains the memory module to any unpainted surface on the outside of the server. Then, remove the memory module from the package and place it on a static-protective surface.

Step 4. Install the memory module.

- a. ① Make sure that the retaining clips are in the fully open position.
- b. ② Align the memory module with the slot, and gently place the memory module on the slot with both hands.
- c. ③ Firmly press both ends of the memory module straight down into the slot until the retaining clips snap into the locked position.

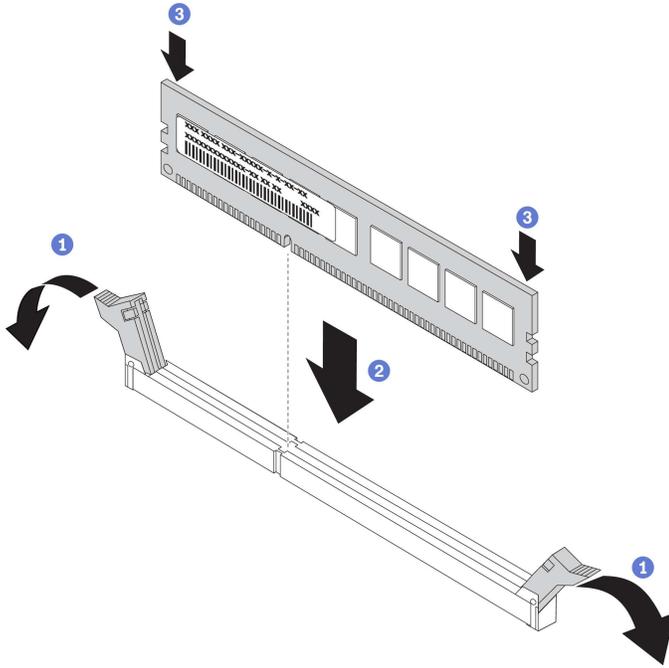


Figure 85. Installing a memory module

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

### After this task is completed

Complete the parts replacement. See “Complete the parts replacement” on page 217.

---

## Optical drive replacement

Follow instructions in this section to remove and install an optical drive.

**Note:** This section applies only to server models that have an optical drive installed.

### Remove an optical drive

Follow instructions in this section to remove an optical drive.

### About this task

To avoid potential danger, read and follow the following safety statements.

- **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.

- **S006**



**CAUTION:**

When laser products (such as CD-ROMs, DVD drives, fiber optic devices, or transmitters) are installed, note the following:

- Do not remove the covers. Removing the covers of the laser product could result in exposure to hazardous laser radiation. There are no serviceable parts inside the device.
- Use of controls or adjustments or performance of procedures other than those specified herein might result in hazardous radiation exposure.

**Attention:**

- Read the “Installation guidelines” on page 85 to ensure that you work safely.
- Turn off the server and peripheral devices, and disconnect the power cords and all external cables (see “Power off the server” on page 13).
- If the server is in a rack, remove it from the rack.
- Remove any locking device that secures the server cover, such as a Kensington lock or a pad lock.
- Use the front door key to unlock the front door, and then open the front door.

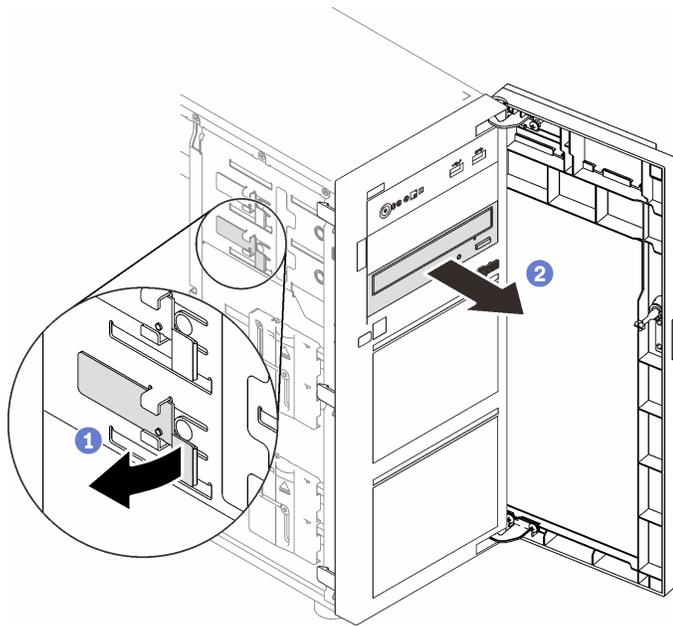
**Watch the procedure**

A video of this procedure is available at YouTube: <https://youtube.com/playlist?list=PLYV5R7hVcs-DoEcxrm2zKNpaK0dZ3f8Qc>.

**Procedure**

- Step 1. Remove the server cover (see “Remove the server cover” on page 199).
- Step 2. Disconnect the cables from the rear of the optical drive.
- Step 3. Remove the optical drive.
  - a. ① Gently pull the metal tab on the side of the chassis and push the optical drive outwards from the rear.
  - b. ② Carefully pull the optical drive out of the chassis.

*Figure 86. Removing an optical drive*



### After this task is completed

1. Install one of the following:

- Another optical drive or a tape drive. See “Install an optical drive” on page 155 or “Install a tape drive” on page 215.

**Note:** A tape drive must be installed into the lower optical drive bay.

- The EMI-protective shield to the chassis and the plastic bay filler to the front bezel.

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

### Install an optical drive

Follow instructions in this section to install an optical drive.

#### About this task

To avoid potential danger, read and follow the following safety statements.

- **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.

- **S006**



**CAUTION:**

When laser products (such as CD-ROMs, DVD drives, fiber optic devices, or transmitters) are installed, note the following:

- Do not remove the covers. Removing the covers of the laser product could result in exposure to hazardous laser radiation. There are no serviceable parts inside the device.
- Use of controls or adjustments or performance of procedures other than those specified herein might result in hazardous radiation exposure.

**Attention:**

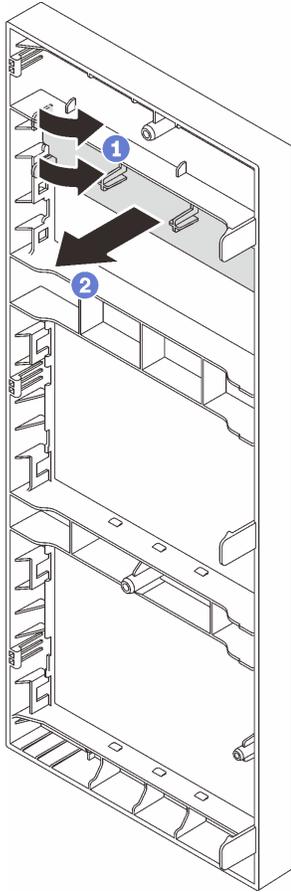
- Read the “Installation guidelines” on page 85 to ensure that you work safely.
- Touch the static-protective package that contains the component to any unpainted metal surface on the server; then, remove it from the package and place it on a static-protective surface.

**Watch the procedure**

A video of this procedure is available at YouTube: <https://youtube.com/playlist?list=PLYV5R7hVcs-DoEcxrm2zKNpaKOdZ3f8Qc>.

**Procedure**

- Step 1. If necessary, remove the plastic bay filler from the optical drive bay.
- a. ① Press the tabs on the side of the plastic bay filler of the optical drive bay.
  - b. ② Remove the drive bay filler as shown.



*Figure 87. Removing the plastic bay filler from the optical drive bay*

Step 2. If necessary, insert two of your fingers into the holes in the EMI shield and carefully pull the EMI shield out of the chassis.

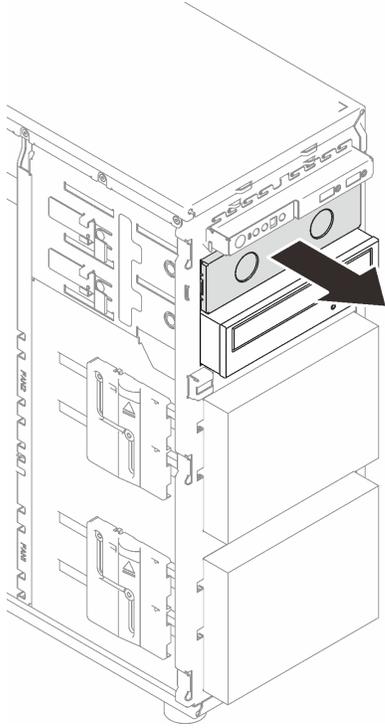


Figure 88. Removing the EMI shield from the optical drive bay

- Step 3. Gently pull the metal tab on the side of the chassis, and insert the optical drive into the optical drive bay.
- Step 4. Release the tab and keep sliding the optical drive until it snaps into place.

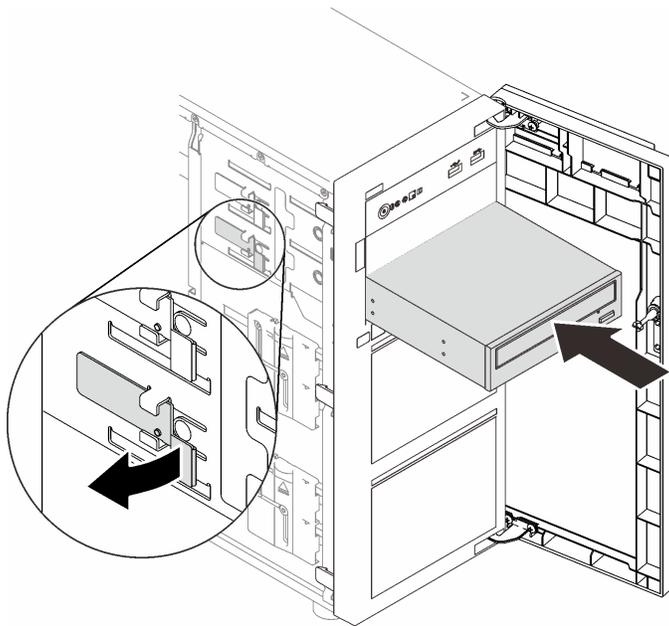


Figure 89. Installing an optical drive

- Step 5. Connect the power cable and the signal cable to the rear of the optical drive. See “Optical/tape drives” on page 66.

Step 6. Save the removed EMI-protective shield from the chassis and the plastic bay filler from the front bezel for future use.

## After this task is completed

Complete the parts replacement. See “Complete the parts replacement” on page 217.

---

## PCIe adapter replacement

Follow instructions in this section to remove and install a PCIe adapter.

Your server comes with four PCIe slots. Depending on your needs, you can install a PCIe adapter to obtain the corresponding function or remove the adapter if necessary. The PCIe adapter can be an Ethernet adapter, a host bus adapter, a RAID adapter, a graphics adapter, 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:  
<https://static.lenovo.com/us/en/serverproven/index.shtml>

## Remove a PCIe adapter

Follow instructions in this section to remove a PCIe adapter.

### About this task

To avoid potential danger, read and follow the following safety statements.

- **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.**

#### Attention:

- Read the “Installation guidelines” on page 85 to ensure that you work safely.
- Turn off the server and peripheral devices, and disconnect the power cords and all external cables (see “Power off the server” on page 13).
- If the server is in a rack, remove it from the rack.
- Remove any locking device that secures the server cover, such as a Kensington lock or a pad lock.

#### Notes:

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

#### Watch the procedure

A video of this procedure is available at YouTube: <https://youtube.com/playlist?list=PLYV5R7hVcs-DoEcxrm2zKNpaK0dZ3f8Qc>.

## Procedure

- Step 1. Make preparations for this task.
  - a. Remove the server cover (see “Remove the server cover” on page 199).
  - b. Remove the processor and the heat sink if necessary (see “Remove the processor” on page 184).
- Step 2. Lay the server on its side for easier operation.
- Step 3. Locate the PCIe adapter you want to remove. Depending on the type of the PCIe adapter, you might also need to disconnect all cables from the PCIe adapter, the system board, or the hot-swap drive backplane.
- Step 4. Remove a PCIe adapter.
  - a. ① Open the retaining clip as illustrated.
  - b. ② Grasp the PCIe adapter by its edges, and carefully pull it out of the slot.

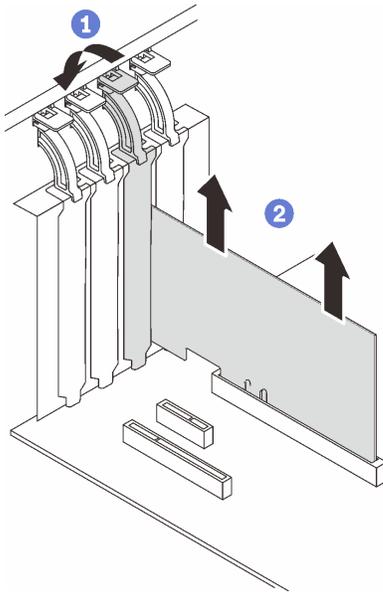


Figure 90. Removing a PCIe adapter

## After this task is completed

1. Install another PCIe adapter if necessary (see “Install a PCIe adapter” on page 160). Otherwise, install a bracket to cover the slot.
2. If you are instructed to return the component or optional device, follow all packaging instructions, and use any packaging materials for shipping that are supplied to you.

## Install a PCIe adapter

Follow instructions in this section to install a PCIe adapter.

## About this task

To avoid potential danger, read and follow the following safety statements.

- **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.

**Attention:**

- Read the “Installation guidelines” on page 85 to ensure that you work safely.
- Use any documentation that comes with the PCIe adapter and follow those instructions in addition to the instructions in this section.
- Touch the static-protective package that contains the component to any unpainted metal surface on the server; then, remove it from the package and place it on a static-protective surface.

**Notes:**

- Depending on the specific type, your PCIe adapter might look different from the illustration in this section.

**Watch the procedure**

A video of this procedure is available at YouTube: <https://youtube.com/playlist?list=PLYV5R7hVcs-DoEcxrm2zKNpaKOdZ3f8Qc>.

**Procedure**

- Step 1. Lay the server on its side for easier operation.
- Step 2. Locate the applicable PCIe slot (see “Specifications” on page 3 to identify the different types of PCIe slots in your server).
- Step 3. If a bracket is installed in the PCIe slot, remove it. Save the bracket for future use.
- Step 4. Open the retaining clip, and position the PCIe adapter over the slot.
- Step 5. Install a PCIe adapter.
  - 1 Carefully press the PCIe adapter straight down until it is seated in the slot.
  - 2 Close the retaining clip to secure the PCIe adapter in place.

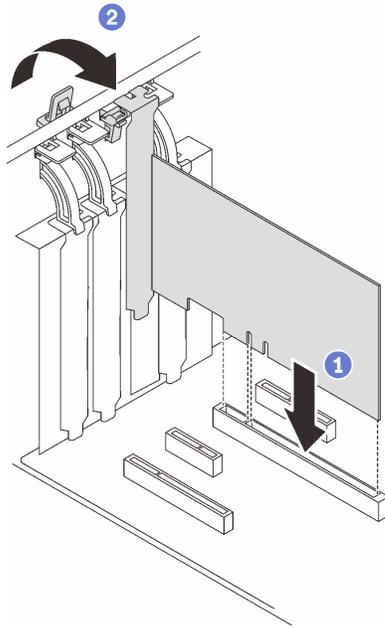


Figure 91. Installing a PCIe adapter

### After this task is completed

- Depending on the type of the PCIe adapter, you might need to connect any required cables.
  - After installing RAID adapters, see Cable routing for hot-swap drives with hardware RAID to complete the corresponding cable routing.
  - After installing M.2 boot adapter, see “M.2 adapter, intrusion switch, and RAID flash power module” on page 66 to complete cable routing.
  - After installing the following RAID adapters, see “M.2 adapter, intrusion switch, and RAID flash power module” on page 66 to complete cable routing for the RAID flash power module.
    - ThinkSystem RAID 9350-16i 4GB Flash PCIe 12Gb Adapter (with flash power module)
    - ThinkSystem RAID 9350-8i 2GB Flash PCIe 12Gb Adapter (with flash power module)
- Complete the parts replacement. See “Complete the parts replacement” on page 217.

---

## Power distribution board replacement

Follow instructions in this section to remove and install the power distribution board.

### Remove the power distribution board of the fixed power supply

Follow instructions in this section to remove the power distribution board of the fixed power supply.

### About this task

To avoid potential danger, read and follow the following safety statements.

- **S001**



 **DANGER**

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

- Connect all power cords to a properly wired and grounded electrical outlet/source.
- Connect any equipment that will be attached to this product to properly wired outlets/sources.
- When possible, use one hand only to connect or disconnect signal cables.
- Never turn on any equipment when there is evidence of fire, water, or structural damage.
- The device might have more than one power cord, to remove all electrical current from the device, ensure that all power cords are disconnected from the power source.

• **S002**



**CAUTION:**

The power-control button on the device and the power switch on the power supply do not turn off the electrical current supplied to the device. The device also might have more than one power cord. To remove all electrical current from the device, ensure that all power cords are disconnected from the power source.

**Attention:**

- Read the “Installation guidelines” on page 85 to ensure that you work safely.
- Turn off the server and peripheral devices, and disconnect the power cords and all external cables (see “Power off the server” on page 13).
- If the server is in a rack, remove it from the rack.
- Remove any locking device that secures the server cover, such as a Kensington lock or a pad lock.

**Watch the procedure**

A video of this procedure is available at YouTube: <https://youtube.com/playlist?list=PLYV5R7hVcs-DoEcxrm2zKNpaK0dZ3f8Qc>.

**Procedure**

Step 1. Make preparations for this task.

- a. Remove the server cover (see “Remove the server cover” on page 199).
- b. Remove the fixed power supply (see “Remove the fixed power supply” on page 170).

Step 2. Disconnect the power cables from the power distribution board.

Step 3. Remove the power distribution board of the fixed power supply.

- a. ① Remove the screw that secures the power distribution board.
- b. ② Slide the board forward (toward the power supply cage direction) until the three T-head pins are in the large opening of the keyholes; then, lift the board out of the chassis.

**Note:** Carefully handle the power distribution board by its edges.

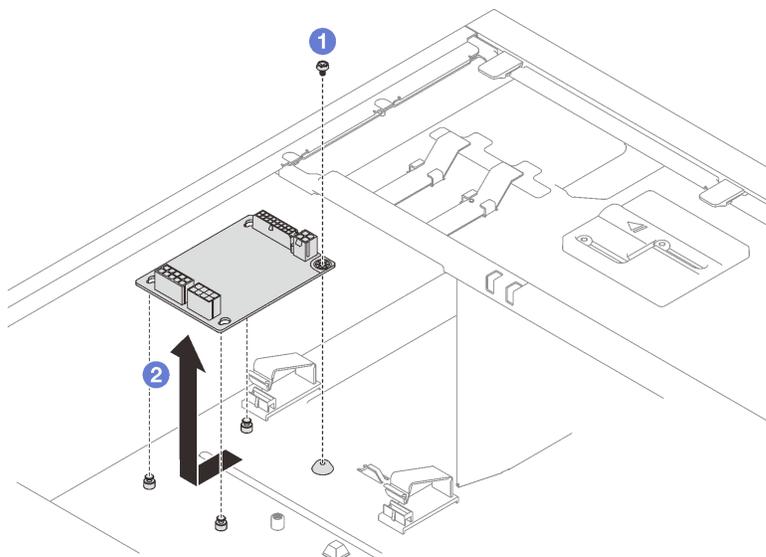


Figure 92. Removing the power distribution board of the fixed power supply

### After this task is completed

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

### Install the power distribution board of the fixed power supply

Follow instructions in this section to install the power distribution board of the fixed power supply.

### About this task

To avoid potential danger, read and follow the following safety statements.

- **S001**



 **DANGER**

**Electrical current from power, telephone, and communication cables is hazardous.**

**To avoid a shock hazard:**

- **Connect all power cords to a properly wired and grounded electrical outlet/source.**
- **Connect any equipment that will be attached to this product to properly wired outlets/sources.**
- **When possible, use one hand only to connect or disconnect signal cables.**
- **Never turn on any equipment when there is evidence of fire, water, or structural damage.**
- **The device might have more than one power cord, to remove all electrical current from the device, ensure that all power cords are disconnected from the power source.**

- **S002**



**CAUTION:**

The power-control button on the device and the power switch on the power supply do not turn off the electrical current supplied to the device. The device also might have more than one power cord. To remove all electrical current from the device, ensure that all power cords are disconnected from the power source.

**Attention:**

- Read the “Installation guidelines” on page 85 to ensure that you work safely.
- Touch the static-protective package that contains the component to any unpainted metal surface on the server; then, remove it from the package and place it on a static-protective surface.

**Watch the procedure**

A video of this procedure is available at YouTube: <https://youtube.com/playlist?list=PLYV5R7hVcs-DoEcXrm2zKNpaK0dZ3f8Qc>.

**Procedure**

- Step 1. Lay the server on its side for easier operation.
- Step 2. Install the power distribution board of the fixed power supply.
  - a. ① Align the large opening of the three keyholes on the power distribution board with the three T-head pins in the chassis; then, slide the board backwards (toward the tape drive/optical drive cage direction) to seat the board in place.
  - b. ② Fasten the screw as illustrated to secure the power distribution board to the chassis.

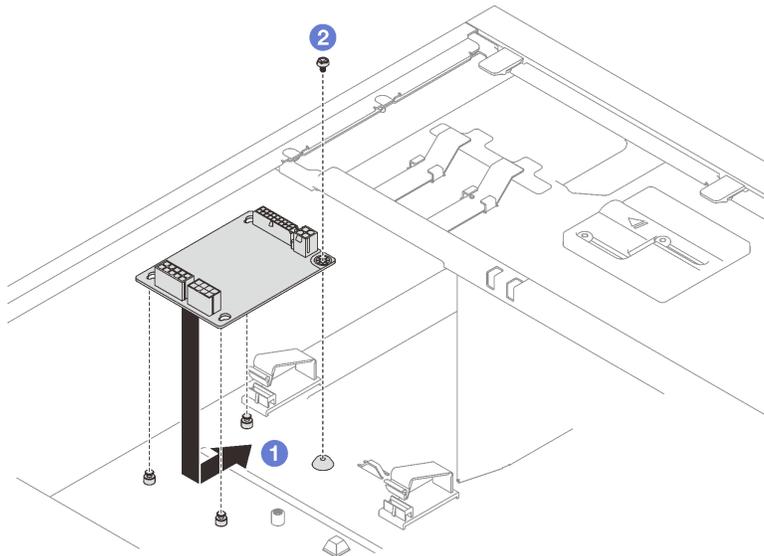


Figure 93. Installing the power distribution board of the fixed power supply

- Step 3. Connect the power cables to the new power distribution board; then, properly route the cables and secure the cables with the cable clips and ties in the chassis.

**Notes:**

- Ensure that all cables are routed through the correct cable clips.
- As the processor power connectors on the power distribution board may look similar in appearance, make sure that the power supply processor power cable and the processor power cable are routed correctly. See the cable routing section of “Fixed power supply” on page 67.

## After this task is completed

Complete the parts replacement. See “Complete the parts replacement” on page 217.

## Remove the power distribution board of the hot-swap power supply

Follow instructions in this section to remove the power distribution board of the hot-swap redundant power supply.

### About this task

To avoid potential danger, read and follow the following safety statements.

- **S001**



 **DANGER**

**Electrical current from power, telephone, and communication cables is hazardous.**

**To avoid a shock hazard:**

- **Connect all power cords to a properly wired and grounded electrical outlet/source.**
- **Connect any equipment that will be attached to this product to properly wired outlets/sources.**
- **When possible, use one hand only to connect or disconnect signal cables.**
- **Never turn on any equipment when there is evidence of fire, water, or structural damage.**
- **The device might have more than one power cord, to remove all electrical current from the device, ensure that all power cords are disconnected from the power source.**

- **S002**



#### **CAUTION:**

**The power-control button on the device and the power switch on the power supply do not turn off the electrical current supplied to the device. The device also might have more than one power cord. To remove all electrical current from the device, ensure that all power cords are disconnected from the power source.**

#### **Attention:**

- Read the “Installation guidelines” on page 85 to ensure that you work safely.

- Turn off the server and peripheral devices, and disconnect the power cords and all external cables (see “Power off the server” on page 13).
- If the server is in a rack, remove it from the rack.
- Remove any locking device that secures the server cover, such as a Kensington lock or a pad lock.

### Watch the procedure

A video of this procedure is available at YouTube: <https://youtube.com/playlist?list=PLYV5R7hVcs-DoEcxrm2zKNpaK0dZ3f8Qc>.

### Procedure

Step 1. Make preparations for this task.

- a. Remove the server cover (see “Remove the server cover” on page 199).
- b. Remove the hot-swap redundant power supply (see “Remove a hot-swap power supply” on page 176).

Step 2. Remove the power distribution board.

- a. ① Remove the screw that secures the power distribution board cover, and remove the cover from the chassis.
- b. ② Pull the power distribution board out.

**Note:** Carefully handle the power distribution board by its edges.

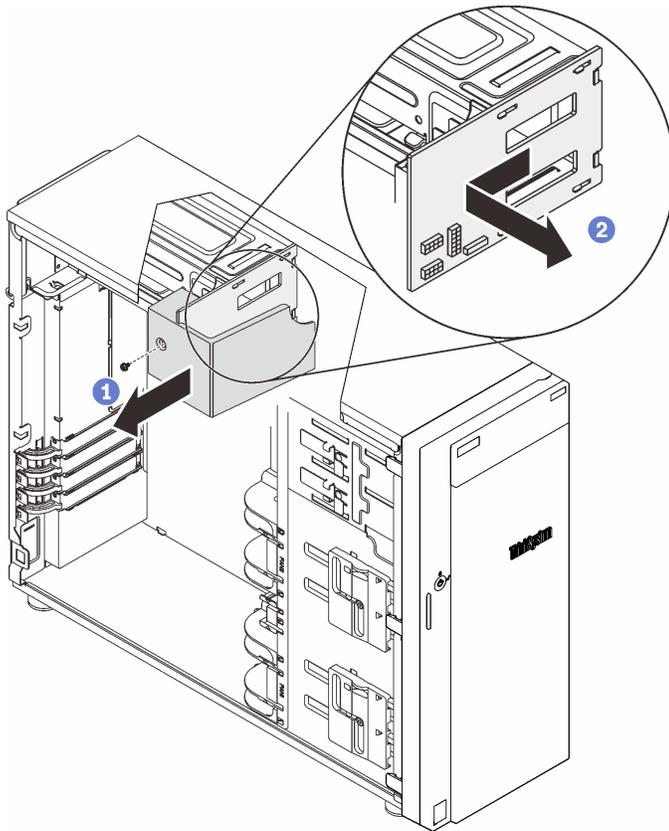


Figure 94. Removing the power distribution board of the hot-swap power supply

Step 3. Disconnect the power cables from the power distribution board.

## After this task is completed

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

## Install the power distribution board of the hot-swap power supply

Follow instructions in this section to install the power distribution board of the hot-swap redundant power supply.

### About this task

To avoid potential danger, read and follow the following safety statements.

- **S001**



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

- Connect all power cords to a properly wired and grounded electrical outlet/source.
- Connect any equipment that will be attached to this product to properly wired outlets/sources.
- When possible, use one hand only to connect or disconnect signal cables.
- Never turn on any equipment when there is evidence of fire, water, or structural damage.
- The device might have more than one power cord, to remove all electrical current from the device, ensure that all power cords are disconnected from the power source.

- **S002**



**CAUTION:**

The power-control button on the device and the power switch on the power supply do not turn off the electrical current supplied to the device. The device also might have more than one power cord. To remove all electrical current from the device, ensure that all power cords are disconnected from the power source.

**Attention:**

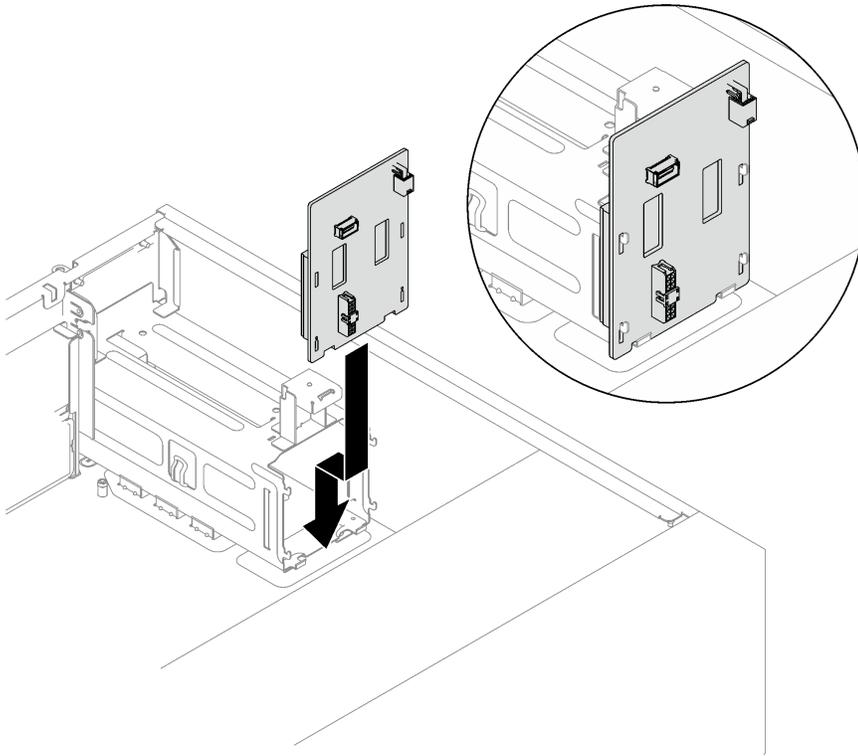
- Read the “Installation guidelines” on page 85 to ensure that you work safely.
- Touch the static-protective package that contains the component to any unpainted metal surface on the server; then, remove it from the package and place it on a static-protective surface.

### Watch the procedure

A video of this procedure is available at YouTube: <https://youtube.com/playlist?list=PLYV5R7hVcs-DoEcxrm2zKNpaKOdZ3f8Qc>.

## Procedure

- Step 1. Lay the server on its side for easier operation.
- Step 2. Hold the power distribution board by its edges, and align the slots on the board with the four tabs on the power supply cage.
- Step 3. Slide the power distribution board toward the power supply cage until it clicks into place.



*Figure 95. Installing the power distribution board of the hot-swap power supply*

- Step 4. Connect the power cables to the power distribution board; then, properly route the cables, and secure the cables with the cable clips.
- Step 5. Align the slot on the power distribution board cover with the one on the power supply cage; then, secure the power distribution board cover with the screw.

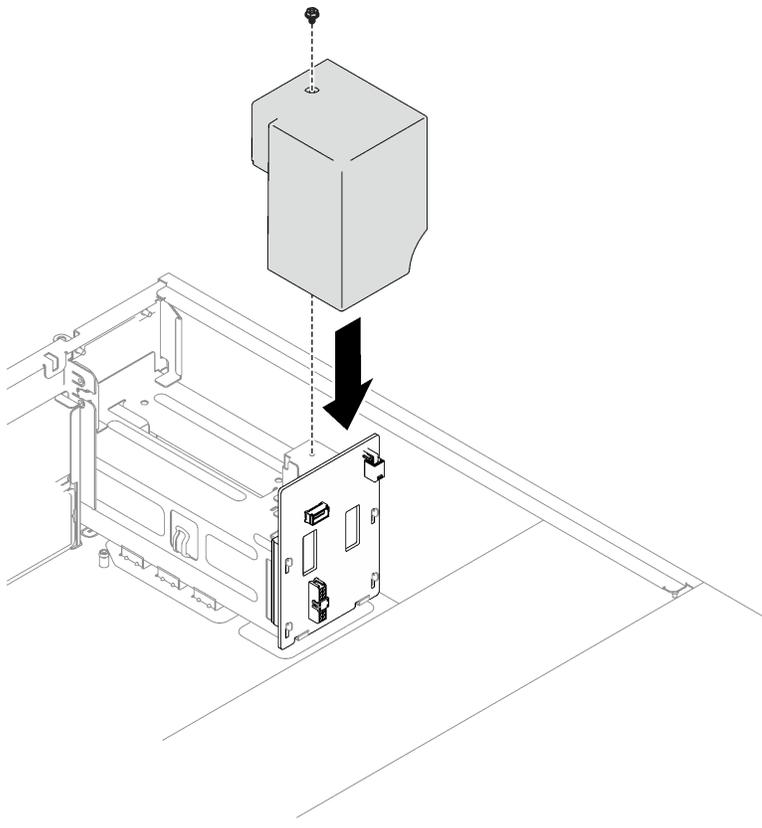


Figure 96. Installing the power distribution board cover

### After this task is completed

- Connect the cables to the corresponding connector on the system board. See “System-board components” on page 27 and “Redundant power supplies” on page 69.
- Complete the parts replacement. See “Complete the parts replacement” on page 217.

---

## Power supply replacement

Follow instructions in this section to remove and install a fixed or redundant power supply unit.

### Remove the fixed power supply

Follow instructions in this section to remove the fixed power supply.

### About this task

To avoid potential danger, read and follow the following safety statements.

- **S001**



 **DANGER**

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

- Connect all power cords to a properly wired and grounded electrical outlet/source.
- Connect any equipment that will be attached to this product to properly wired outlets/sources.
- When possible, use one hand only to connect or disconnect signal cables.
- Never turn on any equipment when there is evidence of fire, water, or structural damage.
- The device might have more than one power cord, to remove all electrical current from the device, ensure that all power cords are disconnected from the power source.



Figure 97. Fixed power supply label on the cover

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

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.

• **S002**



**CAUTION:**

The power-control button on the device and the power switch on the power supply do not turn off the electrical current supplied to the device. The device also might have more than one power cord. To remove all electrical current from the device, ensure that all power cords are disconnected from the power source.

• **S035**



**CAUTION:**

Never remove the cover on a power supply or any part that has this label attached. Hazardous voltage, current, and energy levels are present inside any component that has this label attached.

**There are no serviceable parts inside these components. If you suspect a problem with one of these parts, contact a service technician.**

**Attention:**

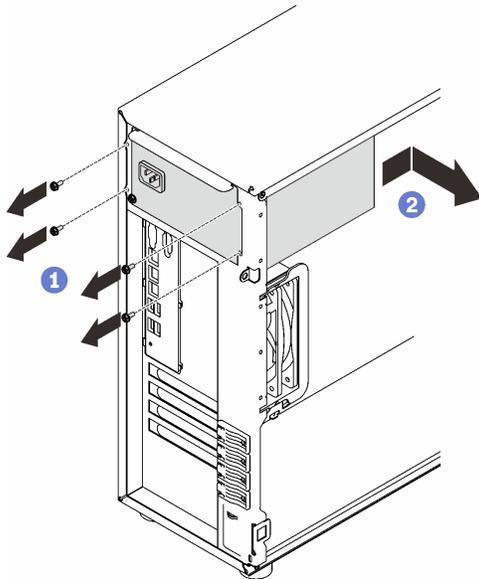
- Read the “Installation guidelines” on page 85 to ensure that you work safely.
- Turn off the server and peripheral devices, and disconnect the power cords and all external cables (see “Power off the server” on page 13).
- If the server is in a rack, remove it from the rack.
- Remove any locking device that secures the server cover, such as a Kensington lock or a pad lock.

**Watch the procedure**

A video of this procedure is available at YouTube: <https://youtube.com/playlist?list=PLYV5R7hVcs-DoEcxrm2zKNpaK0dZ3f8Qc>.

**Procedure**

- Step 1. Remove the server cover (see “Remove the server cover” on page 199).
- Step 2. Disconnect all cables on the fixed power supply from the power distribution board.
- Step 3. Remove a fixed power supply.
  - a. ① Remove the four screws at the rear of the chassis that secure the power supply.
  - b. ② Push the fixed power supply from the rear until it is released from the metal retaining tab, and carefully lift the power supply out of the chassis.



*Figure 98. Removing a fixed power supply*

**After this task is completed**

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

## Install the fixed power supply

Follow instructions in this section to install the fixed power supply.

### About this task

To avoid potential danger, read and follow the following safety statements.

- **S001**



**Electrical current from power, telephone, and communication cables is hazardous.**

**To avoid a shock hazard:**

- Connect all power cords to a properly wired and grounded electrical outlet/source.
- Connect any equipment that will be attached to this product to properly wired outlets/sources.
- When possible, use one hand only to connect or disconnect signal cables.
- Never turn on any equipment when there is evidence of fire, water, or structural damage.
- The device might have more than one power cord, to remove all electrical current from the device, ensure that all power cords are disconnected from the power source.



Figure 99. Fixed power supply label on the cover

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

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.

- **S002**



**CAUTION:**

The power-control button on the device and the power switch on the power supply do not turn off the electrical current supplied to the device. The device also might have more than one power cord. To remove all electrical current from the device, ensure that all power cords are disconnected from the power source.

- **S035**

**CAUTION:**

Never remove the cover on a power supply or any part that has this label attached. Hazardous voltage, current, and energy levels are present inside any component that has this label attached. There are no serviceable parts inside these components. If you suspect a problem with one of these parts, contact a service technician.

**Attention:**

- Read the “Installation guidelines” on page 85 to ensure that you work safely.
- Touch the static-protective package that contains the component to any unpainted metal surface on the server; then, remove it from the package and place it on a static-protective surface.

**Watch the procedure**

A video of this procedure is available at YouTube: <https://youtube.com/playlist?list=PLYV5R7hVcs-DoEcxrm2zKNpaKOdZ3f8Qc>.

**Procedure**

- Step 1. Align the tabs on the fixed power supply bracket with the corresponding holes on the chassis.
- Step 2. Pivot the fixed power supply bracket in until it snaps into place.

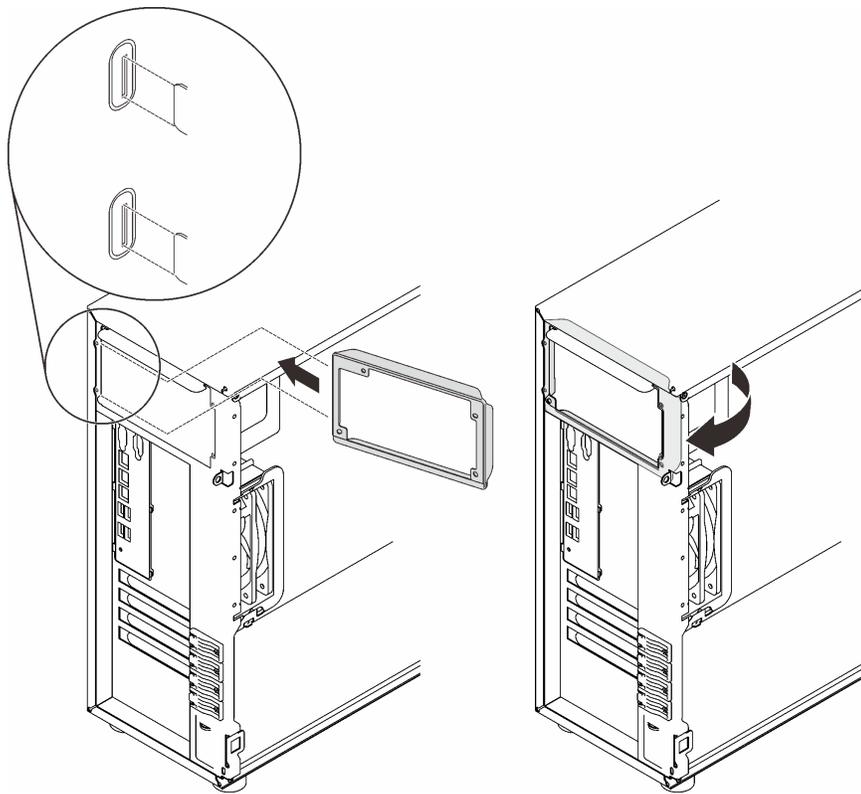


Figure 100. Installing a fixed power supply bracket

Step 3. Install a fixed power supply.

- a. 1 Slide the fixed power supply into the bay until it snaps into place. Make sure the four screw holes in the fixed power supply are aligned with the corresponding holes in the rear of the chassis.
- b. 2 Install the four screws to secure the fixed power supply in place.

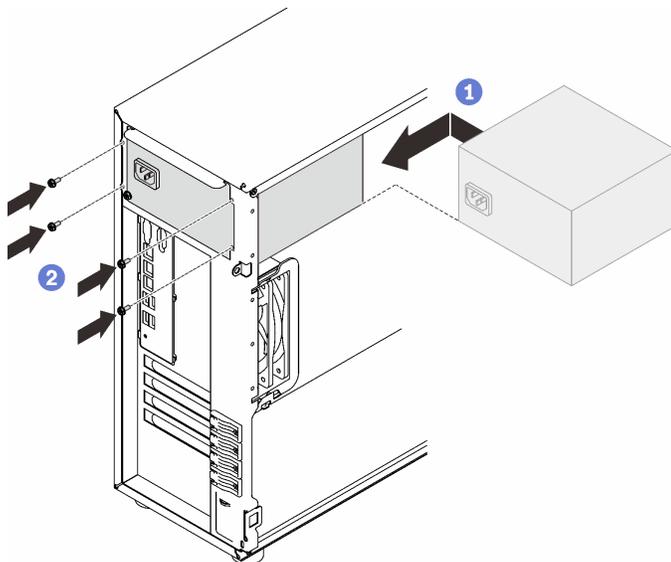


Figure 101. Installing a fixed power supply

## After this task is completed

1. Connect all cables on the fixed power supply to corresponding connectors on the system board. See “Fixed power supply” on page 67.
2. Connect the power cable to the power supply and a properly grounded electrical outlet.
3. Power 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.
4. Complete the parts replacement. See “Complete the parts replacement” on page 217.

## Remove a hot-swap power supply

Follow instructions in this section to remove a hot-swap redundant power supply.

### About this task

To avoid potential danger, read and follow the following safety statements.

- **S001**



 **DANGER**

**Electrical current from power, telephone, and communication cables is hazardous.**

**To avoid a shock hazard:**

- **Connect all power cords to a properly wired and grounded electrical outlet/source.**
- **Connect any equipment that will be attached to this product to properly wired outlets/sources.**
- **When possible, use one hand only to connect or disconnect signal cables.**
- **Never turn on any equipment when there is evidence of fire, water, or structural damage.**
- **The device might have more than one power cord, to remove all electrical current from the device, ensure that all power cords are disconnected from the power source.**

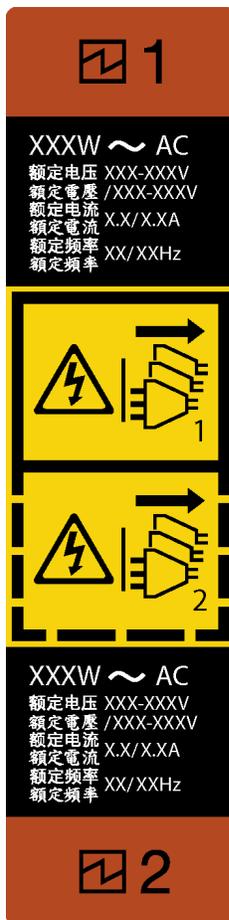


Figure 102. Hot-swap power supply label

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.

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

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

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.

- **S002**



**CAUTION:**

The power-control button on the device and the power switch on the power supply do not turn off the electrical current supplied to the device. The device also might have more than one power cord. To remove all electrical current from the device, ensure that all power cords are disconnected from the power source.

- **S035**



**CAUTION:**

Never remove the cover on a power supply or any part that has this label attached. Hazardous voltage, current, and energy levels are present inside any component that has this label attached. There are no serviceable parts inside these components. If you suspect a problem with one of these parts, contact a service technician.

**Attention:**

- Read the “Installation guidelines” on page 85 to ensure that you work safely.
- If the server is in a rack, pull back the cable management arm to gain access to the rear of the server and the power supply.

**Watch the procedure**

A video of this procedure is available at YouTube: <https://youtube.com/playlist?list=PLYV5R7hVcs-DoEcxrm2zKNpaKOdZ3f8Qc>.

**Procedure**

- Step 1. Locate the hot-swap power supply in the rear of your server and disconnect the power cord from the power supply.
- Step 2. Press the release tab in the direction as shown, and carefully pull the handle at the same time to slide the hot-swap power supply out of the chassis.

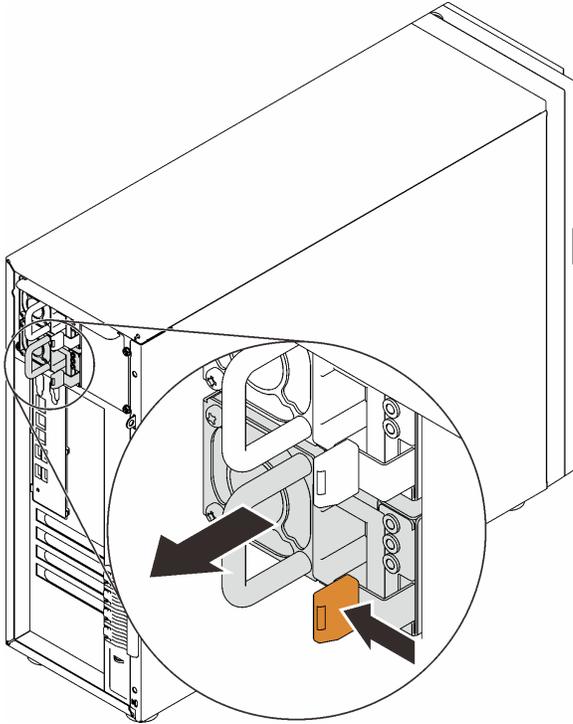


Figure 103. Removing a hot-swap power supply

### After this task is completed

1. Install a new power supply or install the power-supply filler to cover the power supply bay. See “Install the hot-swap power supply” on page 179.
2. If you are instructed to return the component or optional device, follow all packaging instructions, and use any packaging materials for shipping that are supplied to you.

### Install the hot-swap power supply

Follow instructions in this section to install the hot-swap redundant power supply.

### About this task

To avoid potential danger, read and follow the following safety statements.

- **S001**



 **DANGER**

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

- **Connect all power cords to a properly wired and grounded electrical outlet/source.**
- **Connect any equipment that will be attached to this product to properly wired outlets/sources.**
- **When possible, use one hand only to connect or disconnect signal cables.**
- **Never turn on any equipment when there is evidence of fire, water, or structural damage.**
- **The device might have more than one power cord, to remove all electrical current from the device, ensure that all power cords are disconnected from the power source.**

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.

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

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

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.

• **S002**



**CAUTION:**

**The power-control button on the device and the power switch on the power supply do not turn off the electrical current supplied to the device. The device also might have more than one power cord. To remove all electrical current from the device, ensure that all power cords are disconnected from the power source.**

• **S035**



**CAUTION:**

**Never remove the cover on a power supply or any part that has this label attached. Hazardous voltage, current, and energy levels are present inside any component that has this label attached. There are no serviceable parts inside these components. If you suspect a problem with one of these parts, contact a service technician.**

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 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.

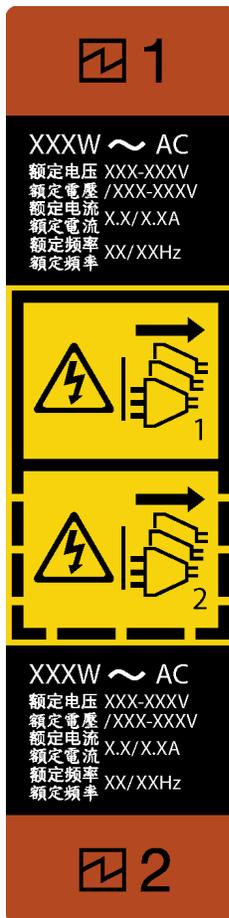


Figure 104. Hot-swap power supply label

- Ensure that the devices that you are installing are supported. For a list of supported optional devices for the server, go to: <https://static.lenovo.com/us/en/serverproven/index.shtml>

**Attention:**

- Read the “Installation guidelines” on page 85 to ensure that you work safely.
- Touch the static-protective package that contains the component to any unpainted metal surface on the server; then, remove it from the package and place it on a static-protective surface.

**Watch the procedure**

A video of this procedure is available at YouTube: <https://youtube.com/playlist?list=PLYV5R7hVcs-DoEcxrm2zKNpaKOdZ3f8Qc>.

## Procedure

Step 1. If there is a power supply bay filler installed, remove it.

**Important:** During normal operation, each power supply bay must contain either a power supply or power supply filler for proper cooling.

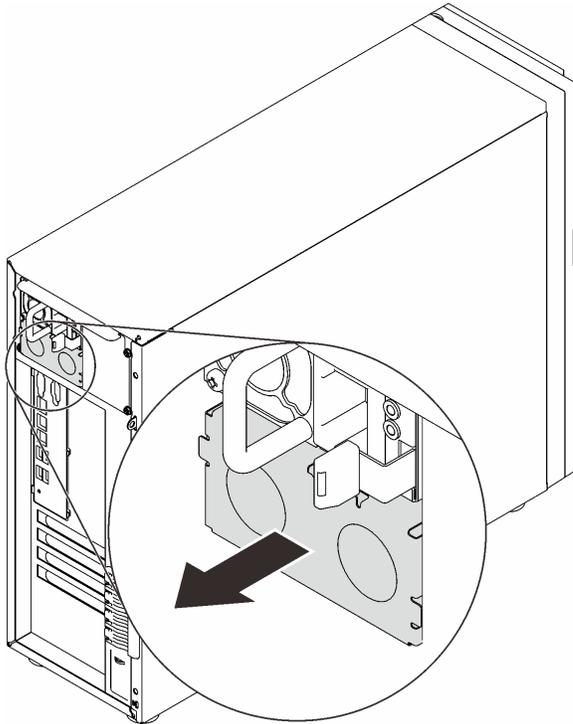
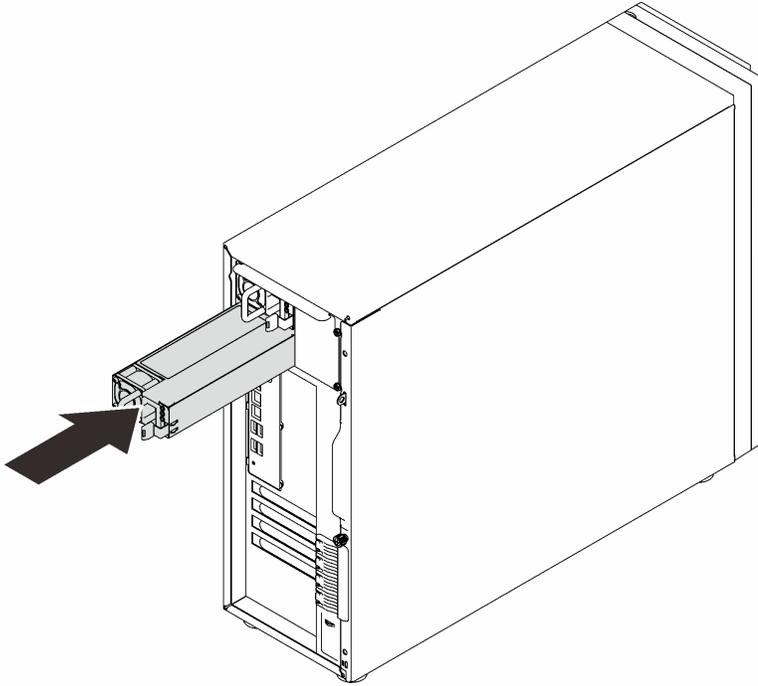


Figure 105. Removing a hot-swap power supply filler

Step 2. Note the orientation of the hot-swap power supply, and then slide it into the chassis until it snaps into place.



*Figure 106. Installing a hot-swap power supply*

**After this task is completed**

1. Connect the power cable to the power supply and a properly grounded electrical outlet.
2. If the server is powered off, power 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.
3. Complete the parts replacement. See “Complete the parts replacement” on page 217.

---

## Processor replacement

Follow instructions in this section to remove and install a processor.

**Attention:** Before you begin replacing a processor, make sure that you have an alcohol cleaning pad (part number 00MP352) and gray thermal grease (part number 41Y9292).

### Remove the processor

Follow instructions in this section to remove the processor. This procedure must be executed by a trained technician.

#### About this task

To avoid potential danger, read and follow the following safety statements.

- **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.

**Attention:**

- Read the “Installation guidelines” on page 85 to ensure that you work safely.
- Turn off the server and peripheral devices, and disconnect the power cords and all external cables (see “Power off the server” on page 13).
- If the server is in a rack, remove it from the rack.
- Remove any locking device that secures the server cover, such as a Kensington lock or a pad lock.
- Use the front door key to unlock the front door, and then open the front door.

**Watch the procedure**

A video of this procedure is available at YouTube: <https://youtube.com/playlist?list=PLYV5R7hVcs-DoEcxrm2zKNpaK0dZ3f8Qc>.

### Procedure

Step 1. Make preparations for this task.

- a. Remove the server cover (see “Remove the server cover” on page 199).
- b. Remove the heat sink and fan module if necessary (see “Remove the heat sink and fan module” on page 130).

Step 2. Remove the processor.

- a. ① Gently pull the handle away from the processor retainer.
- b. ② Lift the handle along with the retainer to the fully open position.
- c. ③ Hold the processor by both sides and gently lift it away from the processor socket.

**Notes:**

1. Do not touch the gold contacts on the bottom of the processor.
2. Keep the processor socket clean from any object to prevent possible damages.

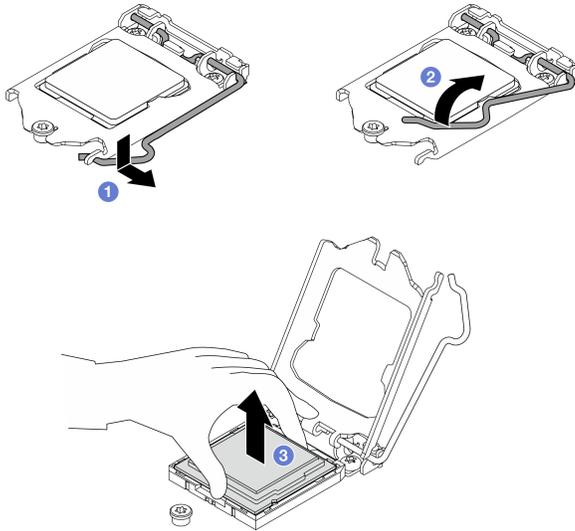


Figure 107. Opening the processor retainer

**After this task is completed**

After removing the processor, perform one of the following tasks immediately:

- Install the replacement processor.
  1. Install the replacement processor to the system board (see “Install the processor ” on page 185).
  2. Package the defective processor that was removed, and return it to Lenovo. To prevent any shipping damage, reuse the packaging of the new processor, and follow all available packaging instructions.
- or
- Install the processor that you removed to the replacement system board.
  1. Install the removed processor to the replacement system board (see “Install the processor ” on page 185).
  2. Package the defective system board, and return it to Lenovo. To prevent any shipping damage, reuse the packaging of the new system board, and follow all available packaging instructions.

**Install the processor**

Follow instructions in this section to install the processor. This procedure must be executed by a trained technician.

**About this task**

To avoid potential danger, read and follow the following safety statements.

- **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.

**Attention:**

- Read the “Installation guidelines” on page 85 to ensure that you work safely.
- Before reusing a processor that was removed from another system board, wipe the thermal grease from the processor with an alcohol cleaning pad, and dispose of the cleaning pad after all of the thermal grease is removed.

**Note:** If you are applying new thermal grease on the top of the processor, make sure to do it after the alcohol has fully evaporated.

- Apply the thermal grease on the top of the processor with syringe by forming four uniformly spaced dots, while each dot consists of about 0.1 ml of thermal grease.

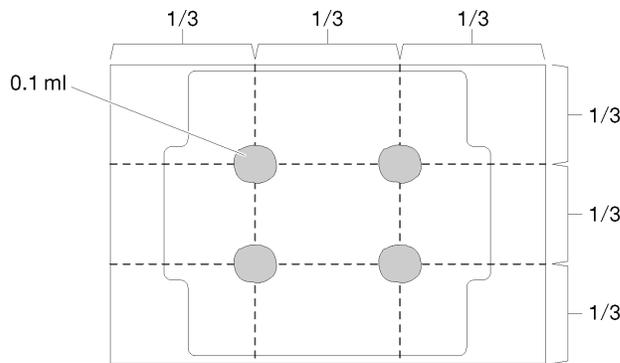


Figure 108. Proper shape of the thermal grease

- Touch the static-protective package that contains the component to any unpainted metal surface on the server; then, remove it from the package and place it on a static-protective surface.
- 

**Watch the procedure**

A video of this procedure is available at YouTube: <https://youtube.com/playlist?list=PLYV5R7hVcs-DoEcxrm2zKNpaK0dZ3f8Qc>.

**Procedure**

Step 1. Hold the processor by both sides, and align the following:

1. Align **1** the small notches on the processor to **2** the tabs on the socket.
2. Align **3** the small triangle of the processor to **4** the beveled corner on the socket.

Then, gently lower the processor evenly into the socket.

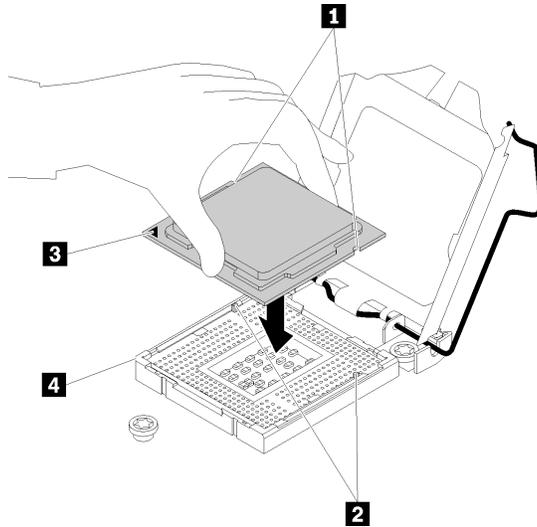


Figure 109. Installing the processor

Step 2. Close the processor retainer, and push the handle to the locked position.

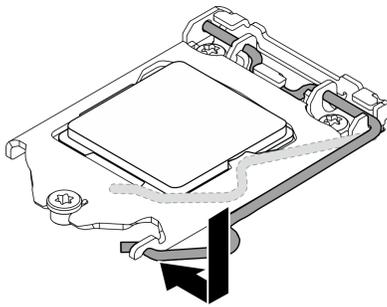


Figure 110. Closing the processor retainer

### After this task is completed

1. Reinstall the heat sink and fan assembly (see “Install the heat sink and the fan module” on page 132).
2. Complete the parts replacement. See “Complete the parts replacement” on page 217.

---

## RAID flash power module replacement

Follow instructions in this section to remove and install the RAID flash power module (supercap).

**Note:** This topic applies only to server models that have RAID flash power modules installed.

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

For a list of supported options, see:

<https://static.lenovo.com/us/en/serverproven/index.shtml>

### Remove a RAID flash power module

Follow instructions in this section to remove a RAID flash power module (supercap).

## About this task

To avoid potential danger, read and follow the following safety statements.

- **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.

### Attention:

- Read the “Installation guidelines” on page 85 to ensure that you work safely.
- Turn off the server and peripheral devices, and disconnect the power cords and all external cables (see “Power off the server” on page 13).
- If the server is in a rack, remove it from the rack.
- Remove any locking device that secures the server cover, such as a Kensington lock or a pad lock.

### Watch the procedure

A video of this procedure is available at YouTube: <https://youtube.com/playlist?list=PLYV5R7hVcs-DoEcxrm2zKNpaK0dZ3f8Qc>.

## Procedure

- Step 1. Remove the server cover (see “Remove the server cover” on page 199).
- Step 2. Disconnect the cable of the RAID flash power module from the RAID card.
- Step 3. Remove the RAID flash power module and bracket assembly from the chassis.

**Note:** Your RAID flash power module might look slightly different from those shown in the illustrations.

- 1 Press the tab on the RAID flash power module bracket.
- 2 Remove the RAID flash power module and bracket assembly from the chassis.

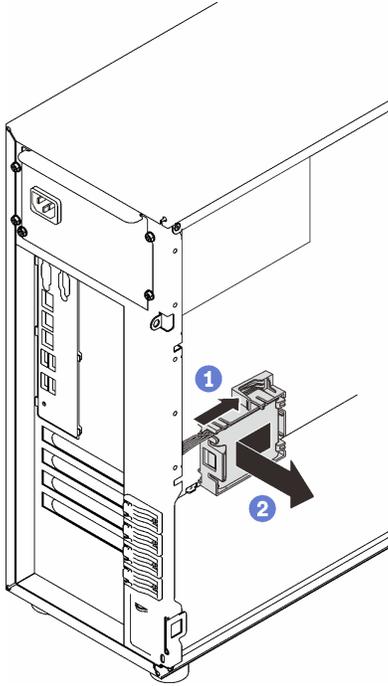


Figure 111. Removing the RAID flash power module and bracket assembly from the chassis

- Step 4. Remove the RAID flash power module from the bracket.
- a. 1 Gently pull the tab on the bracket.
  - b. 2 Remove the module from the bracket.

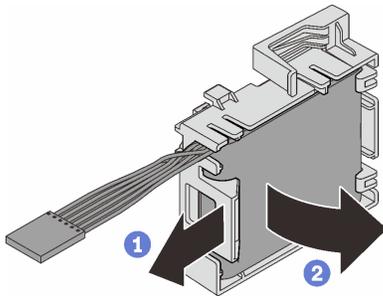


Figure 112. Removing the RAID flash power module from the bracket

### After this task is completed

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

### Install a RAID flash power module

Follow instructions in this section to install a RAID flash power module (supercap).

### About this task

To avoid potential danger, read and follow the following safety statements.

- **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.

**Attention:**

- Read the “Installation guidelines” on page 85 to ensure that you work safely.
- Touch the static-protective package that contains the component to any unpainted metal surface on the server; then, remove it from the package and place it on a static-protective surface.

**Watch the procedure**

A video of this procedure is available at YouTube: <https://youtube.com/playlist?list=PLYV5R7hVcs-DoEcxrm2zKNpaK0dZ3f8Qc>.

**Procedure**

**Note:** Your RAID flash power module might look slightly different from those shown in the illustrations.

- Step 1. Install the RAID flash power module into the bracket.
- 1 Align the RAID flash power module with the bracket.
  - 2 Rotate the other end of the module inward until it is secured in the bracket.

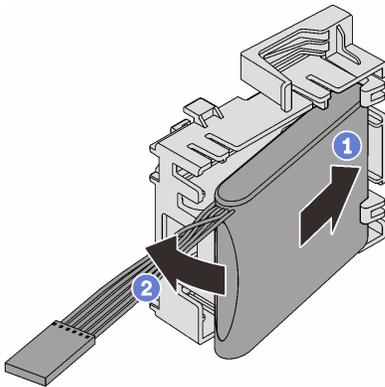


Figure 113. Installing the RAID flash power module into the bracket

- Step 2. Position the RAID flash power module and bracket assembly onto the chassis, where the tabs on the bracket pass through the corresponding holes on the chassis. Move the assembly as shown until it is secured on the chassis.

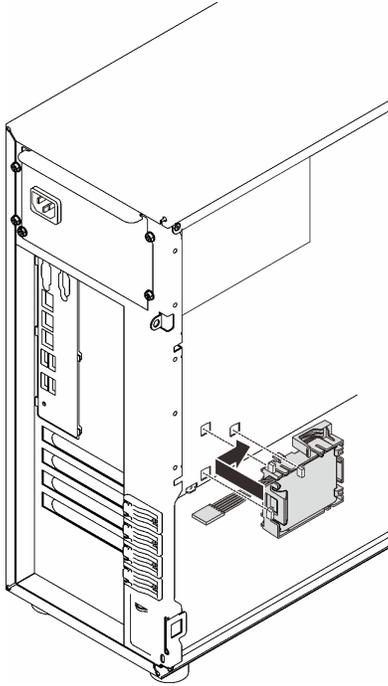
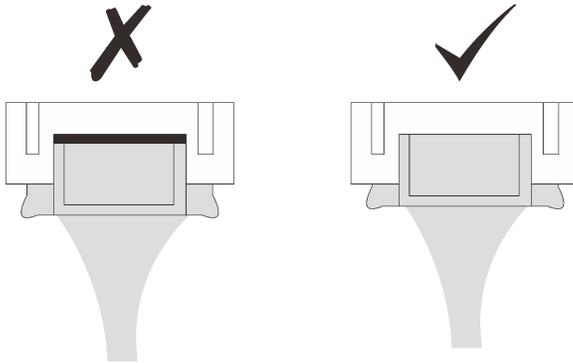


Figure 114. Installing the RAID flash power module and bracket assembly onto the chassis

Step 3. Connect the RAID flash power module cable to the RAID adapter. See “M.2 adapter, intrusion switch, and RAID flash power module” on page 66.

**Note:** Make sure that the RAID flash power module cable connector is fully seated in place as illustrated when being plugged into the connector on the 9350-8i or 9350-16i RAID adapter.



### After this task is completed

Complete the parts replacement. See “Complete the parts replacement” on page 217.

---

## Server replacement

Follow instructions in this section to remove the server from the rails or install it into the rails.

### Remove the server from the rails

Follow instructions in this section to remove ST250 V2 from the rails.

## 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.

## 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.

## 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.

## About this task

### **Attention:**

- Read the “Installation guidelines” on page 85 to ensure that you work safely.
- Turn off the server and peripheral devices, and disconnect the power cords and all external cables (see “Power off the server” on page 13).

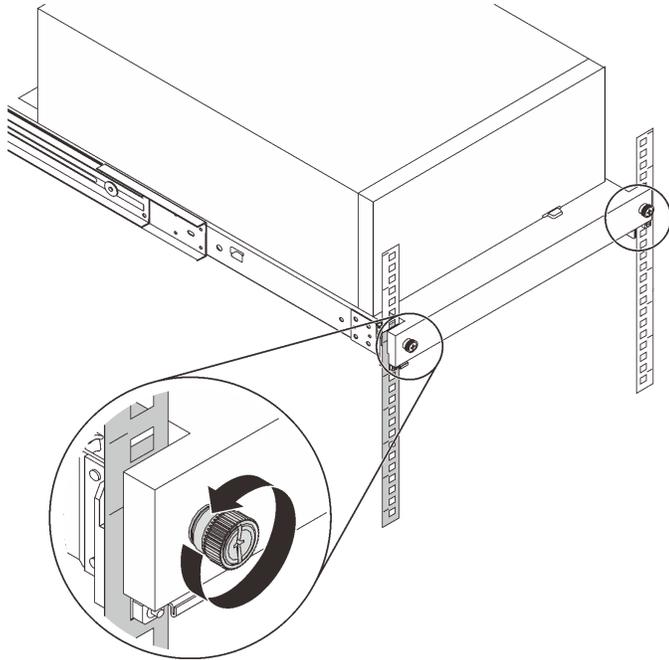
### **Watch the procedure**

A video of this procedure is available at YouTube: <https://youtube.com/playlist?list=PLYV5R7hVcs-DoEcXrm2zKNpaK0dZ3f8Qc>.

## Procedure

**Note:** Your system might look slightly different from those shown in the illustrations.

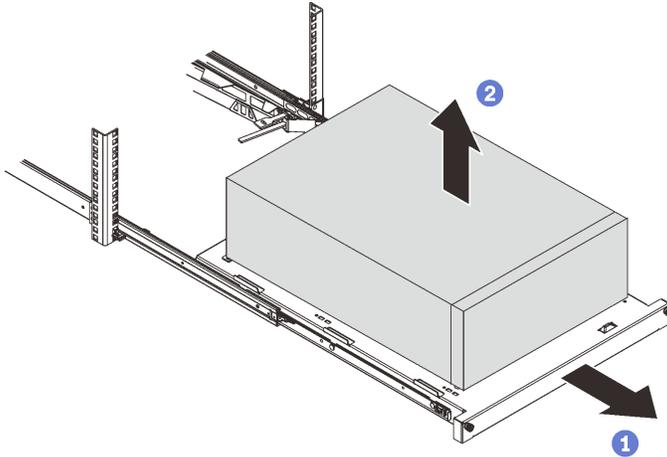
Step 1. Remove the two M6 x 16 screws on the front of the rack cabinet.



- Step 2. Remove the server from the rails.
- a. ① Slide and pull the rack server tray out of the rack cabinet.
  - b. ② Lift the server out of the tray.



**CAUTION:**  
Use safe practices when lifting the server.



### After this task is completed

1. Place the server on its side with the cover up.
2. To install the server to the rails, see “Install the server into the rails” on page 194.

### Install the server into the rails

Follow instructions in this section to install ST250 V2 into the rails.

#### 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.

#### 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.

## 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.

### About this task

#### Attention:

- Read the “Installation guidelines” on page 85 to ensure that you work safely.
- Turn off the server and peripheral devices, and disconnect the power cords and all external cables (see “Power off the server” on page 13).

#### Watch the procedure

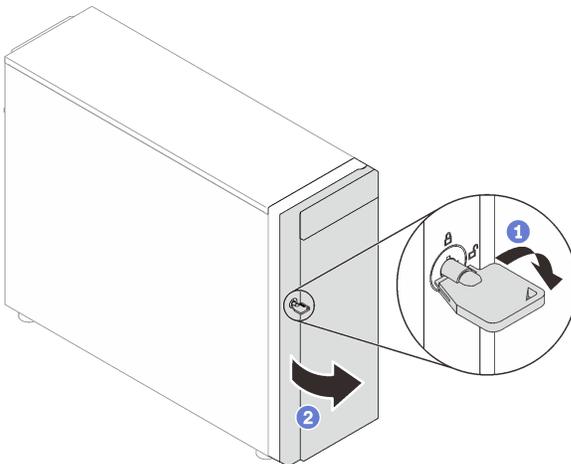
A video of this procedure is available at YouTube: <https://youtube.com/playlist?list=PLYV5R7hVcs-DoEcxrm2zKNpaK0dZ3f8Qc>.

### Procedure

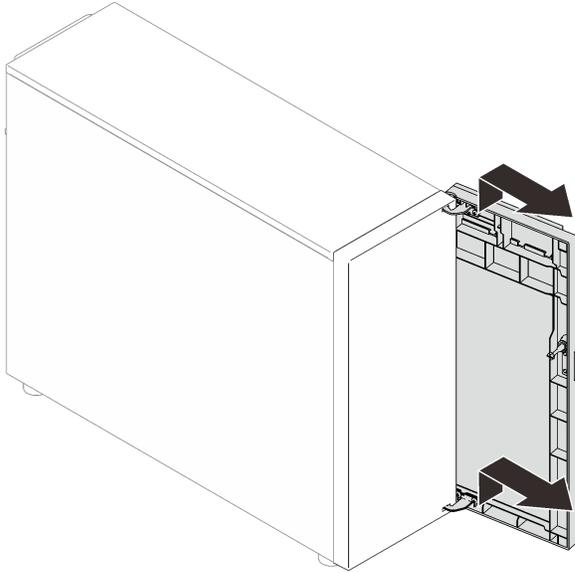
**Note:** Your system might look slightly different from those shown in the illustrations.

Step 1. Unlock ST250 V2 front door.

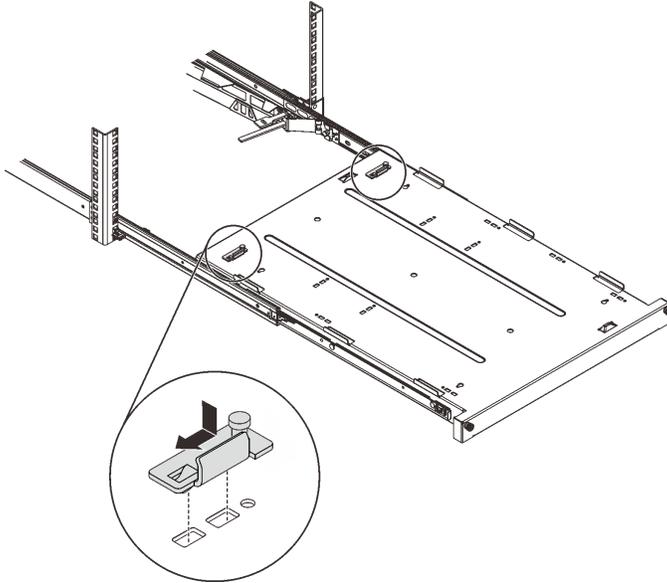
- 1 Slide and push the key into the corresponding hole on the front door and turn it clockwise to unlock the door.
- 2 Open the front door.



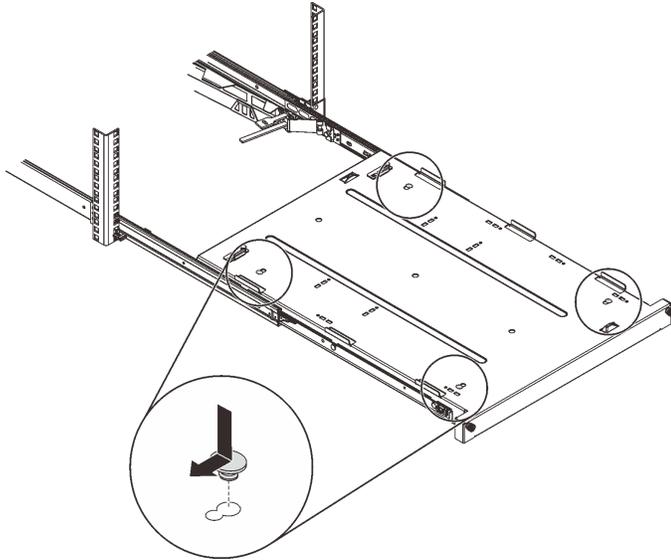
Step 2. Lift the front door to detach the hinge, and remove it from the server.



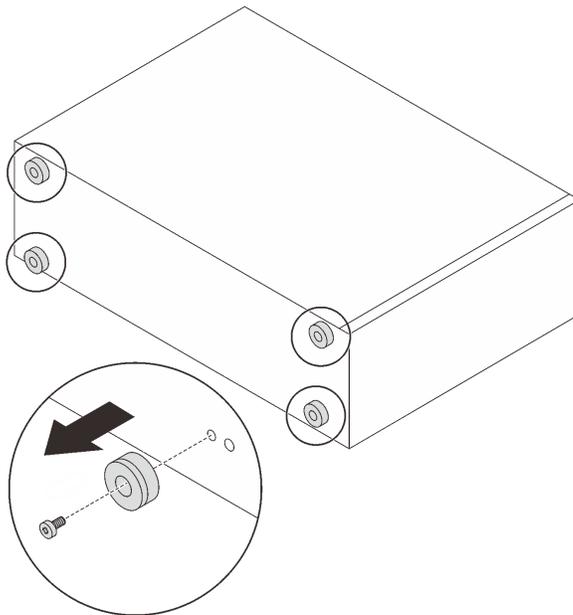
Step 3. Install the two brackets as illustrated.



Step 4. Install the four rubber safety pads as illustrated.



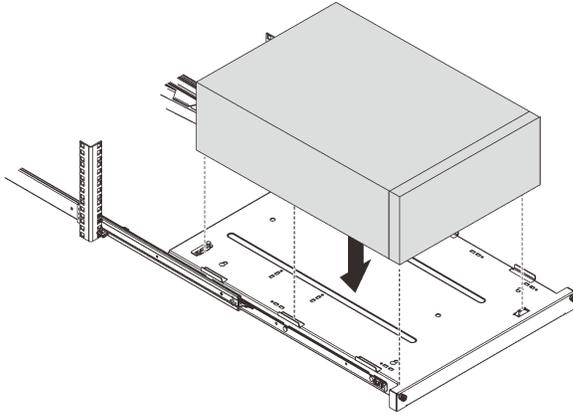
Step 5. Remove the four screws and feet from the server.



Step 6. Align the server with the brackets and the tab on the front of the tray; then, gently place the server on the tray.



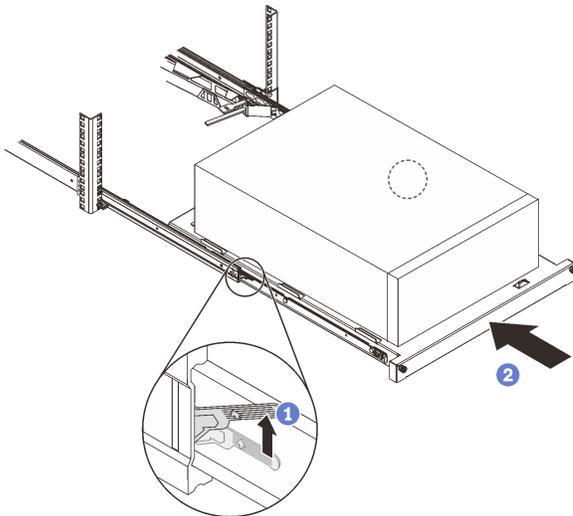
**CAUTION:**  
Use safe practices when lifting the server.



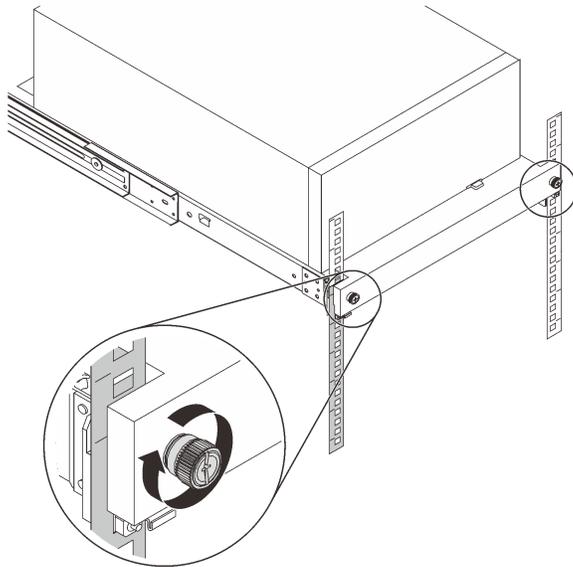
- Step 7. Install the server into the rack cabinet.
- a. ① Lift the rail latches on both sides.
  - b. ② Gently slide and push the tray into the rack cabinet.

**CAUTION:**

To avoid hurting yourself, keep your hands from the latch area when the latches approach the outer rail.



- Step 8. Secure the tray with two M6 x 16 screws to the front of the rack cabinet.



### After this task is completed

Complete the parts replacement. See “Complete the parts replacement” on page 217.

---

## Server cover replacement

Follow instructions in this section to remove and install the server cover.

### Remove the server cover

Follow instructions in this section to remove the server cover.

### About this task

To avoid potential danger, read and follow the following safety statements.

- **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.

- **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.

- **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.

**Attention:**

- Read the “Installation guidelines” on page 85 to ensure that you work safely.
- Turn off the server and peripheral devices, and disconnect the power cords and all external cables (see “Power off the server” on page 13).
- If the server is in a rack, remove it from the rack.
- Remove any locking device that secures the server cover, such as a Kensington lock or a pad lock.

**Watch the procedure**

A video of this procedure is available at YouTube: <https://youtube.com/playlist?list=PLYV5R7hVcs-DoEcxrm2zKNpaKOdZ3f8Qc>.

**Procedure**

Step 1. Remove the server cover.

- a. ① Loosen the thumbscrew that secures the server cover with a screwdriver.

**Note:** The thumbscrew is an integrated part of the server cover. Do not try to remove it from the server cover.

- b. ② Slide the server cover towards the rear of the server until the server cover is disengaged from the chassis.
- c. ③ Pivot the server cover outwards and remove it from the chassis. Place the cover on a flat clean surface.

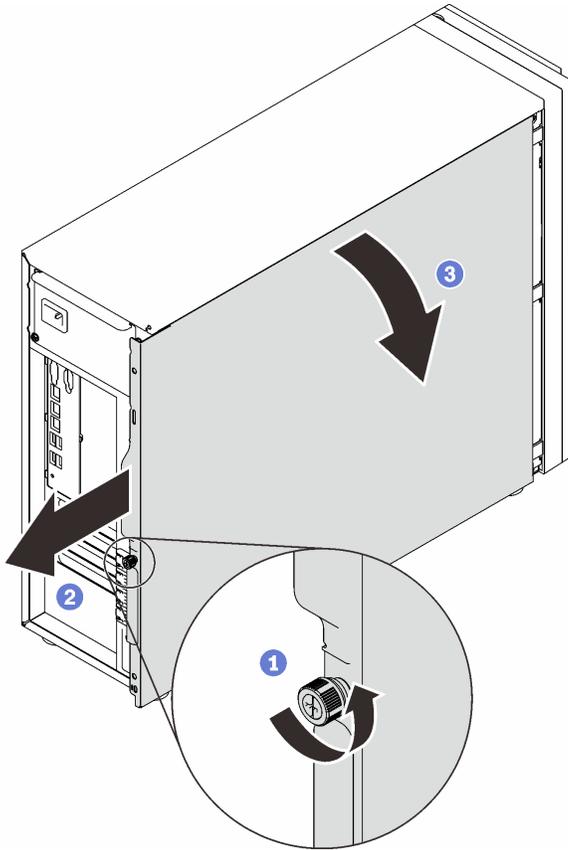


Figure 115. Removing the server cover

**Attention:** For proper cooling, always install the server cover before powering on the server. Operating the server without the cover properly installed might result in server component damage.

### After this task is completed

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

### Install the server cover

Follow instructions in this section to install the server cover.

### About this task

To avoid potential danger, read and follow the following safety statements.

- **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.

- **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.

- **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.

**Attention:**

- Read the “Installation guidelines” on page 85 to ensure that you work safely.
- Ensure that all adapters and other components are installed and seated correctly and that you have not left loose tools or parts inside the server.
- Ensure that all internal cables are correctly routed (see Chapter 3 “Internal cable routing” on page 63).
- If you are installing a new server cover, attach the service label to the inside of the new server cover first if necessary.

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

**Watch the procedure**

A video of this procedure is available at YouTube: <https://youtube.com/playlist?list=PLYV5R7hVcs-DoEcxrm2zKNpaK0dZ3f8Qc>.

**Procedure**

Step 1. Install the server cover.

- a. ① Align the tabs on the server cover with the corresponding slots on the top edge of the chassis.
- b. ② Pivot the server cover to close it.

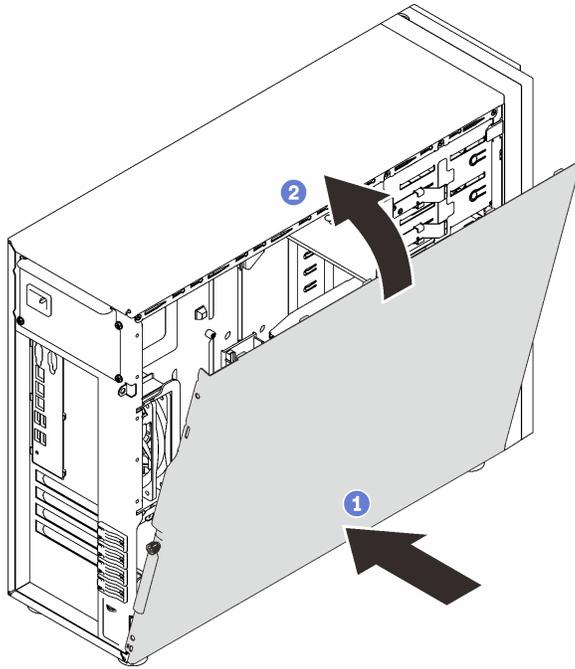


Figure 116. Positioning the server cover onto the chassis

**Note:** Before sliding the cover forward, ensure that all the tabs on the cover align to the slots and engage the chassis properly.

Step 2. Secure the server cover to the chassis.

- a. ① Slide the server cover towards the front of the chassis until it stops.
- b. ② Tighten the thumbscrew with a screwdriver to secure the server cover.

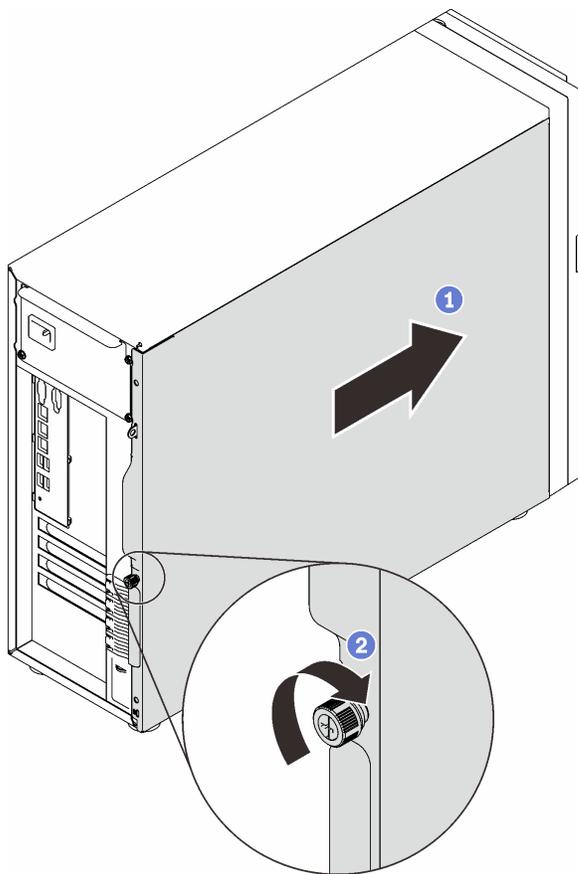


Figure 117. Securing the server cover to the chassis

### After this task is completed

Complete the parts replacement. See “Complete the parts replacement” on page 217.

---

## System board replacement (trained technician only)

Follow instructions in this section to remove and install the system board.

### Remove the system board

Follow instructions in this section to remove the system board.

### About this task

To avoid potential danger, read and follow the following safety statements.

- **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.

- **S012**



**CAUTION:**  
Hot surface nearby.

- **S017**



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

**Attention:**

- Read the “Installation guidelines” on page 85 to ensure that you work safely.
- Turn off the server and peripheral devices, and disconnect the power cords and all external cables (see “Power off the server” on page 13).
- If the server is in a rack, remove it from the rack.
- Remove any locking device that secures the server cover, such as a Kensington lock or a pad lock.

**Watch the procedure**

A video of this procedure is available at YouTube: <https://youtube.com/playlist?list=PLYV5R7hVcs-DoEcxrm2zKNpaK0dZ3f8Qc>.

**Procedure**

Step 1. Make preparations for this task.

- a. Record all system configuration information, such as Lenovo XClarity Controller IP addresses, vital product data, and the machine type, model number, serial number, Universally Unique Identifier, and asset tag of the server.
- b. Save the system configuration to an external device with Lenovo XClarity Essentials.
- c. Save the system event log to external media.
- d. Remove the server cover (see “Remove the server cover” on page 199).
- e. Remove the front and rear system fans (see “Remove the front system fan” on page 113 and “Remove the rear system fan” on page 117).
- f. Remove the M.2 boot adapter (see “Remove the M.2 boot adapter” on page 137).
- g. Remove the PCIe adapters (see “Remove a PCIe adapter” on page 159).
- h. Label the slot number on each memory module, then remove all the memory modules from the system board and set them aside on a static-protective surface for reinstallation (see “Remove a memory module” on page 146).

- i. Remove the heat sink and fan assembly (see “Remove the heat sink and fan module” on page 130).
- j. Remove the processor (see “Remove the processor” on page 184).
- k. Make note of 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.

Step 2. Place the server on the side with the system board facing up.

Step 3. Remove the eight screws that secure the system board following the recommended numerical sequence shown in the illustration; then, carefully remove the system board out of the chassis.

**Note:** For reference, the torque required to fully loosen the screws is 0.5-0.6 newton-meters, 4.5-5.5 inch-pounds.

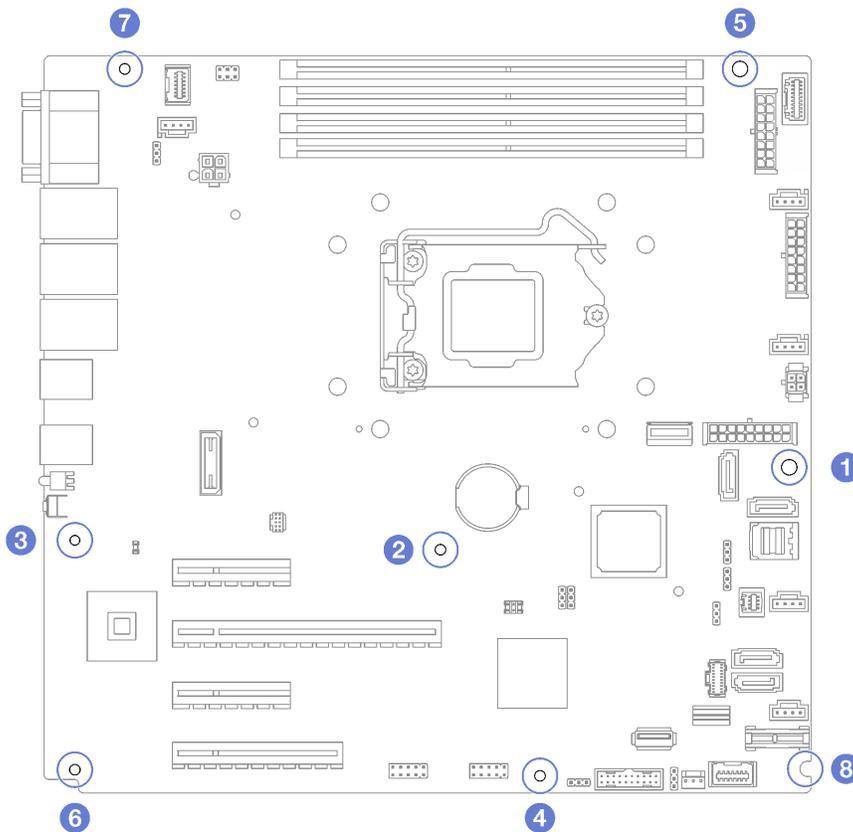


Figure 118. Removing the screws that secure the system board

Step 4. Place the system board on a clean, flat, and static-protective surface.

### After this task is completed

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

**Important:** Before you return the system board, make sure that you install the processor socket dust covers from the new system board. To replace a processor socket dust cover:

1. Take a dust cover from the processor socket assembly on the new system board and orient it correctly above the processor socket assembly on the removed system board.
2. Gently press down the dust cover legs to the processor socket assembly, pressing on the edges to avoid damage to the socket pins. You might hear a click on the dust cover is securely attached.
3. **Make sure** that the dust cover is securely attached to the processor socket assembly.

## Install the system board

Follow instructions in this section to install the system board.

### About this task

To avoid potential danger, read and follow the following safety statements.

- **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.

- **S012**



**CAUTION:**

Hot surface nearby.

- **S017**



**CAUTION:**

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

**Attention:**

- Read the “Installation guidelines” on page 85 to ensure that you work safely.
- Touch the static-protective package that contains the component to any unpainted metal surface on the server; then, remove it from the package and place it on a static-protective surface.

**Watch the procedure**

A video of this procedure is available at YouTube: <https://youtube.com/playlist?list=PLYV5R7hVcs-DoEcxrm2zKNpaKOdZ3f8Qc>.

## Procedure

**Attention:** Before install the new system board, make sure that the power supply cage has been installed into the chassis to avoid damaging components on the system board.

Step 1. Note the orientation of the new system board, and carefully place it into the chassis. Ensure that the serial port on the system board is inserted into the corresponding slot, and the eight screw holes on the system board are aligned with the corresponding mounting studs on the chassis.

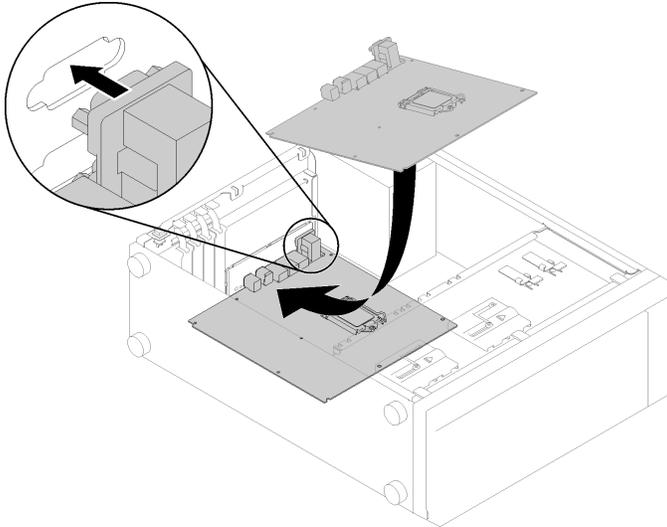


Figure 119. Installing the system board

Step 2. Secure the system board by tightening the eight screws in the sequence shown in the illustration.

**Note:** For reference, the torque required to fully tighten the screws is 0.5-0.6 newton-meters, 4.5-5.5 inch-pounds.

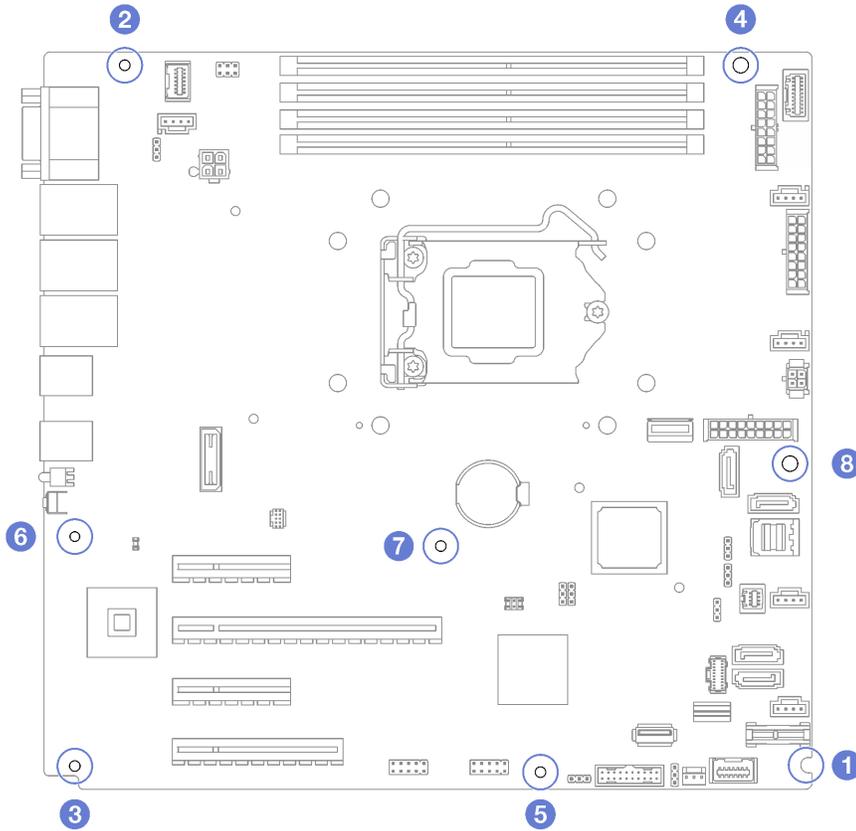


Figure 120. Tightening the screws to secure the system board

### After this task is completed

1. Install any components that you removed from the failing system board. See the related topics in Chapter 4 “Hardware replacement procedures” on page 85.
2. Complete the parts replacement. See “Complete the parts replacement” on page 217.
3. Update the machine type and serial number with new vital product data (VPD). Use the Lenovo XClarity Provisioning Manager to update the machine type and serial number. See “Update the machine type and serial number” on page 209.
4. Enable TPM. See “Enable TPM” on page 211
5. Optionally, enable Secure Boot. See “Enable UEFI Secure Boot” on page 213.

### Update the machine type and serial number

After the system board is replaced by trained service technicians, the machine type and serial number must be updated.

There are two methods available to update the machine type and serial number:

- From Lenovo XClarity Provisioning Manager

To update the machine type and serial number from Lenovo XClarity Provisioning Manager:

1. Start the server and press F1 to display the Lenovo XClarity Provisioning Manager interface.
2. If the power-on Administrator password is required, enter the password.
3. From the System Summary page, click **Update VPD**.

4. Update the machine type and serial number.

- From Lenovo XClarity Essentials OneCLI

Lenovo XClarity Essentials OneCLI sets the machine type and serial number in the Lenovo XClarity Controller. Select one of the following methods to access the Lenovo XClarity Controller and set the machine type and serial number:

- Operate from the target system, such as LAN or keyboard console style (KCS) access
- Remote access to the target system (TCP/IP based)

To update the machine type and serial number from Lenovo XClarity Essentials OneCLI:

1. Download and install Lenovo XClarity Essentials OneCLI.

To download Lenovo XClarity Essentials OneCLI, go to the following site:

<https://datacentersupport.lenovo.com/solutions/HT116433>

2. Copy and unpack the OneCLI package, which also includes other required files, to the server. Make sure that you unpack the OneCLI and the required files to the same directory.
3. After you have Lenovo XClarity Essentials OneCLI in place, type the following commands to set the machine type and serial number:

```
onecli config set SYSTEM_PROD_DATA.SysInfoProdName <m/t_model> [access_method]
onecli config set SYSTEM_PROD_DATA.SysInfoSerialNum <s/n> [access_method]
```

Where:

*<m/t\_model>*

The server machine type and model number. Type *m t m xxxxyyy*, where *xxxx* is the machine type and *yyy* is the server model number.

*<s/n>*

The serial number on the server. Type *sn zzzzzzz*, where *zzzzzz* is the serial number.

*[access\_method]*

The access method that you select to use from the following methods:

- Online authenticated LAN access, type the command:

```
[--bmc-username xcc_user_id --bmc-password xcc_password]
```

Where:

*xcc\_user\_id*

The BMC/IMM/XCC account name (1 of 12 accounts). The default value is USERID.

*xcc\_password*

The BMC/IMM/XCC account password (1 of 12 accounts).

Example commands are as follows:

```
onecli config set SYSTEM_PROD_DATA.SysInfoProdName <m/t_model> --bmc-username xcc_user_id
--bmc-password xcc_password
onecli config set SYSTEM_PROD_DATA.SysInfoSerialNum <s/n> --bmc-username xcc_user_id
--bmc-password xcc_password
```

- Online KCS access (unauthenticated and user restricted):

You do not need to specify a value for *access\_method* when you use this access method.

Example commands are as follows:

```
onecli config set SYSTEM_PROD_DATA.SysInfoProdName <m/t_model>
onecli config set SYSTEM_PROD_DATA.SysInfoSerialNum <s/n>
```

**Note:** The KCS access method uses the IPMI/KCS interface, which requires that the IPMI driver be installed.

- Remote LAN access, type the command:  
[**--bmc** xcc\_user\_id:xcc\_password@xcc\_external\_ip]

Where:

*xcc\_external\_ip*

The BMC/IMM/XCC IP address. There is no default value. This parameter is required.

*xcc\_user\_id*

The BMC/IMM/XCC account (1 of 12 accounts). The default value is USERID.

*xcc\_password*

The BMC/IMM/XCC account password (1 of 12 accounts).

**Note:** BMC, IMM, or XCC internal LAN/USB IP address, account name, and password are all valid for this command.

Example commands are as follows:

```
onecli config set SYSTEM_PROD_DATA.SysInfoProdName <m/t_model>
--bmc xcc_user_id:xcc_password@xcc_external_ip
onecli config set SYSTEM_PROD_DATA.SysInfoSerialNum <s/n>
--bmc xcc_user_id:xcc_password@xcc_external_ip
```

4. Reset the Lenovo XClarity Controller to the factory defaults. See “Resetting the BMC to Factory Default” section in the XCC documentation compatible with your server at [https://sysmgt.lenovofiles.com/help/topic/ixcc\\_frontend/ixcc\\_overview.html](https://sysmgt.lenovofiles.com/help/topic/ixcc_frontend/ixcc_overview.html).

## Enable TPM

The server supports Trusted Platform Module (TPM), Version 1.2 or Version 2.0.

**Note:** For customers in Chinese Mainland, integrated TPM is not supported. However, customers in Chinese Mainland can install a Lenovo-qualified TPM adapter (sometimes called a daughter card).

When a system board is replaced, you must make sure that the TPM policy is set correctly.

### CAUTION:

**Take special care when setting the TPM policy. If it is not set correctly, the system board can become unusable.**

## Set the TPM policy

By default, a replacement system board is shipped with the TPM policy set to **undefined**. You must modify this setting to match the setting that was in place for the system board that is being replaced.

There are two methods available to set the TPM policy:

- From Lenovo XClarity Provisioning Manager

To set the TPM policy from Lenovo XClarity Provisioning Manager:

1. Start the server and press F1 to display the Lenovo XClarity Provisioning Manager interface.
2. If the power-on Administrator password is required, enter the password.
3. From the System Summary page, click **Update VPD**.
4. Set the policy to one of the following settings.

- **NationZ TPM 2.0 enabled - China only.** Customers in the Chinese Mainland should choose this setting if a NationZ TPM 2.0 adapter is installed.

- **TPM enabled - ROW.** Customers outside of the Chinese Mainland should choose this setting.
- **Permanently disabled.** Customers in the Chinese Mainland should use this setting if no TPM adapter is installed.

**Note:** Although the setting **undefined** is available as a policy setting, it should not be used.

- From Lenovo XClarity Essentials OneCLI

**Note:** Please note that a Local IPMI user and password must be setup in Lenovo XClarity Controller for remote accessing to the target system.

To set the TPM policy from Lenovo XClarity Essentials OneCLI:

1. Read TpmTcmPolicyLock to check whether the TPM\_TCM\_POLICY has been locked:

```
OneCli.exe config show imm.TpmTcmPolicyLock --override --imm <userid>:<password>@<ip_address>
```

**Note:** The imm.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 XCC:

- For customers in Chinese Mainland with no TPM, or customers that require to disable TPM:

```
OneCli.exe config set imm.TpmTcmPolicy "NeitherTpmNorTcm" --override --imm <userid>:<password>@<ip_address>
```

- For customers in Chinese Mainland that require to enable TPM:

```
OneCli.exe config set imm.TpmTcmPolicy "NationZTPM20Only" --override --imm <userid>:<password>@<ip_address>
```

- For customers outside Chinese Mainland that require to enable TPM:

```
OneCli.exe config set imm.TpmTcmPolicy "TpmOnly" --override --imm <userid>:<password>@<ip_address>
```

3. Issue reset command to reset system:

```
OneCli.exe misc ospower reboot --imm <userid>:<password>@<ip_address>
```

4. Read back the value to check whether the change has been accepted:

```
OneCli.exe config show imm.TpmTcmPolicy --override --imm <userid>:<password>@<ip_address>
```

**Notes:**

- If the read back value is matched it means the TPM\_TCM\_POLICY has been set correctly.

imm.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 NationZ\_TPM20\_ALLOWED.
- Below 4 steps must also be used to 'lock' the TPM\_TCM\_POLICY when using OneCli/ASU commands:

5. Read TpmTcmPolicyLock to check whether the TPM\_TCM\_POLICY has been locked, command as below:

```
OneCli.exe config show imm.TpmTcmPolicyLock --override --imm <userid>:<password>@<ip_address>
```

The value must be 'Disabled', it means TPM\_TCM\_POLICY is NOT locked and must be set.

6. Lock the TPM\_TCM\_POLICY:

```
OneCli.exe config set imm.TpmTcmPolicyLock "Enabled"--override --imm <userid>:<password>@<ip_address>
```

7. Issue reset command to reset system, command as below:

```
OneCli.exe misc ospower reboot --imm <userid>:<password>@<ip_address>
```

During the reset, UEFI will read the value from `imm.TpmTcmPolicyLock`, if the value is 'Enabled' and the `imm.TpmTcmPolicy` value is valid, UEFI will lock the `TPM_TCM_POLICY` setting.

**Note:** The valid values for `imm.TpmTcmPolicy` include 'NeitherTpmNorTcm', 'TpmOnly', and 'NationZTPM20Only'.

If the `imm.TpmTcmPolicyLock` is set as 'Enabled' but `imm.TpmTcmPolicy` value is invalid, UEFI will reject the 'lock' request and change `imm.TpmTcmPolicyLock` back to 'Disabled'.

8. Read back the value to check whether the 'Lock' is accepted or rejected. command as below:

```
OneCli.exe config show imm.TpmTcmPolicy --override --imm <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.

`imm.TpmTcmPolicyLock` is defined as below:

Value 1 uses string "Enabled" , which means lock the policy. Other values are not accepted.

## Enable UEFI Secure Boot

Optionally, you can enable UEFI Secure Boot.

There are two methods available to enable UEFI Secure Boot:

- From Lenovo XClarity Provisioning Manager

To enable UEFI Secure Boot from Lenovo XClarity Provisioning Manager:

1. Start the server and press F1 to display the Lenovo XClarity Provisioning Manager interface.
2. If the power-on Administrator password is required, enter the password.
3. From the UEFI Setup page, click **System Settings → Security → Secure Boot**.
4. Enable Secure Boot and save the settings.

- From Lenovo XClarity Essentials OneCLI

To enable UEFI Secure Boot from Lenovo XClarity Essentials OneCLI:

1. Download and install Lenovo XClarity Essentials OneCLI.

To download Lenovo XClarity Essentials OneCLI, go to the following site:

<https://datacentersupport.lenovo.com/solutions/HT116433>

2. Run the following command to enable Secure Boot:

```
OneCli.exe config set SecureBootConfiguration.SecureBootSetting Enabled  
--bmc <userid>:<password>@<ip_address>
```

where:

- `<userid>:<password>` are the credentials used to access the BMC (Lenovo XClarity Controller 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.

For more information about the Lenovo XClarity Essentials OneCLI **set** command, see:

[http://sysmgt.lenovofiles.com/help/topic/toolstr\\_cli\\_lenovo/onecli\\_r\\_set\\_command.html](http://sysmgt.lenovofiles.com/help/topic/toolstr_cli_lenovo/onecli_r_set_command.html)

---

## Tape drive replacement

Follow instructions in this section to remove and install the tape drive.

Your server supports RDX and LTO tape drives.

### Remove a tape drive

Follow instructions in this section to remove a tape drive.

#### About this task

To avoid potential danger, read and follow the following safety statements.

- **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.

- **S006**



**CAUTION:**

When laser products (such as CD-ROMs, DVD drives, fiber optic devices, or transmitters) are installed, note the following:

- Do not remove the covers. Removing the covers of the laser product could result in exposure to hazardous laser radiation. There are no serviceable parts inside the device.
- Use of controls or adjustments or performance of procedures other than those specified herein might result in hazardous radiation exposure.

**Attention:**

- Read the “Installation guidelines” on page 85 to ensure that you work safely.
- Turn off the server and peripheral devices, and disconnect the power cords and all external cables (see “Power off the server” on page 13).
- If the server is in a rack, remove it from the rack.
- Remove any locking device that secures the server cover, such as a Kensington lock or a pad lock.
- Use the front door key to unlock the front door, and then open the front door.

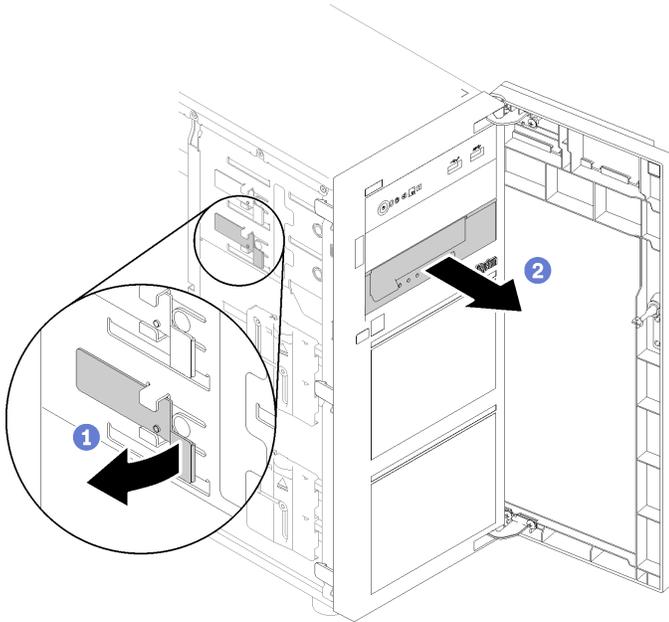
#### Watch the procedure

A video of this procedure is available at YouTube: <https://youtube.com/playlist?list=PLYV5R7hVcs-DoEcxrm2zKNpaK0dZ3f8Qc>.

## Procedure

- Step 1. Remove the server cover (see “Remove the server cover” on page 199).
- Step 2. Disconnect the cables from the rear of the tape drive.
- Step 3. Gently pull the metal tab on the side of the chassis and push the tape drive outward from the rear; then, draw the tape drive out of the chassis.

Figure 121. Removing a tape drive



## After this task is completed

1. Install one of the following:
  - Another tape drive or an optical drive.  
See “Install a tape drive” on page 215 or “Install an optical drive” on page 155.
  - A drive filler in the vacant drive bay.
2. If you are instructed to return the component or optional device, follow all packaging instructions, and use any packaging materials for shipping that are supplied to you.

## Install a tape drive

Follow instructions in this section to install a tape drive.

## About this task

To avoid potential danger, read and follow the following safety statements.

- **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.

- **S006**

**CAUTION:**

When laser products (such as CD-ROMs, DVD drives, fiber optic devices, or transmitters) are installed, note the following:

- Do not remove the covers. Removing the covers of the laser product could result in exposure to hazardous laser radiation. There are no serviceable parts inside the device.
- Use of controls or adjustments or performance of procedures other than those specified herein might result in hazardous radiation exposure.

**Attention:**

- Read the “Installation guidelines” on page 85 to ensure that you work safely.
- Touch the static-protective package that contains the component to any unpainted metal surface on the server; then, remove it from the package and place it on a static-protective surface.

**Watch the procedure**

A video of this procedure is available at YouTube: <https://youtube.com/playlist?list=PLYV5R7hVcs-DoEcxrm2zKNpaK0dZ3f8Qc>.

**Procedure**

- Step 1. The tape drive must be installed into the lower optical drive bay. If a filler is installed in the drive bay, remove it first. Keep the drive filler in a safe place for future use.
- Step 2. Insert the tape drive into the lower drive bay, and slide it in until it is obstructed. Gently pull the metal tab on the side of the chassis, and then continue to slide the tape drive in until it snaps into place.

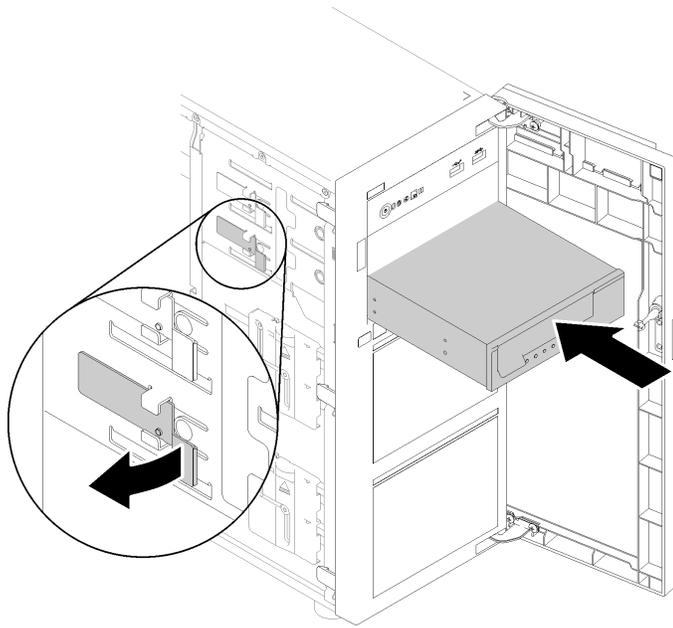


Figure 122. Installing a tape drive

Step 3. Connect the power and signal cables to the rear of the tape drive. See “Optical/tape drives” on page 66.

### After this task is completed

Complete the parts replacement. See “Complete the parts replacement” on page 217.

---

## 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 server cover, reinstall it. See “Install the server cover” on page 201.
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.
  - Download and install the latest device drivers: <http://datacentersupport.lenovo.com>
  - Update the system firmware. See “Firmware updates” on page 9.
  - Update the UEFI configuration.
  - Reconfigure the disk arrays if you have installed or removed a hot-swap drive or a RAID adapter. See the Lenovo XClarity Provisioning Manager User Guide, which is available for download at: <http://datacentersupport.lenovo.com>



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## Chapter 5. 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 XClarity Controller 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 XClarity Controller or by UEFI in the servers. These alerts are stored in the Lenovo XClarity Controller Event Log. If the server is managed by the Chassis Management Module 2 or by the Lenovo XClarity Administrator, alerts are automatically forwarded to those management applications.

**Note:** For a listing of events, including user actions that might need to be performed to recover from an event, see the *Messages and Codes Reference*, which is available at: [http://thinksystem.lenovofiles.com/help/topic/7D8F/pdf\\_files.html](http://thinksystem.lenovofiles.com/help/topic/7D8F/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.

## Logs

The Event log provides a history of hardware and management conditions that have been detected.

Show:

All Event Sources

All Dates

Severity	Serviceability	Date and Time	System	Event	System Type	Source ID
Warning	Support	Jan 30, 2017, 7:48:07 AM	Chassis114:...	Node Node 08 device	Chassis	Jan 30, 20
Warning	Support	Jan 30, 2017, 7:48:07 AM	Chassis114:...	Node Node 02 device	Chassis	Jan 30, 20
Warning	User	Jan 30, 2017, 7:48:07 AM	Chassis114:...	I/O module IO Module	Chassis	Jan 30, 20
Warning	User	Jan 30, 2017, 7:48:07 AM	Chassis114:...	Node Node 08 incom	Chassis	Jan 30, 20

Figure 123. Lenovo XClarity Administrator event log

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

[http://sysmgt.lenovofiles.com/help/topic/com.lenovo.lxca.doc/events\\_vieweventlog.html](http://sysmgt.lenovofiles.com/help/topic/com.lenovo.lxca.doc/events_vieweventlog.html)

## Lenovo XClarity Controller event log

The Lenovo XClarity Controller 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 XClarity Controller provides various interfaces to systems management software and to system administrators and users to enable remote management and control of a server.

The Lenovo XClarity Controller monitors all components of the server and posts events in the Lenovo XClarity Controller event log.

ThinkSystem System name: XCC0023579PK

Event Log Audit Log Maintenance History

Customize Table Clear Logs Refresh

Type: All Source All Date

Severity	Source	Event ID	Message	Date
	System	0X4000000E00000000	Remote login successful. Login ID: userid from webguis at IP address: 10.104.194.180.	27 Jul 2015, 08:11:04 AM
	System	0X4000000E00000000	Remote login successful. Login ID: userid from webguis at IP address: 10.104.194.180.	27 Jul 2015, 08:11:04 AM
	System	0X4000000E00000000	Remote login successful. Login ID: userid from webguis at IP address: 10.104.194.180.	27 Jul 2015, 08:11:04 AM
	System	0X4000000E00000000	Remote login successful. Login ID: userid from webguis at IP address: 10.104.194.180.	27 Jul 2015, 08:11:04 AM

Figure 124. Lenovo XClarity Controller event log

For more information about accessing the Lenovo XClarity Controller event log, see:

“Viewing Event Logs” section in the XCC documentation compatible with your server at [https://sysmgt.lenovofiles.com/help/topic/lxcc\\_frontend/lxcc\\_overview.html](https://sysmgt.lenovofiles.com/help/topic/lxcc_frontend/lxcc_overview.html)

---

## General problem determination procedures

Use the information in this section to resolve problems if the event log does not contain specific errors or the server is inoperative.

If you are not sure about the cause of a problem and the power supplies are working correctly, complete the following steps to attempt to resolve the problem:

1. Power off the server.
2. Make sure that the server is cabled correctly.
3. Remove or disconnect the following devices if applicable, one at a time, until you find the failure. Power on and configure the server each time you remove or disconnect a device.
  - Any external devices.
  - Surge-suppressor device (on the server).
  - Printer, mouse, and non-Lenovo devices.
  - Each adapter.
  - Hard disk drives.
  - Memory modules until you reach the minimum configuration that is supported for the server.

See “Specifications” on page 3 to determine the minimum configuration for your server.

4. Power on the server.

If the problem is solved when you remove an adapter from the server, but the problem recurs when you install the same adapter again, suspect the adapter. If the problem recurs when you replace the adapter with a different one, try a different PCIe slot.

If the problem appears to be a networking problem and the server passes all system tests, suspect a network cabling problem that is external to the server.

## Resolving suspected power problems

Power problems can be difficult to solve. For example, a short circuit can exist anywhere on any of the power distribution buses. Usually, a short circuit will cause the power subsystem to shut down because of an overcurrent condition.

Complete the following steps to diagnose and resolve a suspected power problem.

Step 1. Check the event log and resolve any errors related to the power.

**Note:** Start with the event log of the application that is managing the server. For more information about event logs, see “Event logs” on page 219.

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 Network activity LED on the rear of the server. The Network activity LED is lit when data is active on the Ethernet network. If the Network 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

Follow this procedure 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 XClarity Controller event log.

For more information about event logs, see “Event logs” on page 219.

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 241).

## Power on and power off problems

Follow this procedure to resolve issues when powering on or powering off the server.

- “Embedded hypervisor is not in the boot list” on page 223
- “The power button does not work (server does not start)” on page 223
- “Server does not power on” on page 224
- “Server does not power off” on page 224

### Embedded hypervisor is not in the boot list

Complete the following steps until the problem is solved.

1. If the server has been installed, moved, or serviced recently, or if this is the first time the embedded hypervisor is being used, make sure that the device is connected properly and that there is no physical damage to the connectors.
2. See the documentation that comes with the optional embedded hypervisor flash device for setup and configuration information.
3. Check <https://static.lenovo.com/us/en/serverproven/index.shtml> 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 XClarity Controller product documentation:

[https://sysmgmt.lenovofiles.com/help/topic/lxcc\\_frontend/lxcc\\_overview.html](https://sysmgmt.lenovofiles.com/help/topic/lxcc_frontend/lxcc_overview.html)

5. Check <http://datacentersupport.lenovo.com> for any tech tips (service bulletins) related to the embedded hypervisor and the server.
6. Make sure that other software works on the server to ensure that it is working properly.

### The power button does not work (server does not start)

**Note:** The power 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 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:
  - DIMMs
  - 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. Check the event log for any events related to the server not powering on.
2. Check for any LEDs that are flashing amber.
3. Check the power LED on the system board.
4. Reseat the power supply.
5. 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 button and holding it down for 5 seconds.
  - c. Restart the server.
  - d. If the server fails POST and the power 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**

Follow this procedure to resolve issues related to memory.

- “Displayed system memory less than installed physical memory” on page 224
- “Multiple rows of DIMMs in a branch identified as failing” on page 225

### **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. 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. Reseat the DIMMs, and then restart the server.

3. Run memory diagnostics. When you start a server and press F1, the Lenovo XClarity Provisioning Manager interface is displayed by default. You can perform memory diagnostics from this interface. From the Diagnostic page, click **Run Diagnostic → Memory test**.
4. Check the POST error log:
  - If a DIMM was disabled by a systems-management interrupt (SMI), replace the DIMM.
  - If a DIMM was disabled by the user or by POST, reseat the DIMM; then, run the Setup utility and enable the DIMM.
5. Reseat the DIMM.
6. Restart the server.

### 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

Follow this procedure to resolve issues related to the hard disk drives.

- “Server cannot recognize a hard drive” on page 225
- “Multiple hard drives fail” on page 226
- “Multiple hard drives are offline” on page 226
- “A replacement hard disk drive does not rebuild” on page 226
- “Green hard disk drive activity LED does not represent actual state of associated drive” on page 226
- “Yellow hard disk drive status LED does not represent actual state of associated drive” on page 227

### Server cannot recognize a hard drive

Complete the following steps until the problem is solved.

1. Observe the associated yellow hard disk drive status LED. If the LED is lit, it indicates a drive fault.
2. If the 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 LXPM interface is displayed by default. You can perform hard 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 F1, the LXPM interface is displayed by default. You can perform hard 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 drives fail**

Complete the following steps until the problem is solved:

- View the Lenovo XClarity Controller event log for events related to power supplies or vibration issues 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 drives are offline**

Complete the following steps until the problem is solved:

- View the Lenovo XClarity Controller event log for events related to power supplies or vibration issues 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 LXPM interface is displayed by default. You can perform hard 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. Power on the server and observe the activity of the hard disk drive LEDs.

## **Monitor and video problems**

Follow this procedure to solve problems related to a monitor or video.

- “Incorrect characters are displayed” on page 227
- “Screen is blank” on page 227
- “Screen goes blank when you start some application programs” on page 228
- “The monitor has screen jitter, or the screen image is wavy, unreadable, rolling, or distorted.” on page 228
- “The wrong characters appear on the screen” on page 228
- “Management controller remote presence cannot work” on page 228

### **Incorrect characters are displayed**

Complete the following steps:

1. Verify that the language and locality settings are correct for the keyboard and operating system.
2. If the wrong language is displayed, update the server firmware to the latest level. See “Firmware updates” on page 9.

### **Screen is blank**

1. If the server is attached to a KVM switch, bypass the KVM switch to eliminate it as a possible cause of the problem: connect the monitor cable directly to the correct connector on the rear of the server.
2. If the server 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.
3. Make sure that:
  - The server is turned on. If there is no power to the server.
  - The monitor cables are connected correctly.
  - The monitor is turned on and the brightness and contrast controls are adjusted correctly.
4. Make sure that the correct server is controlling the monitor, if applicable.
5. Make sure that corrupted server firmware is not affecting the video; see “Firmware updates” on page 9.
6. Observe the LEDs on the system board; if the codes are changing, go to step 6.
7. Replace the following components one at a time, in the order shown, restarting the server each time:
  - a. Monitor

- b. Video adapter (if one is installed)
- c. (Trained technician only) System board

### **Screen goes blank when you start some application programs**

1. Make sure that:
  - The application program is not setting a display mode that is higher than the capability of the monitor.
  - You installed the necessary device drivers for the application.

### **The monitor has screen jitter, or the screen image is wavy, unreadable, rolling, or distorted.**

1. If the monitor self-tests show that the monitor is working correctly, consider the location of the monitor. Magnetic fields around other devices (such as transformers, appliances, fluorescents, and other monitors) can cause screen jitter or wavy, unreadable, rolling, or distorted screen images. If this happens, turn off the monitor.

**Attention:** Moving a color monitor while it is turned on might cause screen discoloration.

Move the device and the monitor at least 305 mm (12 in.) apart, and turn on the monitor.

#### **Notes:**

- a. To prevent diskette drive read/write errors, make sure that the distance between the monitor and any external diskette drive is at least 76 mm (3 in.).
  - b. Non-Lenovo monitor cables might cause unpredictable problems.
2. Reseat the monitor cable.
  3. Replace the components listed in step 2 one at a time, in the order shown, restarting the server each time:
    - a. Monitor cable
    - b. Video adapter (if one is installed)
    - c. Monitor
    - d. (Trained technician only) System board

### **The wrong characters appear on the screen**

Complete the following steps until the problem is solved:

1. Verify that the language and locality settings are correct for the keyboard and operating system.
2. If the wrong language is displayed, update the server firmware to the latest level. See “Firmware updates” on page 9.

### **Management controller remote presence cannot work**

The management controller remote presence function is unable to display the system screen when an optional video adapter is present. To use the management controller remote presence function, remove the optional video adapter or use the onboard VGA as the display device.

## **Keyboard, mouse, or USB-device problems**

Follow this procedure to solve problems related to a keyboard, mouse, or USB device.

- “All or some keys on the keyboard do not work.” on page 229
- “Mouse does not work.” on page 229
- “USB-device does not work.” on page 229

### **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 LXPM system setup interface. Then, click **System Settings → Devices and I/O Ports → 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**

Follow this procedure to solve problems related to optional devices.

- “External USB device not recognized” on page 229
- “PCIe adapter is not recognized or is not functioning” on page 230
- “A Lenovo optional device that worked previously does not work now. ” on page 230
- “A Lenovo optional device that was just installed does not work.” on page 230
- “A Lenovo optional device that worked previously does not work now. ” on page 230

### **External USB device not recognized**

Complete the following steps until the problem is resolved:

1. Make sure that the proper drivers are installed on the compute node. See the product documentation for the USB device for information about device drivers.
2. Use the Setup utility to make sure that the device is configured correctly.
3. If the USB device is plugged into a hub or the console breakout cable, unplug the device and plug it directly into the USB port on the front of the compute node.

### **PCIe adapter is not recognized or is not functioning**

Complete the following steps until the problem is resolved:

1. Check the event log and resolve any issues related to the device.
2. Validate that the device is supported for the server (see <https://static.lenovo.com/us/en/serverproven/index.shtml>).
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.

### **Insufficient PCIe resources are detected.**

If you see an error message stating “Insufficient PCI Resources Detected,” complete the following steps until the problem is resolved:

1. Remove one of the PCIe adapters.
2. Restart the system and press F1 to display the Lenovo XClarity Provisioning Manager system setup interface.
3. Click **UEFI Setup → System Settings → Devices and I/O Ports → MM Config Base**; then, modify the setting to the lower memory capacity. For example, modify 3 GB to 2 GB or modify 2 GB to 1 GB.
4. Save the settings and restart the system.
5. The action for this step will differ based on whether or not the reboot is successful.
  - If the reboot is successful, shut down the solution and reinstall the PCIe card you removed.
  - If the reboot failed, repeat step 2 to step 5.

### **A Lenovo optional device that was just installed does not work.**

1. Make sure that:
  - The device is supported for the server (see <https://static.lenovo.com/us/en/serverproven/index.shtml>).
  - 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

Follow this procedure to solve problems with serial ports or devices.

- “Number of displayed serial ports is less than the number of installed serial ports” on page 231
- “Serial device does not work” on page 231

### 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

Follow this procedure to solve intermittent problems.

- “Intermittent external device problems” on page 231
- “Intermittent KVM problems” on page 232
- “Intermittent unexpected reboots” on page 232

### 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 LXPM system setup interface. Then, click **System Settings** → **Devices and I/O Ports** → **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 DIMM or a processor to allow the machine to boot up properly.

1. If the reset occurs during POST and the POST watchdog timer is enabled, make sure that sufficient time is allowed in the watchdog timeout value (POST Watchdog Timer).

To check the POST watchdog time, restart the server and press F1 to display the LXPM system setup interface. Then, click **BMC Settings → POST Watchdog Timer**.

2. 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.
3. See the management controller event log to check for an event code that indicates a reboot. See “Event logs” on page 219 for information about viewing the event log.

### **Power problems**

Follow this procedure 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**

Follow this procedure to resolve issues related to networking.

- “Cannot wake server using Wake on LAN” on page 233
- “Could not log in using LDAP account with SSL enabled” on page 233

### **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 IMM2 system event log (see “Event logs” on page 219), 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**

Follow this procedure to solve observable problems.

- “The server immediately displays the POST Event Viewer when it is turned on” on page 233
- “Server is unresponsive (POST is complete and operating system is running)” on page 234
- “Server is unresponsive (cannot press F1 to start System Setup)” on page 234
- “Voltage planar fault is displayed in the event log” on page 234
- “Unusual smell” on page 235
- “Server seems to be running hot” on page 235
- “Cracked parts or cracked chassis” on page 235

### **The server immediately displays the POST Event Viewer when it is turned on**

Complete the following steps until the problem is solved.

1. Correct any errors that are indicated by the light path diagnostics LEDs.
2. Make sure that the server supports all the processors and that the processors match in speed and cache size.

You can view processor details from system setup.

To determine if the processor is supported for the server, see <https://static.lenovo.com/us/en/serverproven/index.shtml>.

3. (Trained technician only) Make sure that processor 1 is seated correctly.
4. (Trained technician only) Remove processor 2 and restart the server.
5. Replace the following components one at a time, in the order shown, restarting the server each time:
  - a. (Trained technician only) Processor
  - b. (Trained technician only) System board

### **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.

You can specify the number of consecutive restart attempts in System Setup. Restart the server and press F1 to display the LXPM system setup interface. Then, click **System Settings → Recovery and RAS → POST Attempts → POST Attempts Limit**. Available options are 3, 6, 9, and disable.

### **Voltage planar fault is displayed in the event log**

Complete the following steps until the problem is solved.

1. Revert the system to the minimum configuration. See “Specifications” on page 3 for the minimally required number of processors and DIMMs.
2. Restart the system.

- If the system restarts, add each of the items that you removed one at a time, restarting the system each time, until the error occurs. Replace the item for which the error occurs.
- If the system does not restart, suspect the system board.

### **Unusual smell**

Complete the following steps until the problem is solved.

1. An unusual smell might be coming from newly installed equipment.
2. If the problem remains, contact Lenovo Support.

### **Server seems to be running hot**

Complete the following steps until the problem is solved.

Multiple compute nodes or chassis:

1. Make sure that the room temperature is within the specified range (see “Specifications” on page 3).
2. Check the management processor event log for rising temperature events. If there are no events, the compute node is running within normal operating temperatures. Note that you can expect some variation in temperature.

### **Cracked parts or cracked chassis**

Contact Lenovo Support.

## **Software problems**

Follow this procedure to solve software problems.

1. To determine whether the problem is caused by the software, make sure that:
  - The server has the minimum memory that is needed to use the software. For memory requirements, see the information that comes with the software.

**Note:** If you have just installed an adapter or memory, the server might have a memory-address conflict.

  - The software is designed to operate on the server.
  - Other software works on the server.
  - The software works on another server.
2. If you receive any error messages while you use the software, see the information that comes with the software for a description of the messages and suggested solutions to the problem.
3. Contact your place of purchase of the software.



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## Appendix A. Hardware disassembling for recycle

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

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### Disassemble the server for chassis recycle

Follow the instructions in this section to disassemble the server before recycling the chassis.

#### About this task

##### Attention:

- Read the “Installation guidelines” on page 85 to ensure that you work safely.
- Turn off the server and peripheral devices, and disconnect the power cords and all external cables (see “Power off the server” on page 13).
- Touch the static-protective package that contains the component to any unpainted metal surface on the server; then, remove it from the package and place it on a static-protective surface.
- If the server is in a rack, remove it from the rack.
- Lay the server on its side for easier operation.

- Step 1. Remove the front door (see “Remove the front door” on page 124).
- Step 2. Remove all the installed drives and fillers. See “Remove a hot-swap drive” on page 102 or “Remove a simple-swap drive” on page 106.
- Step 3. Remove the server cover (see “Remove the server cover” on page 199).
- Step 4. Remove the front bezel (see “Remove the front bezel” on page 122).
- Step 5. Remove the front panel board assembly. See “Remove the front panel board assembly ” on page 127.
- Step 6. Remove the optical drives and the tape drive. See “Remove an optical drive” on page 153 or “Remove a tape drive” on page 214.
- Step 7. Remove all the installed power supplies. See “Remove a hot-swap power supply” on page 176 or “Remove the fixed power supply” on page 170.
- Step 8. Remove all the M.2 drives from the M.2 boot adapter. See “Remove an M.2 drive” on page 142
- Step 9. Remove the M.2 boot adapter. See “Remove the M.2 boot adapter” on page 137.
- Step 10. Remove the RAID flash power module. See “Remove a RAID flash power module” on page 187.
- Step 11. Remove all the installed PCIe adapters. See “Remove a PCIe adapter” on page 159.
- Step 12. Remove the front and rear system fans. See “Remove the front system fan” on page 113 and “Remove the rear system fan” on page 117.
- Step 13. Remove all the drive backplanes or backplates. See “Remove the 3.5-inch/2.5-inch hot-swap drive backplane” on page 92, or “Remove the 3.5-inch simple-swap drive backplate” on page 96.
- Step 14. Remove the intrusion switch. See “Remove the intrusion switch” on page 135.
- Step 15. Remove the power distribution board. See “Remove the power distribution board of the hot-swap power supply” on page 166 or “Remove the power distribution board of the fixed power supply” on page 162.
- Step 16. Remove the memory modules that are installed on the system board. See “Remove a memory module” on page 146.
- Step 17. Remove the heat sink and fan module. See “Remove the heat sink and fan module” on page 130.

Step 18. Remove the processor. See “Remove the processor” on page 184.

Step 19. Remove the system board. See “Remove the system board” on page 204.

After disassembling the server, recycle the unit in compliance with local regulations.

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## Appendix B. Getting help and technical assistance

If you need help, service, or technical assistance or just want more information about Lenovo products, you will find a wide variety of sources available from Lenovo to assist you.

On the World Wide Web, up-to-date information about Lenovo systems, optional devices, services, and support are available at:

<http://datacentersupport.lenovo.com>

**Note:** IBM is Lenovo's preferred service provider for ThinkSystem.

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### Before you call

Before you call, there are several steps that you can take to try and solve the problem yourself. If you decide that you do need to call for assistance, gather the information that will be needed by the service technician to more quickly resolve your problem.

#### Attempt to resolve the problem yourself

You can solve many problems without outside assistance by following the troubleshooting procedures that Lenovo provides in the online help or in the Lenovo product documentation. The Lenovo product documentation also describes the diagnostic tests that you can perform. The documentation for most systems, operating systems, and programs contains troubleshooting procedures and explanations of error messages and error codes. If you suspect a software problem, see the documentation for the operating system or program.

You can find the product documentation for your ThinkSystem products at the following location:

<http://thinksystem.lenovofiles.com/help/index.jsp>

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

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

You can solve many problems without outside assistance by following the troubleshooting procedures that Lenovo provides in the online help or in the Lenovo product documentation. The Lenovo product documentation also describes the diagnostic tests that you can perform. The documentation for most systems, operating systems, and programs contains troubleshooting procedures and explanations of error messages and error codes. If you suspect a software problem, see the documentation for the operating system or program.

## Gathering information needed to call Support

If you believe that you require warranty service for your Lenovo product, the service technicians will be able to assist you more efficiently if you prepare before you call. You can also see <http://datacentersupport.lenovo.com/warrantylookup> for more information about your product warranty.

Gather the following information to provide to the service technician. This data will help the service technician quickly provide a solution to your problem and ensure that you receive the level of service for which you might have contracted.

- Hardware and Software Maintenance agreement contract numbers, if applicable
- Machine type number (Lenovo 4-digit machine identifier)
- Model number
- Serial number
- Current system UEFI and firmware levels
- Other pertinent information such as error messages and logs

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

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## Collecting service data

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

Service data can be collected through the following tools:

- **Lenovo XClarity Provisioning Manager**

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

- **Lenovo XClarity Controller**

You can use the Lenovo XClarity Controller web interface or the CLI to collect service data for the server. The file can be saved and sent to Lenovo Support.

- For more information about using the web interface to collect service data, see the “Downloading service data” section in the XCC documentation version compatible with your server at [https://sysmgt.lenovofiles.com/help/topic/lxcc\\_frontend/lxcc\\_overview.html](https://sysmgt.lenovofiles.com/help/topic/lxcc_frontend/lxcc_overview.html).
- For more information about using the CLI to collect service data, see the “ffdc command” section in the XCC documentation version compatible with your server at [https://sysmgt.lenovofiles.com/help/topic/lxcc\\_frontend/lxcc\\_overview.html](https://sysmgt.lenovofiles.com/help/topic/lxcc_frontend/lxcc_overview.html).

- **Lenovo XClarity Administrator**

Lenovo XClarity Administrator can be set up to collect and send diagnostic files automatically to Lenovo Support when certain serviceable events occur in Lenovo XClarity Administrator and the managed endpoints. You can choose to send diagnostic files to Lenovo Support using Call Home or to another service provider using SFTP. You can also manually collect diagnostic files, open a problem record, and send diagnostic files to the Lenovo Support Center.

You can find more information about setting up automatic problem notification within the Lenovo XClarity Administrator at [http://sysmgt.lenovofiles.com/help/topic/com.lenovo.lxca.doc/admin\\_setupcallhome.html](http://sysmgt.lenovofiles.com/help/topic/com.lenovo.lxca.doc/admin_setupcallhome.html).

- **Lenovo XClarity Essentials OneCLI**

Lenovo XClarity Essentials OneCLI has inventory application to collect service data. It can run both in-band and out-of-band. When running in-band within the host operating system on the server, OneCLI can collect information about the operating system, such as the operating system event log, in addition to the hardware service data.

To obtain service data, you can run the **getinfor** command. For more information about running the **getinfor**, see [http://sysmgt.lenovofiles.com/help/topic/toolsctr\\_cli\\_lenovo/onecli\\_r\\_getinfor\\_command.html](http://sysmgt.lenovofiles.com/help/topic/toolsctr_cli_lenovo/onecli_r_getinfor_command.html).

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## Contacting Support

You can contact Support to obtain help for your issue.

You can receive hardware service through a Lenovo Authorized Service Provider. To locate a service provider authorized by Lenovo to provide warranty service, go to <https://datacentersupport.lenovo.com/serviceprovider> and use filter searching for different countries. For Lenovo support telephone numbers, see <https://datacentersupport.lenovo.com/supportphonenumberlist> for your region support details.



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## 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.

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*Lenovo (United States), Inc.  
1009 Think Place  
Morrisville, NC 27560  
U.S.A.  
Attention: Lenovo VP of Intellectual Property*

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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.

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Linux is a registered trademark of Linus Torvalds.

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## Important notes

Processor speed indicates the internal clock speed of the processor; 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.

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## Telecommunication regulatory statement

This product may not be certified in your country for connection by any means whatsoever to interfaces of public telecommunications networks. Further certification may be required by law prior to making any such connection. Contact a Lenovo representative or reseller for any questions.

## 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 <sup>+6</sup> )	多溴聯苯 Polybrominated biphenyls (PBB)	多溴二苯醚 Polybrominated diphenyl ethers (PBDE)
機架	○	○	○	○	○	○
外部蓋板	○	○	○	○	○	○
機械組零件	-	○	○	○	○	○
空氣傳動設備	-	○	○	○	○	○
冷卻組零件	-	○	○	○	○	○
內存模組	-	○	○	○	○	○
處理器模組	-	○	○	○	○	○
電纜組零件	-	○	○	○	○	○
電源供應器	-	○	○	○	○	○
儲備設備	-	○	○	○	○	○
電路卡	-	○	○	○	○	○
光碟機	-	○	○	○	○	○

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 0.1wt%” and “exceeding 0.01 wt%” indicate that the percentage content of the restricted substance exceeds the reference percentage value of presence condition.

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.

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.

## 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

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