Lenovo

ThinkSystem SR630
Maintenance Manual



Machine Types: 7X01 and 7X02

Note

Before using this information and the product it supports, be sure to read and understand the safety information and the safety instructions, which are available at:
http://thinksystem.lenovofiles.com/help/topic/safety_documentation/pdf_files.html

In addition, be sure that you are familiar with the terms and conditions of the Lenovo warranty for your server, which can be found at:
http://datacentersupport.lenovo.com/warrantylookup

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Safety

Before installing this product, read the Safety Information.

قبل تركيب هذا المنتج، يجب قراءة الملاحظات الآمنية

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.

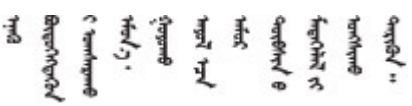
A termék telepítése előtt olvassa el a Biztonsági előírásokat!

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.

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Перед установкой продукта прочтите инструкции по технике безопасности.

Pred inštaláciou tohto zariadenia si pečítaje 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་རྫས་འདི་བདེ་སྤྱོད་མ་བྱས་གོང་། ·སྐྱོན་ཉི་ཡིད་གཟབ· བྱ་འདྲ་མིན་ཡོད་པའི་ཧོད་ཁྱེར་བལྟ་དགོས།

Bu ürünü kurmadan önce güvenlik bilgilerini okuyun.

ھەزكۇر مەھسۇلاتنى ئورنىتىشتىن بۇرۇن بىخەتەرلىك ئۇچۇرلىرىنى ئوقۇپ چىقىڭ.

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

Safety inspection checklist

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

Notes:

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

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

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

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

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

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

     a. Go to:

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

b. 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™ SR630 server is a 1U rack server designed to be highly flexible to support many kinds of Information Technology (IT) workloads. This high-performance, multi-core server is ideally suited for IT environments that require superior processor performance, input/output (I/O) flexibility, and flexible manageability.

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

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

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

Identifying your server

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

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

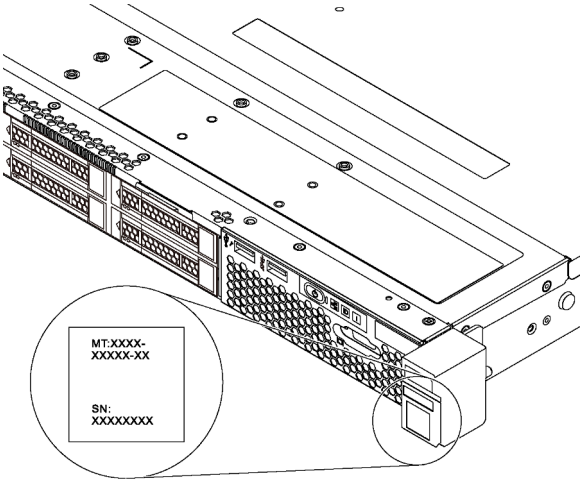


Figure 1. Location of the ID label

XClarity Controller network access label

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

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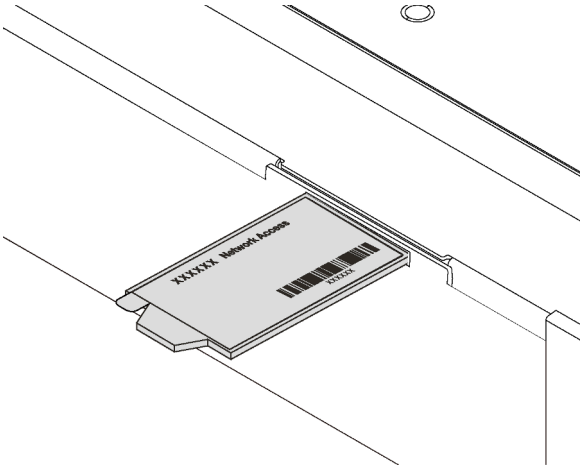


Figure 2. Location of the XClarity Controller network access label

Quick response code

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

The following illustration shows the QR code: https://support.lenovo.com/p/servers/sr630



Figure 3. QR code

Specifications

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

Table 1. Server specifications

Specification	Description
Dimension	• 1U • Height: 43.0 mm (1.7 inches) • Width: – With rack latches: 482.0 mm (19.0 inches) – Without rack latches: 434.4 mm (17.1 inches) • Depth: 778.3 mm (30.7 inches) **Note:** The depth is measured with rack latches and power supply installed, but without security bezel installed.
Weight	Up to 19.0 kg (41.9 lb)
Processor (depending on the model)	• Up to two Intel® Xeon® Scalable Processors – Designed for Land Grid Array (LGA) 3647 socket – Up to 28 cores – Thermal Design Power (TDP): up to 205 watts For more important information about the processor, refer to "Important information for system board, processor, and heat sink" on page 10. For a list of supported processors, see: https://static.lenovo.com/us/en/serverproven/index.shtml
Memory	For 1st Generation Intel Xeon Scalable Processor (Intel Xeon SP Gen 1) : • Slots: 24 memory module slots • Minimum: 8 GB • Maximum: – 768 GB using registered memory modules (RDIMMs) – 1.5 TB using load-reduced memory modules (LRDIMMs) – 3 TB using three-dimensional stack registered memory modules (3DS RDIMMs) • Type (depending on the model): – TruDDR4 2666, single-rank/dual-rank, 8 GB/16 GB/32 GB RDIMM – TruDDR4 2666, quad-rank, 64 GB LRDIMM – TruDDR4 2666, octa-rank, 128 GB 3DS RDIMM For 2nd Generation Intel Xeon Scalable Processor (Intel Xeon SP Gen 2): • Slots: 24 memory module slots • Minimum: 8 GB • Maximum: – 1.5 TB using registered memory modules (RDIMMs) – 3 TB using three-dimensional stack registered memory modules (3DS RDIMMs) – 6 TB using DC Persistent Memory Module (DCPMM) and RDIMMs/3DS RDIMMs in Memory Mode • Type: (depending on the model) – TruDDR4 2666, single-rank/dual-rank, 16 GB/32 GB RDIMMs – TruDDR4 2933, single-rank/dual-rank, 8 GB/16 GB/32 GB/64 GB RDIMMs – TruDDR4 2666, quad-rank, 64 GB 3DS RDIMMs – TruDDR4 2933, quad-rank, 128 GB 3DS RDIMMs – 128 GB/256 GB/512 GB DC Persistent Memory Module DCPMM installation rules: • PDCPMMs are not supported if any GPU is installed. **Notes:** • Operating speed and total memory capacity depend on the processor model and UEFI settings. • Rear drive assembly and 256 GB/512 GB DCPMM are not installed at the same time. For a list of supported memory, see the Lenovo ServerProven Web site: https://static.lenovo.com/us/en/serverproven/index.shtml.

Table 1. Server specifications (continued)

Specification	Description
Operating systems	Supported and certified operating systems: • Microsoft Windows Server • VMware ESXi • Red Hat Enterprise Linux • SUSE Linux Enterprise Server References: • Complete list of available operating systems: https://lenovopress.com/osig. • OS deployment instructions: See “Deploy the operating system” in *Setup Guide*..
Internal drives	• Up to two M.2 drives • Up to four 3.5-inch hot-swap SAS/SATA drives • Up to four 3.5-inch hot-swap SAS/SATA/NVMe drives • Up to eight 2.5-inch hot-swap SAS/SATA drives • Up to ten 2.5-inch hot-swap SAS/SATA/NVMe drives (NVMe drives are supported only in drive bays 6–9) • Up to ten 2.5-inch hot-swap NVMe drives • Up to two 2.5-inch hot-swap SAS/SATA drives in the rear (the processor TDP should be less than or equal to 125 watts) **Notes:** – NVMe drives means Non-Volatile Memory express drives. – Only use M.2 drives provided by Lenovo. – The backplane for ten 2.5-inch hot-swap NVMe drives is supported only when the following configuration requirements are met: – Intel Xeon 6144, 6146, 6154, 6240C, 6240Y, 6242R, 6244, 6246, 6246R, 6248R, 6252N, 6254, 6258R, 8168, 8171M, 8180, 8180M, 8268, 8270, 8280, 8280L, and 8280M processors are not installed. – The power of the hot-swap power supply is 1100 watts. – Rear hot-swap drive assembly is not installed. – GPU is not installed. – NVMe PCIe flash adapter is not installed. – 256 GB/512 GB DCPMM is not installed.
PCIe slots	Depending on the model, your server supports up to three PCIe slots in the rear. For detailed information, see “Rear view” on page 22. **Note:** For ThinkSystem Mellanox ConnectX-6 HDR/200GbE QSFP56 1-port PCIe adapter, when AOC cable and transceiver are installed, the system operating temperature must be less than or equal to 30°C; when other DAC cable is installed, the system operating temperature must be less than or equal to 35°C.

Table 1. Server specifications (continued)

Specification	Description
Graphics processing unit (GPU)	Your server supports the following GPUs: • One NVIDIA Quadro P2000 PCIe Active GPU (full-height, 3/4 length) • One NVIDIA Quadro P2200 PCIe Active GPU (full-height, 3/4 length) • One NVIDIA Quadro P4000 PCIe Active GPU (full-height, full-length) • One NVIDIA Quadro RTX4000 PCIe Active GPU (full-height, full-length) • Up to two NVIDIA Tesla P4 8GB PCIe Passive GPU (low-profile) • Up to two NVIDIA Tesla T4 8GB PCIe Passive GPU (low-profile) • Up to two NVIDIA A2 16GB PCIe Gen4 Passive GPU (half-height, half-length) • Up to three NVIDIA Quadro P600 2GB PCIe Active GPU (low-profile) • Up to three NVIDIA Quadro P620 PCIe Active GPU (low-profile) **Location for installing GPUs:** • Install P2000/P2200/P4000/RTX4000 GPU only in the full-height PCIe slot 2. • Install the first A2/P4/T4 GPU in PCIe slot 3 and install the second A2/P4/T4 GPU in PCIe slot 1. • Install the first P600 GPU in PCIe slot 3, install the second P600 GPU in PCIe slot 1, and install the third P600 GPU in PCIe slot 2. • Install the first P620 GPU in PCIe slot 3, install the second P620 GPU in PCIe slot 1, and install the third P620 GPU in PCIe slot 2. **GPU installation requirements:** • P2000/P2200 GPU is supported only when the following configuration requirements are met: – Processor TDP is less than or equal to 140 watts. – No RAID adapter is installed on the RAID adapter slot on the system board. If you want to install a RAID adapter, install it in PCIe slot 1. – The power of the hot-swap power supply is 750 watts or 1100 watts. – The backplane for ten 2.5-inch NVMe drives is not installed. – Rear hot-swap drive assembly is not installed. – No system fan is failed. • P4000/RTX4000 GPU is supported only when the following configuration requirements are met: – Intel Xeon 6144, 6146, 6246, or 6252N processor is not installed and processor TDP is less than or equal to 165 watts. – No RAID adapter is installed on the RAID adapter slot on the system board. If you want to install a RAID adapter, install it in PCIe slot 1. – The power of the hot-swap power supply is 750 watts or 1100 watts. – The backplane for ten 2.5-inch NVMe drives is not installed. – Rear hot-swap drive assembly is not installed. – No system fan is failed. • A2/P4/T4 GPU is supported only when the following configuration requirements are met: – Intel Xeon 6144, 6146, 6246, or 6252N processor is not installed and processor TDP is less than or equal to 165 watts. – The backplane for ten 2.5-inch NVMe drives is not installed. – Rear hot-swap drive assembly is not installed. – If one A2/P4/T4 GPU is installed, the power of the hot-swap power supply must be 750 watts or 1100 watts. – If two A2/P4/T4 GPUs are installed, the power of the hot-swap power supply must be 1100 watts – If one A2/P4/T4 GPU is installed in PCIe slot 3, the system operating temperature must be less than or equal to 35 °C to support fan rotor redundancy. – If two A2/P4/T4 GPUs are installed, one in PCIe slot 1 and one in PCIe slot 3, the system operating temperature must be less than or equal to 30 °C to support fan rotor redundancy. – A2 GPU cannot be mixed with T4 GPU.

Table 1. Server specifications (continued)

Specification	Description
	• P600 GPU is supported only when the following configuration requirements are met: – Intel Xeon 6144, 6146, 6246, or 6252N processor is not installed and processor TDP is less than or equal to 165 watts. – If one or two P600 GPUs are installed, the power of the hot-swap power supply is 750 watts or 1100 watts; if three P600 GPUs are installed, the power of the hot-swap power supply is 1100 watts. – The backplane for ten 2.5-inch NVMe drives is not installed. – Rear hot-swap drive assembly is not installed. – No system fan is failed. • P620 GPU is supported only when the following configuration requirements are met: – Intel Xeon 6144, 6146, 6246, or 6252N processor is not installed and processor TDP is less than or equal to 165 watts. – If one or two P620 GPUs are installed, the power of the hot-swap power supply is 750 watts or 1100 watts; if three P620 GPUs are installed, the power of the hot-swap power supply is 1100 watts. – The backplane for ten 2.5-inch NVMe drives is not installed. – Rear hot-swap drive assembly is not installed. – No system fan is failed.
Input/Output (I/O) features	• Front panel: – One VGA connector (available on some models) – One XClarity Controller USB 2.0 connector – One USB 3.0 connector • Rear panel: – One VGA connector – Two USB 3.0 connectors – One XClarity Controller network connector – Two or four Ethernet connectors on the LOM adapter (available on some models) – One serial port (available on some models)
RAID adapters (depending on the model)	• Onboard SATA ports with software RAID support (Intel VROC SATA RAID, formerly known as Intel RSTe) **Note:** VROC is not supported with the VMware ESXi yet. • Onboard NVMe ports with software RAID support (Intel VROC NVMe RAID) – VROC Intel-SSD-Only (also known as Intel VROC standard): supports RAID levels 0, 1, 5, and 10 with Intel NVMe drives only – VROC Premium: supports RAID levels 0, 1, 5, and 10 with non-Intel NVMe drives **Note:** VROC is not supported with the VMware ESXi yet. • An HBA 430-8e or 430-16e SAS/SATA adapter that support JBOD mode but does not support RAID • An HBA 430-8i or 430-16i SAS/SATA adapter that support JBOD mode but does not support RAID • An HBA 4350-8i or 4350-16i SAS/SATA adapter that support JBOD mode but does not support RAID • An HBA 440-8i or 440-16i SAS/SATA adapter that support JBOD mode but does not support RAID • An HBA 440-8e SAS/SATA adapter that support JBOD mode but does not support RAID • An HBA 440-16e SAS/SATA adapter that support JBOD mode but does not support RAID • A RAID 530-16i 2G SAS/SATA adapter that supports JBOD mode and RAID levels 0, 1, and 10

Table 1. Server specifications (continued)

Specification	Description
	• A RAID 5350-8i SAS/SATA adapter that supports JBOD mode and RAID levels 0, 1, 5, and 10 • A RAID 530-8i SAS/SATA adapter that supports JBOD mode and RAID levels 0, 1, 5, 10, and 50 • A RAID 540-8i SAS/SATA adapter that supports JBOD mode and RAID levels 0, 1, and 10 • A RAID 730-8i 1G Cache SAS/SATA adapter that supports JBOD mode and RAID levels 0, 1, 5, 10, and 50 (for Chinese Mainland only) • A RAID 730-8i 2GB Cache SAS/SATA adapter that supports JBOD mode and RAID levels 0, 1, 5, 6, 10, 50, and 60 • A RAID 930-8e SAS/SATA adapter that supports JBOD mode and RAID levels 0, 1, 5, 6, 10, 50, and 60 • A RAID 930-8i or 930-16i SAS/SATA adapter that supports JBOD mode and RAID levels 0, 1, 5, 6, 10, 50, and 60 • A RAID 9350-8i 2GB or 9350-16i 4GB SAS/SATA adapter that supports JBOD mode and RAID levels 0, 1, 5, 6, 10, 50 and 60 • A RAID 940-8i or 940-16i SAS/SATA adapter that supports JBOD mode and RAID levels 0, 1, 5, 6, 10, 50, and 60 **Notes:** • RAID 730-8i 2GB SAS/SATA adapter, RAID 930-8i SAS/SATA adapter, RAID 930-16i SAS/SATA adapter, and RAID 930-8e SAS/SATA adapter cannot be mixed. • If RAID 730-8i 1GB/2GB Cache SAS/SATA adapter is installed, ThinkSystem 2.5" PM1653/PM1655 Read Intensive/Mixed Use SAS 24Gb SSD cannot be installed. • A RAID super capacitor module must be installed if RAID 730-8i 2GB, 930-8e, 930-8i, 930-16i, 940-8e 4GB, 940-8i, 940-16i, 9350-8i, or 9350-16i SAS/SATA adapter is installed. • HBA 440-8i/440-16i SAS/SATA adapter and HBA 430-8i/430-16i SAS/SATA adapter cannot be mixed. • HBA/RAID 440-8i, 440-16i, 540-8i, 940-8i, 940-16i, 5350-8i, 9350-8i, or 9350-16i SAS/SATA adapters cannot be installed in the inner raid adapter slot. • HBA 540-16i SAS/SATA adapter can only be installed in the PCIe slot 1. • HBA 440-8e, 440-16e, or 940 8e 4GB SAS/SATA adapters can be supported when the following configuration requirements are met: – Can only be installed in the PCIe slots 2 and 1 for the server models with one processor. – Can only be installed in the PCIe slots 2, 3, and 1 for the server models with two processors. • RAID 4350-8i, 4350-16i, 9350-8i, or 9350-16i SAS/SATA adapters can be supported when the following configuration requirements are met: – Can only be installed in the PCIe slots 1, 2, and 3. – Can not be mixed with HBA/RAID 430-8i, 430-16i, 440-8i, 440-16i, 530-8i, 730-8i, 930-8e, 930-8i, 930-16i, 940-8i, or 940-16i SAS/SATA adapters. • RAID 5350-8i SAS/SATA adapter can be supported when the following configuration requirements are met: – Can only be installed in the PCIe slot 1. – Can not be mixed with HBA/RAID 430-8i, 430-16i, 440-8i, 440-16i, 530-8i, 730-8i, 930-8e, 930-8i, 930-16i, 940-8i, or 940-16i SAS/SATA adapters. • RAID 940-8i or 940-16i SAS/SATA adapter can be supported when the following configuration requirements are met: – Only one RAID 940 adapter is supported. – Can be installed in PCIe slot 1 only. – A RAID super capacitor module must be installed. – No rear HDD – Can not be mixed with 930-8i or 930-16i SAS/SATA adapter. – Can be mixed with HBA 440-8i or 440-16i SAS/SATA adapter.
System fans	• One processor: five dual-rotor hot-swap fans (including one redundant fan rotor)

Table 1. Server specifications (continued)

Specification	Description
	• Two processors: seven dual-rotor hot-swap fans (including one redundant fan rotor) **Notes:** • When the system is powered off but still plugged in to AC power, fans 1 and 2 may continue to spin at a much lower speed. This is the system design to provide proper cooling. • For server models installed with Intel Xeon 6144, 6146, 6154, 6240C, 6240Y, 6242R, 6244, 6246, 6246R, 6248R, 6252N, 6254, 6258R, 8168, 8171M, 8180, 8180M, 8268, 8270, 8280, 8280L, and 8280M processors, fan rotor redundancy is not supported. If one fan rotor fails, the server performance will be degraded. • If your server comes with only one processor, five system fans (fan 1 to fan 5) are adequate to provide proper cooling. However, you must keep the locations for fan 6 and fan 7 occupied by a fan filler to ensure proper airflow. • When 256 GB/512 GB DCPMM is installed, and the ambient temperature is more than 30°C, fan rotor redundancy is not supported.
Power supplies	**CAUTION:** **1. 240 V dc input (input range: 180-300 V dc) is ONLY supported in Chinese Mainland.** **2. Power supplies with 240 V dc are not hot-swappable. To remove the power cord, ensure you have turned off the server or disconnected the dc power sources at the breaker panel.** **3. In order for the ThinkSystem products to operate error free in both a DC or AC electrical environment, a TN-S earthing system which complies to 60364-1 IEC 2005 standard has to be present or installed.** One or two hot-swap power supplies for redundancy support • 550-watt ac 80 PLUS Platinum • 750-watt ac 80 PLUS Platinum • 750-watt ac 80 PLUS Titanium • 1100-watt ac 80 PLUS Platinum
Minimal configuration for debugging	• One processor in processor socket 1 • One memory module in slot 5 • One power supply • One HDD drive or one M.2 drive (if OS is needed for debugging) • Five system fans (fan 1 to fan 5)
Acoustical noise emissions	• Sound power levels, idle – 4.9 bels, minimum – 5.0 bels, typical – 5.8 bels, maximum • Sound power levels, operating – 5.3 bels, minimum – 6.1 bels, typical – 6.2 bels, maximum **Notes:** • These sound power levels are measured in controlled acoustical environments according to procedures specified by ISO 7779 and are reported in accordance with ISO 9296. • The declared acoustic noise levels are based on specified configurations and they may change depending on configuration/conditions. • The declared acoustic noise levels may increase greatly if high-power components are installed, for example, some high-power NICs, CPUs, and GPUs.

Table 1. Server specifications (continued)

Specification	Description
Electrical input	• Sine-wave input (50–60 Hz) required • Input voltage low range: – Minimum: 100 V ac – Maximum: 127 V ac • Input voltage high range: – Minimum: 200 V ac – Maximum: 240 V ac **Note:** For server models with 750-watt ac 80 PLUS Titanium power supplies, 100–127 V ac input voltage is not supported. **CAUTION:** **240 V dc input (input range: 180-300 V dc) is supported in Chinese Mainland ONLY. Power supply with 240 V dc input cannot support hot plugging power cord function. Before removing the power supply with dc input, please turn off server or disconnect dc power sources at the breaker panel or by turning off the power source. Then, remove the power cord.**
Environment	The server is supported in the following environment: **Note:** This server is designed for standard data center environment and recommended to be placed in industrial data center. • Air temperature: – Operating: – ASHRAE class A2: 10–35°C (50–95°F); when the altitude exceeds 900 m (2953 ft), the maximum ambient temperature value decreases by 1°C (1.8°F) with every 300 m (984 ft) of altitude increase. – ASHRAE class A3: 5–40°C (41–104°F); when the altitude exceeds 900 m (2953 ft), the maximum ambient temperature value decreases by 1°C (1.8°F) with every 175 m (574 ft) of altitude increase. – ASHRAE class A4: 5–45°C (41–113°F); when the altitude exceeds 900 m (2953 ft), the maximum ambient temperature value decreases by 1°C (1.8°F) with every 125 m (410 ft) of altitude increase. – Server off: 5–45°C (41–113°F) – Shipping or storage: -40–60°C (-40–140°F) • Maximum altitude: 3050 m (10 000 ft) • Relative humidity (non-condensing): – Operating: – ASHRAE class A2: 8%–80%; maximum dew point: 21°C (70°F) – ASHRAE class A3: 8%–85%; maximum dew point: 24°C (75°F) – ASHRAE class A4: 8%–90%; maximum dew point: 24°C (75°F) – Shipping or storage: 8%–90% • Particulate contamination **Attention:** Airborne particulates and reactive gases acting alone or in combination with other environmental factors such as humidity or temperature might pose a risk to the server. For information about the limits for particulates and gases, see “Particulate contamination” on page 12. **Note:** Your server complies with ASHRAE class A2 specifications. The server performance might be impacted when the system operating temperature is outside the ASHRAE A2 specifications. Depending on the hardware configuration, some server models comply with ASHRAE class A3 and class A4 specifications. To comply with ASHRAE class A3 and class A4 specifications, the server models must meet the following hardware configuration requirements at the same time: • Two power supplies are installed. • NVMe drive is not installed. • NVMe PCIe flash adapter is not installed.

Table 1. Server specifications (continued)

Specification	Description
	• P2000 GPU is not installed. • P2200 GPU is not installed. • P4000 GPU is not installed. • RTX4000 GPU is not installed. • No A2 GPU is installed in PCIe slot 1. • No P4 GPU is installed in PCIe slot 1. • No T4 GPU is installed in PCIe slot 1. • No P600 GPU is installed in PCIe slot 2. • No P620 GPU is installed in PCIe slot 2. • Innova-2 FPGA Smart NIC active GPU is not installed. • ThinkSystem Mellanox ConnectX-6 100 Gbs 1P/2P PCIe adapter is not installed. • ThinkSystem Mellanox ConnectX-6 HDR/200GbE QSFP56 1-port PCIe adapter is not installed. • For server models with 2.5-inch drive bays, the RAID super capacitor module cannot be installed on the bottom of the air baffle, but only can be installed on the chassis. • The backplane for ten 2.5-inch NVMe drives is not installed. • The following processors are not installed: – Processors with TDP higher than or equal to 150 watts – Intel Xeon 4112, 5122, 6126, 6128, 6132, 6134, 6134M, and 8156 processors

Important information about EU ecodesign requirements

To meet the EU ecodesign requirements for energy-related products (ErP) Lot 9, your server must meet the following requirements:

- Minimum memory: 16 GB
- If your server is configured with one processor, Intel Xeon 3104 is not supported.

Important information for system board, processor, and heat sink

There are two types of system board for your server:

- Left: System board with large lift handle 1
- Right: System board with small lift handle 2

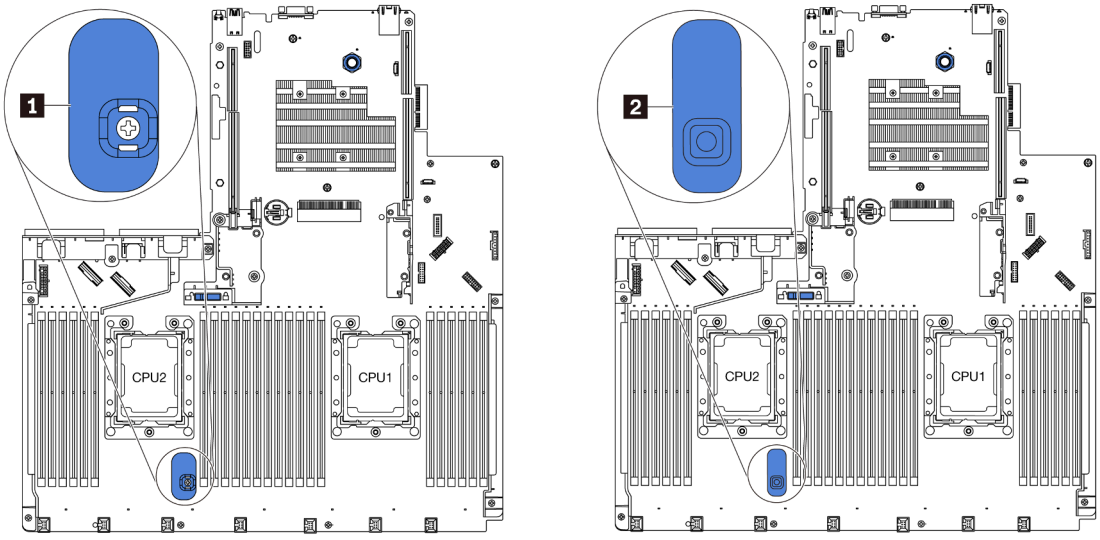


Figure 4. Two types of system board

There are two shape types of heat sink for your server:
- Left: Small-size heat sink
- Right: Large-size heat sink

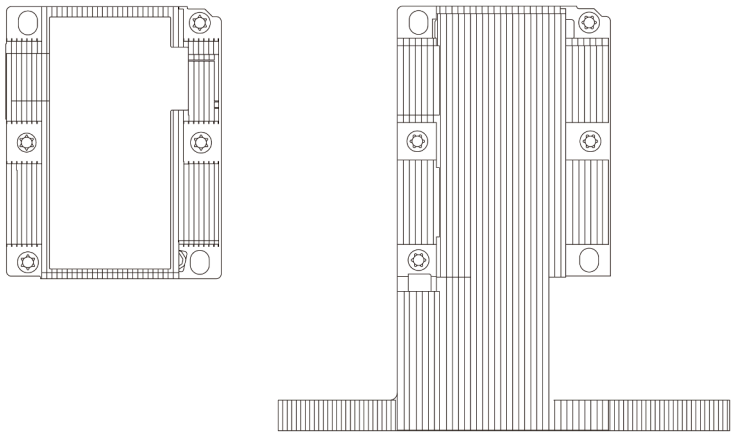
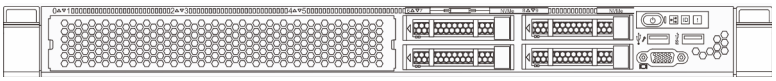


Figure 5. Two types of heat sink

The following table lists the important information for the system board, heat sink, and processor.

System board installed	Heat sink installed	Important information
System board with large lift handle or system board with small lift handle	Small size heat sink	For server models installed with Intel Xeon 6144, 6146, 6154, 6240C, 6240Y, 6242R, 6244, 6246, 6246R, 6248R, 6252N, 6254, 6258R, 8168, 8171M, 8180, 8180M, 8268, 8270, 8280, 8280L, and 8280M processors, the following parts are not supported: • Front backplane and front hot-swap SAS/SATA/NVMe drives • Rear hot-swap drive assembly • RAID super capacitor module on the bottom of the air baffle • NVMe PCIe flash adapter • GPU
System board with small lift handle	Large size heat sink	• For server models installed with large size heat sink, the air baffle and the RAID super capacitor module on the bottom of the air baffle are not supported. • For server models installed with Intel Xeon 6144, 6146, 6244, 6246, 6252N, 8168, 8171M, 8180, 8180M, 8268, 8270, 8280, 8280L, and 8280M processors, ensure that the following configuration requirements are met: – The backplane for ten 2.5-inch NVMe drives is not installed. – No system fan is failed. – Rear hot-swap drive assembly is not installed. – NVMe PCIe flash adapter is not installed. – GPU is not installed. • For server models installed with the backplane for ten 2.5-inch SAS/SATA/NVMe drives, Intel Xeon 6154, 6240C, 6240Y, 6242R, 6246R, 6248R, 6254, and 6258R, processor is supported with the condition that the following configuration requirements are met: – No system fan is failed. – Only four SAS/SATA/NVMe drives are installed in drive bays 6–9. – Rear hot-swap drive assembly is not installed. – NVMe PCIe flash adapter is not installed. – GPU is not installed.  *Figure 6. Front view of server models installed with Intel Xeon 6154, 6254 and 6240Y processor*

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	Severity level G1 as per ANSI/ISA 71.04-1985[1]: • The copper reactivity level shall be less than 200 Angstroms per month (Å/month ≈ 0.0035 µg/cm^2-hour weight gain).[2] • The silver reactivity level shall be less than 200 Angstroms per month (Å/month ≈ 0.0035 µg/cm^2-hour weight gain).[3] • The reactive monitoring of gaseous corrosivity must be conducted approximately 5 cm (2 in.) in front of the rack on the air inlet side at one-quarter and three-quarter frame height off the floor or where the air velocity is much higher.
Airborne particulates	Data centers must meet the cleanliness level of ISO 14644-1 class 8. For data centers without airside economizer, the ISO 14644-1 class 8 cleanliness might be met by choosing one of the following filtration methods: • The room air might be continuously filtered with MERV 8 filters. • Air entering a data center might be filtered with MERV 11 or preferably MERV 13 filters. 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. • The deliquescent relative humidity of the particulate contamination should be more than 60% RH.[4] • Data centers must be free of zinc whiskers.[5]

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

[2] The derivation of the equivalence between the rate of copper corrosion growth in the thickness of the corrosion product in Å/month and the rate of weight gain assumes that Cu_2S and Cu_2O grow in equal proportions.

[3] The derivation of the equivalence between the rate of silver corrosion growth in the thickness of the corrosion product in Å/month and the rate of weight gain assumes that Ag_2S is the only corrosion product.

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

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

Firmware updates

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

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

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/sr630/7X01/downloads

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.

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

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

Tool	Update Methods Supported	Core System Firmware Updates	I/O Devices Firmware Updates	Graphical user interface	Command line interface	Supports UXSPs
Lenovo XClarity Essentials Bootable Media Creator[3] (BOMC)	In-band On-Target	√	All I/O devices	√ (BOMC application)	√ (BOMC application)	√
Lenovo XClarity Administrator (LXCA)	In-band[1] Out-of-band[2] Off-Target	√	All I/O devices	√		√
Lenovo XClarity Integrator (LXCI) for VMware vCenter	Out-of-band Off-Target	√	Selected I/O devices	√		
Lenovo XClarity Integrator (LXCI) for Microsoft Windows Admin Center	In-band Out-of-band On-Target Off-Target	√	All I/O devices	√		√
Lenovo XClarity Integrator (LXCI) for Microsoft System Center Configuration Manager	In-band On-Target	√	All I/O devices	√		√
Notes: 1. For I/O firmware updates. 2. For BMC and UEFI firmware updates.						

- **Lenovo XClarity Provisioning Manager**

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

  Note: By default, the Lenovo XClarity Provisioning Manager Graphical User Interface is displayed when you 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.

  Additional information about using Lenovo XClarity Provisioning Manager to update firmware is available at:

  http://sysmgt.lenovofiles.com/help/topic/LXPM/platform_update.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.

  Additional information about configuring Ethernet over USB is available at:

  http://sysmgt.lenovofiles.com/help/topic/com.lenovo.systems.management.xcc.doc/NN1ia_c_configuringUSB.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.

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

http://sysmgt.lenovofiles.com/help/topic/com.lenovo.systems.management.xcc.doc/NN1ia_c_manageserverfirmware.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).

  Specific details about updating firmware using Lenovo XClarity Essentials OneCLI is available at:

  http://sysmgt.lenovofiles.com/help/topic/toolsctr_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/lnvo-xpress
- **Lenovo XClarity Essentials Bootable Media Creator**

  You can use Lenovo XClarity Essentials Bootable Media Creator to create bootable media that is suitable for applying firmware updates, running preboot diagnostics, and deploying Microsoft Windows operating systems.

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

  https://datacentersupport.lenovo.com/solutions/lnvo-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
- **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.

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

https://sysmgt.lenovofiles.com/help/topic/lxci/lxci_product_page.html

Tech Tips

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

To find the Tech Tips available for your server:

1. Go to http://datacentersupport.lenovo.com and navigate to the support page for your server.
2. Click **Knowledge Base & Guides** 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.

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 site:

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

Power on the server

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

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

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

For information about powering off the server, see “Power off the server” on page 17.

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 status LED off), you must disconnect all power cables.

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

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

- Start an orderly shutdown using the operating system (if supported by your operating system).
- Press the power button to start an orderly shutdown (if supported by your operating system).
- Press and hold the power button for more than 4 seconds to force a shutdown.

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 17.

Chapter 2. Server components

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

Front view

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

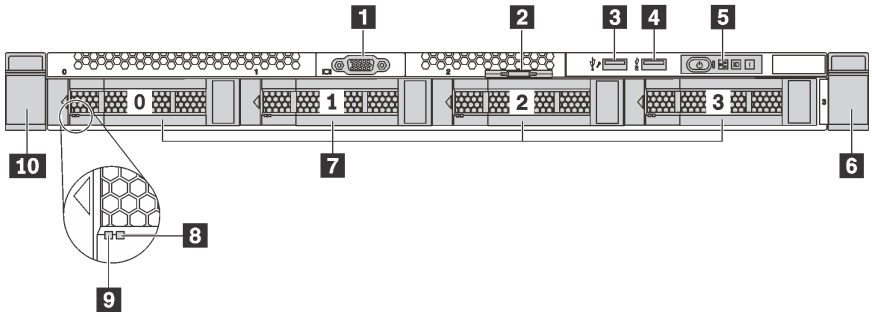


Figure 7. Front view of server models with four 3.5-inch drive bays

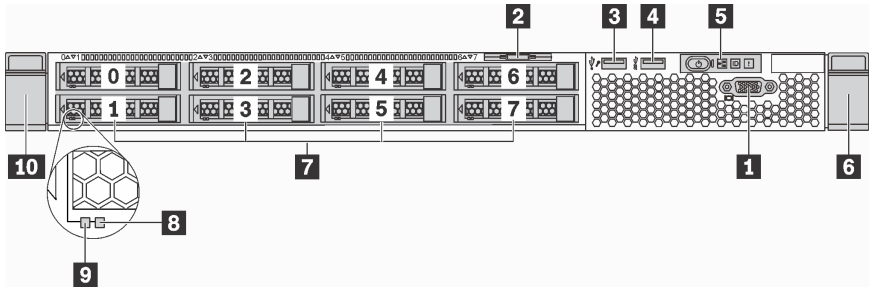


Figure 8. Front view of server models with eight 2.5-inch drive bays

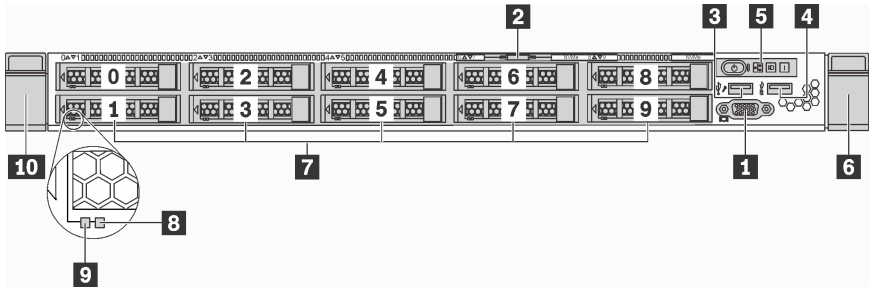


Figure 9. Front view of server models with ten 2.5-inch drive bays

Table 3. Components on the front of the server

1 VGA connector (available on some models)	2 Pull-out information tab
3 XClarity Controller USB connector	4 USB 3.0 connector
5 Operator information panel	6 Rack latch (right)

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Table 3. Components on the front of the server (continued)

7 Hot-swap drive bays	8 Drive status LED (yellow)
9 Drive activity LED (green)	10 Rack latch (left)

1 VGA connector (available on some models)

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

2 Pull-out information tab

The XClarity Controller network access label is attached on the pull-out information tab.

3 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 ID button for three seconds to switch between the two functions.

4 USB 3.0 connector

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

5 Operator information panel

For information about the controls and status LEDs on the operator information panel, see "Operator information panel" on page 21.

6 10 Rack latches

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

7 Hot-swap drive bays

The number of the installed drives in your server varies by model. When you install drives, follow the order of the drive bay numbers.

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

8 Drive status LED

9 Drive activity LED

Each hot-swap drive has two LEDs.

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

Operator information panel

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

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

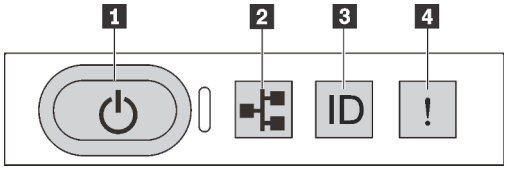


Figure 10. Operator information panel

Table 4. Components on the operator information panel

1 Power button with power status LED	2 Network activity LED
3 System ID button with system ID LED	4 System error LED

1 Power button with power status LED

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

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

The network activity LED on the operator information panel 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.

Compatibility of the NIC adapter and the network activity LED:

NIC adapter	Network activity LED
LOM adapter	Support
ML2 NIC adapter	Support
PCIe NIC adapter	Not support

3 System ID button with system ID LED

Use this system ID button and the blue system ID LED to visually locate the server. A system ID LED is also located on the rear of the server. Each time you press the system ID button, the state of both the system ID LEDs changes. The LEDs can be changed to on, blinking, or off. You can also use the Lenovo XClarity Controller or a remote management program to change the state of the system ID LEDs 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.

4 System error LED

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

Status	Color	Description	Action
On	Yellow	An error has been detected on the server. Causes might include but not limited to the following errors: • The temperature of the server reached the non-critical temperature threshold. • The voltage of the server reached the non-critical voltage threshold. • A fan has been detected to be running at low speed. • A hot-swap fan has been removed. • The power supply has a critical error. • The power supply is not connected to the power.	Check the event log to determine the exact cause of the error. For information about troubleshooting, see “Troubleshooting by symptom” on page 182 .
Off	None	The server is off or the server is on and is working correctly.	None.

Rear view

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

- “Rear view of server models with three PCIe slots” on page 23
- “Rear view of server models with two PCIe slots” on page 24
- “Rear view of server models with two hot-swap drive bays and one PCIe slot” on page 26

Rear view of server models with three PCIe slots

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

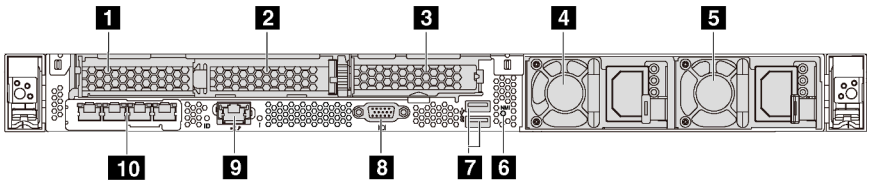


Figure 11. Rear view of server models with three PCIe slots

Table 5. Components on the rear of the server

1 PCIe slot 1 on riser 1 assembly	2 PCIe slot 2 on riser 1 assembly
3 PCIe slot 3 on riser 2 assembly	4 Power supply 1
5 Power supply 2 (available on some models)	6 NMI button
7 USB 3.0 connectors	8 VGA connector
9 XClarity Controller network connector	10 Ethernet connectors on LOM adapter (available on some models)

1 2 PCIe slots on riser 1 assembly

Your server supports three types of riser cards for riser 1 assembly.

- Type 1
  - Slot 1: PCIe x16 (x8, x4, x1), low-profile
  - Slot 2: PCIe x16 (x16, x8, x4, x1), low-profile
- Type 2
  - Slot 1: ML2 x8 (x8, x4, x1), low-profile
  - Slot 2: PCIe x16 (x16, x8, x4, x1), low-profile
- Type 3
  - Slot 1: ML2 x16 (x16, x8, x4, x1), low-profile
  - Slot 2: PCIe x16 (x8, x4, x1), low-profile

3 PCIe slot on riser 2 assembly

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

Note: PCIe slot 3 is supported only when two processors are installed.

4 Power supply 1

5 Power supply 2 (available on some models)

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

On each power supply, there are three status LEDs near the power cord connector. For information about the LEDs, see "Rear view LEDs" on page 28.

6 NMI button

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

7 USB 3.0 connectors (2)

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

8 VGA connector

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

9 XClarity Controller network connector

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

10 Ethernet connectors on LOM adapter (available on some models)

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

The leftmost Ethernet connector on the LOM adapter can be set as XClarity Controller network connector. To set the Ethernet connector as XClarity Controller network connector, start Setup utility, go to **BMC Settings → Network Settings → Network Interface Port** and select **Shared**. Then, go to **Shared NIC on** and select **PHY Card**.

Rear view of server models with two PCIe slots

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

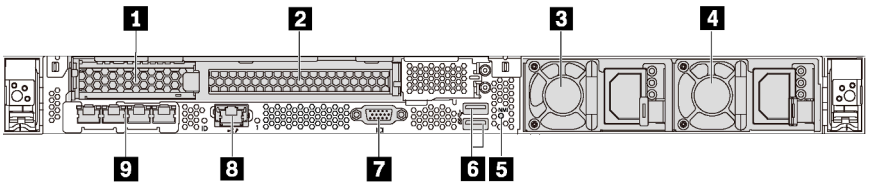


Figure 12. Rear view of server models with two PCIe slots

Table 6. Components on the rear of the server

1 PCIe slot 1 on riser 1 assembly	2 PCIe slot 2 on riser 1 assembly
3 Power supply 1	4 Power supply 2 (available on some models)
5 NMI button	6 USB 3.0 connectors

Table 6. Components on the rear of the server (continued)

7 VGA connector	8 XClarity Controller network connector
9 Ethernet connectors on LOM adapter (available on some models)	

1 2 PCIe slots on riser 1 assembly

Your server supports three types of riser cards for riser 1 assembly.

- Type 1
  - Slot 1: PCIe x16 (x8, x4, x1), low-profile
  - Slot 2: PCIe x16 (x16, x8, x4, x1), full-height, half-length
- Type 2
  - Slot 1: ML2 x8 (x8, x4, x1), low-profile
  - Slot 2: PCIe x16 (x16, x8, x4, x1), full-height, half-length
- Type 3
  - Slot 1: ML2 x16 (x16, x8, x4, x1), low-profile
  - Slot 2: PCIe x16 (x8, x4, x1), full-height, half-length

3 Power supply 1

4 Power supply 2 (available on some models)

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

On each power supply, there are three status LEDs near the power cord connector. For information about the LEDs, see “Rear view LEDs” on page 28.

5 NMI button

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

6 USB 3.0 connectors (2)

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

7 VGA connector

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

8 XClarity Controller network connector

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

9 Ethernet connectors on LOM adapter (available on some models)

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

The leftmost Ethernet connector on the LOM adapter can be set as XClarity Controller network connector. To set the Ethernet connector as XClarity Controller network connector, start Setup utility, go to **BMC Settings → Network Settings → Network Interface Port** and select **Shared**. Then, go to **Shared NIC on** and select **PHY Card**.

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

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

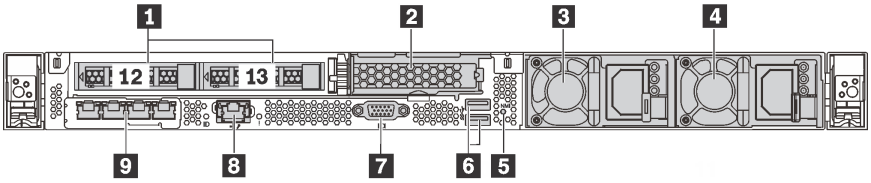


Figure 13. Rear view of server models with two hot-swap drive bays and one PCIe slot

Table 7. Components on the rear of the server

1 Rear 2.5-inch drive bays	2 PCIe slot 3
3 Power supply 1	4 Power supply 2 (available on some models)
5 NMI button	6 USB 3.0 connectors
7 VGA connector	8 XClarity Controller network connector
9 Ethernet connectors on LOM adapter (available on some models)	

1 Rear 2.5-inch drive bays

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

The number of the installed drives in your server varies by model. When you install drives, follow the order of the drive bay numbers.

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

2 PCIe slot 3

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

Note: PCIe slot 3 is supported only when two processors are installed.

3 Power supply 1

4 Power supply 2 (available on some models)

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

On each power supply, there are three status LEDs near the power cord connector. For information about the LEDs, see “Rear view LEDs” on page 28.

5 NMI button

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

6 USB 3.0 connectors (2)

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

7 VGA connector

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

8 XClarity Controller network connector

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

9 Ethernet connectors on LOM adapter (available on some models)

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

The leftmost Ethernet connector on the LOM adapter can be set as XClarity Controller network connector. To set the Ethernet connector as XClarity Controller network connector, start Setup utility, go to **BMC Settings → Network Settings → Network Interface Port** and select **Shared**. Then, go to **Shared NIC on** and select **PHY Card**.

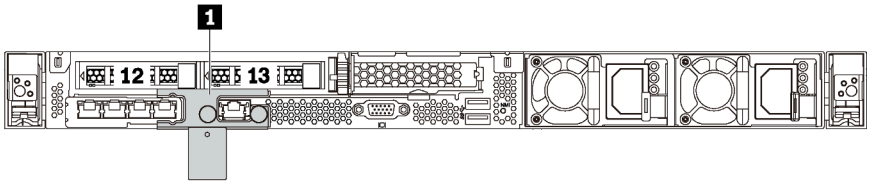


Figure 14. Rear view of server models with a shipping bracket

1 Shipping bracket (available on some models)

For server models with two hot-swap drive bays in the rear, if the server is installed in a rack and shipped to you, the server comes with a shipping bracket installed.

Attention:

- Before turning on the server, ensure that you remove the shipping bracket.
- For server models with two hot-swap drive bays in the rear, if the server is installed in a rack for shipping, be sure to install the shipping bracket.

To remove the shipping bracket, hold the two handles 1 and remove the shipping bracket from the server.

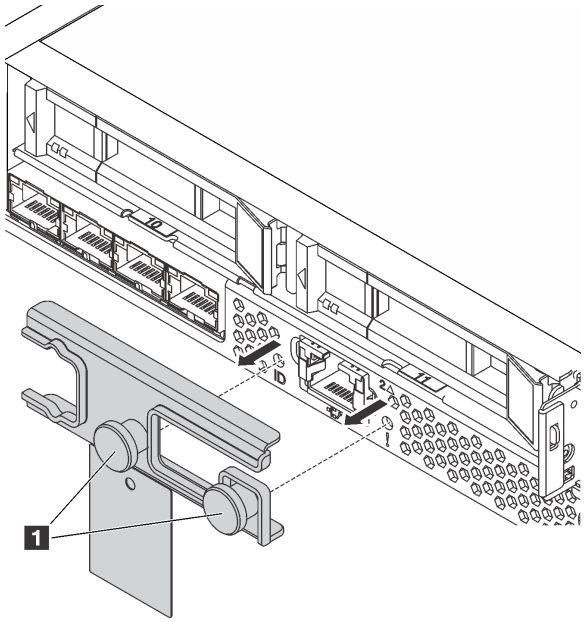


Figure 15. Shipping bracket removal

To install the shipping bracket, align the two handles **1** with the system error LED hole and system ID LED hole and insert the shipping bracket into the rear of the server until it is firmly installed.

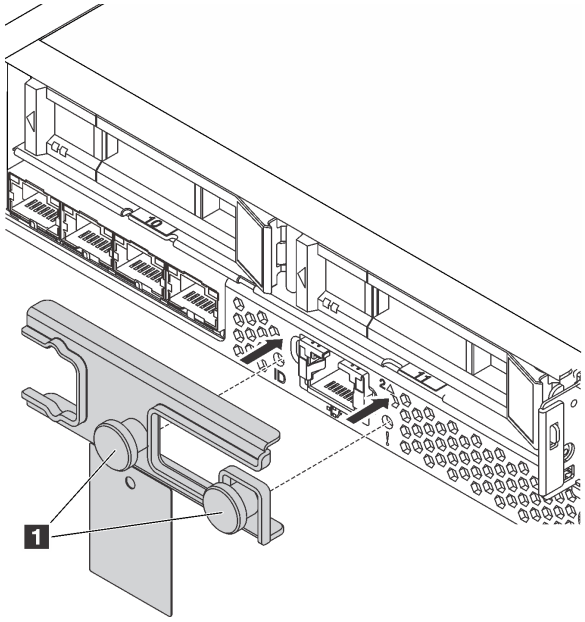


Figure 16. Shipping bracket installation

Rear view LEDs

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

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

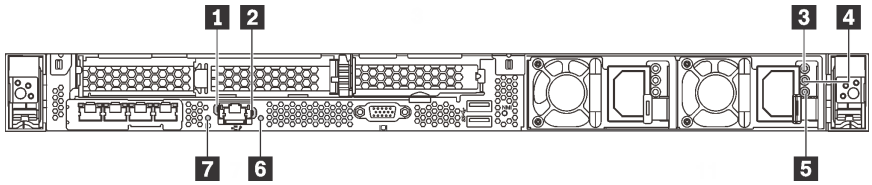


Figure 17. Rear view LEDs

Table 8. LEDs on the rear view of the server

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

1 Ethernet link LED
2 Ethernet activity LED

The XClarity Controller network connector has two status LEDs.

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

3 4 5 Power supply LEDs

Each hot-swap power supply has three status LEDs.

LED	Description
3 Power input LED	• Green: The power supply is connected to the ac power source. • Off: The power supply is disconnected from the ac power source or a power problem occurs.
4 Power output LED	• Green: The server is on and the power supply is working normally. • Blinking green: The power supply is in the zero-output mode (standby). When the server power load is low, one of the installed power supplies enters into the standby state while the other one delivers the entire load. When the power load increases, the standby power supply will switch to active state to provide sufficient power to the system. To disable zero-output mode, start the Setup utility, go to **System Settings → Power → Zero Output** and select **Disable**. If you disable the zero-out mode, both power supplies will be in the active state. • Off: The server is powered off, or the power supply is not working properly. If the server is powered on but the LED is off, replace the power supply.
5 Power supply error LED	• Yellow: The power supply has failed. To resolve the issue, replace the power supply. • Off: The power supply is working normally.

6 System error LED

The system error LED helps you to determine if there are any system errors. For details, see “System error LED” on page 22.

7 System ID LED

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

System board components

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

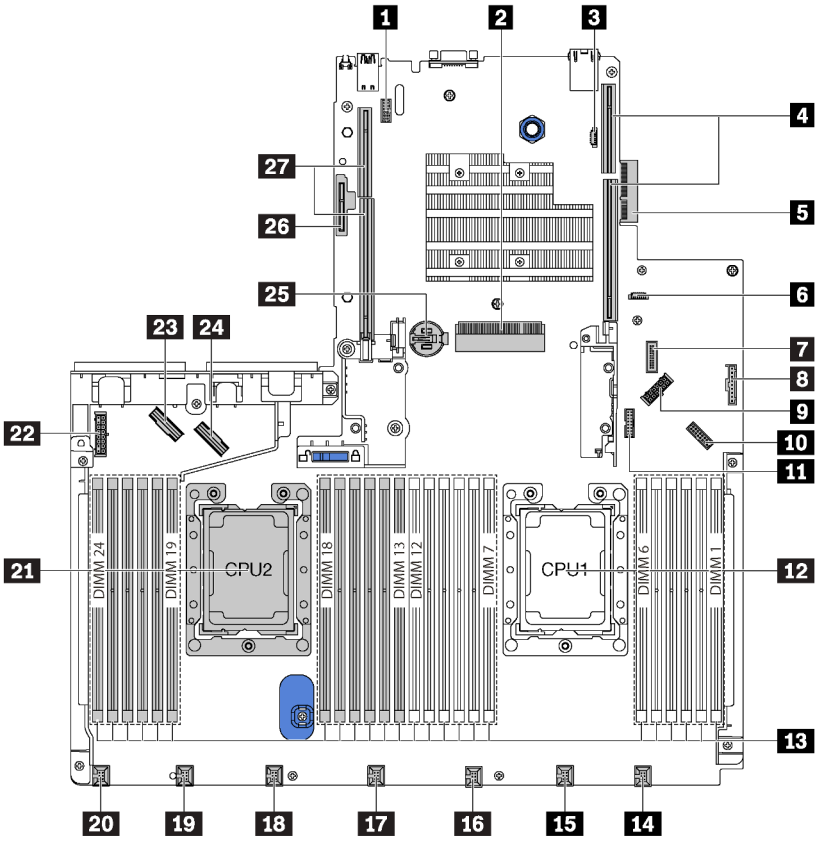


Figure 18. System board components

1 Serial-port-module connector	2 RAID adapter slot (slot 4)
3 BIOS ROM programming connector	4 Riser 1 slot
5 LOM adapter connector	6 XCC ROM programming connector
7 Front USB connector	8 Operator-information-panel connector
9 Rear-backplane power connector	10 Front VGA connector

11 TCM[1]/TPM[2] connector (for Chinese Mainland only)	12 Processor 1 socket
13 Memory module slots (24)	14 System fan 1 connector
15 System fan 2 connector	16 System fan 3 connector
17 System fan 4 connector	18 System fan 5 connector
19 System fan 6 connector	20 System fan 7 connector
21 Processor 2 socket	22 Front-backplane power connector
23 NVMe 2-3 connector	24 NVMe 0-1 connector
25 CMOS battery	26 M.2 module slot (SATA/PCIe slot 5)
27 Riser 2 slot	

Notes:

- [1] Trusted Cryptography Module
- [2] Trusted Platform Module

System board LEDs

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

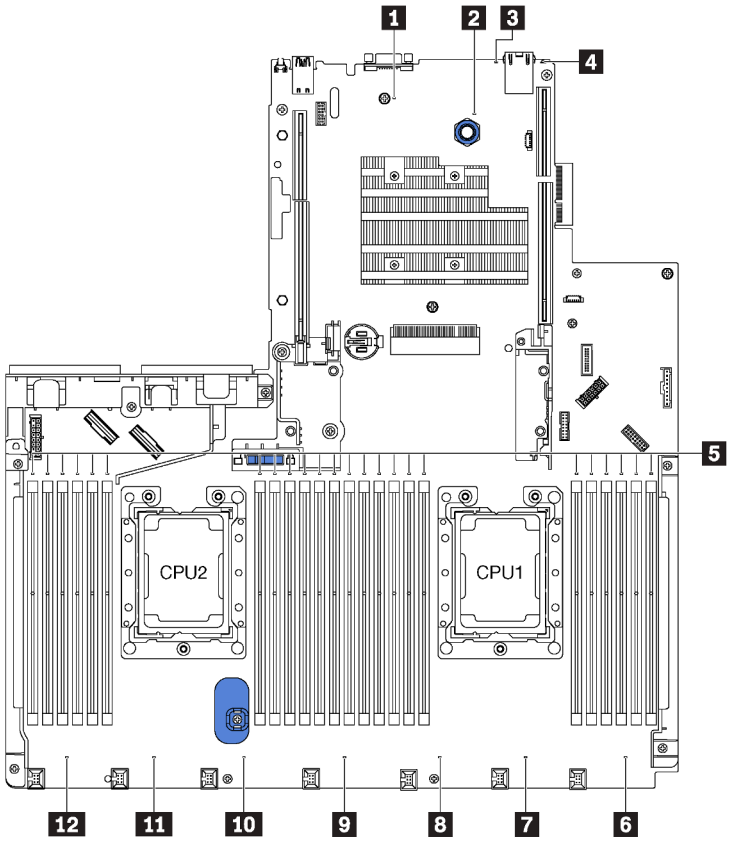


Figure 19. System board LEDs

1 System power LED	2 Heartbeat LED
3 System error LED	4 System ID LED
5 Memory module error LEDs	6 System fan 1 error LED
7 System fan 2 error LED	8 System fan 3 error LED
9 System fan 4 error LED	10 System fan 5 error LED
11 System fan 6 error LED	12 System fan 7 error LED

System board jumpers

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

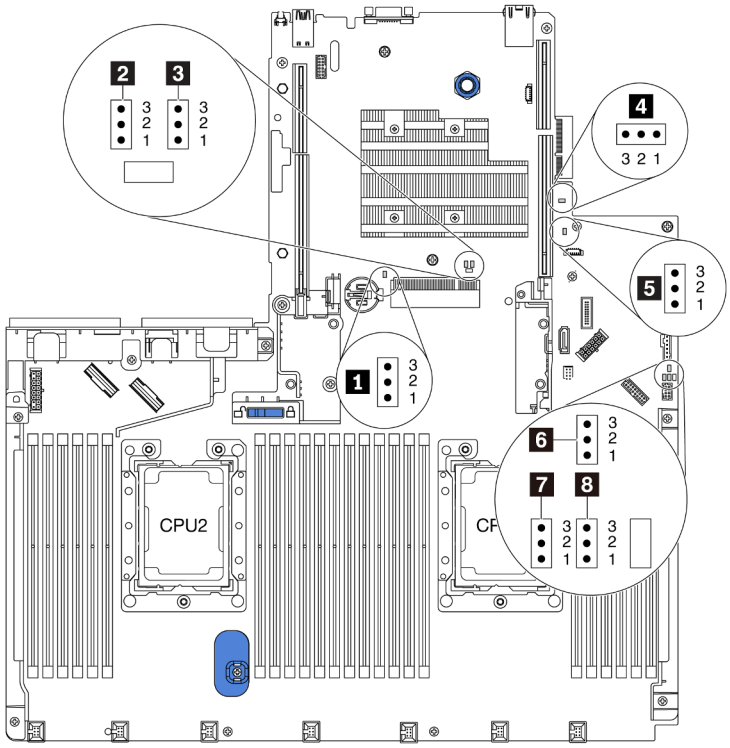


Figure 20. System board jumpers

Table 9. Jumper description

Jumper/Swtich name	Jumper/Swtich number	Jumper/Swtich setting
1 Clear CMOS jumper	J95	• Pins 1 and 2: The jumper is in default setting. • Pins 2 and 3: Clear the real-time clock (RTC) registry.
2 Override power-on password jumper	J50	• Pins 1 and 2: The jumper is in default setting. • Pins 2 and 3: Override the power-on password.
3 Boot backup XClarity Controller	J47	• Pins 1 and 2: The jumper is in default setting. • Pins 2 and 3: The tower server will boot by using a backup of the XClarity Controller firmware.
4 TCM/TPM physical presence jumper	J46	• Pins 1 and 2: The jumper is in default setting. • Pins 2 and 3: TCM/TPM physical presence is asserted.
5 ME firmware security override	J30	• Pins 1 and 2: The jumper is in default setting. • Pins 2 and 3: Enable Flash security override. **Note:** For debug only.
6 Force XCC update jumper	J45	• Pins 1 and 2: The jumper is in default setting. • Pins 2 and 3: Force the Lenovo XClarity Controller to update to the latest version.
7 Force XCC reset jumper	J181	• Pins 1 and 2: The jumper is in default setting. • Pins 2 and 3: Reset the Lenovo XClarity Controller.
8 Power permission	J49	• Pins 1 and 2: The jumper is in default setting. • Pins 2 and 3: Enable Power On.

Important:

- Before you move any jumpers, power off the server; then, disconnect all power cords and external cables. Do not open your server or attempt any repair before reading and understanding the following information:
  - http://thinksystem.lenovofiles.com/help/topic/safety_documentation/pdf_files.html
  - “Handling static-sensitive devices” on page 68
- Any system-board switch or jumper block that is not shown in the illustrations in this document are reserved.

Internal cable routing

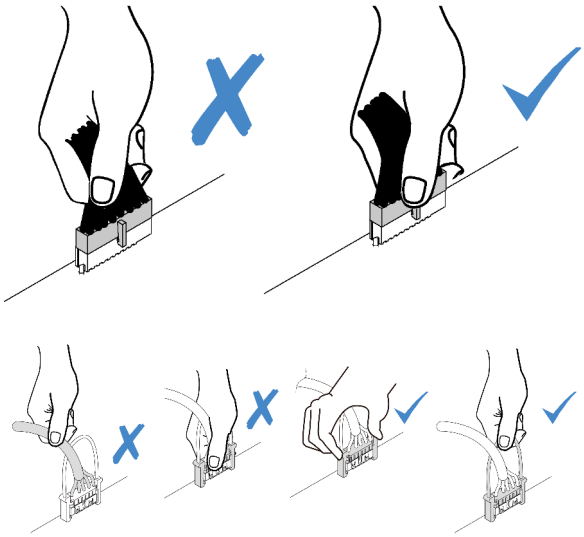
Some of the components in the server have internal cables and cable connectors.

To connect cables, observe the following guidelines:

- Power off the server before you connect or disconnect any internal cables.
- See the documentation that comes with any external devices for additional cabling instructions. It might be easier for you to route cables before you connect the devices to the server.
- Cable identifiers of some cables are printed on the cables that come with the server and optional devices. Use these identifiers to connect the cables to the correct connectors.
- Ensure that the relevant cables pass through the cable clips.
- Oversubscription may exist in some configurations installed with NVMe 810-4P/1611-8P switch adapters.

Notes:

- Oversubscription occurs when the system supports NVMe 810-4P， NVMe 1611-8P, and NVMe 1611-8P switch adapters.
- 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.



Server models with four 3.5-inch SAS/SATA drives

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

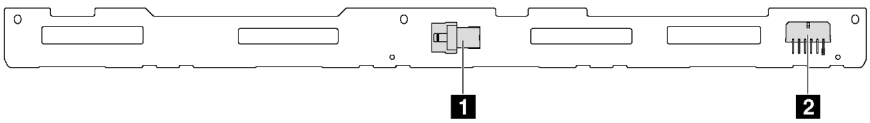


Figure 21. Connectors on the backplane for four 3.5-inch SAS/SATA drives

1 SAS 0 connector

2 Power connector

Server models with four 3.5-inch SAS/SATA drives and rear drive assembly

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

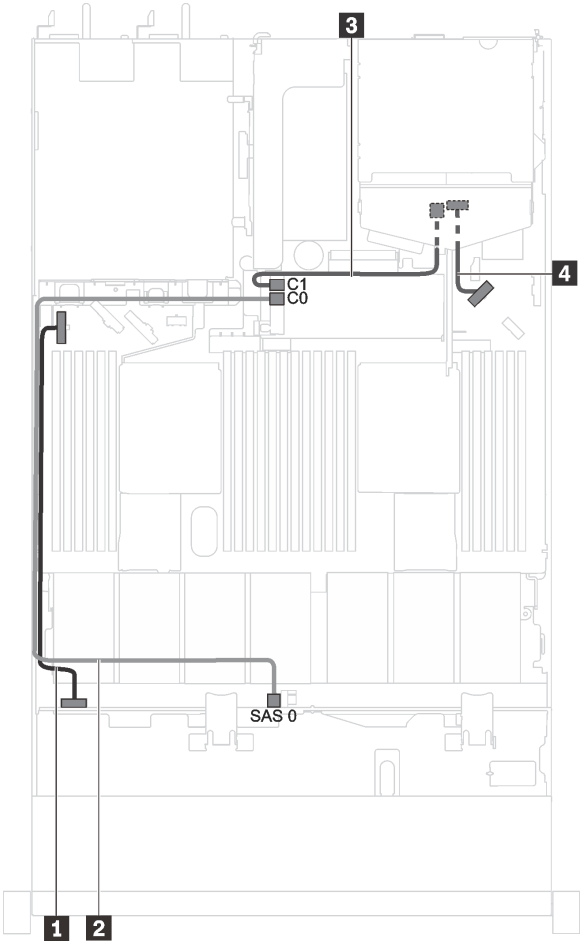


Figure 22. Cable routing for server models with four 3.5-inch SAS/SATA drives and rear drive assembly

Cable	From	To
1 Power cable for front backplane	Power connector on the front backplane	Front-backplane power connector on the system board
2 SAS signal cable for front backplane	SAS 0 connector on the front backplane	C0 connector on the RAID adapter
3 SAS signal cable for rear backplane	SAS connector on the rear backplane	C1 connector on the RAID adapter
4 Power cable for rear backplane	Power connector on the rear backplane	Rear-backplane power connector on the system board

Server models with four 3.5-inch SAS/SATA drives and a full-height half-length GPU

Note: Cable 3 is only available for P4000/RTX4000 GPU.

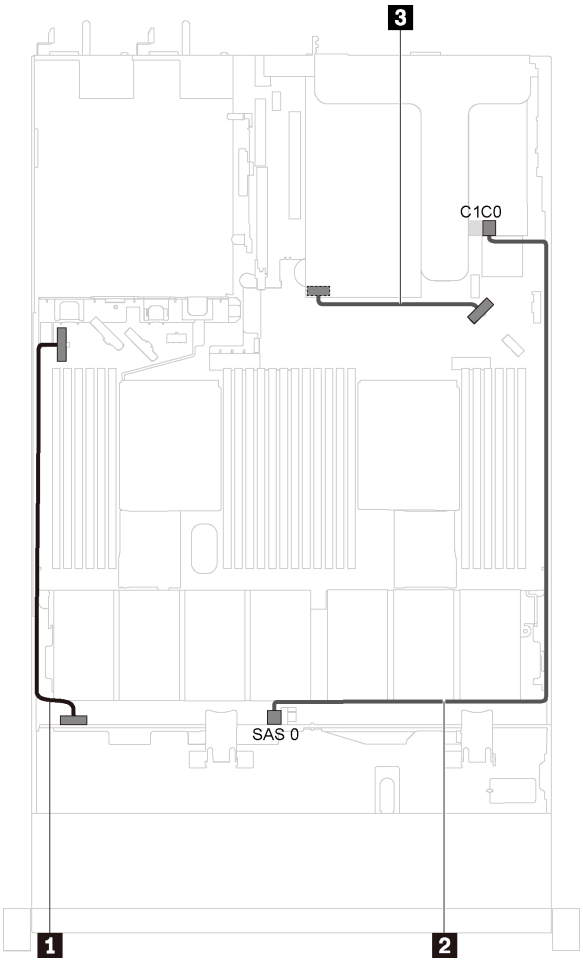


Figure 23. Cable routing for server models with four 3.5-inch SAS/SATA drives and a full-height half-length GPU

Cable	From	To
1 Power cable for front backplane	Power connector on the front backplane	Front-backplane power connector on the system board
2 SAS signal cable for front backplane	SAS 0 connector on the front backplane	C0 connector on the RAID adapter
3 GPU power cable (only available for P4000/RTX4000 GPU)	Power connector on P4000/ RTX4000 GPU	Rear-backplane power connector on the system board

Server models with four 3.5-inch SAS/SATA/NVMe drives

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

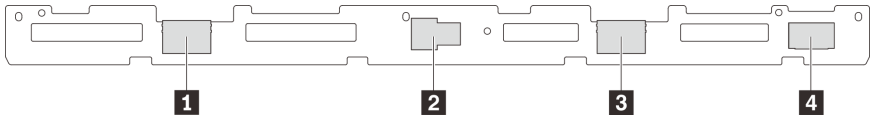


Figure 24. Connectors on the backplane for four 3.5-inch SAS/SATA/NVMe drives

1 NVMe 1 connector
2 SAS 0 connector
3 NVMe 0 connector
4 Power connector

Server models with four 3.5-inch SAS/SATA/NVMe drives and rear drive assembly

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

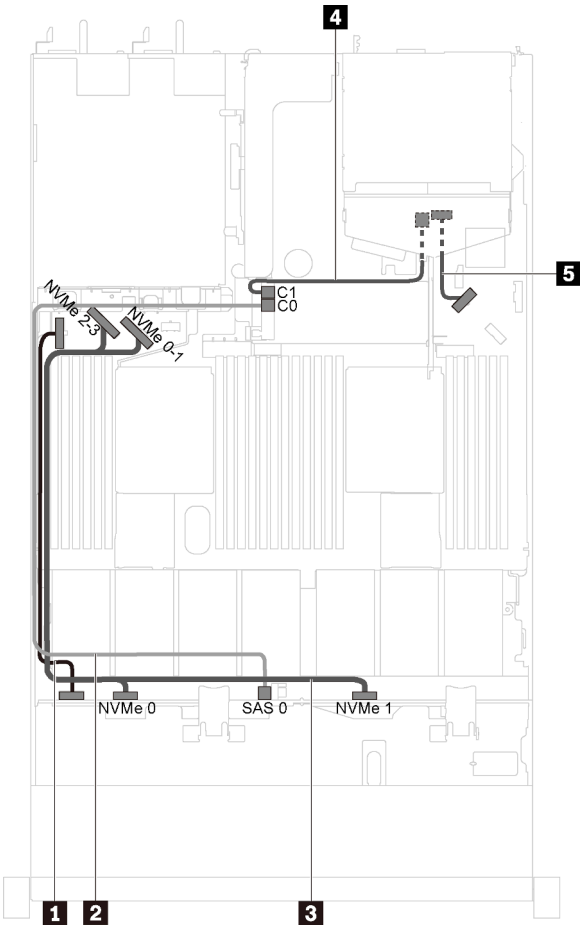


Figure 25. Cable routing for server models with four 3.5-inch SAS/SATA/NVMe drives and rear drive assembly

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

Server models with four 3.5-inch SAS/SATA/NVMe drives and a full-height half-length GPU

Note: Cable 4 is only available for P4000/RTX4000 GPU.

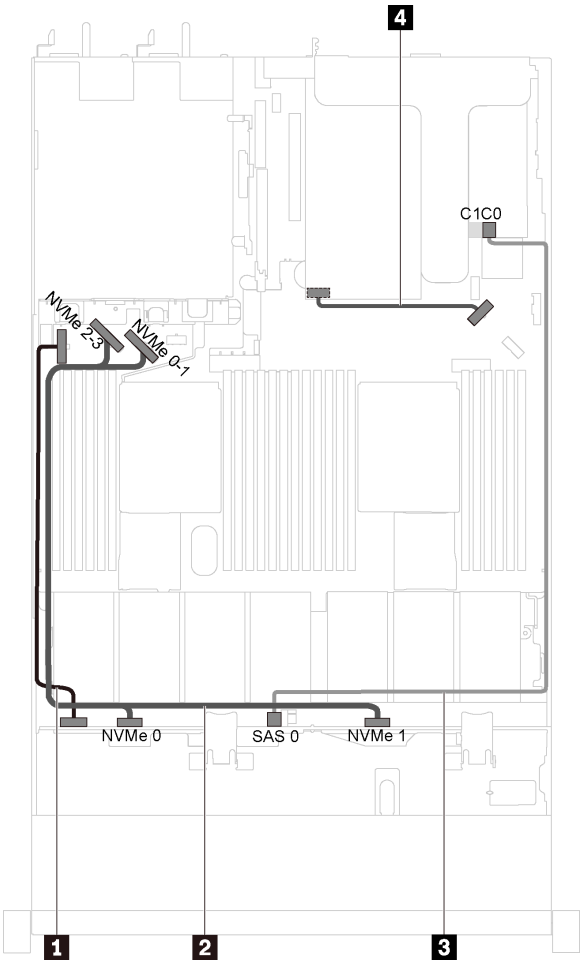


Figure 26. Cable routing for server models with four 3.5-inch SAS/SATA/NVMe drives and a full-height half-length GPU

Cable	From	To
1 Power cable for front backplane	Power connector on the front backplane	Front-backplane power connector on the system board
2 NVMe signal cable for front backplane	NVMe 0 and NVMe 1 connectors on the front backplane	NVMe 0-1 connector and NVMe 2-3 connector on the system board
3 SAS signal cable for front backplane	SAS 0 connector on the front backplane	C0 connector on the RAID adapter
4 GPU power cable (only available for P4000/ RTX4000 GPU)	Power connector on P4000/ RTX4000 GPU	Rear-backplane power connector on the system board

Server models with four 3.5-inch SAS/SATA/NVMe drives and one 1610-4P NVMe switch adapter

Note: This configuration is supported in server models installed with one processor.

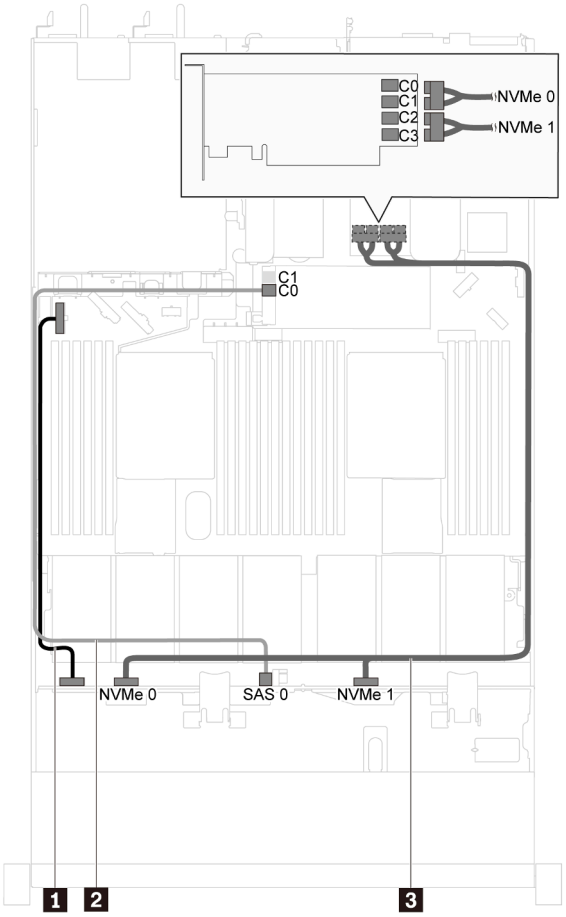


Figure 27. Cable routing for server models with four 3.5-inch SAS/SATA/NVMe drives and one 1610-4P NVMe switch adapter in PCIe slot 2

Cable	From	To
1 Power cable for front backplane	Power connector on the front backplane	Front-backplane power connector on the system board
2 SAS signal cable for front backplane	SAS 0 connector on the front backplane	C0 connector on the RAID adapter
3 NVMe signal cable for front backplane	NVMe 0 and NVMe 1 connectors on the front backplane	C0, C1, C2, and C3 connectors on the NVMe switch adapter installed in PCIe slot 2

Server models with eight 2.5-inch SAS/SATA drives

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

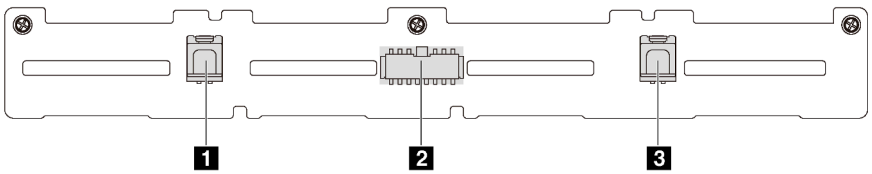


Figure 28. Connectors on the backplane for eight 2.5-inch SAS/SATA drives

1 SAS 1 connector 2 Power connector 3 SAS 0 connector

Server models with eight 2.5-inch SAS/SATA drives and one 8i HBA/RAID adapter

Notes:

- Gen 4 HBA/RAID adapter cannot be installed in the inner raid adapter slot.
- *When Gen 4 HBA/RAID adapter is installed, ensure you use Gen 4 SAS signal cable (ThinkSystem SR530/SR570/SR630 2.5" SAS/SATA 8-Bay X40 RAID Cable Kit).

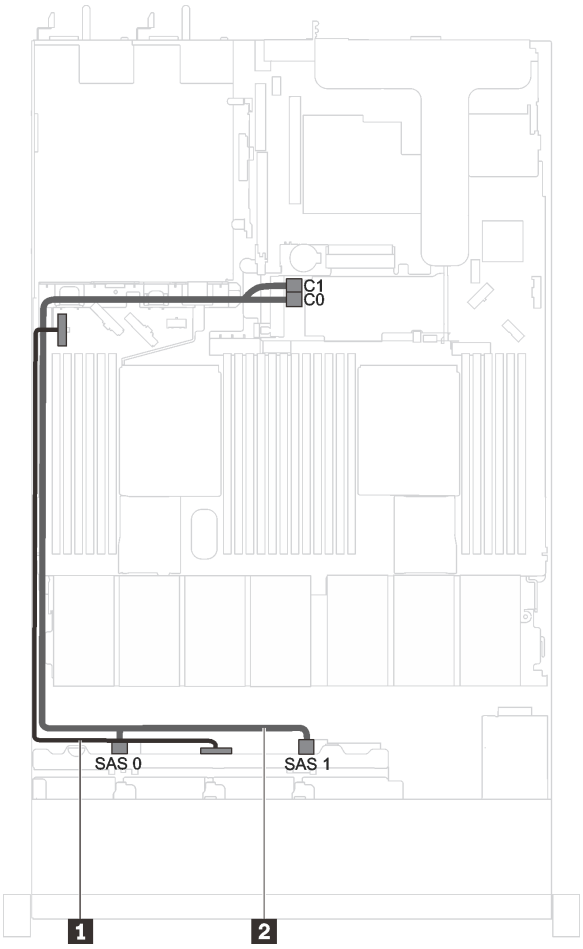


Figure 29. Cable routing for server models with eight 2.5-inch SAS/SATA drives and one 8i HBA/RAID adapter

Cable	From	To
1 Power cable for front backplane	Power connector on the front backplane	Front-backplane power connector on the system board
2 SAS signal cable for front backplane*	SAS 0 and SAS 1 connectors on the front backplane	8i HBA/RAID adapter • Gen 3: C0C1 • Gen 4: C0

Server models with eight 2.5-inch SAS/SATA drives, one 16i HBA/RAID adapter, and rear drive assembly

Notes:

- The cable routing illustration is based on the scenario that the rear hot-swap drive assembly is installed. Depending on the model, the rear hot-swap drive assembly might not be available on your server.
- Gen 4 HBA/RAID adapter cannot be installed in the inner raid adapter slot.
- *When Gen 4 HBA/RAID adapter is installed, ensure you use Gen 4 SAS signal cable (ThinkSystem SR570/SR630 2.5" AnyBay 10-Bay X40 RAID Cable Kit).

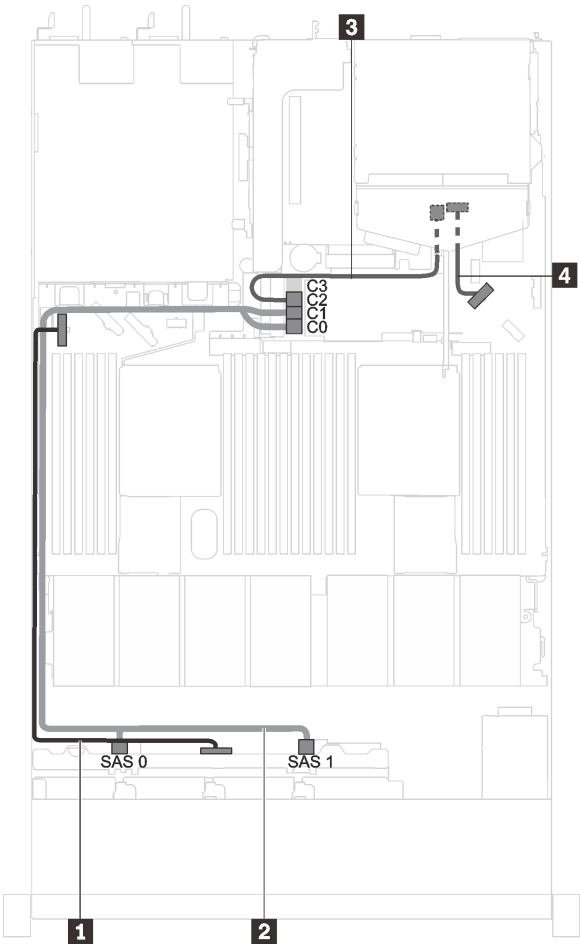


Figure 30. Cable routing for server models with eight 2.5-inch SAS/SATA drives, one 16i HBA/RAID adapter, and rear drive assembly

Cable	From	To
1 Power cable for front backplane	Power connector on the front backplane	Front-backplane power connector on the system board
2 SAS signal cable for front backplane*	SAS 0 and SAS 1 connectors on the front backplane	16i HBA/RAID adapter • Gen 3: C0C1 • Gen 4: C0
3 SAS signal cable for rear backplane*	SAS connector on the rear backplane	16i HBA/RAID adapter • Gen 3: C2 • Gen 4: C1
4 Power cable for rear backplane	Power connector on the rear backplane	Rear-backplane power connector on the system board

Server models with eight 2.5-inch SAS/SATA drives and a full-height half-length GPU

Note: Cable 3 is only available for P4000/RTX4000 GPU.

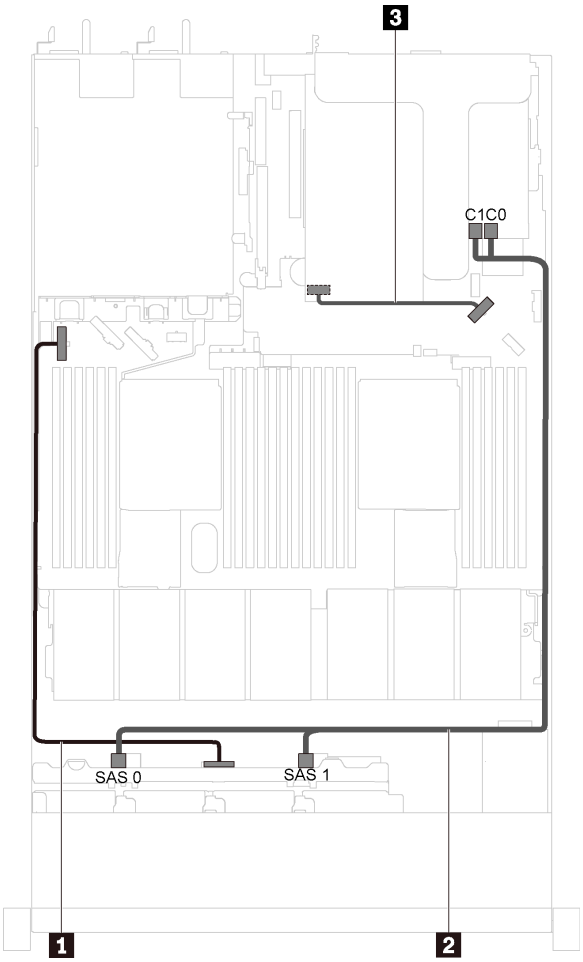


Figure 31. Cable routing for server models with eight 2.5-inch SAS/SATA drives and a full-height half-length GPU

Cable	From	To
1 Power cable for front backplane	Power connector on the front backplane	Front-backplane power connector on the system board
2 SAS signal cable for front backplane	SAS 0 and SAS 1 connectors on the front backplane	C0 and C1 connectors on the RAID adapter
3 GPU power cable (only available for P4000/ RTX4000 GPU)	Power connector on P4000/RTX4000 GPU	Rear-backplane power connector on the system board

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

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

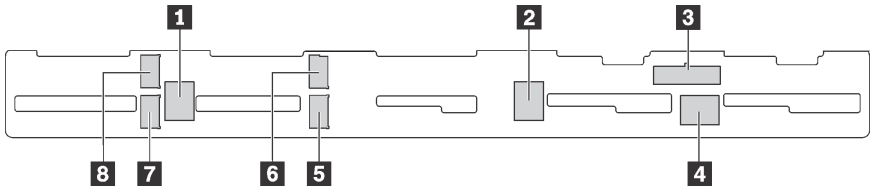


Figure 32. Connectors on the backplane for ten 2.5-inch SAS/SATA/NVMe drives

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

Server models with six 2.5-inch SAS/SATA drives, four 2.5-inch SAS/SATA/NVMe drives, one 16i HBA/RAID adapter, and rear drive assembly

Notes:

- The cable routing illustration is based on the scenario that the rear hot-swap drive assembly is installed. Depending on the model, the rear hot-swap drive assembly might not be available on your server.
- NVMe drives are only supported in drive bays 6–9.
- Gen 4 HBA/RAID adapter cannot be installed in the inner raid adapter slot.
- *When Gen 4 HBA/RAID adapter is installed, ensure you use Gen 4 SAS signal cable (ThinkSystem SR570/SR630 2.5" AnyBay 10-Bay X40 RAID Cable Kit).

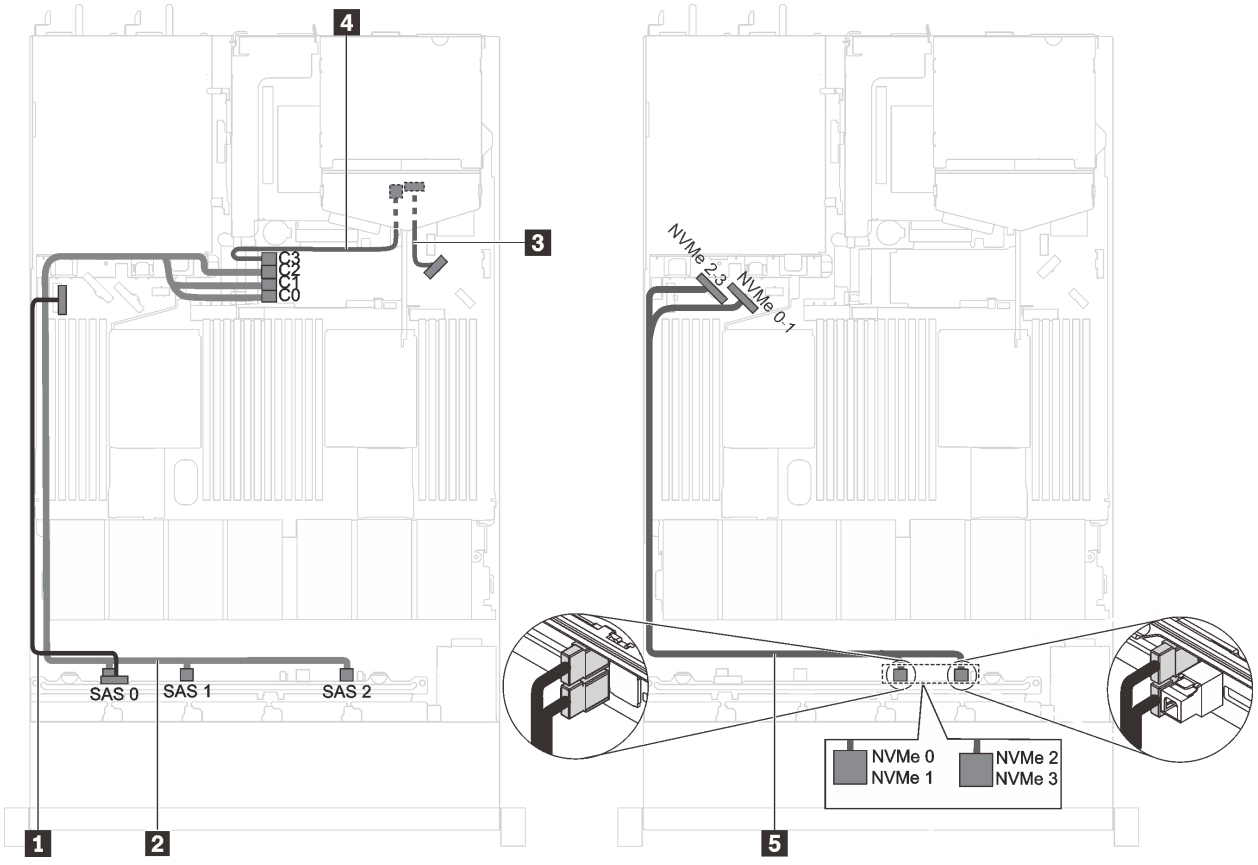


Figure 33. Cable routing for server models with six 2.5-inch SAS/SATA drives, four 2.5-inch SAS/SATA/NVMe drives, one 16i HBA/RAID adapter, and rear drive assembly

Cable	From	To
1 Power cable for front backplane	Power connector on the front backplane	Front-backplane power connector on the system board
2 SAS signal cable for front backplane*	SAS 0, SAS 1, and SAS 2 connectors on the front backplane	16i HBA/RAID adapter • Gen 3: C0C1C2 • Gen 4: C0C1
3 Power cable for rear backplane	Power connector on the rear backplane	Rear-backplane power connector on the system board
4 SAS signal cable for rear backplane*	SAS connector on the rear backplane	16i HBA/RAID adapter • Gen 3: C3 • Gen 4: C1
5 NVMe signal cable for front backplane	NVMe 0, NVMe 1, NVMe 2, and NVMe 3 connectors on the front backplane	NVMe 0-1 connector and NVMe 2-3 connector on the system board

Server models with six 2.5-inch SAS/SATA drives, four 2.5-inch NVMe drives, and one 8i HBA/RAID adapter

Notes:

- NVMe drives are only supported in drive bays 6–9.
- Gen 4 HBA/RAID adapter cannot be installed in the inner raid adapter slot.
- *When Gen 4 HBA/RAID adapter is installed, ensure you use Gen 4 SAS signal cable (ThinkSystem SR530/SR570/SR630 2.5" SAS/SATA 8-Bay X40 RAID Cable Kit).

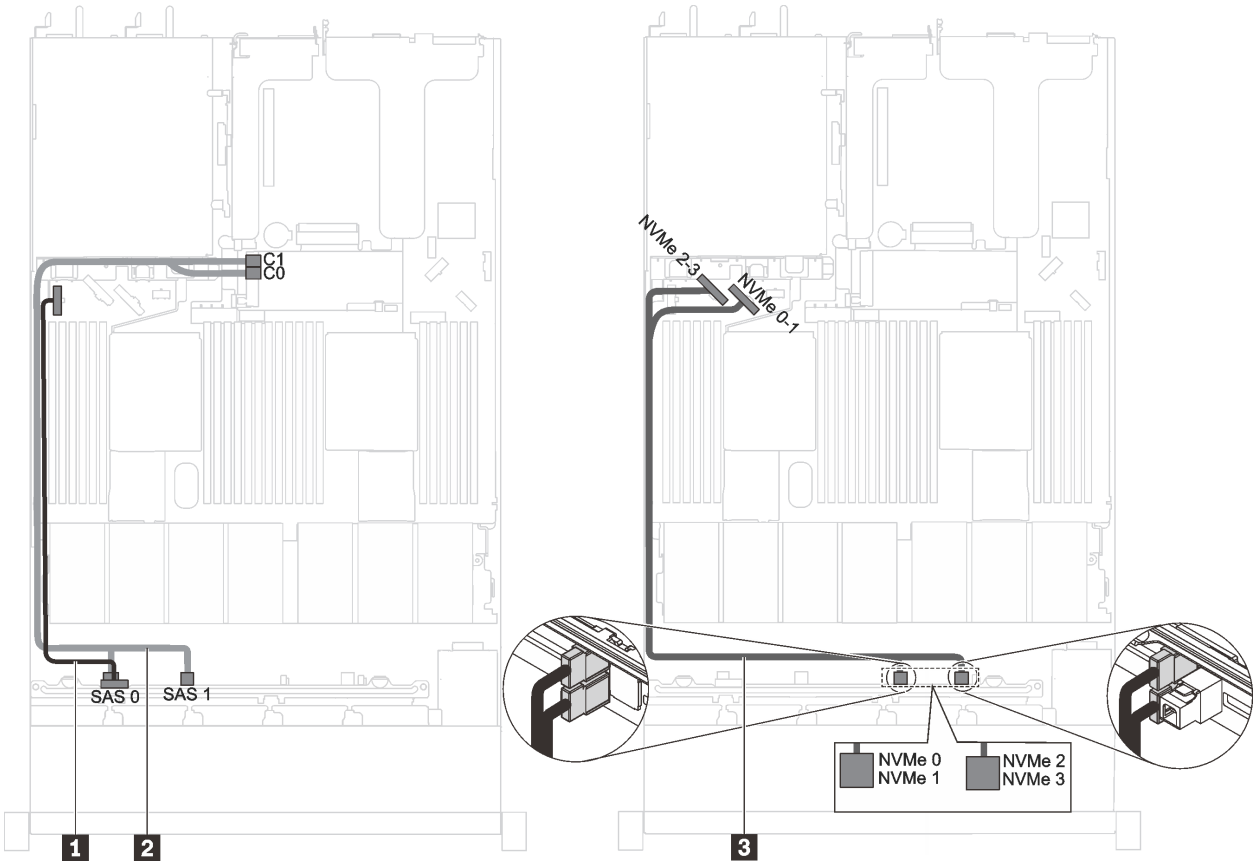


Figure 34. Cable routing for server models with six 2.5-inch SAS/SATA drives, four 2.5-inch NVMe drives, and one 8i HBA/RAID adapter

Cable	From	To
1 Power cable for front backplane	Power connector on the front backplane	Front-backplane power connector on the system board
2 SAS signal cable for front backplane*	SAS 0 and SAS 1 connectors on the front backplane	8i HBA/RAID adapter • Gen 3: C0C1 • Gen 4: C0
3 NVMe signal cable for front backplane	NVMe 0, NVMe 1, NVMe 2, and NVMe 3 connectors on the front backplane	NVMe 0-1 connector and NVMe 2-3 connector on the system board

Server models with six 2.5-inch SAS/SATA drives, four 2.5-inch SAS/SATA/NVMe drives, and a full-height half-length GPU

Notes:

- NVMe drives are only supported in drive bays 6–9.
- Cable 3 is only available for P4000/RTX4000 GPU.

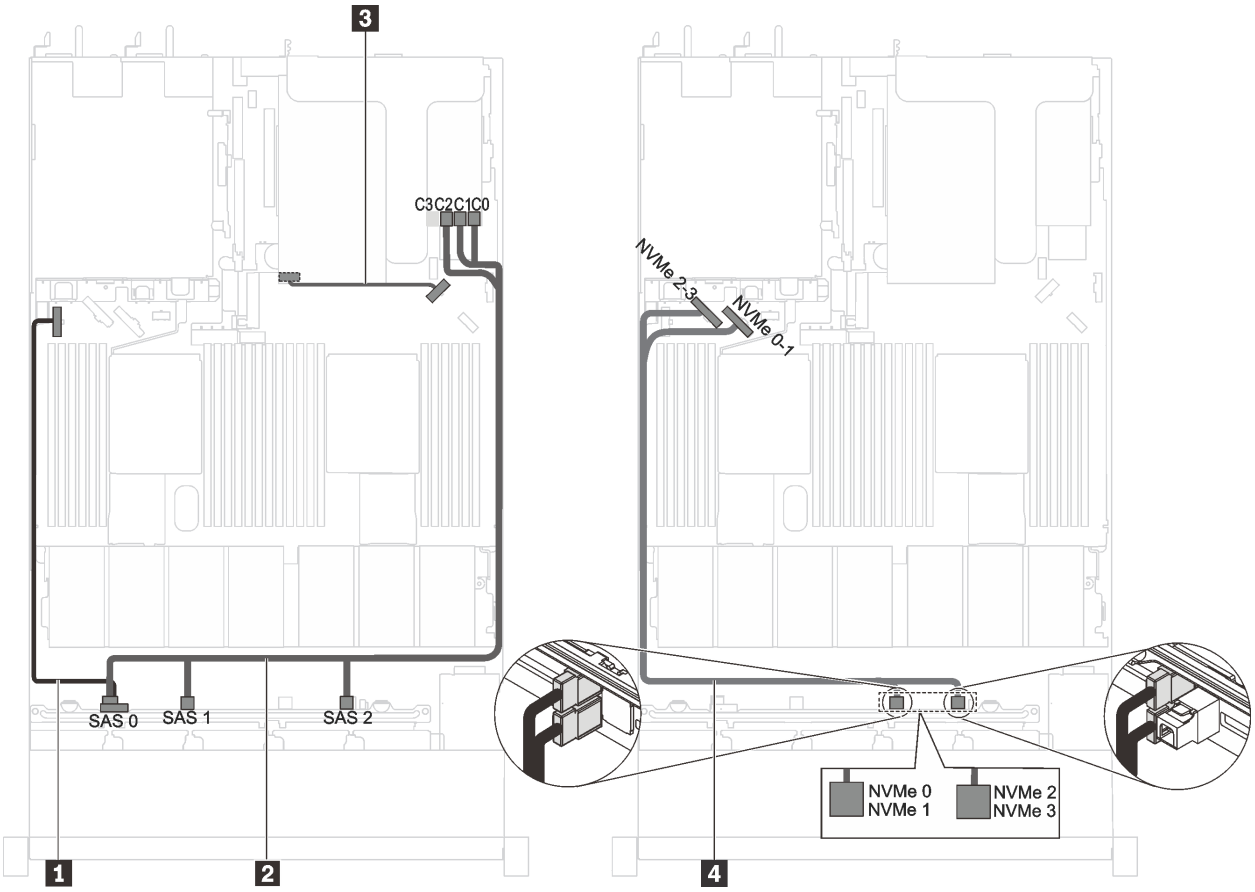


Figure 35. Cable routing for server models with six 2.5-inch SAS/SATA drives, four 2.5-inch SAS/SATA/NVMe drives, and a full-height half-length GPU

Cable	From	To
1 Power cable for front backplane	Power connector on the front backplane	Front-backplane power connector on the system board
2 SAS signal cable for front backplane	SAS 0, SAS 1, and SAS 2 connectors on the front backplane	C0, C1, and C2 connectors on the RAID adapter
3 GPU power cable (only available for P4000/ RTX4000 GPU)	Power connector on P4000/RTX4000 GPU	Rear-backplane power connector on the system board
4 NVMe signal cable for front backplane	NVMe 0, NVMe 1, NVMe 2, and NVMe 3 connectors on the front backplane	NVMe 0-1 connector and NVMe 2-3 connector on the system board

Server models with six 2.5-inch SAS/SATA drives, four 2.5-inch NVMe drives, one 8i HBA/RAID adapter, and one 1610-4P NVMe switch adapter

Notes:

- NVMe drives are only supported in drive bays 6–9.
- This configuration is supported in server models installed with one processor.
- Gen 4 HBA/RAID adapter cannot be installed in the inner raid adapter slot.
- *When Gen 4 HBA/RAID adapter is installed, ensure you use Gen 4 SAS signal cable (ThinkSystem SR530/SR570/SR630 2.5" SAS/SATA 8-Bay X40 RAID Cable Kit).

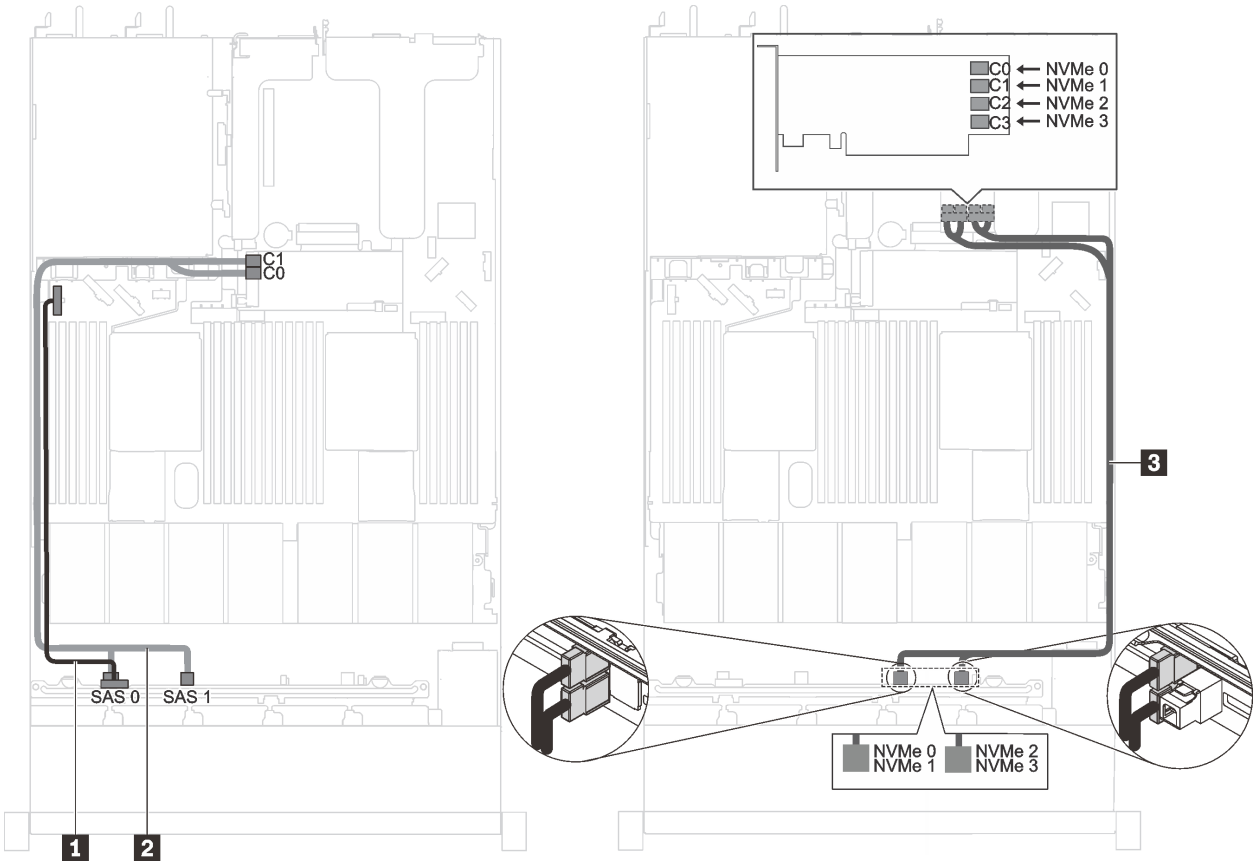


Figure 36. Cable routing for server models with six 2.5-inch SAS/SATA drives, four 2.5-inch NVMe drives, one 8i HBA/RAID adapter, and one 1610-4P NVMe switch adapter in PCIe slot 2

Cable	From	To
1 Power cable for front backplane	Power connector on the front backplane	Front-backplane power connector on the system board
2 SAS signal cable for front backplane*	SAS 0 and SAS 1 connectors on the front backplane	8i HBA/RAID adapter • Gen 3: C0C1 • Gen 4: C0
3 NVMe signal cable for front backplane	NVMe 0, NVMe 1, NVMe 2, and NVMe 3 connectors on the front backplane	C0, C1, C2, and C3 connectors on the NVMe switch adapter installed in PCIe slot 2

Server models with Intel Xeon 6154, 6254, and 6240Y processor, four 2.5-inch SAS/SATA/NVMe drives, and one 16i HBA/RAID adapter

Notes:

- NVMe drives are only supported in drive bays 6–9.
- Gen 4 HBA/RAID adapter cannot be installed in the inner raid adapter slot.
- *When Gen 4 HAB/RAID adapter is installed, ensure you use Gen 4 SAS signal cable (ThinkSystem SR570/SR630 2.5" AnyBay 10-Bay X40 RAID Cable Kit).

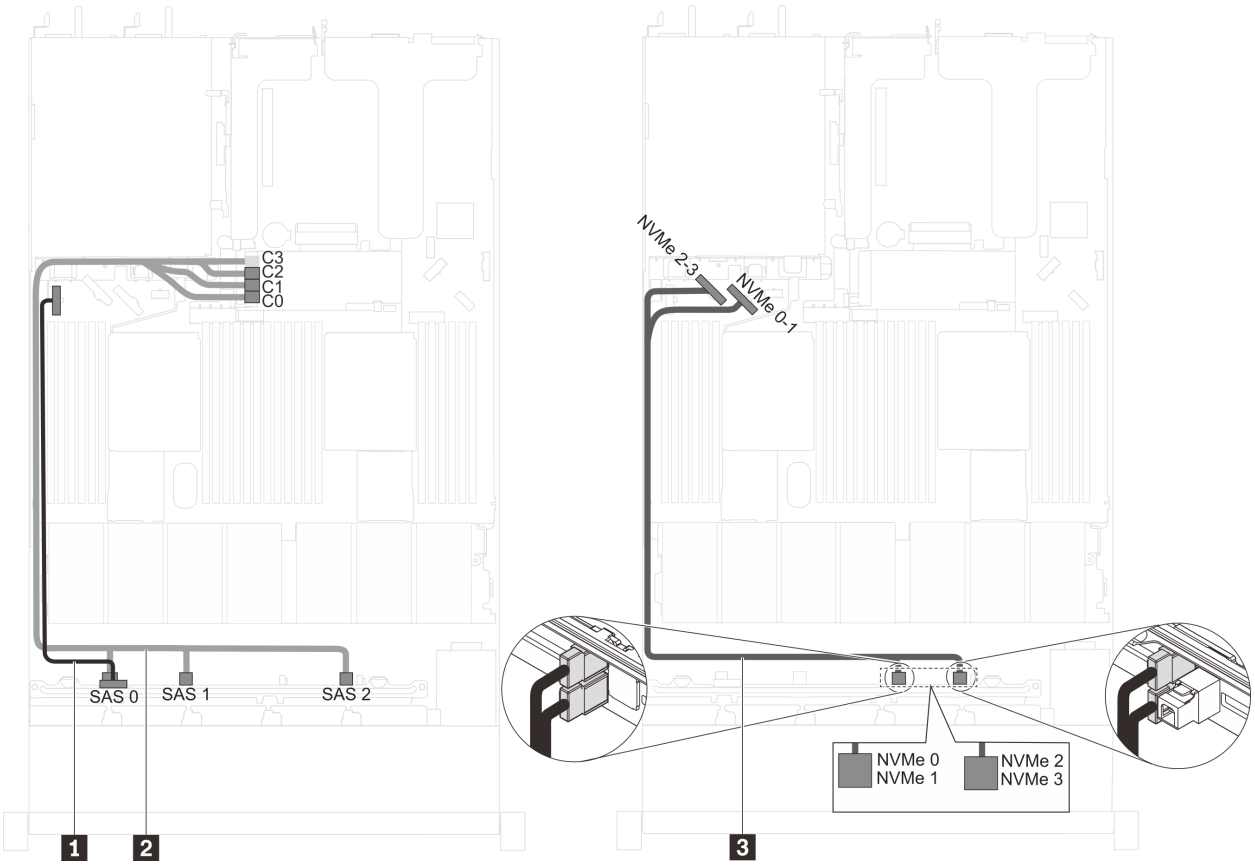


Figure 37. Cable routing for server models with Intel Xeon 6154, 6254, and 6240Y processor, four 2.5-inch SAS/SATA/NVMe drives, and one 16i HBA/RAID adapter

Cable	From	To
1 Power cable for front backplane	Power connector on the front backplane	Front-backplane power connector on the system board
2 SAS signal cable for front backplane*	SAS 0, SAS 1, and SAS 2 connectors on the front backplane	16i HBA/RAID adapter • Gen 3: C0C1C2 • Gen 4: C0C1
3 NVMe signal cable for front backplane	NVMe 0, NVMe 1, NVMe 2, and NVMe 3 connectors on the front backplane	NVMe 0-1 connector and NVMe 2-3 connector on the system board

Server models with six 2.5-inch SAS/SATA drives, four 2.5-inch NVMe drives, one 16i HBA/RAID adapter, and one 1610-4P NVMe switch adapter

Notes:

- NVMe drives are only supported in drive bays 6–9.
- This configuration is supported in server models installed with one processor.
- Gen 4 HBA/RAID adapter cannot be installed in the inner raid adapter slot.
- *When Gen 4 HBA/RAID adapter is installed, ensure you use Gen 4 SAS signal cable (ThinkSystem SR570/SR630 2.5" AnyBay 10-Bay X40 RAID Cable Kit).

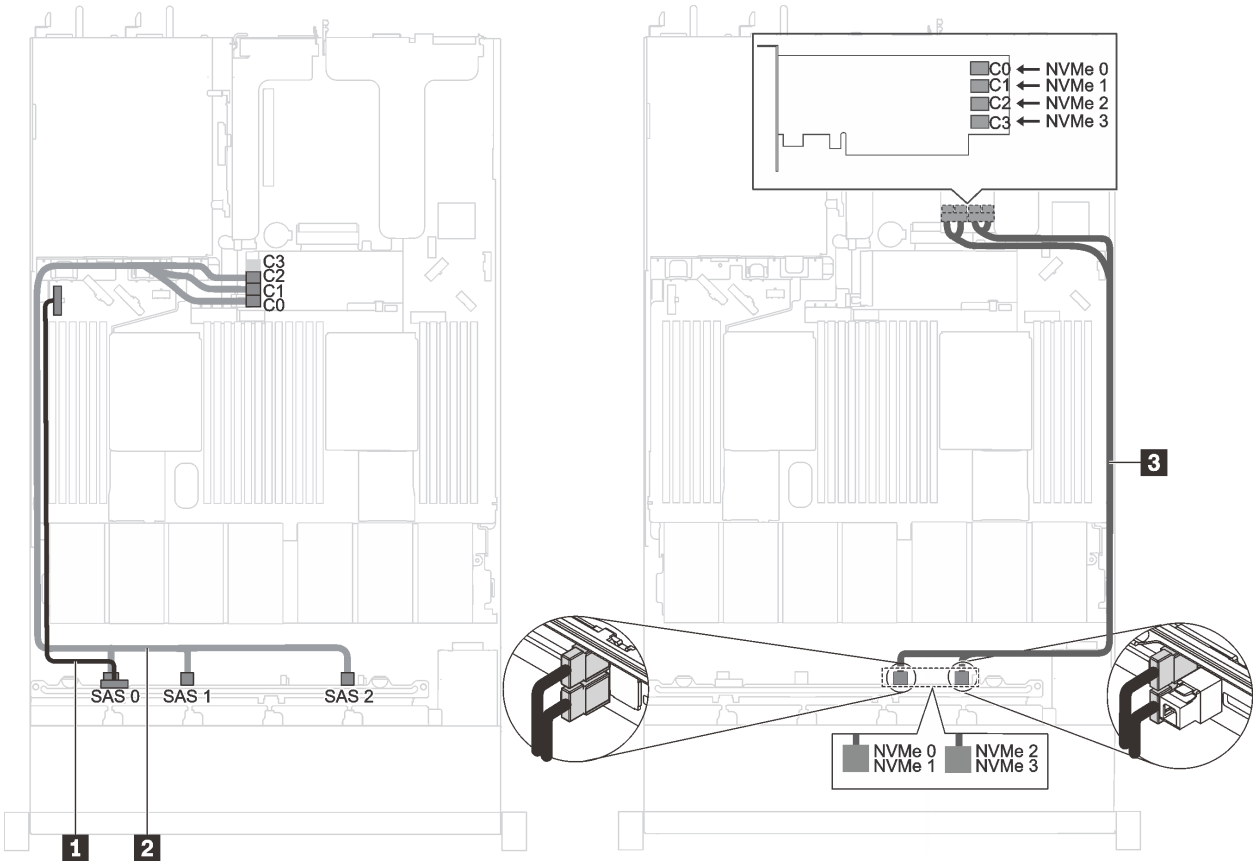


Figure 38. Cable routing for server models with six 2.5-inch SAS/SATA drives, four 2.5-inch NVMe drives, one 16i HBA/RAID adapter, and one 1610-4P NVMe switch adapter in PCIe slot 2

Cable	From	To
1 Power cable for front backplane	Power connector on the front backplane	Front-backplane power connector on the system board
2 SAS signal cable for front backplane*	SAS 0, SAS 1 SAS 2 connectors on the front backplane	16i HBA/RAID adapter • Gen 3: C0C1C2 • Gen 4: C0C1
3 NVMe signal cable for front backplane	NVMe 0, NVMe 1, NVMe 2, and NVMe 3 connectors on the front backplane	C0, C1, C2, and C3 connectors on the NVMe switch adapter installed in PCIe slot 2

Server models with four 2.5-inch NVMe drives and no RAID adapter

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

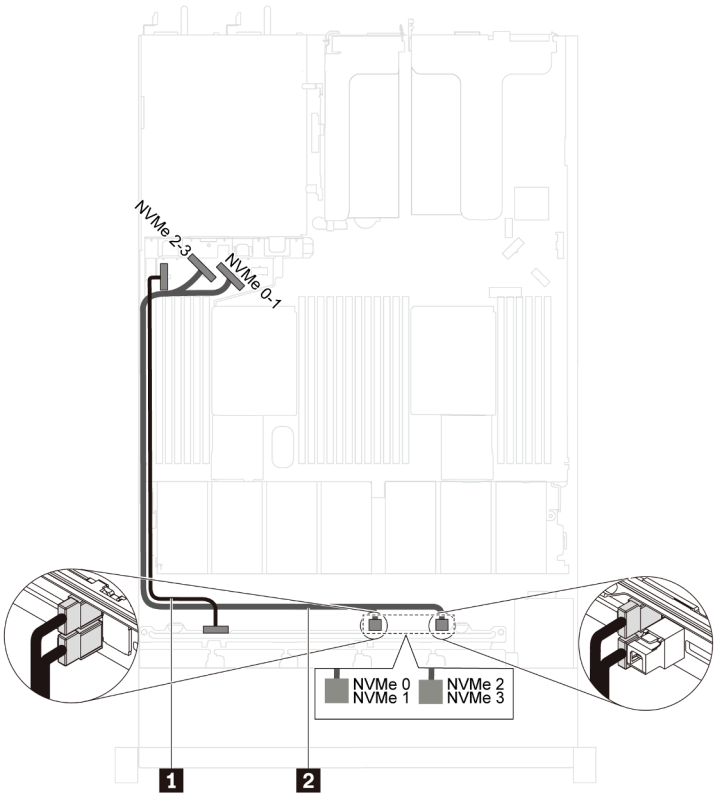


Figure 39. Cable routing for server models with four 2.5-inch NVMe drives, and no RAID adapter

Cable	From	To
1 Power cable for front backplane	Power connector on the front backplane	Front-backplane power connector on the system board
2 NVMe signal cable for front backplane	NVMe 0, NVMe 1, NVMe 2, and NVMe 3 connectors on the front backplane	NVMe 0-1 connector and NVMe 2-3 connector on the system board

Server models with ten 2.5-inch NVMe drives

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

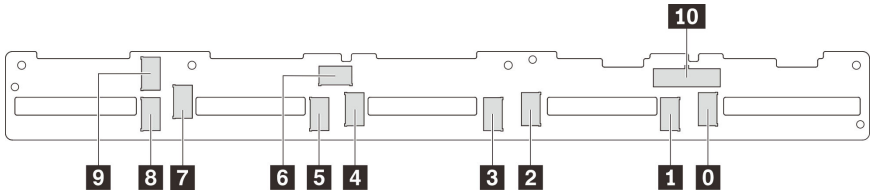


Figure 40. Connectors on the backplane for ten 2.5-inch NVMe drives

0 NVMe 0 connector	1 NVMe 1 connector	2 NVMe 2 connector	3 NVMe 3 connector
4 NVMe 4 connector	5 NVMe 5 connector	6 NVMe 6 connector	7 NVMe 7 connector
8 NVMe 8 connector	9 NVMe 9 connector	10 Power connector	

Server models with ten 2.5-inch NVMe drives, one 1610-4P NVMe switch adapter in PCIe slot 2, and one 1610-4P NVMe switch adapter in PCIe slot 3

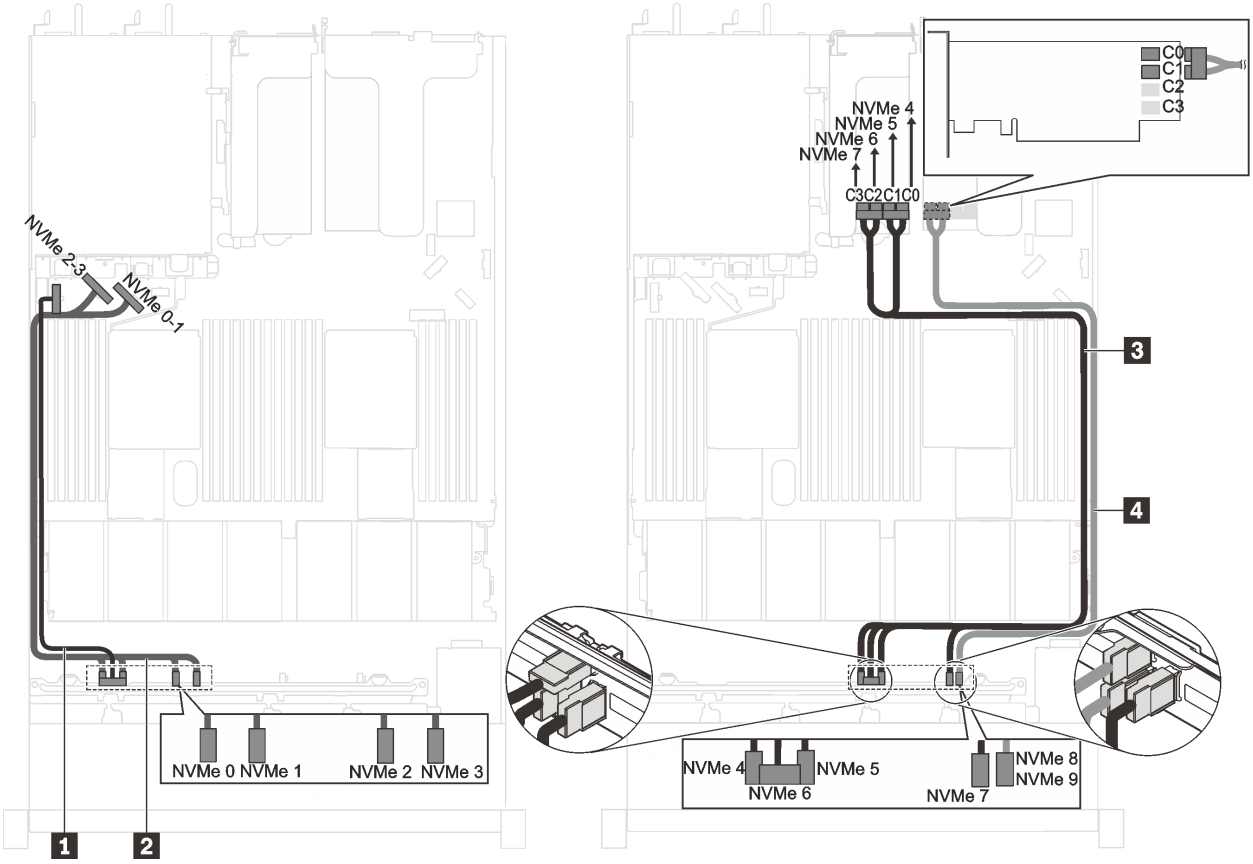


Figure 41. Cable routing for server models with ten 2.5-inch NVMe drives, one 1610-4P NVMe switch adapter in PCIe slot 2, and one 1610-4P NVMe switch adapter in PCIe slot 3

Cable	From	To
1 Power cable for front backplane	Power connector on the front backplane	Front-backplane power connector on the system board
2 NVMe signal cable for front backplane	NVMe 0, NVMe 1, NVMe 2, and NVMe 3 connectors on the front backplane	NVMe 0-1 connector and NVMe 2-3 connector on the system board
3 NVMe signal cable for front backplane	NVMe 4, NVMe 5, NVMe 6, and NVMe 7 connectors on the front backplane	C0, C1, C2, and C3 connectors on the NVMe switch adapter installed in PCIe slot 3
4 NVMe signal cable for front backplane	NVMe 8 and NVMe 9 connectors on the front backplane	C0 and C1 connectors on the NVMe switch adapter installed in PCIe slot 2

Server models with ten 2.5-inch NVMe drives, one 1610-4P NVMe switch adapter in PCIe slot 2, and one 810-4P NVMe switch adapter in the RAID adapter slot

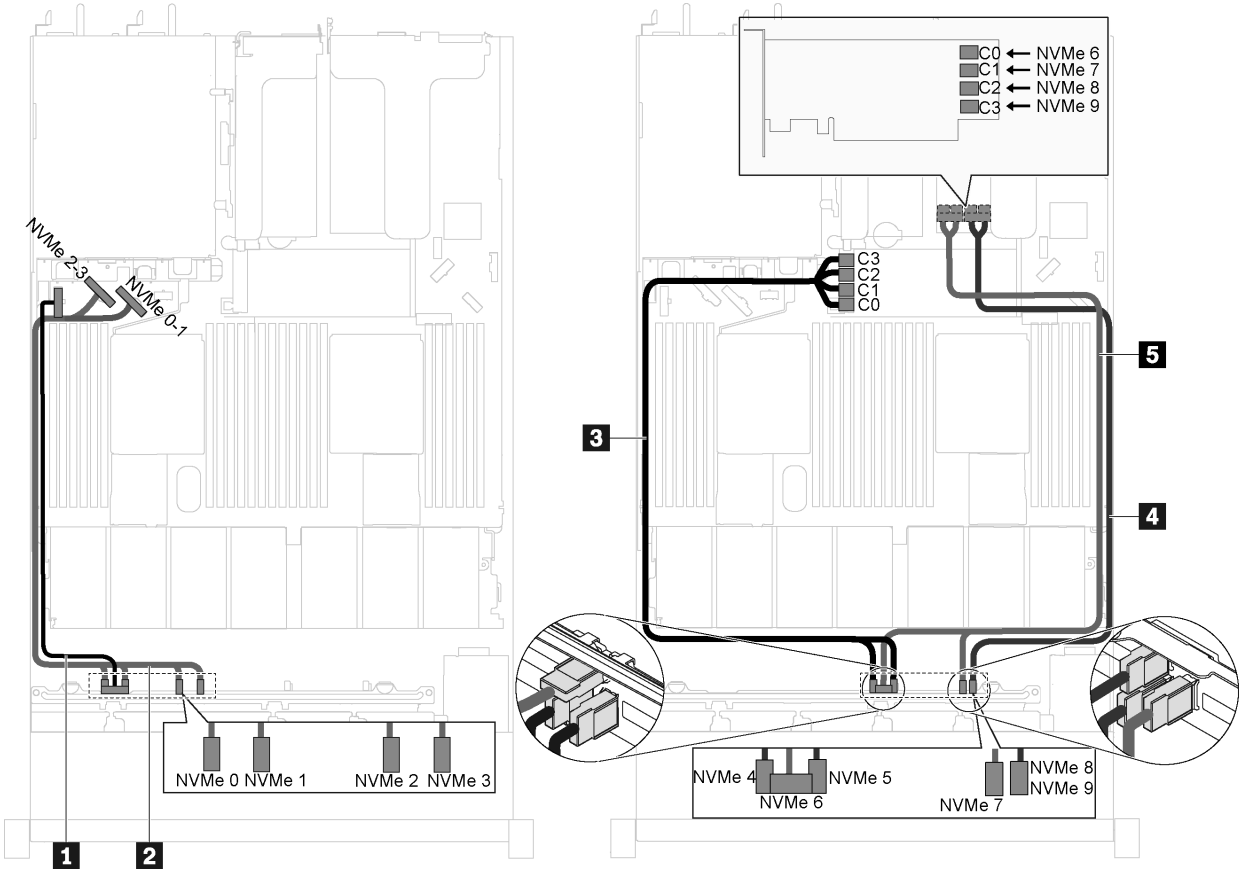


Figure 42. Cable routing for server models with ten 2.5-inch NVMe drives, one 1610-4P NVMe switch adapter in PCIe slot 2, and one 810-4P NVMe switch adapter in the RAID adapter slot

Cable	From	To
1 Power cable for front backplane	Power connector on the front backplane	Front-backplane power connector on the system board
2 NVMe signal cable for front backplane	NVMe 0, NVMe 1, NVMe 2, and NVMe 3 connectors on the front backplane	NVMe 0-1 connector and NVMe 2-3 connector on the system board
3 NVMe signal cable for front backplane	NVMe 4 and NVMe 5 connectors on the front backplane	C0, C1, C2, and C3 connectors on the NVMe switch adapter installed in the RAID adapter slot
4 NVMe signal cable for front backplane	NVMe 6 and NVMe 7 connectors on the front backplane	C0 and C1 connectors on the NVMe switch adapter installed in PCIe slot 2
5 NVMe signal cable for front backplane	NVMe 8 and NVMe 9 connectors on the front backplane	C2 and C3 connectors on the NVMe switch adapter installed in PCIe slot 2

Server model with ten 2.5-inch NVMe drives and one NVMe 1611-8P switch adapter in PCIe slot 2

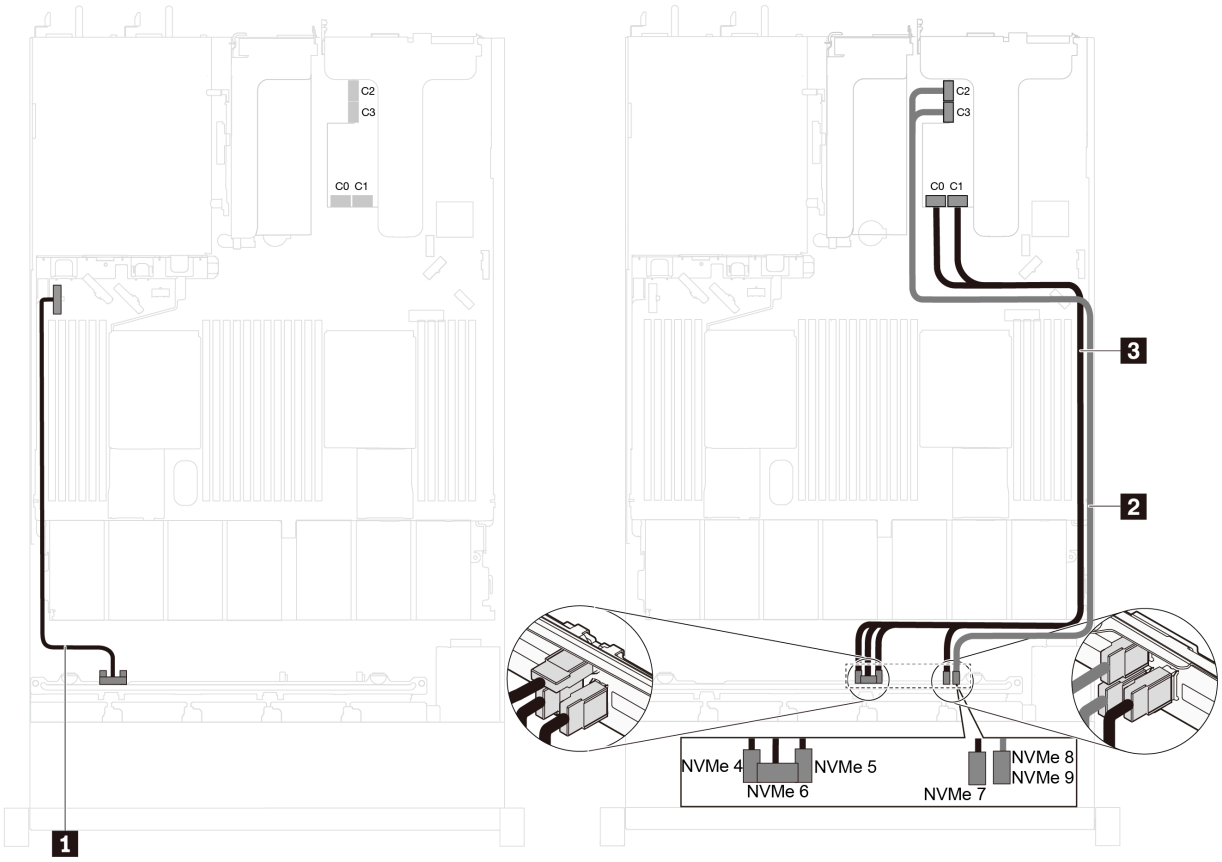


Figure 43. Cable routing for server models with ten 2.5-inch NVMe drives and one NVMe 1611-8P switch adapter in PCIe slot 2

Cable	From	To
1 Power cable for front backplane	Power connector on the front backplane	Front-backplane power connector on the system board
2 NVMe signal cable for front backplane	NVMe 8 and NVMe 9 connectors on the front backplane	C2 and C3 connectors on the NVMe switch adapter installed in PCIe slot 2
3 NVMe signal cable for front backplane	NVMe 4, NVMe 5, NVMe 6, and NVMe 7 connectors on the front backplane	C0 and C1 connectors on the NVMe switch adapter installed in PCIe slot 2

Server models with eight 2.5-inch NVMe drives and one 810-4P NVMe switch adapter in the RAID adapter slot

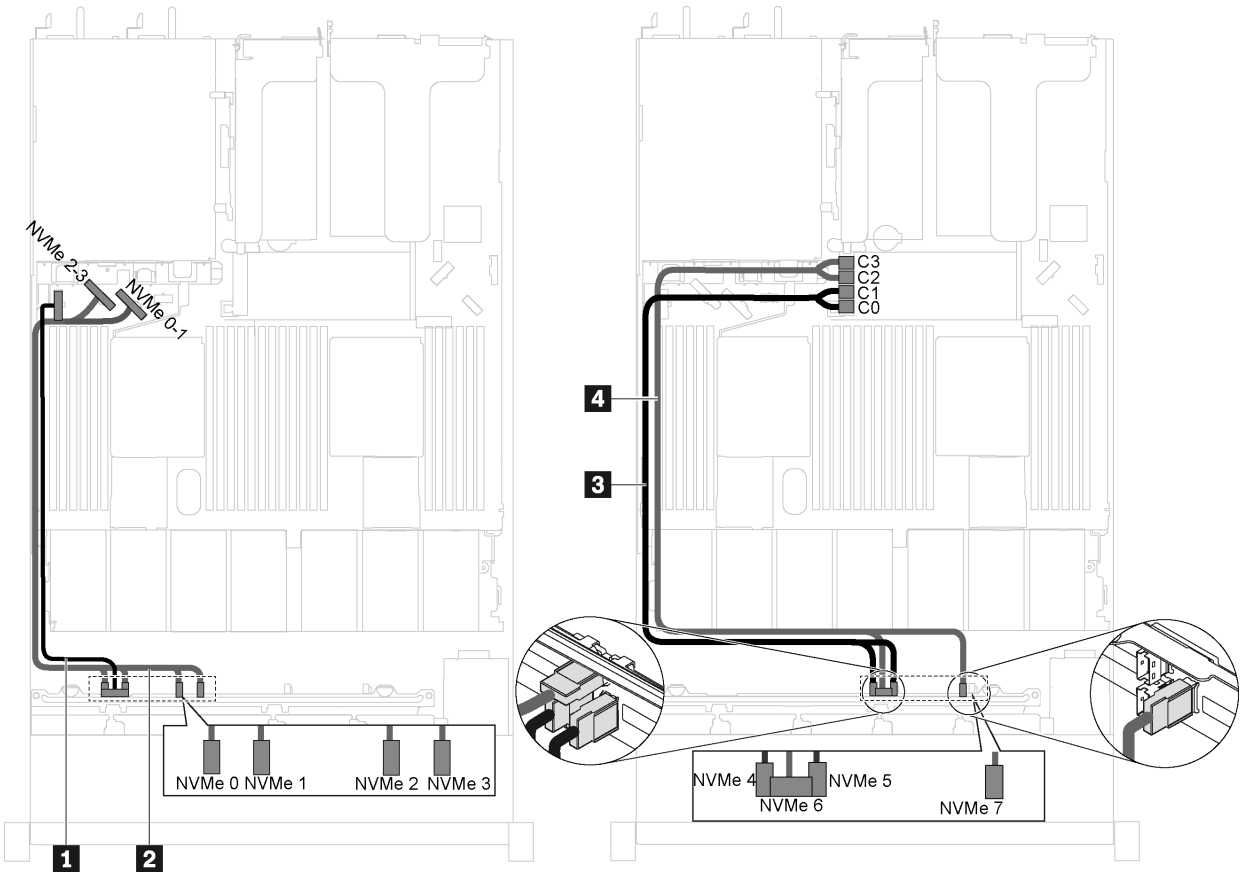


Figure 44. Cable routing for server models with eight 2.5-inch NVMe drives and one 810-4P NVMe switch adapter in the RAID adapter slot

Cable	From	To
1 Power cable for front backplane	Power connector on the front backplane	Front-backplane power connector on the system board
2 NVMe signal cable for front backplane	NVMe 0, NVMe 1, NVMe 2, and NVMe 3 connectors on the front backplane	NVMe 0-1 connector and NVMe 2-3 connector on the system board
3 NVMe signal cable for front backplane	NVMe 4 and NVMe 5 connectors on the front backplane	C0 and C1 connectors on the NVMe switch adapter installed in the RAID adapter slot
4 NVMe signal cable for front backplane	NVMe 6 and NVMe 7 connectors on the front backplane	C2 and C3 connectors on the NVMe switch adapter installed in the RAID adapter slot

Server models with eight 2.5-inch NVMe drives, one 810-4P NVMe switch adapter in PCIe slot 1, and one 810-4P NVMe switch adapter in the RAID adapter slot

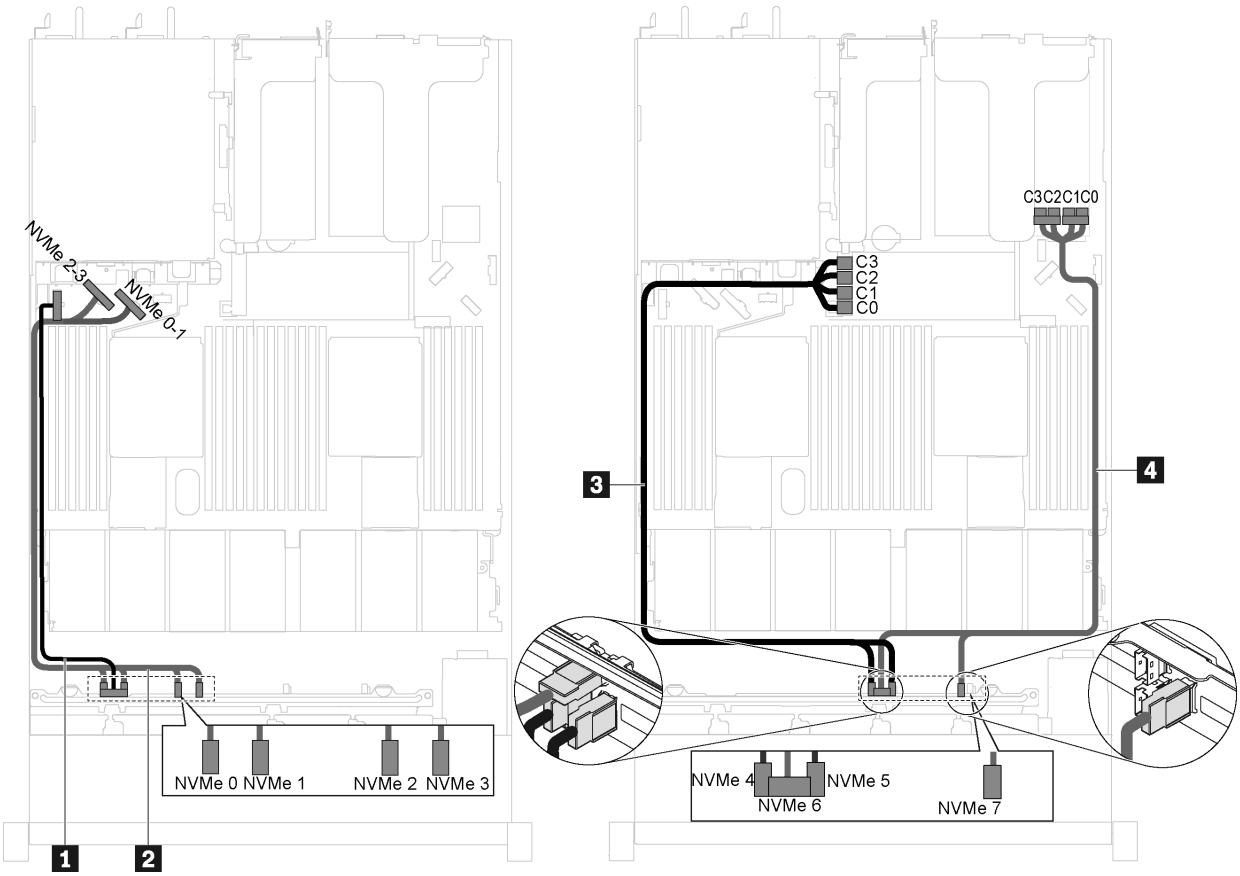


Figure 45. Cable routing for server models with eight 2.5-inch NVMe drives, one 810-4P NVMe switch adapter in PCIe slot 1, and one 810-4P NVMe switch adapter in the RAID adapter slot

Cable	From	To
1 Power cable for front backplane	Power connector on the front backplane	Front-backplane power connector on the system board
2 NVMe signal cable for front backplane	NVMe 0, NVMe 1, NVMe 2, and NVMe 3 connectors on the front backplane	NVMe 0-1 connector and NVMe 2-3 connector on the system board
3 NVMe signal cable for front backplane	NVMe 4 and NVMe 5 connectors on the front backplane	C0, C1, C2, and C3 connectors on the NVMe switch adapter installed in the RAID adapter slot
4 NVMe signal cable for front backplane	NVMe 6 and NVMe 7 connectors on the front backplane	C0, C1, C2, and C3 connectors on the NVMe switch adapter installed in PCIe slot 1

Server models with eight 2.5-inch NVMe drives and one NVMe 1611-8P switch adapter in PCIe slot 2

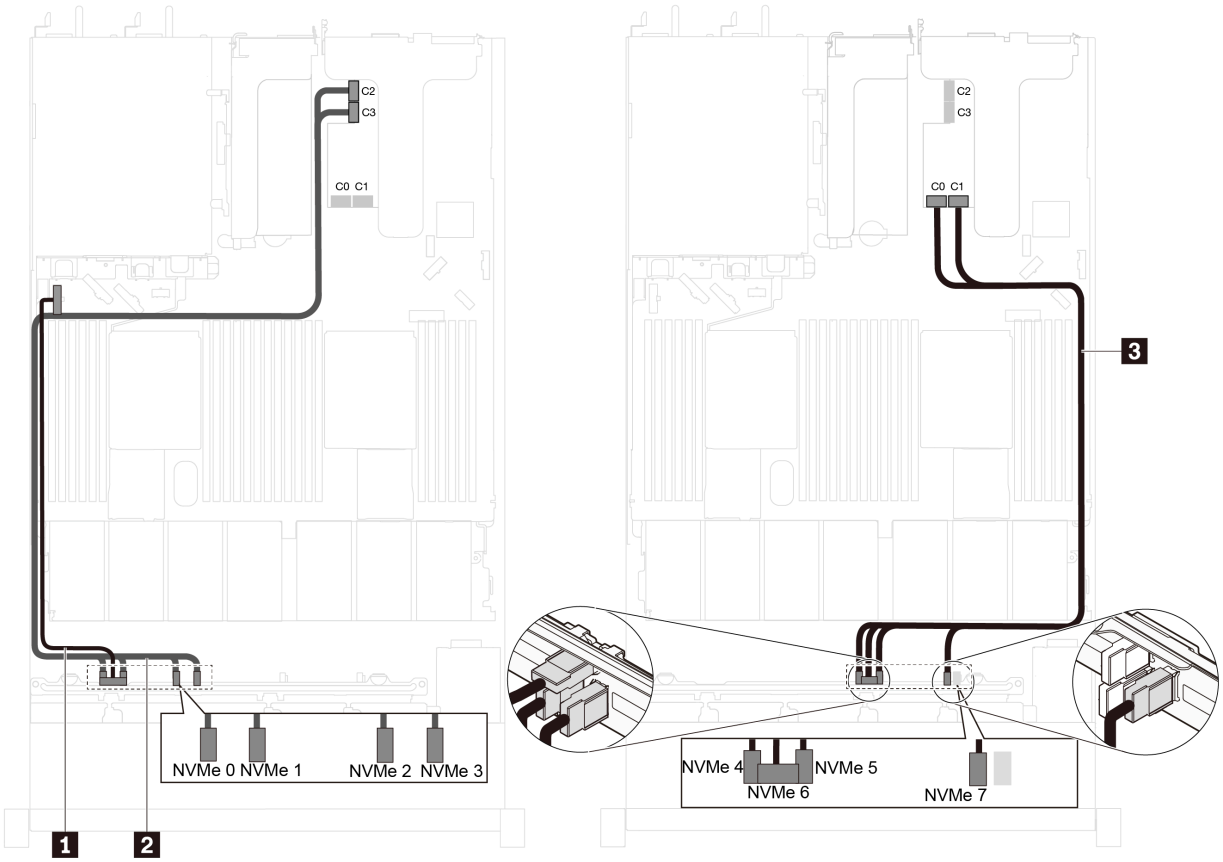


Figure 46. Cable routing for server models with eight 2.5-inch NVMe drives and one NVMe 1611-8P switch adapter in PCIe slot 2

Cable	From	To
1 Power cable for front backplane	Power connector on the front backplane	Front-backplane power connector on the system board
2 NVMe signal cable for front backplane	NVMe 0, NVMe 1, NVMe 2, and NVMe 3 connectors on the front backplane	C2 and C3 connectors on the NVMe switch adapter installed in PCIe slot 2
3 NVMe signal cable for front backplane	NVMe 4, NVMe 5, NVMe 6, and NVMe 7 connectors on the front backplane	C0 and C1 connectors on the NVMe switch adapter installed in PCIe slot 2

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 47 “Server components” on page 61, go to:

http://datacentersupport.lenovo.com/us/en/products/servers/thinksystem/sr630/7x01/parts

Note: Depending on the model, your server might look slightly different from the illustration. Some of the components might not be available on your server.

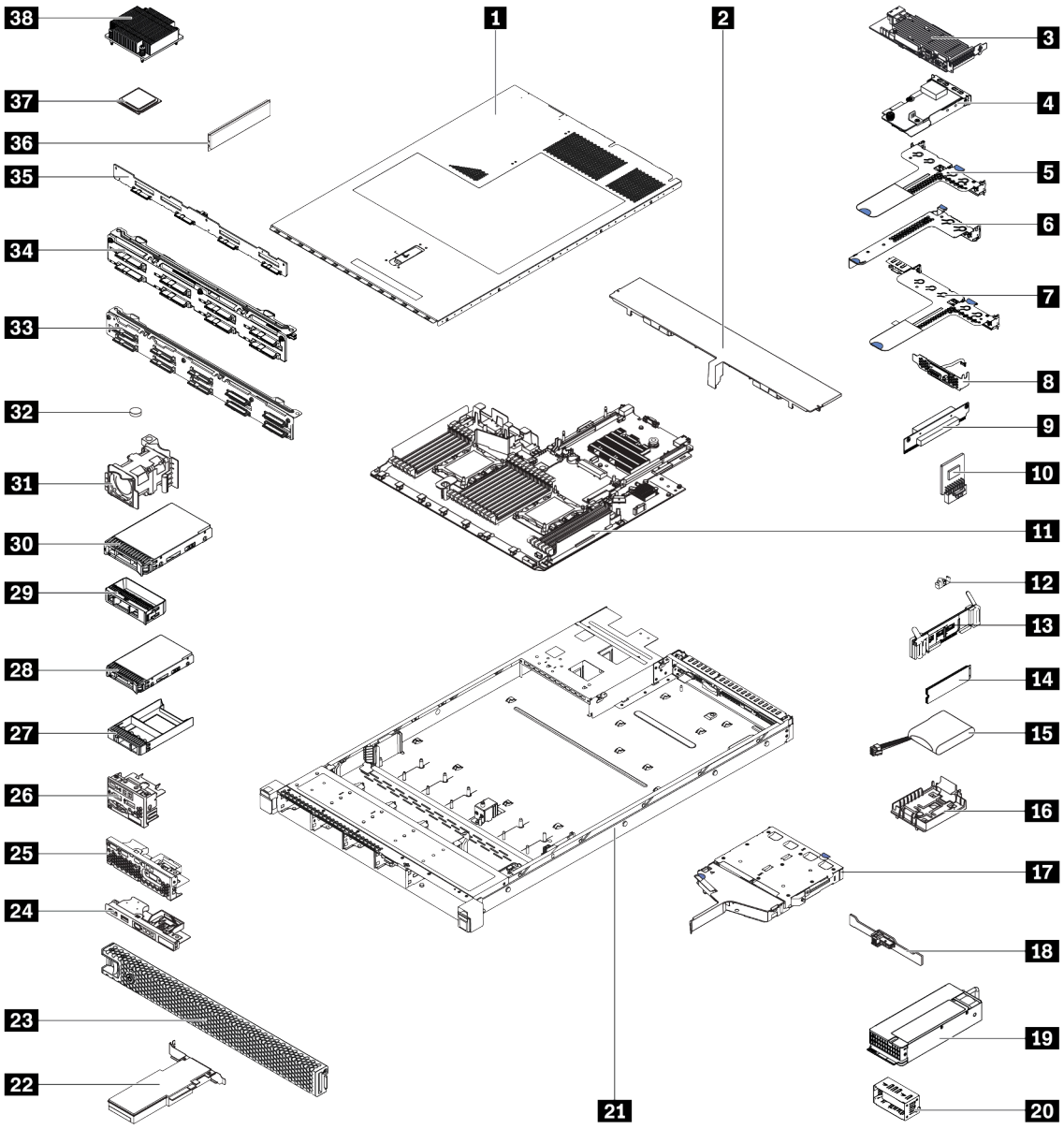


Figure 47. Server components

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 (components, such as a cover or bezel) is your responsibility. If Lenovo acquires or installs a structural component at your request, you will be charged for the service.

Table 10. Parts list

Index	Description	Tier 1 CRU	Tier 2 CRU	FRU	Consumable and Structural parts
For more information about ordering the parts shown in Figure 47 “Server components” on page 61, go to: http://datacentersupport.lenovo.com/us/en/products/servers/thinksystem/sr630/7x01/parts It is highly recommended that you check the power summary data for your server using Lenovo Capacity Planner before purchasing any new parts.					
1	Top cover	√			
2	Air baffle				√
3	RAID adapter on the system board	√			
4	LOM adapter	√			
5	Riser 1 bracket (two low-profile slots)	√			
6	Riser 2 bracket (one low-profile slot)	√			
7	Riser 1 bracket (one low-profile slot and one full-height half-length slot)	√			
8	Serial port module	√			
9	Riser card	√			
10	TCM/TPM adapter (only available in Chinese Mainland)			√	
11	System board			√	
12	M.2 retainer	√			
13	M.2 drive backplane	√			
14	M.2 drive	√			
15	RAID super capacitor module	√			
16	RAID super capacitor module holder				√
17	Rear hot-swap drive cage				√
18	Rear backplane	√			
19	Power supply	√			
20	Power supply filler				√
21	Chassis with four 3.5-inch drive bays Chassis with eight 2.5-inch drive bays Chassis with ten 2.5-inch drive bays			√	
22	PCIe adapter	√			
23	Security bezel	√			
24	Front I/O assembly for server models with four 3.5-inch drive bays	√			
25	Front I/O assembly for server models with eight 2.5-inch drive bays	√			

Table 10. Parts list (continued)

Index	Description	Tier 1 CRU	Tier 2 CRU	FRU	Consumable and Structural parts
26	Front I/O assembly for server models with ten 2.5-inch drive bays	√			
27	2.5-inch drive filler				√
28	2.5-inch hot-swap drive	√			
29	3.5-inch drive filler				√
30	3.5-inch hot-swap drive	√			
31	System fan	√			
32	CMOS battery				√
33	Backplane for server models with ten 2.5-inch drive bays	√			
34	Backplane for server models with eight 2.5-inch drive bays	√			
35	Backplane for server models with four 3.5-inch drive bays	√			
36	Memory module (DCPMM module might look slightly different from the illustration.)	√			
37	Processor			√	
38	Heat sink			√	

Power cords

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

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

1. Go to:

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

2. Click **Preconfigured Model** or **Configure to order**.
3. Enter the machine type and model for your server to display the configurator page.
4. Click **Power → Power Cables** to see all line cords.

Notes:

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

Chapter 3. Hardware replacement procedures

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

For more information about ordering parts, go to:

http://datacentersupport.lenovo.com/us/en/products/servers/thinksystem/sr630/7x01/parts

Note: If you replace a part, such as an adapter, that contains firmware, you might also need to update the firmware for that part. For more information about updating firmware, see "Firmware updates" on page 13.

Installation Guidelines

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

Before installing optional devices, read the following notices carefully:

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

- Read the safety information and guidelines to ensure that you work safely.
  - A complete list of safety information for all products is available at:

    http://thinksystem.lenovofiles.com/help/topic/safety_documentation/pdf_files.html
  - The following guidelines are available as well: "Handling static-sensitive devices" on page 68 and "Working inside the server with the power on" on page 67.
- 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 SR630 Drivers and Software to download firmware updates for your server.

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

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

  Note: See the system specific instructions for removing or installing a hot-swap drive for any additional procedures that you might need to perform before you remove or install the drive.
- After finishing working on the server, make sure you reinstall all safety shields, guards, labels, and ground wires.

Safety inspection checklist

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

Notes:

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

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

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

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

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

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

     a. Go to:

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

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

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

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

- Make sure that the insulation is not frayed or worn.

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

System reliability guidelines

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

Make sure the following requirements are met:

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

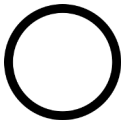
Top cover replacement

Use this information to remove and install the top cover.

Remove the top cover

Use this information to remove the top cover.


"**Read** the installation Guidelines" on page 65


"**Power off** the server for this task" on page 17


"**ATTENTION: Static Sensitive Device** Ground package before opening" on page 68

S033



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

S014

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

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

To remove the top cover, complete the following steps:

Watch the procedure

A video of this procedure is available at https://www.youtube.com/playlist?list=PLYV5R7hVcs-C_GGjNudxYy8-c69INMcmE.

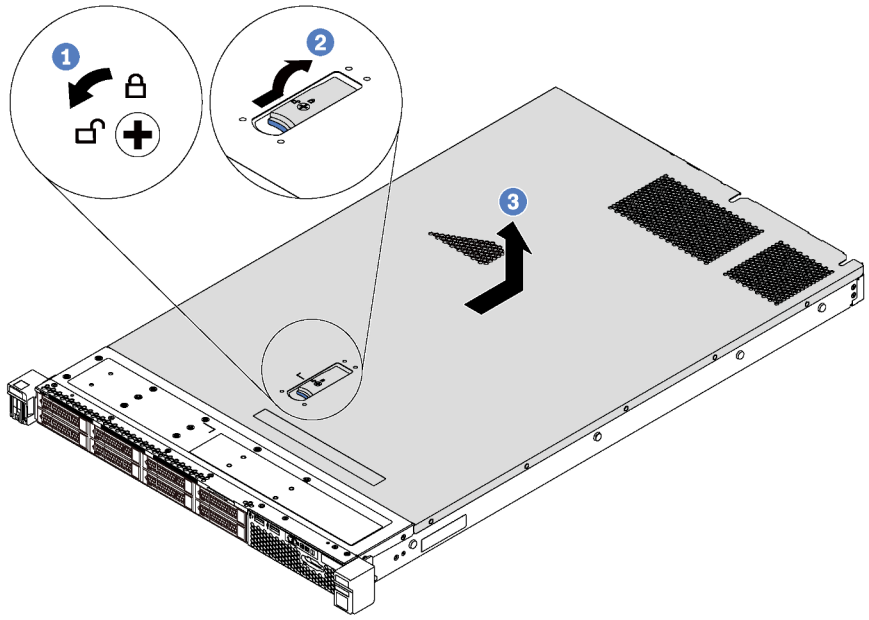


Figure 48. Top cover removal

Step 1. Use a screwdriver to turn the cover lock to the unlocked position as shown.

Step 2. Press the release button on the cover latch and then fully open the cover latch.

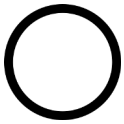
Step 3. Slide the top cover to the rear of the server until it is disengaged from the chassis. Then, lift the top cover off the chassis and place it on a flat clean surface.

Attention:

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

Install the top cover

Use this information to install the top cover.

		
"**Read** the installation Guidelines" on page 65	"**Power off** the server for this task" on page 17	"**ATTENTION: Static Sensitive Device** Ground package before opening" on page 68

Before installing the top cover:

1. Ensure that all cables, adapters, and other components are installed and seated correctly and that you have not left loose tools or parts inside the server.
2. Ensure that all internal cables are correctly routed. See "Internal cable routing" on page 34.
3. If you are installing a new top cover, attach the service label to the new top cover first if necessary.

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

To install the top cover, complete the following steps:

Watch the procedure

A video of this procedure is available at https://www.youtube.com/playlist?list=PLYV5R7hVcs-C_GGjNudxYy8-c69INMcmE.

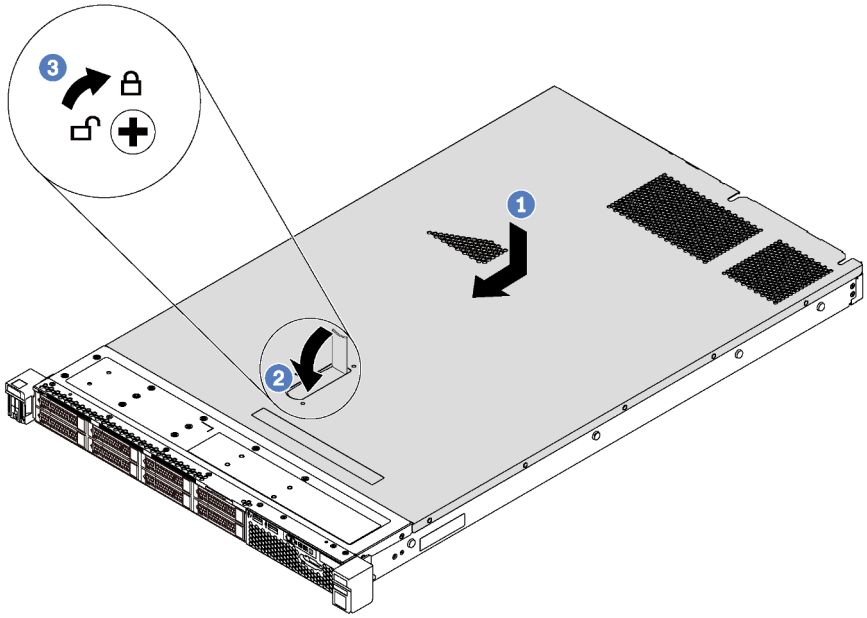


Figure 49. Top cover installation

Note: Before you slide the top cover forward, ensure that all the tabs on the top cover engage the chassis correctly. If the tabs do not engage the chassis correctly, it will be very difficult to remove the top cover later.

Step 1. Ensure that the cover latch is in the open position. Lower the top cover onto the chassis until both sides of the top cover engage with the guides on both sides of the chassis.

Step 2. Pivot the cover latch and slide the top cover to the front of the chassis at the same time until the top cover snaps into position. Ensure that the cover latch is completely closed.

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

After installing the top cover, complete the parts replacement. See "Complete the parts replacement" on page 177.

Air baffle replacement

Use this information to remove and install the air baffle.

S033



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

S017



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

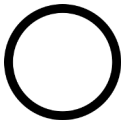
Note: Air baffle is not available for some server models.

Remove the air baffle

Use this information to remove the air baffle.



"**Read** the installation Guidelines" on page 65



"**Power off** the server for this task" on page 17

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

Before removing the air baffle:

1. Remove the top cover. See "Remove the top cover" on page 68.
2. If there is a RAID super capacitor module installed on the bottom of the air baffle, disconnect the RAID super capacitor module cable first.

To remove the air baffle, complete the following step:

Watch the procedure

A video of this procedure is available at https://www.youtube.com/playlist?list=PLYV5R7hVcs-C_GGjNudxYy8-c69INMcmE.

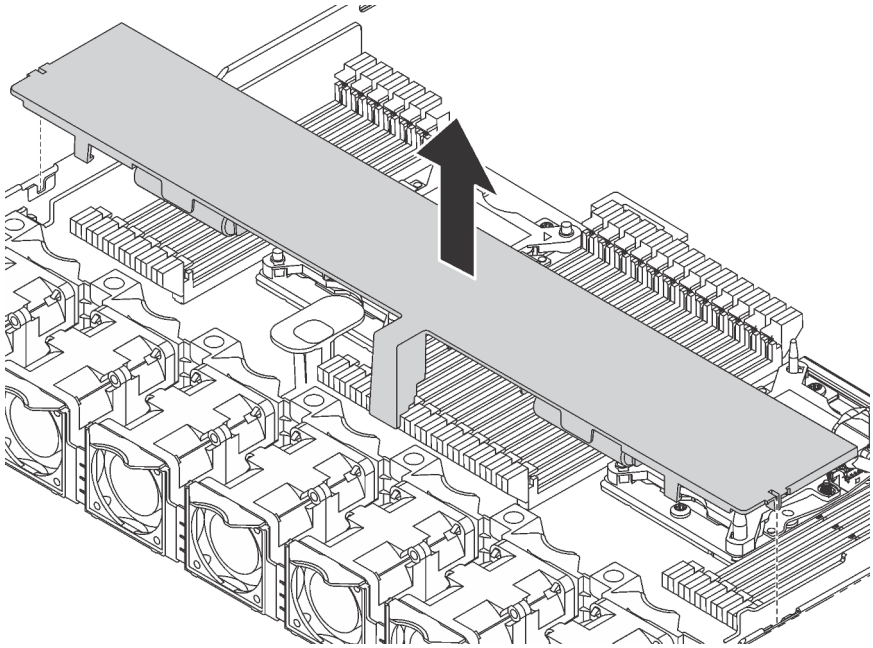


Figure 50. Air baffle removal

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

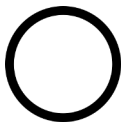
Attention: For proper cooling and airflow, install the air baffle before you power on the server. Operating the server with the air baffle removed might damage server components.

Install the air baffle

Use this information to install the air baffle.



"**Read** the installation Guidelines" on page 65



"**Power off** the server for this task" on page 17

Note: For server models installed with large size heat sink, the air baffle is not supported. See "Important information for system board, processor, and heat sink" on page 10.

Before installing the air baffle, if you want to install a RAID super capacitor module on the bottom of the air baffle, install it first. See "Install a RAID super capacitor module on the bottom of the air baffle" on page 145.

To install the air baffle, complete the following steps:

Watch the procedure

A video of this procedure is available at https://www.youtube.com/playlist?list=PLYV5R7hVcs-C_GGjNudxYy8-c69INMcmE.

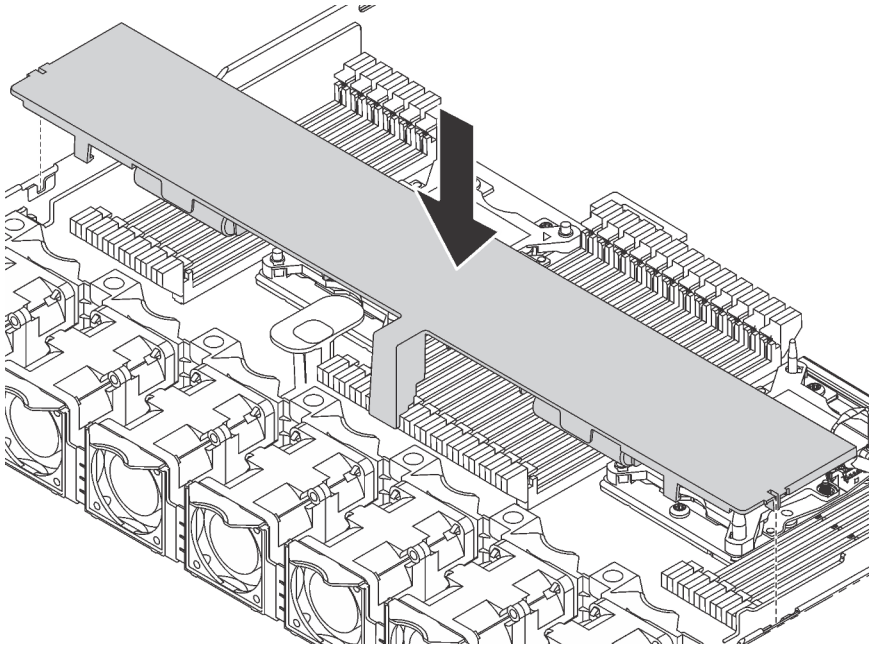


Figure 51. Air baffle installation

Step 1. Align the tabs on both sides of the air baffle with the corresponding slots on both sides of the chassis.

Step 2. Lower the air baffle into the chassis and press the air baffle down until it is securely seated.

After installing the air baffle:

1. If there is a RAID super capacitor module installed on the bottom of the air baffle, connect it to the RAID adapter with the extension cable that comes with the RAID super capacitor module.
2. Complete the parts replacement. See "Complete the parts replacement" on page 177.

Rack latches replacement

Use this information to remove and install the rack latches.

Remove the rack latches

Use this information to remove the rack latches.



"**Read** the installation Guidelines" on page 65

Before removing the rack latches:

1. If the server is installed with the security bezel, remove it first. See "Remove the security bezel" on page 77.
2. Use a flat-blade screwdriver to remove the ID label plate on the right rack latch and place it in a safe place.

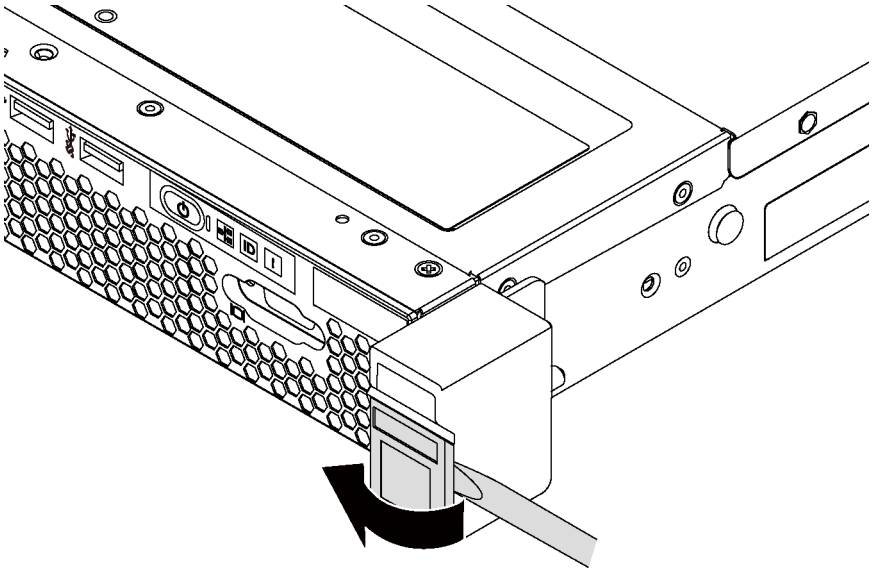


Figure 52. ID label plate removal

To remove the rack latches, complete the following steps:

Watch the procedure

A video of this procedure is available at https://www.youtube.com/playlist?list=PLYV5R7hVcs-C_GGjNudxYy8-c69INMcmE.

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

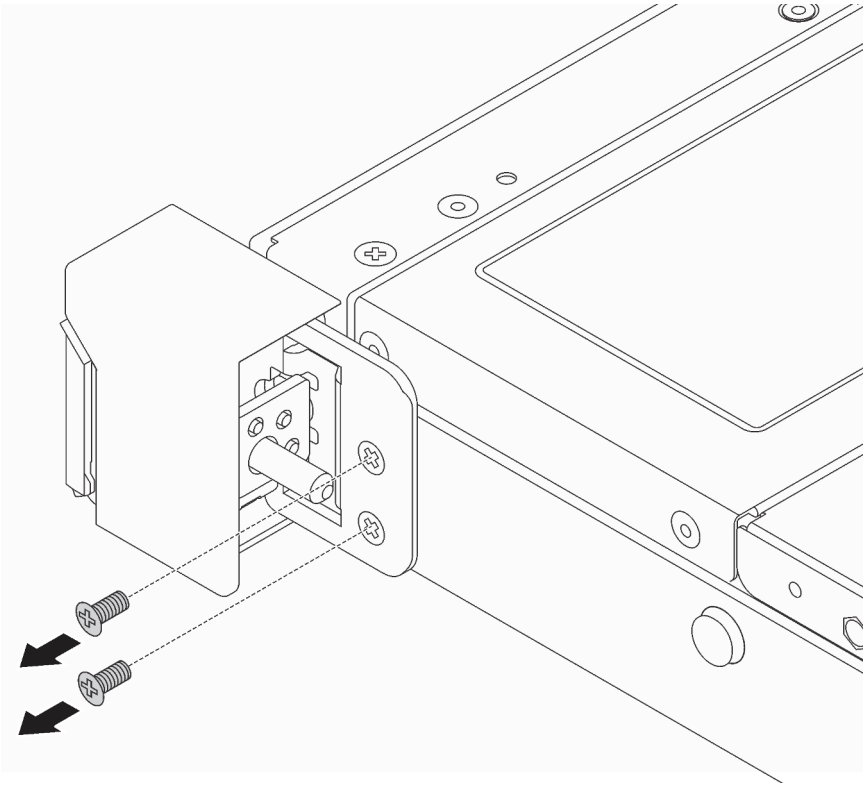


Figure 53. Rack latch screws removal

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

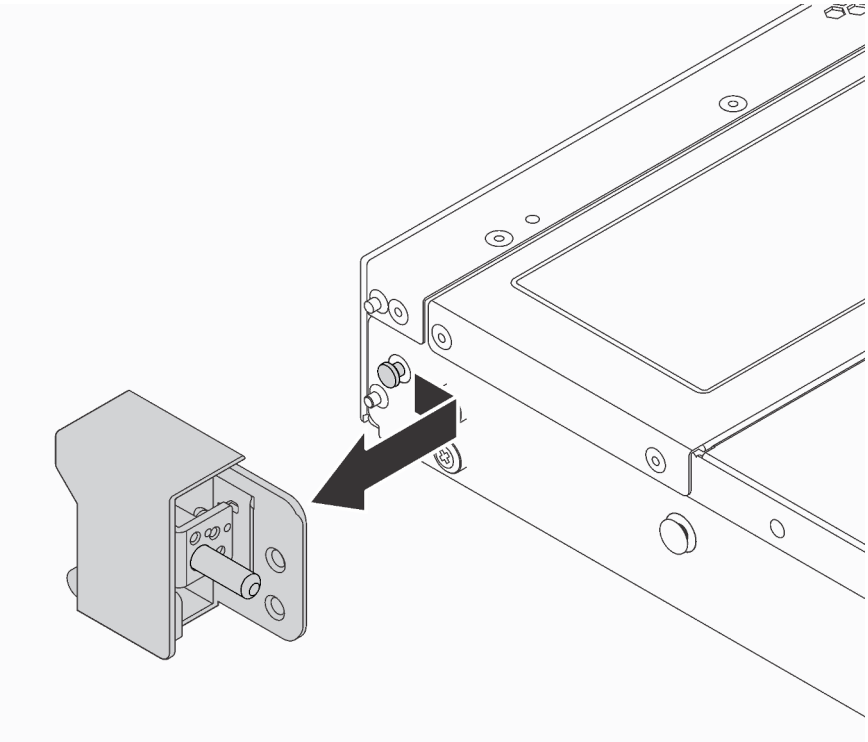


Figure 54. Rack latch removal

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

Install the rack latches

Use this information to install the rack latches.



"**Read** the installation Guidelines" on page 65

To install the rack latches, complete the following steps:

Watch the procedure

A video of this procedure is available at https://www.youtube.com/playlist?list=PLYV5R7hVcs-C_GGjNudxYy8-c69INMcmE.

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

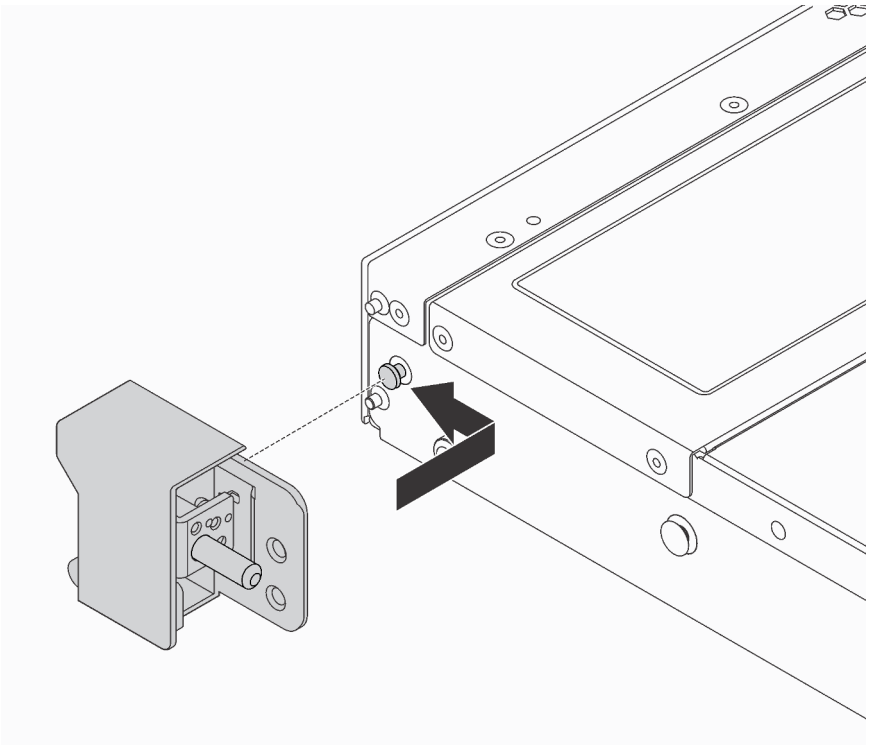


Figure 55. Rack latch installation

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

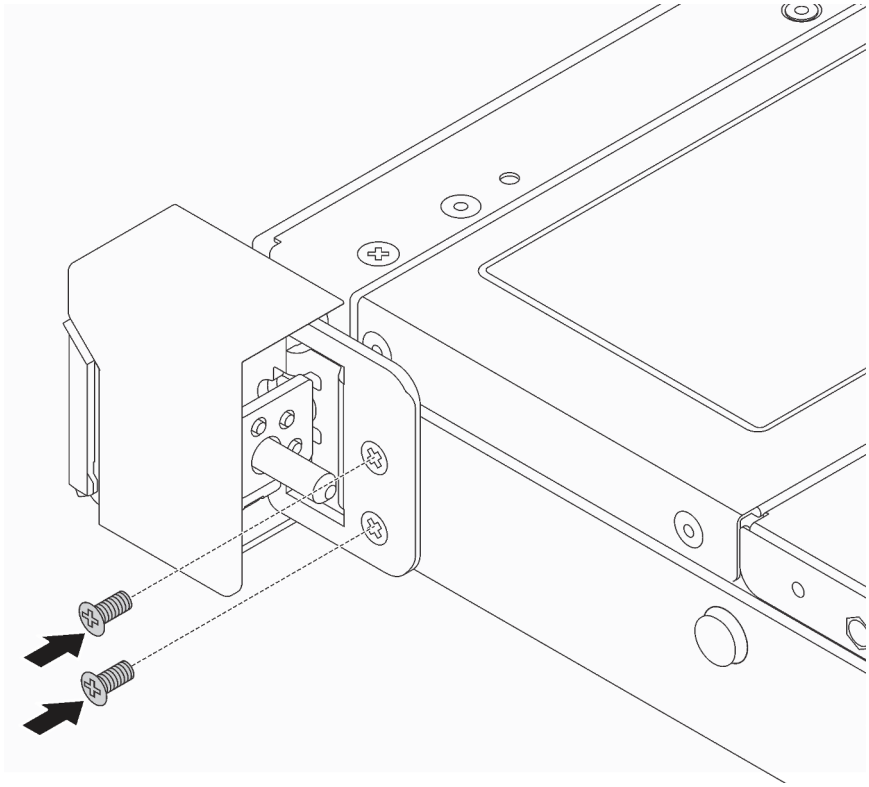


Figure 56. Rack latch screws installation

After installing the rack latches:

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

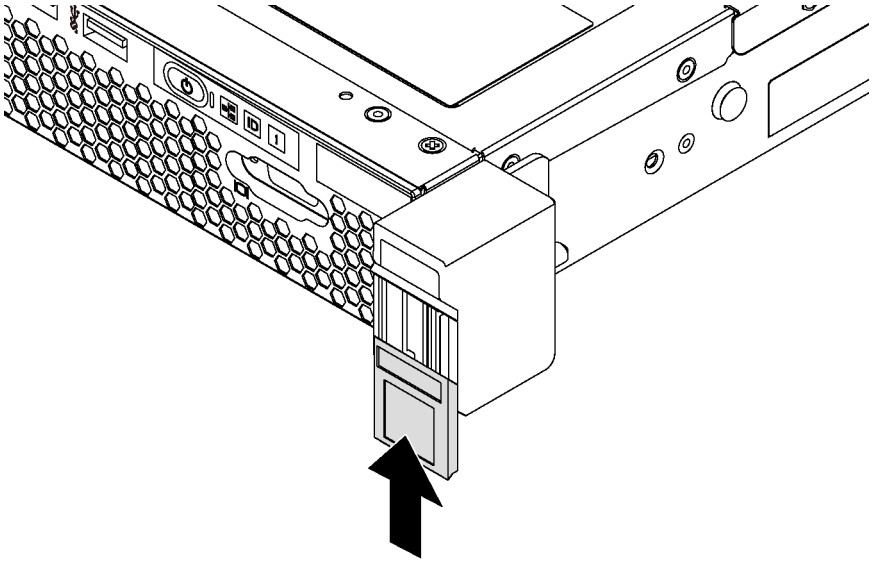


Figure 57. ID label plate installation

2. Complete the parts replacement. See “Complete the parts replacement” on page 177.

Security bezel replacement

Use this information to remove and install the security bezel.

Remove the security bezel

Use this information to remove the security bezel.



“**Read** the installation Guidelines” on page 65

To remove the security bezel, complete the following steps:

Watch the procedure

A video of this procedure is available at https://www.youtube.com/playlist?list=PLYV5R7hVcs-C_GGjNudxYy8-c69INMcmE.

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

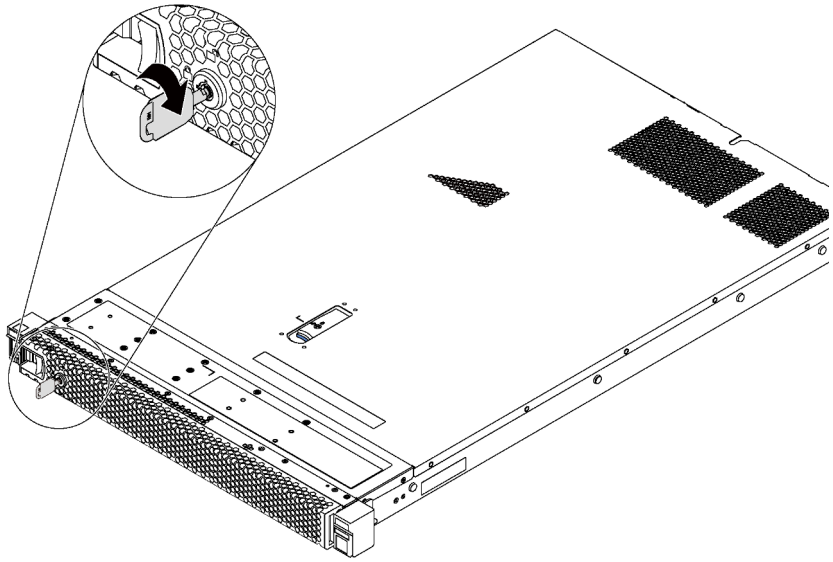


Figure 58. Security bezel unlock

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

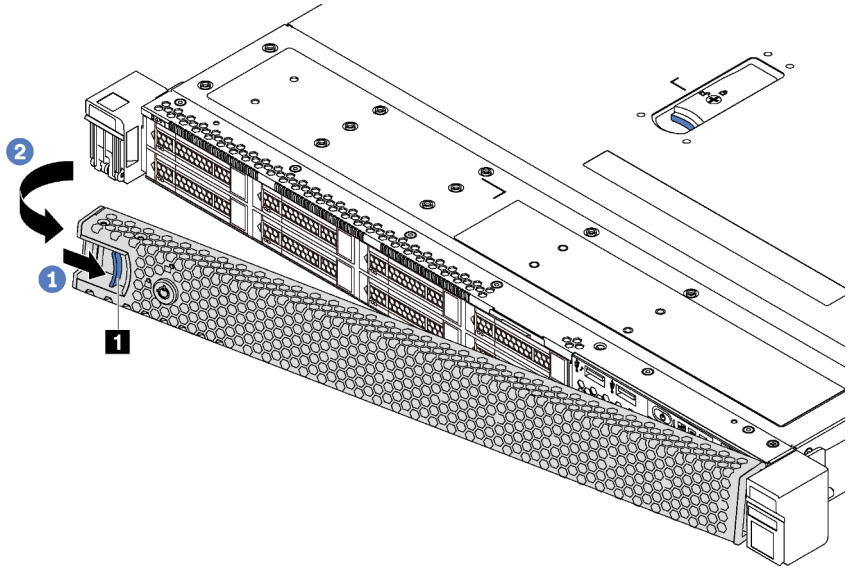


Figure 59. Security bezel removal

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

Install the security bezel

Use this information to install the security bezel.



"**Read** the installation Guidelines" on page 65

Before installing the security bezel, if you have removed the rack latches, reinstall them. See “Install the rack latches” on page 75.

To install the security bezel, complete the following steps:

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

Watch the procedure

A video of this procedure is available at https://www.youtube.com/playlist?list=PLYV5R7hVcs-C_GGjNudxYy8-c69INMcmE.

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

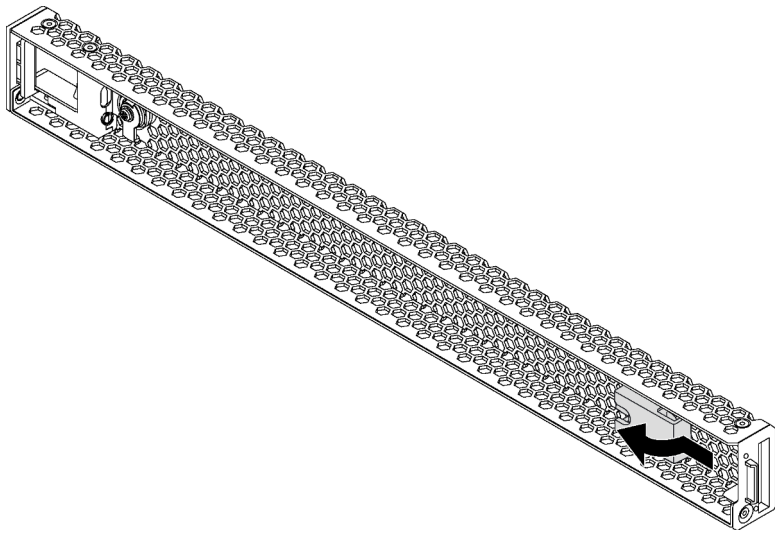


Figure 60. Key removal

Step 2. Insert the tab on the security bezel into the slot on the right side of the chassis. Then, press and hold the blue release latch 1 and pivot the security bezel inward until it clicks into place.

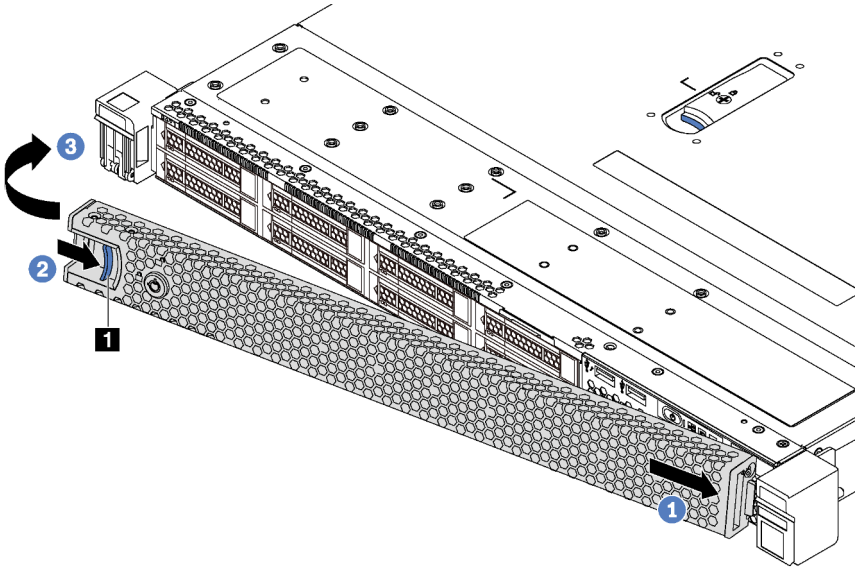


Figure 61. Security bezel installation

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

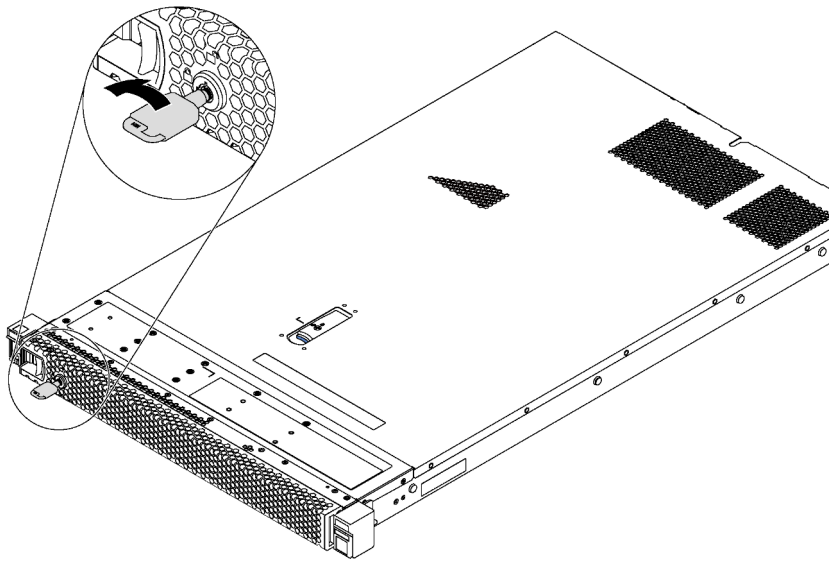


Figure 62. Security bezel lockup

System fan replacement

Use this information to remove and install a system fan.

Remove a system fan

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



"**Read** the installation Guidelines" on page 65



"**ATTENTION: Static Sensitive Device** Ground package before opening" on page 68

S033



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

S017



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

Before removing a system fan, remove the top cover. See “Remove the top cover” on page 68.

To remove a system fan, complete the following step:

Watch the procedure

A video of this procedure is available at https://www.youtube.com/playlist?list=PLYV5R7hVcs-C_GGjNudxYy8-c69INMcmE.

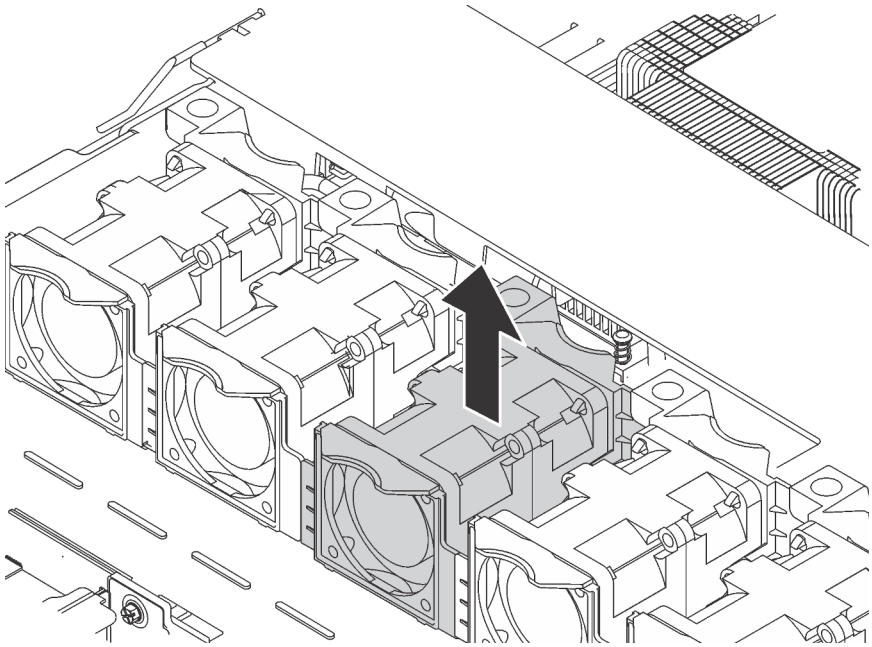


Figure 63. System fan removal

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

After removing the system fan:

- Install a new system fan. See “Install a system fan” on page 81.
- If you are instructed to return the old system fan, follow all packaging instructions and use any packaging materials that are provided.

Install a system fan

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



“**Read** the installation Guidelines” on page 65



“**ATTENTION: Static Sensitive Device** Ground package before opening” on page 68

S033



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

S017



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

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

To install a system fan, complete the following steps:

Watch the procedure

A video of this procedure is available at https://www.youtube.com/playlist?list=PLYV5R7hVcs-C_GGjNudxYy8-c69INMcmE.

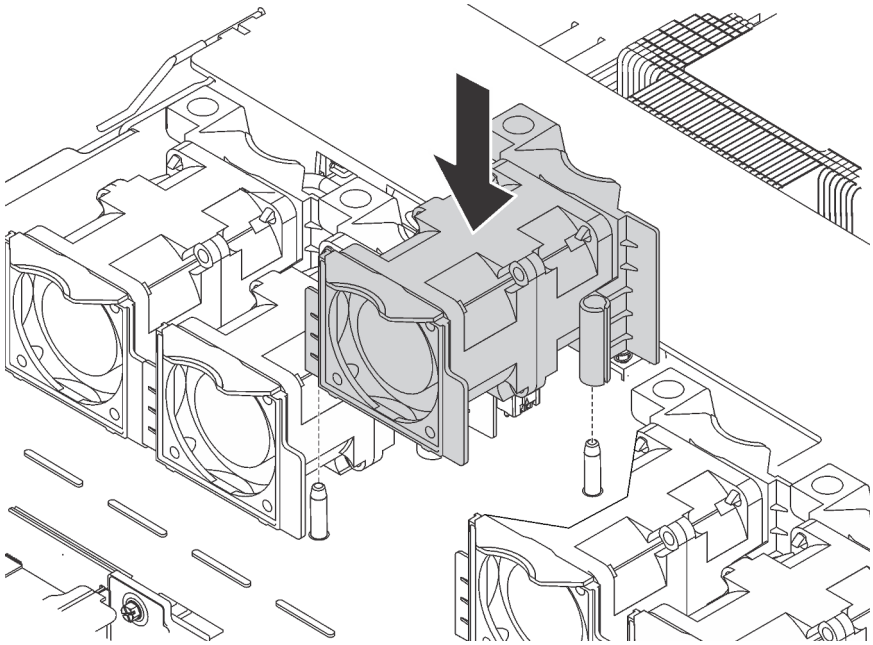


Figure 64. System fan installation

Step 1. Align the two holes in the system fan with the two pins on the chassis.

Step 2. Press the system fan down until it is seated correctly in the slot. Ensure that the fan connector is installed correctly to the connector on the system board.

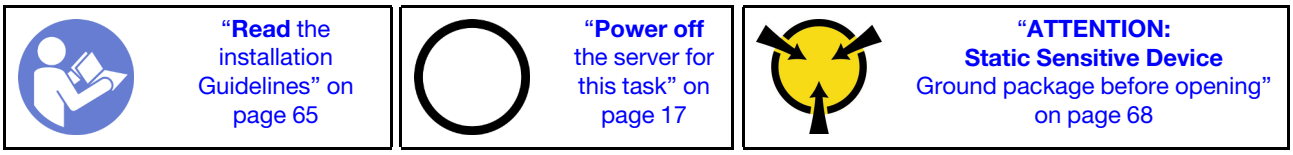
After installing the system fan, complete the parts replacement. See “Complete the parts replacement” on page 177.

Memory module replacement

Use this information to remove and install a memory module.

Remove a memory module

Use this information to remove a memory module.



Before you remove a memory module:

1. If you are removing a DCPMM in App Direct or Mixed Memory Mode, make sure to:
   a. Back up the stored data.
   b. If the App Direct capacity is interleaved:
      1) Delete all the created namspaces and filesystems in the operating system.
      2) Perform secure erase on all the DCPMMs that are installed. Go to **Intel Optane DCPMMs → Security → Press to Secure Erase** to perform secure erase.

      Note: If one or more DCPMMs are secured with passphrase, make sure security of every unit is disabled before performing secure erase. In case the passphrase is lost or forgotten, contact Lenovo service.

      If the App Direct capacity is not interleaved:
      1) Delete the namespace and filesystem of the DCPMM unit to be replaced in the operating system.
      2) Perform secure erase on the DCPMM unit that is to be replaced. Go to **Intel Optane DCPMMs → Security → Press to Secure Erase** to perform secure erase.

Attention:

- Disconnect all power cords for this task.
- memory modules are sensitive to static discharge and require special handling. In addition to the standard guidelines for “Handling static-sensitive devices” on page 68:
  - Always wear an electrostatic-discharge strap when removing or installing memory modules. Electrostatic-discharge gloves can also be used.
  - Never hold two or more memory modules together so that they touch. Do not stack memory modules directly on top of each other during storage.
  - Never touch the gold memory module connector contacts or allow these contacts to touch the outside of the memory module connector housing.
  - Handle memory modules with care: never bend, twist, or drop a memory module.
  - Do not use any metal tools (such as jigs or clamps) to handle the memory modules, because the rigid metals may damage the memory modules.
  - Do not insert memory modules while holding packages or passive components, which can cause package cracks or detachment of passive components by the high insertion force.

Note: A DCPMM module looks slightly different from a DRAM DIMM in the illustration, but the removal method is the same.

Before removing a memory module:

Note: If you are removing a DCPMM in App Direct or Mixed Memory Mode, make sure to back up the stored data, and delete any created name space.

1. Remove the top cover. See "Remove the top cover" on page 68.
2. If your server comes with an air baffle, remove it first. See "Remove the air baffle" on page 71.

Watch the procedure

A video of this procedure is available at https://www.youtube.com/playlist?list=PLYV5R7hVcs-C_GGjNudxYy8-c69INMcmE.

To remove a memory module, complete the following steps:

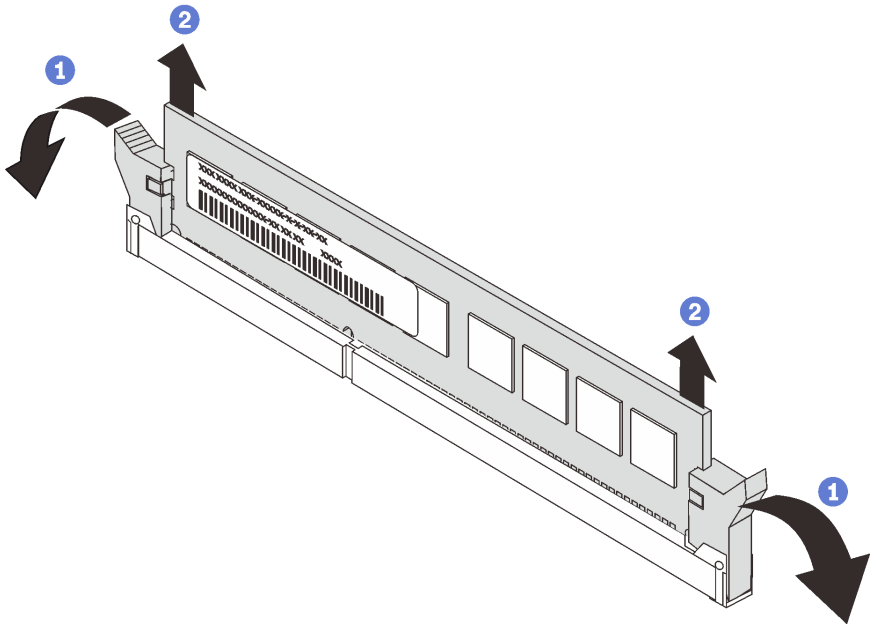


Figure 65. Memory module removal

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

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

Step 2. Grasp the memory module at both ends and carefully lift it up to remove it from the slot.

After removing a memory module:

1. Install a memory module filler or a new memory module to cover the slot. See "Install a memory module" on page 98.
2. If you are instructed to return the old memory module, follow all packaging instructions and use any packaging materials that are provided.

Memory module installation rules

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

Your server has 24 memory module slots. It supports up to 12 memory modules when one processor is installed, and up to 24 memory modules when two processors are installed. It has the following features:

For Intel Xeon SP Gen 1:

- Supporting memory module type is as follows:
  - TruDDR4 2666, single-rank or dual-rank, 8 GB/16 GB/32 GB RDIMM
  - TruDDR4 2666, quad-rank, 64 GB LRDIMM
  - TruDDR4 2666, octa-rank, 128 GB 3DS RDIMM
- The minimum system memory is 8 GB.
- The maximum system memory is as follows:
  - 768 GB using RDIMMs
  - 1.5 TB using LRDIMMs
  - 3 TB using 3DS RDIMMs

For Intel Xeon SP Gen 2:

- Supporting memory module type is as follows:
  - TruDDR4 2666, single-rank or dual-rank, 16 GB/32 GB RDIMM
  - TruDDR4 2933, single-rank or dual-rank, 8 GB/16 GB/32 GB/64 GB RDIMM
  - TruDDR4 2933, single-rank or dual-rank, 16 GB/32 GB/64 GB Performance+ RDIMM
  - TruDDR4 2666, quad-rank, 64 GB 3DS RDIMM
  - TruDDR4 2933, quad-rank, 128 GB 3DS RDIMM
  - TruDDR4 2933, quad-rank, 128 GB Performance+ 3DS RDIMM
  - 128 GB/256 GB/512 GB DCPMM
- The minimum system memory is 8 GB.
- The maximum system memory is as follows:
  - 1.5 TB using RDIMMs
  - 3 TB using 3DS RDIMMs
  - 6 TB with DCPMM and 3DS RDIMMs/RDIMMs in Memory Mode

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

Depending on the memory modules installed, refer to below topics for detailed installation rules:

- Without DCPMMs: “DRAM DIMM installation rules” on page 85
- With DCPMMs: “DCPMM installation rules” on page 90

DRAM DIMM installation rules

For RDIMMs or LRDIMMs, the following memory modes are available:

- “Independent mode” on page 86

- “Mirroring mode” on page 88
- “Rank sparing mode” on page 89

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

Note: It is recommended to install memory modules with the same rank in each channel.

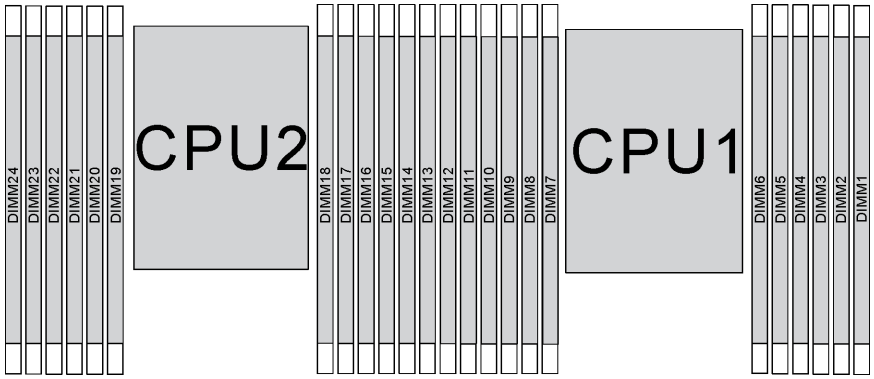


Figure 66. memory module slots on the system board

Independent mode

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

Notes:

- All memory modules to be installed must be the same type.
- All Performance+ DIMMs in the server must be of the same type, rank, and capacity (the same Lenovo part number) to operate at 2933 MHz in the configurations with two DIMMs per channel. Performance+ DIMMs cannot be mixed with other DIMMs.
- When you install memory modules with same rank and different capacity, install the memory module that has the highest capacity first.

The following table shows the memory module population sequence for independent mode when only one processor (Processor 1) is installed.

Notes:

- If there are three identical memory modules to be installed for Processor 1, and the three memory modules have the same Lenovo part number, move the memory module to be installed in slot 8 to slot 1.
- If there are ten identical memory modules to be installed for Processor 1, and the ten memory modules have the same Lenovo part number, move the memory module to be installed in slot 6 to slot 12.

Table 11. Independent mode with one processor

Total DIMMs	Processor 1												Total DIMMs
	12	11	10	9	8	7	6	5	4	3	2	1	
1								5					1
2					8			5					2
3					8			5		3			3

Table 11. Independent mode with one processor (continued)

Total DIMMs	Processor 1												Total DIMMs
	12	11	10	9	8	7	6	5	4	3	2	1	
4			10		8			5		3			**4**
5			10		8			5		3		1	**5**
6	12		10		8			5		3		1	**6**
7	12		10		8		6	5	4	3			**7**
8			10	9	8	7	6	5	4	3			**8**
9	12		10		8		6	5	4	3	2	1	**9**
10			10	9	8	7	6	5	4	3	2	1	**10**
11	12		10	9	8	7	6	5	4	3	2	1	**11**
12	12	11	10	9	8	7	6	5	4	3	2	1	**12**

The following table shows the memory module population sequence for independent mode when two processors (Processor 1 and Processor 2) are installed.

Notes:

- If there are three identical memory modules to be installed for Processor 1, and the three memory modules have the same Lenovo part number, move the memory module to be installed in slot 8 to slot 1.
- If there are three identical memory modules to be installed for Processor 2, and the three memory modules have the same Lenovo part number, move the memory module to be installed in slot 20 to slot 13.
- If there are ten identical memory modules to be installed for Processor 1, and the ten memory modules have the same Lenovo part number, move the memory module to be installed in slot 2 to slot 12.
- If there are ten identical memory modules to be installed for Processor 2, and the ten memory modules have the same Lenovo part number, move the memory module to be installed in slot 14 to slot 24.

Table 12. Independent mode with two processors

Total DIMMs	Processor 2												Processor 1												Total DIMMs
	24	23	22	21	20	19	18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	
2								17												5					**2**
3								17									8			5					**3**
4					20			17									8			5					**4**
5					20			17									8			5		3			**5**
6					20			17		15							8			5		3			**6**
7					20			17		15					10		8			5		3			**7**
8			22		20			17		15					10		8			5		3			**8**
9			22		20			17		15					10		8			5		3		1	**9**
10			22		20			17		15		13			10		8			5		3		1	**10**
11			22		20			17		15		13	12		10		8			5		3		1	**11**
12	24		22		20			17		15		13	12		10		8			5		3		1	**12**
13	24		22		20			17		15		13	12		10		8		6	5	4	3			**13**

Table 12. Independent mode with two processors (continued)

Total	Processor 2												Processor 1												Total
DIMMs	24	23	22	21	20	19	18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	DIMMs
14	24		22		20		18	17	16	15			12		10		8		6	5	4	3			**14**
15	24		22		20		18	17	16	15					10	9	8	7	6	5	4	3			**15**
16			22	21	20	19	18	17	16	15					10	9	8	7	6	5	4	3			**16**
17			22	21	20	19	18	17	16	15			12		10		8		6	5	4	3	2	1	**17**
18	24		22		20		18	17	16	15	14	13	12		10		8		6	5	4	3	2	1	**18**
19	24		22		20		18	17	16	15	14	13			10	9	8	7	6	5	4	3	2	1	**19**
20			22	21	20	19	18	17	16	15	14	13			10	9	8	7	6	5	4	3	2	1	**20**
21	24		22		20		18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	**21**
22	24		22	21	20	19	18	17	16	15	14	13	12		10	9	8	7	6	5	4	3	2	1	**22**
23	24		22	21	20	19	18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	**23**
24	24	23	22	21	20	19	18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	**24**

Mirroring mode

In mirroring mode, each memory module in a pair must be identical in size and architecture. The channels are grouped in pairs with each channel receiving the same data. One channel is used as a backup of the other, which provides redundancy.

Notes:
- Partial memory mirroring is a sub-function of memory mirroring, which requires to follow the installation rules of mirroring mode.
- All memory modules to be installed must be the same type with the same capacity, frequency, voltage, and ranks.
- All Performance+ DIMMs in the server must be of the same type, rank, and capacity (the same Lenovo part number) to operate at 2933 MHz in the configurations with two DIMMs per channel. Performance+ DIMMs cannot be mixed with other DIMMs.

The following table shows the memory module population sequence for mirroring mode when only one processor (Processor 1) is installed.

Table 13. Mirroring mode with one processor

Total	Processor 1												Total
DIMMs	12	11	10	9	8	7	6	5	4	3	2	1	DIMMs
2								5		3			**2**
3								5		3		1	**3**
4			10		8			5		3			**4**
6	12		10		8			5		3		1	**6**
8			10	9	8	7	6	5	4	3			**8**
9	12		10		8		6	5	4	3	2	1	**9**
12	12	11	10	9	8	7	6	5	4	3	2	1	**12**

The following table shows the memory module population sequence for mirroring mode when two processors (Processor 1 and Processor 2) are installed.

Table 14. Mirroring mode with two processors

Total	Processor 2												Processor 1												Total
DIMMs	24	23	22	21	20	19	18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	DIMMs
4								17		15										5		3			4
5								17		15										5		3		1	5
6								17		15		13								5		3		1	6
7								17		15		13			10		8			5		3			7
8			22		20			17		15					10		8			5		3			8
9								17		15		13	12		10		8			5		3		1	9
10			22		20			17		15			12		10		8			5		3		1	10
12	24		22		20			17		15		13	12		10		8			5		3		1	12
13			22		20			17		15			12		10		8		6	5	4	3	2	1	13
14			22	21	20	19	18	17	16	15			12		10		8			5		3		1	14
15	24		22		20			17		15		13	12		10		8		6	5	4	3	2	1	15
16			22	21	20	19	18	17	16	15					10	9	8	7	6	5	4	3			16
17			22	21	20	19	18	17	16	15			12		10		8		6	5	4	3	2	1	17
18	24		22		20		18	17	16	15	14	13	12		10		8		6	5	4	3	2	1	18
20			22	21	20	19	18	17	16	15			12	11	10	9	8	7	6	5	4	3	2	1	20
21	24		22		20		18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	21
24	24	23	22	21	20	19	18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	24

Rank sparing mode

In rank sparing mode, one rank of a memory module works as the spare rank for the other ranks on the same channel. The spare rank is not available as system memory.

Notes:

- All memory modules to be installed must be the same type with the same capacity, frequency, voltage, and ranks.
- All Performance+ DIMMs in the server must be of the same type, rank, and capacity (the same Lenovo part number) to operate at 2933 MHz in the configurations with two DIMMs per channel. Performance+ DIMMs cannot be mixed with other DIMMs.
- If the rank of installed memory modules is one rank, follow the installation rules listed in the following tables. If the rank of installed memory modules is more than one rank, follow the installation rules of independent mode.

The following table shows the memory module population sequence for rank sparing mode when only one processor (Processor 1) is installed.

Table 15. Rank sparing mode with one processor

Total	Processor 1												Total
DIMMs	12	11	10	9	8	7	6	5	4	3	2	1	DIMMs
2							6	5					2
4					8	7	6	5					4

Table 15. Rank sparing mode with one processor (continued)

Total DIMMs	Processor 1												Total DIMMs
	12	11	10	9	8	7	6	5	4	3	2	1	
6					8	7	6	5	4	3			**6**
8			10	9	8	7	6	5	4	3			**8**
10			10	9	8	7	6	5	4	3	2	1	**10**
12	12	11	10	9	8	7	6	5	4	3	2	1	**12**

The following table shows the memory module population sequence for rank sparing mode when two processors (Processor 1 and Processor 2) are installed.

Table 16. Rank sparing mode with two processors

Total DIMMs	Processor 2												Processor 1												Total DIMMs
	24	23	22	21	20	19	18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	
4							18	17											6	5					**4**
6							18	17									8	7	6	5					**6**
8					20	19	18	17									8	7	6	5					**8**
10					20	19	18	17									8	7	6	5	4	3			**10**
12					20	19	18	17	16	15							8	7	6	5	4	3			**12**
14					20	19	18	17	16	15					10	9	8	7	6	5	4	3			**14**
16			22	21	20	19	18	17	16	15					10	9	8	7	6	5	4	3			**16**
18			22	21	20	19	18	17	16	15					10	9	8	7	6	5	4	3	2	1	**18**
20			22	21	20	19	18	17	16	15	14	13			10	9	8	7	6	5	4	3	2	1	**20**
22			22	21	20	19	18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	**22**
24	24	23	22	21	20	19	18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	**24**

DCPMM installation rules

For DC Persistent Memory Module (DCPMM), the following memory modes are available:

- "App Direct Mode" on page 91
- "Memory Mode" on page 94
- "Mixed Memory Mode" on page 96

Notes:

- Before installing DCPMMs and DRAM DIMMs, refer to "DC Persistent Memory Module (DCPMM) set up" in *Setup Guide* and make sure to meet all the requirements.
- To verify if the presently installed processors support DCPMMs, examine the four digits in the processor description. Only the processor with description meeting *both* of the following requirements support DCPMMs.
  - The first digit is ***5*** or a larger number.

    Note: The only exception to this rule is *Intel Xeon Silver 4215*, which also supports DCPMM.
  - The second digit is ***2***.

  Example: *Intel Xeon 5215**L*** and *Intel Xeon Platinum 8280**M***

Note: Processor 4215 also supports DCPMMs.

If the presently installed processors do not support DCPMMs, replace them with the processors that support DCPMMs.

- DCPMMs are supported only by Intel Xeon SP Gen 2. For a list of supported processors and memory modules, see http://www.lenovo.com/us/en/serverproven/
- When you install two or more DCPMMs, all DCPMMs must have the same Lenovo part number.
- All DRAM memory modules installed must have the same Lenovo part number.
- 16 GB RDIMM has two different types: 16 GB 1Rx4 and 16 GB 2Rx8. The part number of the two types are different.
- Supported memory capacity range varies with the following types of DCPMMs.
  - **Large memory tier (L):** The processors with **L** after the four digits (for example: *Intel Xeon 5215**L***)
  - **Medium memory tier (M):** The processors with **M** after the four digits (for example: *Intel Xeon Platinum 8280**M***)
  - **Other:** Other processors that support DCPMMs (for example: *Intel Xeon Gold 5222*)
- In addition, you can take advantage of a memory configurator, which is available at the following site:http://1config.lenovo.com/#/memory_configuration.

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

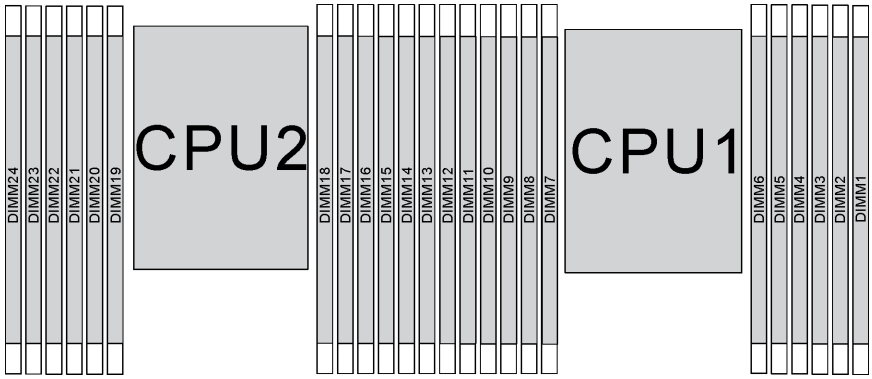


Figure 67. memory module slots on the system board

App Direct Mode

In this mode, DCPMMs act as independent and persistent memory resources directly accessible by specific applications, and DRAM DIMMs act as system memory.

App Direct Mode with one processor

Note: When adding one or more DCPMMs and DIMMs during a memory upgrade, you might need to move other DIMMs that are already installed to new locations.

Table 17. App Direct Mode with one processor

D: All supported DDR4 DIMM except 8GB 1Rx8 RDIMM **P**: Only Data Center Persistent Memory Module (DCPMM) can be installed on the corresponding DIMM slots.												
Configuration	Processor 1											
	12	**11**	**10**	**9**	**8**	**7**	**6**	**5**	**4**	**3**	**2**	**1**
1 DCPMM and 6 DIMMs	**D**		**D**		**D**	**P**		**D**		**D**		**D**

Table 17. App Direct Mode with one processor (continued)

2 DCPMMs and 4 DIMMs	**P**		**D**		**D**			**D**		**D**		**P**
2 DCPMMs and 6 DIMMs	**D**		**D**		**D**	**P**	**P**	**D**		**D**		**D**
2 DCPMMs and 8 DIMMs	**P**		**D**	**D**	**D**	**D**	**D**	**D**	**D**	**D**		**P**
4 DCPMMs and 6 DIMMs	**D**		**D**	**P**	**D**	**P**	**P**	**D**	**P**	**D**		**D**
6 DCPMMs and 6 DIMMs	**D**	**P**	**D**	**P**	**D**	**P**	**P**	**D**	**P**	**D**	**P**	**D**

Table 18. Supported DCPMM capacity in App Direct Mode with one processor

Total DCPMMs	Total DIMMs	Processor Family	128 GB DCPMM	256 GB DCPMM	512 GB DCPMM
1	**6**	**L**	√	√	√
		M	√	√	√
		Other	√	√	√[2]
2	**4**	**L**	√	√	√
		M	√	√	√
		Other	√	√	
2	**6**	**L**	√	√	√
		M	√	√	√
		Other	√	√[2]	
2	**8**	**L**	√	√	√
		M	√	√	√
		Other	√[2]	√[2]	
4	**6**	**L**	√	√	√
		M	√	√	
		Other	√[2]		
6	**6**	**L**	√	√	√
		M	√	√[2]	
		Other	√[1]		

Notes:

1. Supported DIMM capacity is up to 32 GB.
2. Supported DIMM capacity is up to 64 GB.

App Direct Mode with two processors

Note: When adding one or more DCPMMs and DIMMs during a memory upgrade, you might need to move other DCPMMs and DIMMs that are already installed to new locations.

Table 19. App Direct Mode with two processors

D: All supported DDR4 DIMM except 8GB 1Rx8 RDIMM

P: Only Data Center Persistent Memory Module (DCPMM) can be installed on the corresponding DIMM slots.

Configuration	Processor 2												Processor 1											
	24	23	22	21	20	19	18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1
1 DCPMM and 12 DIMMs	D		D		D			D		D		D	D		D		D		P	D		D		D
2 DCPMMs and 12 DIMMs	D		D		D		P	D		D		D	D		D		D		P	D		D		D
4 DCPMMs and 8 DIMMs	P		D		D			D		D		P	P		D		D			D		D		P
4 DCPMMs and 12 DIMMs	D		D		D	P	P	D		D		D	D		D		D	P	P	D		D		D
4 DCPMMs and 16 DIMMs	P		D	D	D	D	D	D	D	D		P	P		D	D	D	D	D	D	D	D		P
8 DCPMMs and 12 DIMMs	D		D	P	D	P	P	D	P	D		D	D		D	P	D	P	P	D	P	D		D
12 DCPMMs and 12 DIMMs	D	P	D	P	D	P	P	D	P	D	P	D	D	P	D	P	D	P	P	D	P	D	P	D

Table 20. Supported DCPMM capacity in App Direct Mode with two processors

Total DCPMMs	Total DIMMs	Processor Family	128 GB DCPMM	256 GB DCPMM	512 GB DCPMM
1	12	L	√	√	√
		M	√	√	√
		Other	√	√	√[2]
2	12	L	√	√	√
		M	√	√	√
		Other	√	√	√[2]
4	8	L	√	√	√
		M	√	√	√
		Other	√	√	
4	12	L	√	√	√
		M	√	√	√
		Other	√	√[2]	
4	16	L	√	√	√
		M	√	√	√
		Other	√[2]	√[2]	
8	12	L	√	√	√
		M	√	√	

Table 20. Supported DCPMM capacity in App Direct Mode with two processors (continued)

		Other	√[2]		
12	**12**	**L**	√	√	√
		M	√	√[2]	
		Other	√[1]		

Notes:

1. Supported DIMM capacity is up to 32 GB.
2. Supported DIMM capacity is up to 64 GB.

Memory Mode

In this mode, DCPMMs act as volatile system memory, while DRAM DIMMs act as cache. Ensure that the ratio of DRAM DIMM capacity to DCPMM capacity is between 1:2 and 1:16.

Memory Mode with one processor

Table 21. Memory Mode with one processor

D: All supported DDR4 DIMM except 8GB 1Rx8 RDIMM

P: Only Data Center Persistent Memory Module (DCPMM) can be installed on the corresponding DIMM slots.

Configuration	Processor 1											
	12	**11**	**10**	**9**	**8**	**7**	**6**	**5**	**4**	**3**	**2**	**1**
2 DCPMMs and 4 DIMMs	**P**		**D**		**D**			**D**		**D**		**P**
2 DCPMMs and 6 DIMMs	**D**		**D**		**D**	**P**	**P**	**D**		**D**		**D**
4 DCPMMs and 6 DIMMs	**D**		**D**	**P**	**D**	**P**	**P**	**D**	**P**	**D**		**D**
6 DCPMMs and 6 DIMMs	**D**	**P**	**D**	**P**	**D**	**P**	**P**	**D**	**P**	**D**	**P**	**D**

Table 22. Supported DCPMM capacity in Memory Mode with one processor

Total DCPM-Ms	**Total DIMMs**	**Processor Family**	**128 GB DCPMM**	**256 GB DCPMM**	**512 GB DCPMM**
2	**4**	**L**	√[1]	√[2]	√[3]
		M	√[1]	√[2]	√[3]
		Other	√[1]	√[2]	
2	**6**	**L**		√[1]	√[2]
		M		√[1]	√[2]
		Other		√[1]	
4	**6**	**L**	√[1]	√[2]	√[4]
		M	√[1]	√[2]	
		Other	√[1]		

Table 22. Supported DCPMM capacity in Memory Mode with one processor (continued)

6	**6**	**L**	√[2]	√[3]	√[5]
		M	√[2]	√[3]	
		Other	√[2]		

Notes:

1. Supported DIMM capacity is 16 GB.
2. Supported DIMM capacity is 16 to 32 GB.
3. Supported DIMM capacity is 16 GB to 64 GB.
4. Supported DIMM capacity is 32 GB to 64 GB.
5. Supported DIMM capacity is 32 GB to 128 GB.

Memory Mode with two processors

Table 23. Memory Mode with two processors

D: All supported DDR4 DIMM except 8GB 1Rx8 RDIMM

P: Only Data Center Persistent Memory Module (DCPMM) can be installed on the corresponding DIMM slots.

Configuration	Processor 2												Processor 1											
	24	**23**	**22**	**21**	**20**	**19**	**18**	**17**	**16**	**15**	**14**	**13**	**12**	**11**	**10**	**9**	**8**	**7**	**6**	**5**	**4**	**3**	**2**	**1**
4 DCPMMs and 8 DIMMs	**P**		**D**		**D**			**D**		**D**		**P**	**P**		**D**		**D**			**D**		**D**		**P**
4 DCPMMs and 12 DIMMs	**D**		**D**		**D**	**P**	**P**	**D**		**D**		**D**	**D**		**D**		**D**	**P**	**P**	**D**		**D**		**D**
8 DCPMMs and 12 DIMMs	**D**		**D**	**P**	**D**	**P**	**P**	**D**	**P**	**D**		**D**	**D**		**D**	**P**	**D**	**P**	**P**	**D**	**P**	**D**		**D**
12 DCPMMs and 12 DIMMs	**D**	**P**	**D**	**P**	**D**	**P**	**P**	**D**	**P**	**D**	**P**	**D**	**D**	**P**	**D**	**P**	**D**	**P**	**P**	**D**	**P**	**D**	**P**	**D**

Table 24. Supported DCPMM capacity in Memory Mode with two processors

Total DCPMMs	Total DIMMs	Processor Family	128 GB DCPMM	256 GB DCPMM	512 GB DCPMM
4	**8**	**L**	√[1]	√[2]	√[3]
		M	√[1]	√[2]	√[3]
		Other	√[1]	√[2]	
4	**12**	**L**		√[1]	√[2]
		M		√[1]	√[2]
		Other		√[1]	
8	**12**	**L**	√[1]	√[2]	√[4]
		M	√[1]	√[2]	
		Other	√[1]		
12	**12**	**L**	√[2]	√[3]	√[5]

Table 24. Supported DCPMM capacity in Memory Mode with two processors (continued)

		M	√[2]	√[3]	
		Other	√[2]		

Notes:

1. Supported DIMM capacity is 16 GB.
2. Supported DIMM capacity is 16 to 32 GB.
3. Supported DIMM capacity is 16 GB to 64 GB.
4. Supported DIMM capacity is 32 GB to 64 GB.
5. Supported DIMM capacity is 32 GB to 128 GB.

Mixed Memory Mode

In this mode, some percentage of DCPMM capacity is directly accessible to specific applications (App Direct), while the rest serves as system memory. The App Direct part of DCPMM is displayed as persistent memory, while the rest of DCPMM capacity is displayed as system memory. DRAM DIMMs act as cache in this mode.

Mixed Memory Mode with one processor

Note: When adding one or more DCPMMs and DIMMs during a memory upgrade, you might need to move other DIMMs that are already installed to new locations.

Table 25. Mixed Memory Mode with one processor

D: All supported DDR4 DIMM except 8GB 1Rx8 RDIMM

P: Only Data Center Persistent Memory Module (DCPMM) can be installed on the corresponding DIMM slots.

Configuration	Processor 1											
	12	**11**	**10**	**9**	**8**	**7**	**6**	**5**	**4**	**3**	**2**	**1**
2 DCPMMs and 4 DIMMs	**P**		**D**		**D**			**D**		**D**		**P**
2 DCPMMs and 6 DIMMs	**D**		**D**		**D**	**P**	**P**	**D**		**D**		**D**
4 DCPMMs and 6 DIMMs	**D**		**D**	**P**	**D**	**P**	**P**	**D**	**P**	**D**		**D**
6 DCPMMs and 6 DIMMs	**D**	**P**	**D**	**P**	**D**	**P**	**P**	**D**	**P**	**D**	**P**	**D**

Table 26. Supported DCPMM capacity in Mixed Memory Mode with one processor

Total DCPMMs	**Total DIMMs**	**Processor Family**	**128 GB DCPMM**	**256 GB DCPMM**	**512 GB DCPMM**
2	**4**	**L**		√[1]	√[2]
		M		√[1]	√[2]
		Other		√[1]	
2	**6**	**L**		√[1]	√[2]
		M		√[1]	√[2]
		Other		√[1]	

Table 26. Supported DCPMM capacity in Mixed Memory Mode with one processor (continued)

4	**6**	**L**	√[1]	√[2]	√[3]
		M	√[1]	√[2]	
		Other	√[1]		
6	**6**	**L**	√[1]	√[2]	√[3]
		M	√[1]	√[2]	
		Other	√[1]		

Notes:

1. Supported DIMM capacity is 16 GB.
2. Supported DIMM capacity is 16 to 32 GB.
3. Supported DIMM capacity is 16 to 64 GB.

Mixed Memory Mode with two processors

Table 27. Mixed Memory Mode with two processors

D: All supported DDR4 DIMM except 8GB 1Rx8 RDIMM

P: Only Data Center Persistent Memory Module (DCPMM) can be installed on the corresponding DIMM slots.

Configuration	Processor 2												Processor 1											
	24	**23**	**22**	**21**	**20**	**19**	**18**	**17**	**16**	**15**	**14**	**13**	**12**	**11**	**10**	**9**	**8**	**7**	**6**	**5**	**4**	**3**	**2**	**1**
4 DCPMMs and 8 DIMMs	**P**		**D**		**D**			**D**		**D**		**P**	**P**		**D**		**D**			**D**		**D**		**P**
4 DCPMMs and 12 DIMMs	**D**		**D**		**D**	**P**	**P**	**D**		**D**		**D**	**D**		**D**		**D**	**P**	**P**	**D**		**D**		**D**
8 DCPMMs and 12 DIMMs	**D**		**D**	**P**	**D**	**P**	**P**	**D**	**P**	**D**		**D**	**D**		**D**	**P**	**D**	**P**	**P**	**D**	**P**	**D**		**D**
12 DCPMMs and 12 DIMMs	**D**	**P**	**D**	**P**	**D**	**P**	**P**	**D**	**P**	**D**	**P**	**D**	**D**	**P**	**D**	**P**	**D**	**P**	**P**	**D**	**P**	**D**	**P**	**D**

Table 28. Supported DCPMM capacity in Mixed Memory Mode with two processors

Total DCPMMs	Total DIMMs	Processor Family	128 GB DCPMM	256 GB DCPMM	512 GB DCPMM
4	**8**	**L**		√[1]	√[2]
		M		√[1]	√[2]
		Other		√[1]	
4	**12**	**L**		√[1]	√[2]
		M		√[1]	√[2]
		Other		√[1]	
8	**12**	**L**	√[1]	√[2]	√[3]
		M	√[1]	√[2]	
		Other	√[1]		

Table 28. Supported DCPMM capacity in Mixed Memory Mode with two processors (continued)

12	**12**	**L**	√[1]	√[2]	√[3]
		M	√[1]	√[2]	
		Other	√[1]		

Notes:

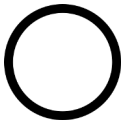
1. Supported DIMM capacity is 16 GB.
2. Supported DIMM capacity is 16 to 32 GB.
3. Supported DIMM capacity is 16 to 64 GB.

Install a memory module

Use this information to install a memory module.



"**Read** the installation Guidelines" on page 65



"**Power off** the server for this task" on page 17



"**ATTENTION: Static Sensitive Device** Ground package before opening" on page 68

Attention:

- Disconnect all power cords for this task.
- Memory modules are sensitive to static discharge and require special handling. In addition to the standard guidelines for "Handling static-sensitive devices" on page 68:
  - Always wear an electrostatic-discharge strap when removing or installing memory modules. Electrostatic-discharge gloves can also be used.
  - Never hold two or more memory modules together so that they touch. Do not stack memory modules directly on top of each other during storage.
  - Never touch the gold memory module connector contacts or allow these contacts to touch the outside of the memory module connector housing.
  - Handle memory modules with care: never bend, twist, or drop a memory module.
  - Do not use any metal tools (such as jigs or clamps) to handle the memory modules, because the rigid metals may damage the memory modules.
  - Do not insert memory modules while holding packages or passive components, which can cause package cracks or detachment of passive components by the high insertion force.

Before installing a memory module:

Note: If you are installing DC Persistent Memory Module (DCPMM) for the first time, follow the instructions in "DC Persistent Memory Module (DCPMM)" in *Setup Guide*.

1. Touch the static-protective package that contains the new memory module to any unpainted surface on the outside of the server. Then, take the new memory module out of the package and place it on a static-protective surface.
2. Locate the required memory module slot on the system board. See "Memory module installation rules" on page 85. Ensure that you observe the installation rules and sequence.
3. If you are going to install a DCPMM, refer to "DC Persistent Memory Module (DCPMM) setup" in *Setup Guide* .

Note: A DCPMM module looks slightly different from a DRAM DIMM in the illustration, but the installation method is the same.

To install a memory module, complete the following steps:

Watch the procedure

A video of this procedure is available at https://www.youtube.com/playlist?list=PLYV5R7hVcs-C_GGjNudxYy8-c69INMcmE.

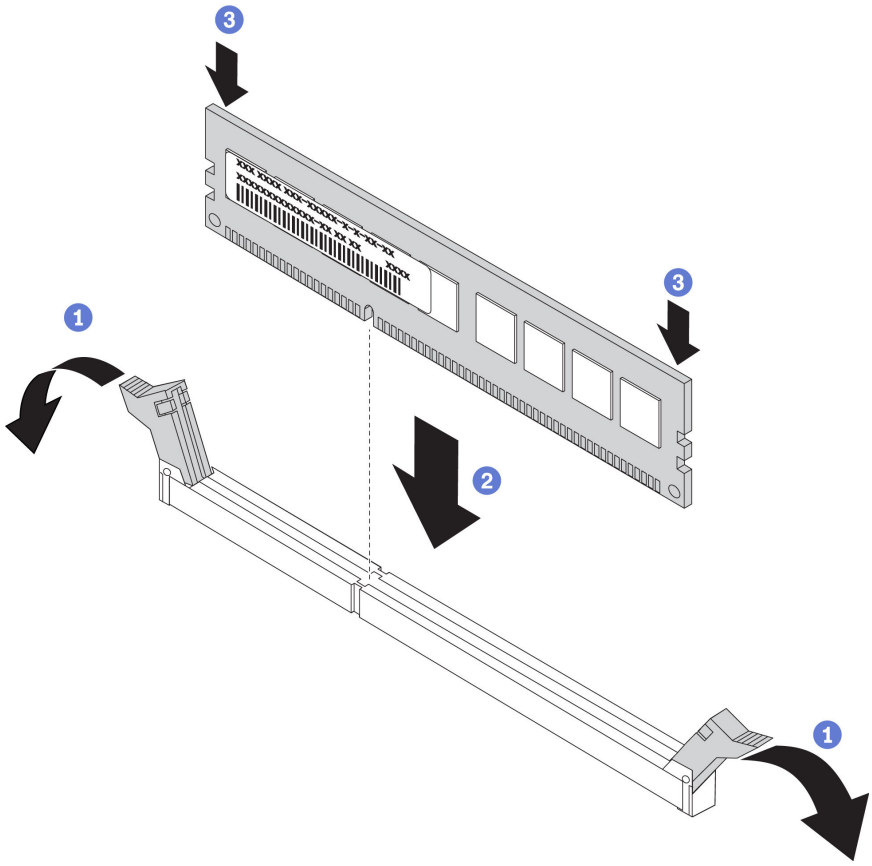


Figure 68. Memory module installation

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

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

Step 2. Align the memory module with the slot, and gently place the memory module on the slot with both hands.

Step 3. Firmly press both ends of the memory module straight down into the slot until the retaining clips snap into the locked position.

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

If you have installed a DRAM DIMM, complete the parts replacement. See "Complete the parts replacement" on page 177.

If you have installed a DCPMM:

1. Update the system firmware to the latest version (see “Update the firmware” in *Setup Guide*).
2. Make sure the firmware of all the DCPMM units is the latest version. If not, update it to the latest version (see https://sysmgt.lenovofiles.com/help/topic/com.lenovo.lxca.doc/update_fw.html).
3. Configure DCPMMs and DRAM DIMMs (see “Configuring DC Persistent Memory Module (DCPMM)” in *Setup Guide*).).
4. Restore the data that have been backed up if necessary.

Hot-swap drive replacement

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

Notes:

- The term “hot-swap drive” refers to all the supported types of hot-swap hard disk drives, hot-swap solid-state drives, and hot-swap NVMe drives.
- Use any documentation that comes with the drive and follow those instructions in addition to the instructions in this topic. Ensure that you have all the cables and other equipment that are specified in the documentation that comes with the drive.
- The electromagnetic interference (EMI) integrity and cooling of the server are protected by having all drive bays covered or occupied. The vacant bays are either covered by an EMI-protective panel or occupied by drive fillers. When installing a drive, save the removed drive filler in case that you later remove the drive and need the drive filler to cover the place.
- To avoid damage to the drive connectors, ensure that the top cover is in place and fully closed whenever you install or remove a drive.

Remove a hot-swap drive

Use this information to remove a hot-swap drive.



“**Read** the installation Guidelines” on page 65



“**ATTENTION: Static Sensitive Device** Ground package before opening” on page 68

Before removing a hot-swap drive:

1. Ensure that you have back up data on your drive, especially if it is part of a RAID array.
   - Before you make changes to drives, RAID adapters, drive backplanes, or drive cables, back up all important data that is stored on the drives.
   - Before you remove any component of a RAID array, back up all RAID configuration information.
2. If one or more NVMe drives are to be removed, it is recommended to disable them first in Safely Remove Hardware and Eject Media (Windows) or filesystem (Linux). See the indications above the drive bays to determine the type of the drive to remove. If the drive bay numbers come with the term “NVMe”, it indicates the installed drives are NVMe drives.
3. If the security bezel is installed, remove it first. See “Remove the security bezel” on page 77.

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

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

Watch the procedure

A video of this procedure is available at https://www.youtube.com/playlist?list=PLYV5R7hVcs-C_GGjNudxYy8-c69INMcmE.

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

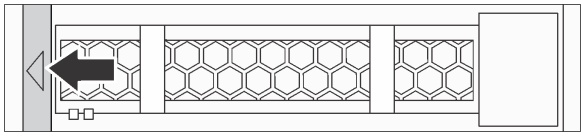


Figure 69. Opening the drive tray handle

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

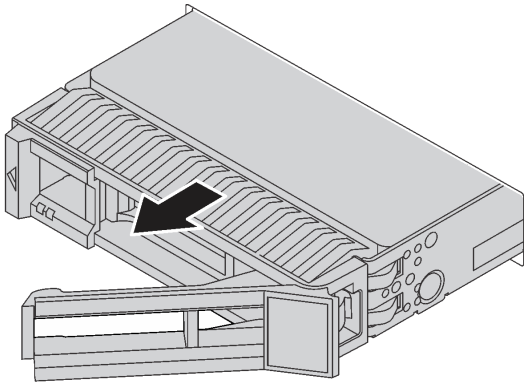


Figure 70. Hot-swap drive removal

After removing a hot-swap drive:

1. Install the drive filler or a new drive to cover the drive bay. See "Install a hot-swap drive" on page 101.
2. If you are instructed to return the old hot-swap drive, follow all packaging instructions and use any packaging materials that are provided.

Install a hot-swap drive

Use this information to install a hot-swap drive.



"**Read** the installation Guidelines" on page 65



"**ATTENTION: Static Sensitive Device** Ground package before opening" on page 68

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

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

For a list of supported drives, see:
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 19.
- You can mix drives of different types and different capacities in one system, but not in one RAID array. The following order is recommended when installing the drives:
  - Drive type priority: NVMe SSD, SAS SSD, SATA SSD, SAS HDD, SATA HDD
  - Drive capacity priority: the lowest capacity first
- For server models with ten 2.5-inch drive bays in the front, NVMe drives are supported in drive bays 6–9.
- The drives in a single RAID array must be the same type, same size, and same capacity.

Before installing a hot-swap drive:

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

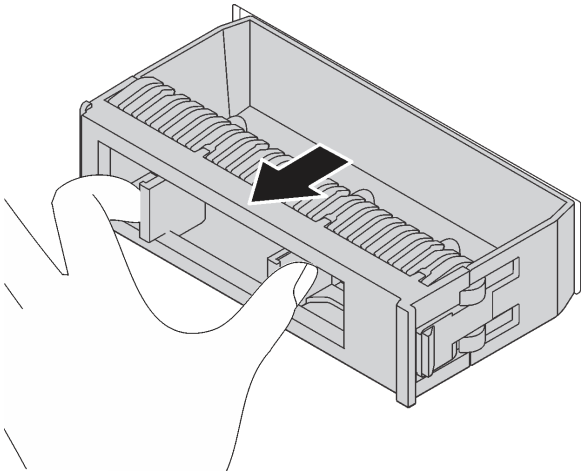


Figure 71. Drive filler removal

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

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

Watch the procedure

A video of this procedure is available at https://www.youtube.com/playlist?list=PLYV5R7hVcs-C_GGjNudxYy8-c69INMcmE.

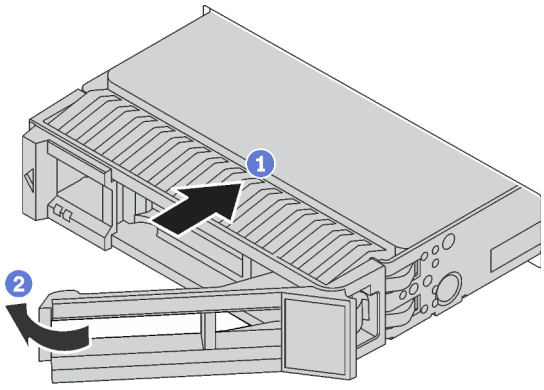


Figure 72. Hot-swap drive installation

Step 1. Ensure that the drive tray handle is in the open position. Slide the drive into the drive bay until it snaps into position.

Step 2. Close the drive tray handle to lock the drive in place.

Step 3. Check the drive status LED to verify that the drive is operating correctly.

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

Step 4. Continue to install additional hot-swap drives if necessary.

After installing all hot-swap drives:

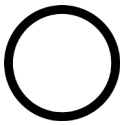
1. Reinstall the security bezel. See "Install the security bezel" on page 78.
2. Use the Lenovo XClarity Provisioning Manager to configure the RAID if necessary. For more information, see:
   http://sysmgt.lenovofiles.com/help/topic/LXPM/RAID_setup.html

LOM adapter replacement

Use this information to remove and install the LOM adapter.

Remove the LOM adapter

Use this information to remove the LOM adapter.

		
"**Read** the installation Guidelines" on page 65	"**Power off** the server for this task" on page 17	"**ATTENTION: Static Sensitive Device** Ground package before opening" on page 68

Before removing the LOM adapter:

1. Remove the top cover. See "Remove the top cover" on page 68.
2. If riser 1 assembly is installed, remove it to access the LOM adapter slot.

To remove the LOM adapter, complete the following steps:

Watch the procedure

A video of this procedure is available at https://www.youtube.com/playlist?list=PLYV5R7hVcs-C_GGjNudxYy8-c69INMcmE.

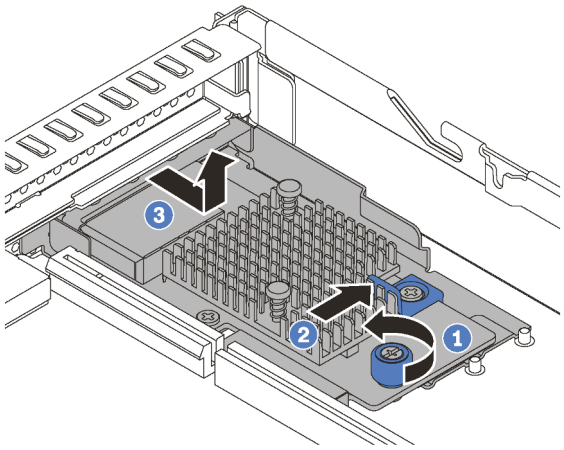


Figure 73. LOM adapter removal

Step 1. Loosen the thumbscrew that secures the LOM adapter.

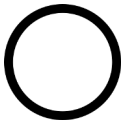
Step 2. Push the LOM adapter out of the connector on the system board.

Step 3. Slide the LOM adapter as shown and lift the LOM adapter out of the chassis.

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

Install the LOM adapter

Use this information to install the LOM adapter.

	“**Read** the installation Guidelines” on page 65	
	“**Power off** the server for this task” on page 17	
	“**ATTENTION: Static Sensitive Device** Ground package before opening” on page 68	

Before installing the LOM adapter:

1. If riser 1 assembly is installed, remove it to access the LOM adapter slot.
2. Touch the static-protective package that contains the new LOM adapter to any unpainted surface on the outside of the server. Then, take the new LOM adapter out of the package and place it on a static-protective surface.

To install the LOM adapter, complete the following steps:

Watch the procedure

A video of this procedure is available at https://www.youtube.com/playlist?list=PLYV5R7hVcs-C_GGjNudxYy8-c69INMcmE.

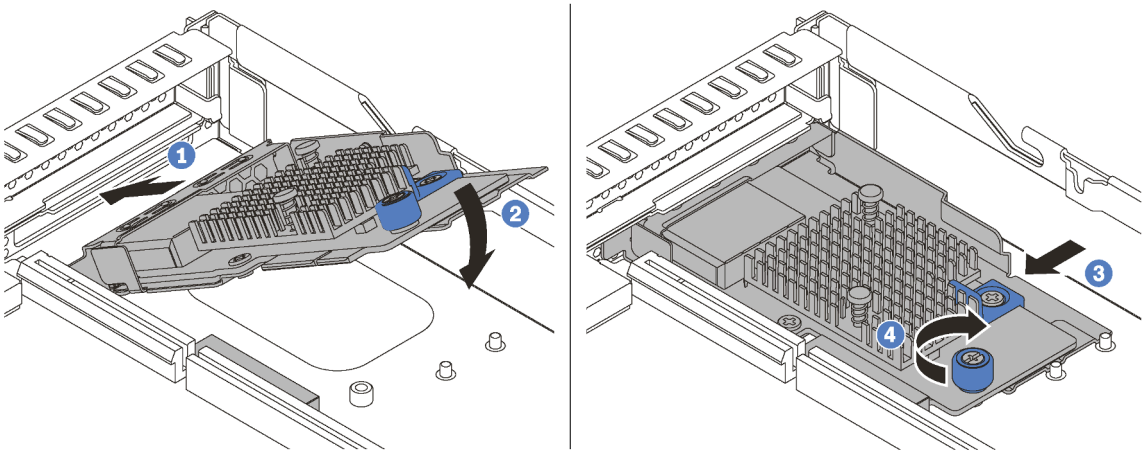


Figure 74. LOM adapter installation

Step 1. Insert the LOM adapter into the rear of the chassis at an angle as shown.

Step 2. Lower the LOM adapter and slide it to the rear of the chassis until the LOM adapter stops.

Step 3. Push the LOM adapter as shown to insert it into the connector on the system board.

Step 4. Tighten the thumbscrew to secure the LOM adapter.

After installing the LOM adapter, complete the parts replacement. See “Complete the parts replacement” on page 177.

Riser card replacement

Use this information to remove and install a riser card.

Your server comes with one of the following riser assembly configurations:

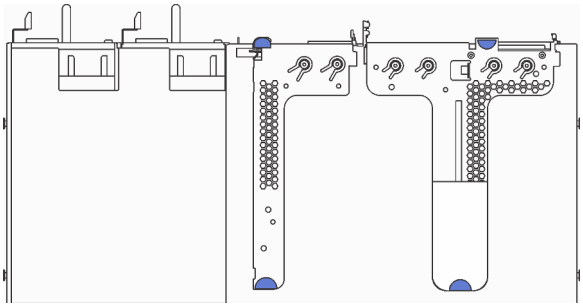


Figure 75. Configuration 1

Note: Riser 2 assembly might not be available on some models.

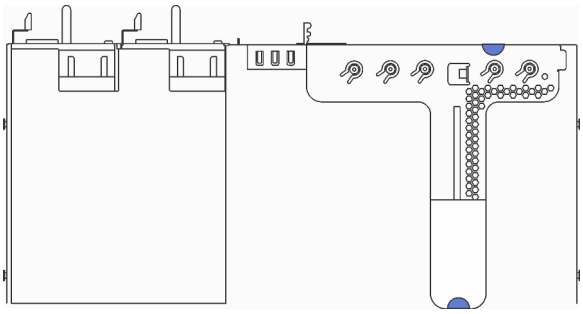


Figure 76. Configuration 2

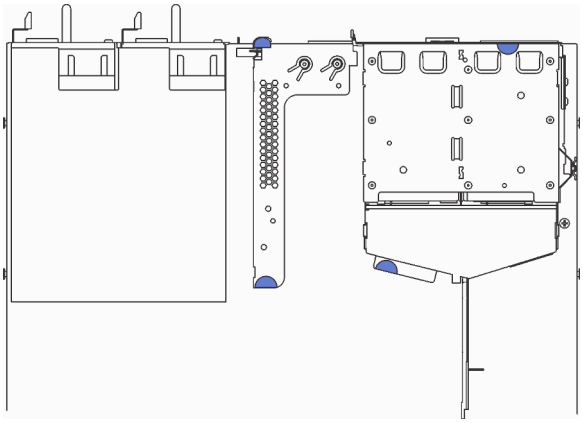


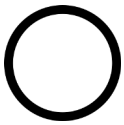
Figure 77. Configuration 3

Note: Riser 2 assembly might not be available on some models.

There are three types of riser assembly. The removing and installation procedure of the riser card is similar for all types of riser assembly. The following procedures are based on the riser assembly in configuration 2.

Remove a riser card

Use this information to remove a riser card.

		
"**Read** the installation Guidelines" on page 65	"**Power off** the server for this task" on page 17	"**ATTENTION: Static Sensitive Device** Ground package before opening" on page 68

Before removing a riser card, remove the top cover. See "Remove the top cover" on page 68.

To remove a riser card, complete the following steps:

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

Watch the procedure

A video of this procedure is available at https://www.youtube.com/playlist?list=PLYV5R7hVcs-C_GGjNudxYy8-c69INMcmE.

Step 1. Grasp the riser assembly by its edges and carefully lift it out of the chassis.

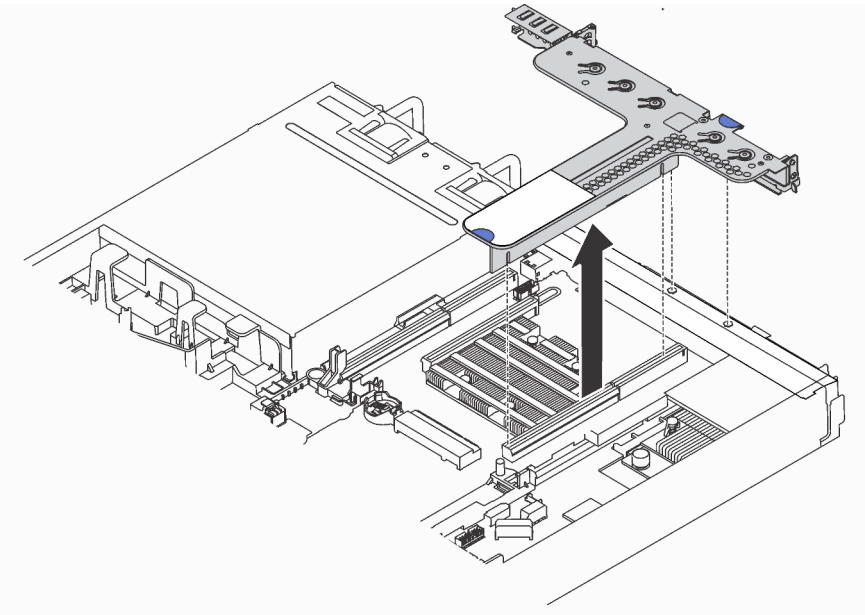


Figure 78. Riser assembly removal

Step 2. If there is any PCIe adapter installed on the riser card, record the cable connections first. Then, disconnect all cables from the PCIe adapter and completely remove the riser assembly out of the chassis.

Step 3. Remove the PCIe adapters that are installed on the riser card. See “Remove a PCIe adapter” on page 109.

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

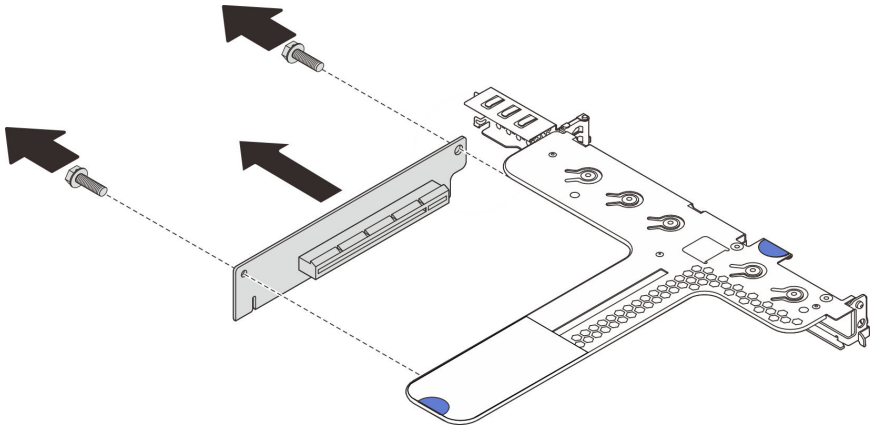


Figure 79. Riser card removal

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

Install a riser card

Use this information to install a riser card.

“**Read** the installation Guidelines” on page 65

“**Power off** the server for this task” on page 17

“**ATTENTION: Static Sensitive Device** Ground package before opening” on page 68

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

To install a riser card, complete the following steps:

Note: The riser assembly you want to install might be different from the illustrations below, but the installation method is the same.

Watch the procedure

A video of this procedure is available at https://www.youtube.com/playlist?list=PLYV5R7hVcs-C_GGjNudxYy8-c69INMcmE.

Step 1. Note the notch 1 on the riser card and ensure that the orientation of the riser card is correct as shown. Then, align the screw holes in the new riser card with the corresponding ones in the bracket and install the two screws to secure the riser card to the bracket.

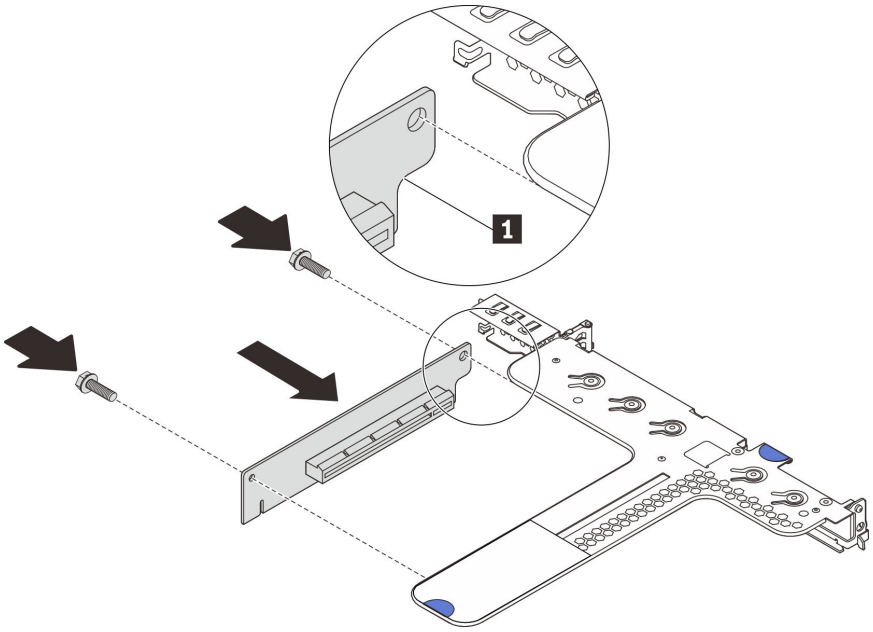


Figure 80. Riser card installation

Step 2. Reinstall the PCIe adapters on the new riser card. See “Install a PCIe adapter” on page 110.

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

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

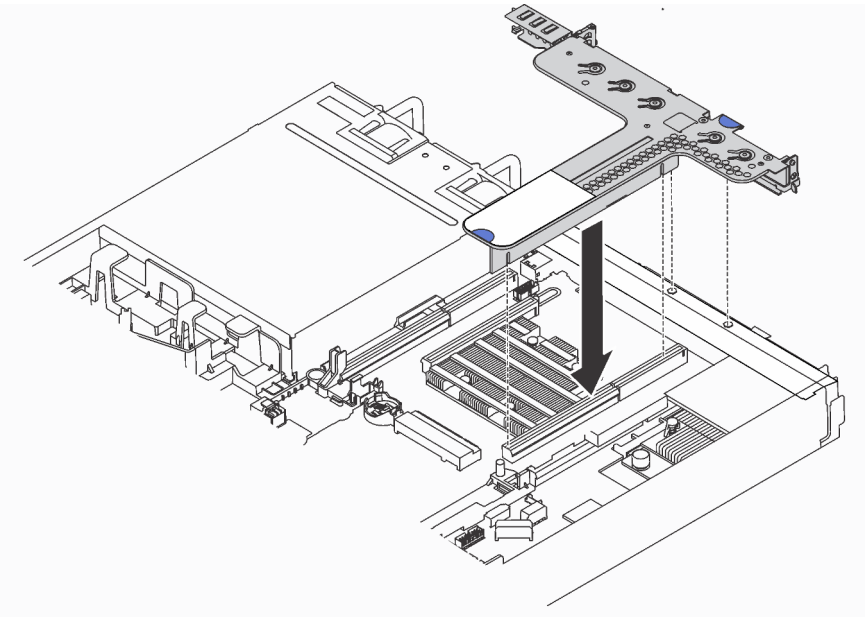


Figure 81. Riser assembly installation

After installing the riser card, complete the parts replacement. See “Complete the parts replacement” on page 177.

PCIe adapter replacement

Use this information to remove and install a PCIe adapter.

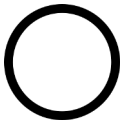
The PCIe adapter can be an Ethernet adapter, a host bus adapter (HBA), a PCIe RAID adapter, a PCIe interposer adapter, a PCIe solid-state drive, a PCIe GPU, and any other supported PCIe adapters.

Notes:

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

Remove a PCIe adapter

Use this information to remove a PCIe adapter.

		
“**Read** the installation Guidelines” on page 65	“**Power off** the server for this task” on page 17	“**ATTENTION: Static Sensitive Device** Ground package before opening” on page 68

Before removing a PCIe adapter:

1. Remove the top cover. See “Remove the top cover” on page 68.
2. Remove the riser assembly. See “Remove a riser card” on page 106.

To remove a PCIe adapter, complete the following steps:

Watch the procedure

A video of this procedure is available at https://www.youtube.com/playlist?list=PLYV5R7hVcs-C_GGjNudxYy8-c69INMcmE.

Table 29. PCIe adapter removal

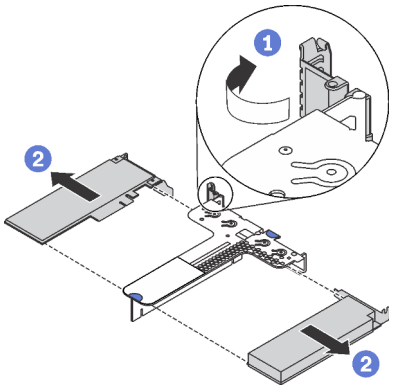


Figure 82. Riser 1 assembly (LP+LP)

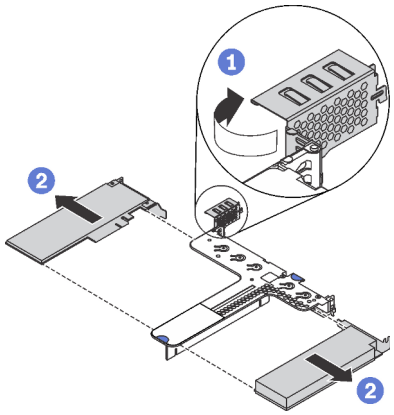


Figure 83. Riser 1 assembly (LP +FHHL)

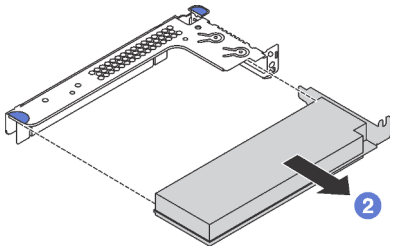


Figure 84. Riser 2 assembly (LP)

Step 1. (Skip this step for riser 2 assembly.) Pivot the latch on the riser bracket to the open position.

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

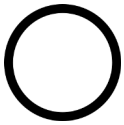
If you are instructed to return the old PCIe adapter, follow all packaging instructions and use any packaging materials that are provided.

Install a PCIe adapter

Use this information to install a PCIe adapter.



"**Read** the installation Guidelines" on page 65



"**Power off** the server for this task" on page 17



"**ATTENTION: Static Sensitive Device** Ground package before opening" on page 68

Notes:

- For information about installing a Mellanox ConnectX-6 HDR/200GbE QSFP56 1-port PCIe adapter with the ThinkSystem Mellanox HDR/200GbE 2x PCIe Aux Kit on the riser assembly, refer to the most up-to-date documentation at https://thinksystem.lenovofiles.com/help/index.jsp?topic=%2Fthinksystem_mellanox_hdr_200gbe_2x_pcie_aux_kit%2FThinkSystem_Mellanox_HDR200GbE_2xPCIe_Aux_Kit.html&cp=7_9_4.
- The ThinkSystem Broadcom 57454 10/25GbE SFP28 4-port PCIe Ethernet Adapter_Refresh (V2) requires a full-height bracket and must be installed in a full-height slot.
- ThinkSystem Xilinx Alveo U50 Data Center Accelerator Adapter is supported only when the following requirement are met:
  - Only for server modules installed with four 3.5-inch SAS/SATA drives, four 3.5-inch SAS/SATA/NVMe drives, eight 2.5-inch SAS/SATA drives, or ten 2.5-inch SAS/SATA/NVMe drives.
  - For server models installed with one CPU, only one adapter is supported and must be installed in PCIe slot 1.

- For server models installed with two CPUs, up to two adapters are supported and must be installed in PCIe slot 1 and slot 3.
- The maximum supported processor TDP is 165 watts
- The maximum operating temperature is 30°C.
- No fan fails.

Before installing a PCIe adapter:

1. Touch the static-protective package that contains the new PCIe adapter to any unpainted surface on the outside of the server. Then, take the new PCIe adapter out of the package and place it on a static-protective surface.
2. Locate the correct PCIe slot for the PCIe adapter. For information about the PCIe slots and supported PCIe adapters, see "Rear view" on page 22.

To install a PCIe adapter, complete the following steps:

Watch the procedure

A video of this procedure is available at https://www.youtube.com/playlist?list=PLYV5R7hVcs-C_GGjNudxYy8-c69INMcmE.

Table 30. PCIe adapter installation

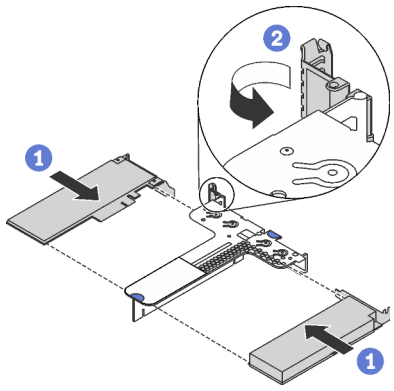


Figure 85. Riser 1 assembly (LP+LP)

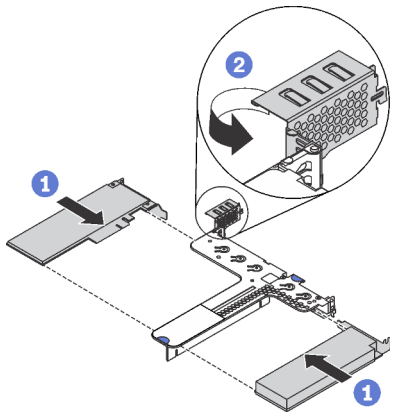


Figure 86. Riser 1 assembly (LP +FHHL)

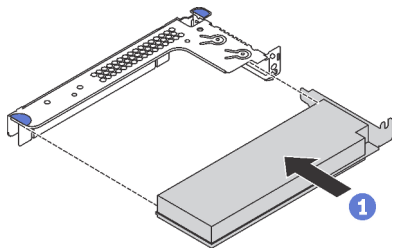


Figure 87. Riser 2 assembly (LP)

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

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

After installing the PCIe adapter:

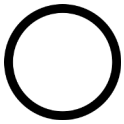
1. Reinstall the riser assembly. See "Install a riser card" on page 107.
2. Complete the parts replacement. See "Complete the parts replacement" on page 177.

Install a full-height half-length GPU with the GPU upgrade kit

Use this information to install a full-height half-length GPU and the GPU upgrade kit.



"**Read** the installation Guidelines" on page 65



"**Power off** the server for this task" on page 17



"**ATTENTION: Static Sensitive Device** Ground package before opening" on page 68

Notes:

- For information about the form factor of GPUs, refer to GPU specifications.
- For server models with a RAID adapter installed on the RAID adapter slot on the system board, if you want to install a full-height half-length GPU to upgrade your server, you need to use the GPU upgrade kit. The GPU upgrade kit contains the following items:
  - Low-profile bracket for RAID 930-8i or 930-16i adapter (part number on the bracket label: SB47A19064)
  - Low-profile bracket for RAID 730-8i adapter (part number on the bracket label: SB47A19108)
  - Low-profile bracket for RAID 530-8i, 430-8i, or 430-16i adapter (part number on the bracket label: SB47A19050)
  - Two screws
  - ThinkSystem 8x2.5" HDD backplane signal cable
  - ThinkSystem 10x2.5" HDD backplane signal cable
- The full-height half-length GPU can be installed in the full-height half length PCIe slot 2 only.

Before installing a full-height half-length GPU with the GPU upgrade kit, touch the static-protective package that contains the new GPU to any unpainted surface on the outside of the server. Then, take the new GPU out of the package and place it on a static-protective surface.

To install a full-height half-length GPU and the GPU upgrade kit, complete the following steps:

Watch the procedure

A video of this procedure is available at https://www.youtube.com/playlist?list=PLYV5R7hVcs-C_GGjNudxYy8-c69INMcmE.

Step 1. Remove the RAID adapter from the RAID adapter slot on the system board. See "Remove the RAID adapter" on page 133.

Step 2. Select the corresponding low-profile bracket for the RAID adapter and install the bracket to the RAID adapter with the two screws provided in the GPU upgrade kit.

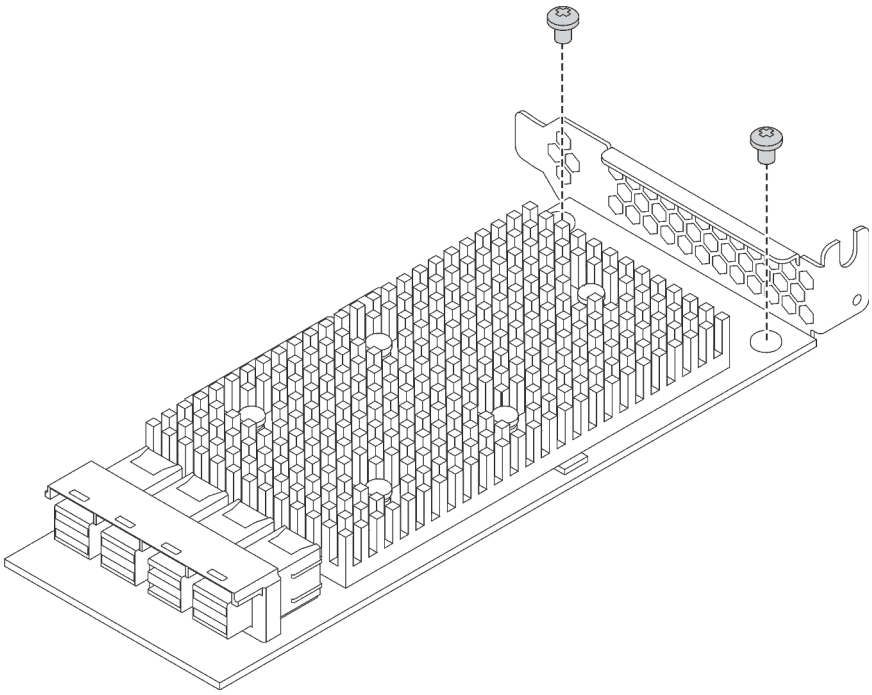


Figure 88. Installing the low-profile bracket to the RAID adapter

Step 3. Install the RAID adapter in PCIe slot 1 and install the GPU in the full-height half-length PCIe slot 2. See “Install a PCIe adapter” on page 110.

Step 4. Connect the RAID adapter to the backplane by doing one of the following:

- For server models with four 3.5-inch drive bays, connect the SAS signal cable on your server to the RAID adapter.
- For server models with eight 2.5-inch drive bays, remove the old SAS signal cable from the backplane and use the 8x2.5" cable in the GPU upgrade kit to connect the RAID adapter to the backplane.
- For server models with ten 2.5-inch drive bays, remove the old SAS signal cable from the backplane and use the 10x2.5" cable in the GPU upgrade kit to connect the RAID adapter to the backplane.

For information about how to connect the cables for server models with a full-height half-length GPU, see “Internal cable routing” on page 34.

After installing the full-height half-length GPU:

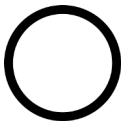
1. Reinstall the riser assembly. See “Install a riser card” on page 107.
2. Complete the parts replacement. See “Complete the parts replacement” on page 177.

Backplane replacement

Use this information to remove and install the backplane.

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

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

		
"**Read** the installation Guidelines" on page 65	"**Power off** the server for this task" on page 17	"**ATTENTION: Static Sensitive Device** Ground package before opening" on page 68

Before removing the backplane:

1. Remove the top cover. See "Remove the top cover" on page 68.
2. Remove all the installed drives and drive fillers from the drive bays. See "Remove a hot-swap drive" on page 100 and "Install a hot-swap drive" on page 101.
3. Disconnect the cables from the backplane.

To remove the backplane, complete the following steps:

Watch the procedure

A video of this procedure is available at https://www.youtube.com/playlist?list=PLYV5R7hVcs-C_GGjNudxYy8-c69INMcmE.

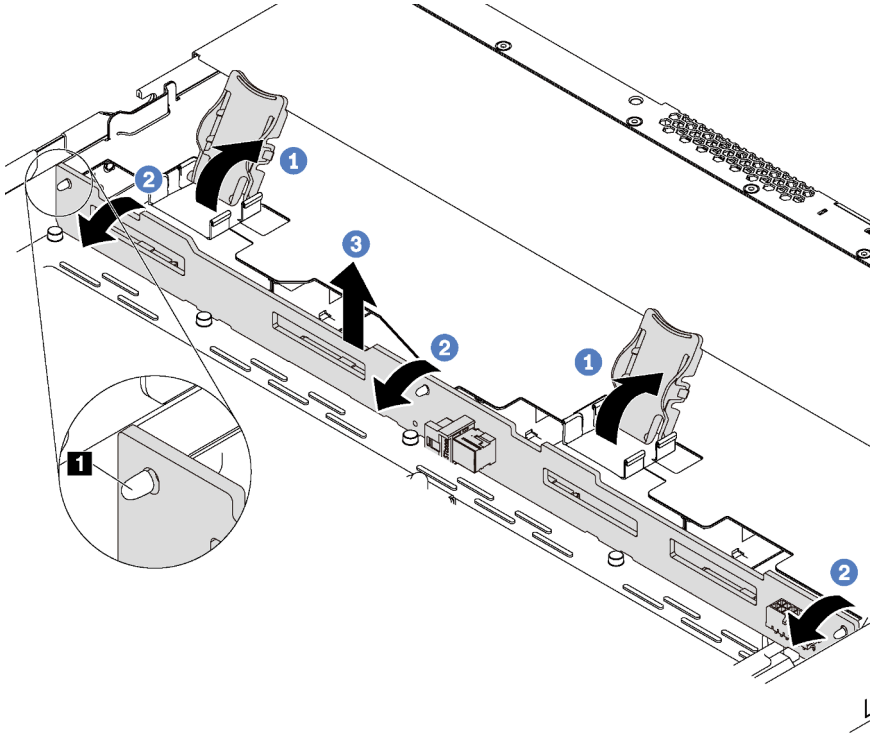


Figure 89. Removal of backplane for four 3.5-inch hot-swap drives

Step 1. Open the release latches that secure the backplane.

Step 2. Pivot the backplane backward slightly to release it from the three pins 1 on the chassis.

Step 3. Carefully remove the backplane out of the chassis from under the front I/O assembly cables.

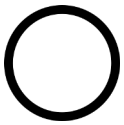
If you are instructed to return the old backplane, follow all packaging instructions and use any packaging materials that are provided.

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

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



"**Read** the installation Guidelines" on page 65



"**Power off** the server for this task" on page 17



"**ATTENTION: Static Sensitive Device** Ground package before opening" on page 68

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

To install the backplane, complete the following steps:

Watch the procedure

A video of this procedure is available at https://www.youtube.com/playlist?list=PLYV5R7hVcs-C_GGjNudxYy8-c69INMcmE.

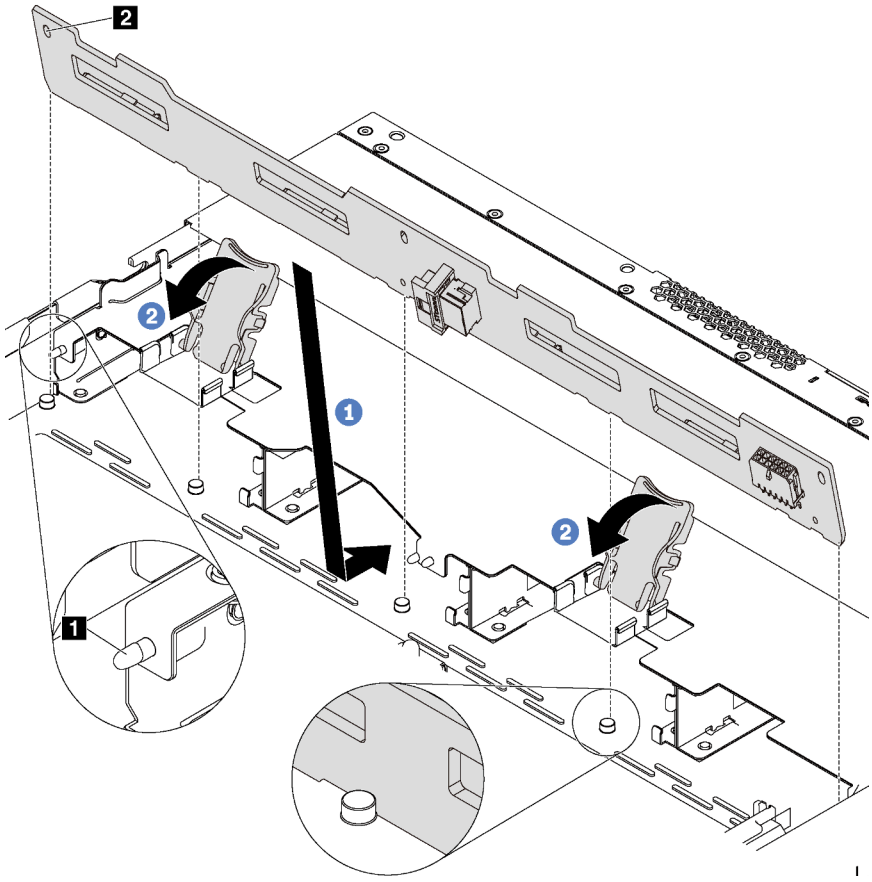


Figure 90. Installation of backplane for four 3.5-inch hot-swap drives

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

Step 2. Close the release latches to secure the backplane in place.

After installing the backplane:

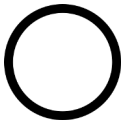
1. Connect the cables to the backplane. See “Server models with four 3.5-inch SAS/SATA drives ” on page 34.
2. Reinstall all the drives and drive fillers into the drive bays. See “Install a hot-swap drive” on page 101.
3. Complete the parts replacement. See “Complete the parts replacement” on page 177.

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

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



“**Read** the installation Guidelines” on page 65



“**Power off** the server for this task” on page 17



“**ATTENTION: Static Sensitive Device** Ground package before opening” on page 68

Before removing the backplane:

1. Remove the top cover. See “Remove the top cover” on page 68.
2. Remove all the installed drives and drive fillers from the drive bays. See “Remove a hot-swap drive” on page 100 and “Install a hot-swap drive” on page 101.
3. Disconnect the cables from the backplane.

To remove the backplane, complete the following step:

Watch the procedure

A video of this procedure is available at https://www.youtube.com/playlist?list=PLYV5R7hVcs-C_GGjNudxYy8-c69INMcmE.

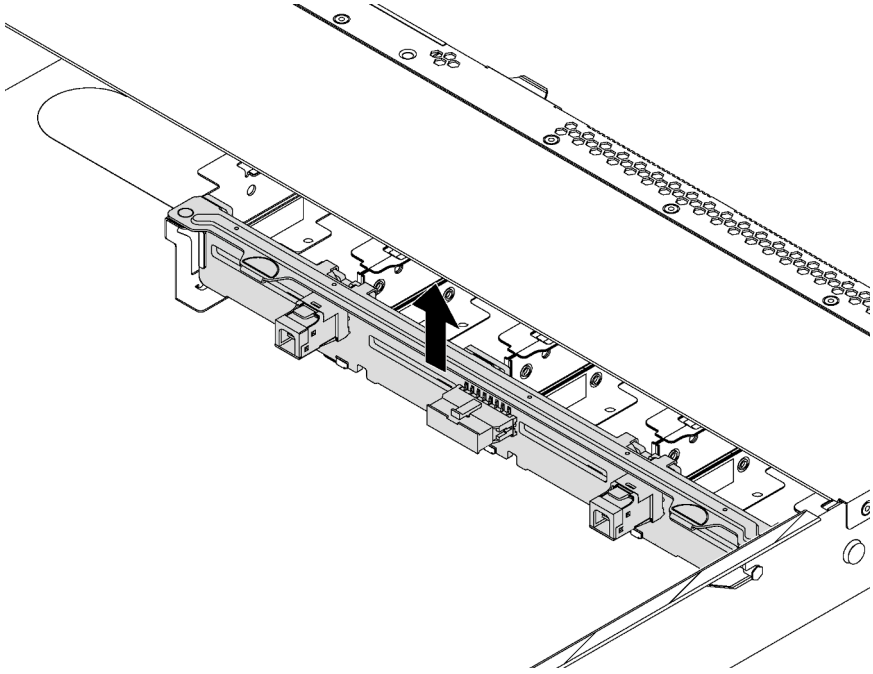


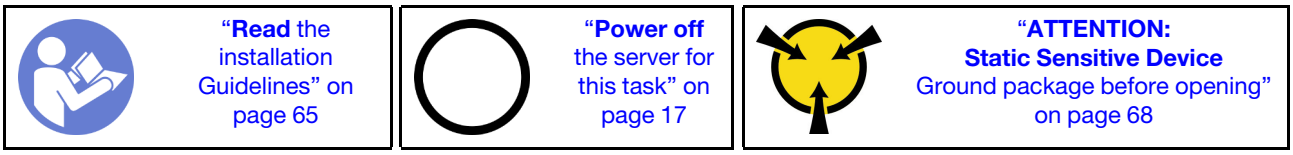
Figure 91. Removal of backplane for eight 2.5-inch hot-swap drives

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

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

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

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



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

To install the backplane, complete the following steps:

Watch the procedure

A video of this procedure is available at https://www.youtube.com/playlist?list=PLYV5R7hVcs-C_GGjNudxYy8-c69INMcmE.

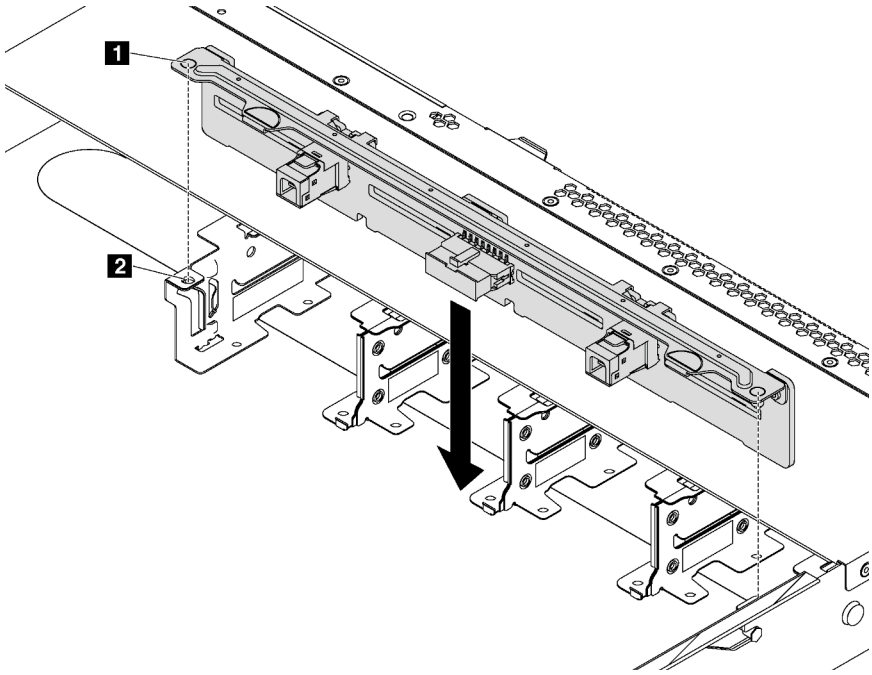


Figure 92. Installation of backplane for eight 2.5-inch hot-swap drives

Step 1. Align the two pins 1 on the backplane with the corresponding holes 2 in the chassis.

Step 2. Lower the backplane into the chassis. Ensure that the pins pass through the holes and the backplane is fully seated in place.

After installing the backplane:

1. Connect the cables to the backplane. See "Server models with eight 2.5-inch SAS/SATA drives" on page 41.

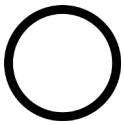
2. Reinstall all the drives and drive fillers into the drive bays. See “Install a hot-swap drive” on page 101.
3. Complete the parts replacement. See “Complete the parts replacement” on page 177.

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

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



“**Read** the installation Guidelines” on page 65



“**Power off** the server for this task” on page 17



“**ATTENTION: Static Sensitive Device** Ground package before opening” on page 68

Before removing the backplane:

1. Remove the top cover. See “Remove the top cover” on page 68.
2. Remove all the installed drives and drive fillers from the drive bays. See “Remove a hot-swap drive” on page 100 and “Install a hot-swap drive” on page 101.
3. Disconnect the cables from the backplane.

To remove the backplane, complete the following step:

Watch the procedure

A video of this procedure is available at https://www.youtube.com/playlist?list=PLYV5R7hVcs-C_GGjNudxYy8-c69INMcmE.

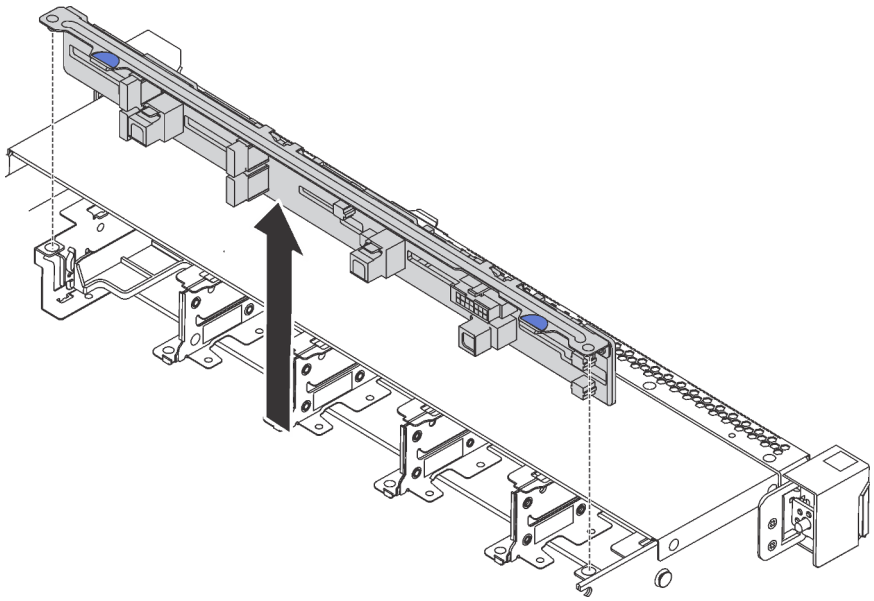


Figure 93. Removal of backplane for ten 2.5-inch hot-swap drives

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

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

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

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

“**Read** the installation Guidelines” on page 65	“**Power off** the server for this task” on page 17	“**ATTENTION: Static Sensitive Device** Ground package before opening” on page 68

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

To install the backplane, complete the following steps:

Watch the procedure

A video of this procedure is available at https://www.youtube.com/playlist?list=PLYV5R7hVcs-C_GGjNudxYy8-c69INMcmE.

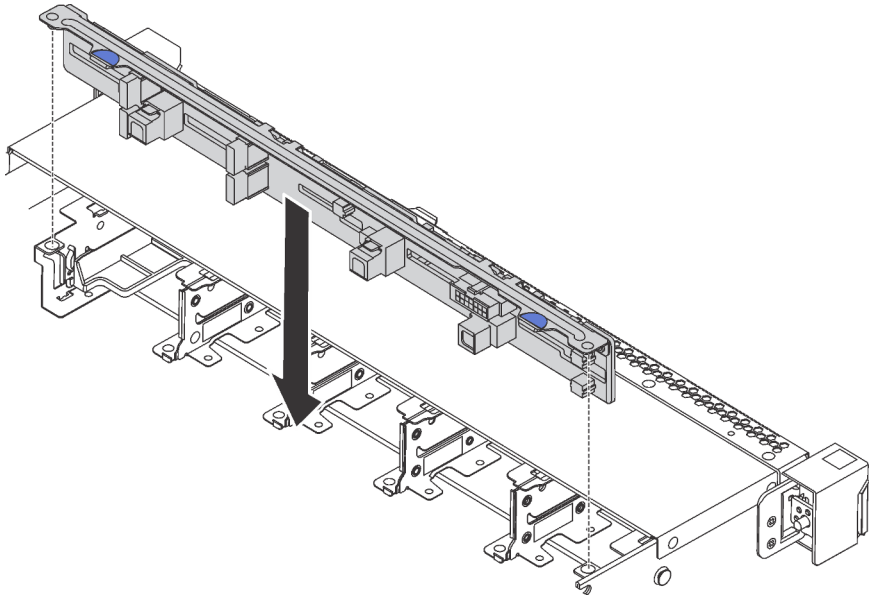


Figure 94. Installation of backplane for ten 2.5-inch hot-swap drives

Step 1. Align the two pins on the backplane with the corresponding holes in the chassis as shown.

Step 2. Lower the backplane into the chassis. Ensure that the pins pass through the holes and the backplane is fully seated in place.

After installing the backplane:

1. Connect the cables to the backplane. See “Server models with ten 2.5-inch SAS/SATA/NVMe drives” on page 45.
2. Reinstall all the drives and drive fillers into the drive bays. See “Install a hot-swap drive” on page 101.
3. Complete the parts replacement. See “Complete the parts replacement” on page 177.

Remove the rear backplane

Use this information to remove the rear backplane.

“**Read** the installation Guidelines” on page 65	“**Power off** the server for this task” on page 17	“**ATTENTION: Static Sensitive Device** Ground package before opening” on page 68

Before removing the rear backplane:

1. Remove the top cover. See “Remove the top cover” on page 68.
2. Remove the drives or drive fillers installed in the rear hot-swap drive assembly. See “Remove a hot-swap drive” on page 100 and “Install a hot-swap drive” on page 101.

To remove the rear backplane, complete the following steps:

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

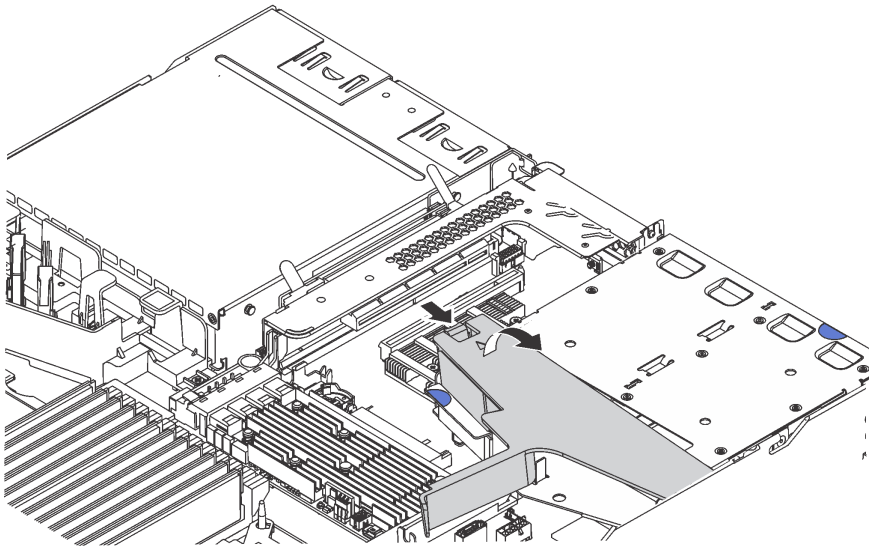


Figure 95. Air baffle removal

Step 2. Disconnect the cables from the rear backplane.

Step 3. Carefully lift the rear backplane out of the rear hot-swap drive cage.

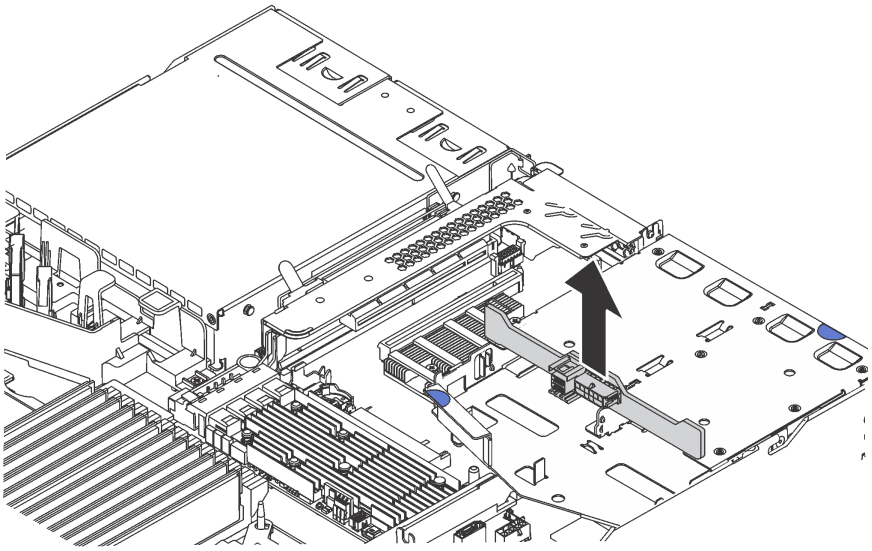


Figure 96. Rear backplane removal

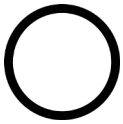
If you are instructed to return the old rear backplane, follow all packaging instructions and use any packaging materials that are provided.

Install the rear backplane

Use this information to install the rear backplane.



"**Read** the installation Guidelines" on page 65



"**Power off** the server for this task" on page 17



"**ATTENTION: Static Sensitive Device** Ground package before opening" on page 68

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

To install the rear backplane, complete the following steps:

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

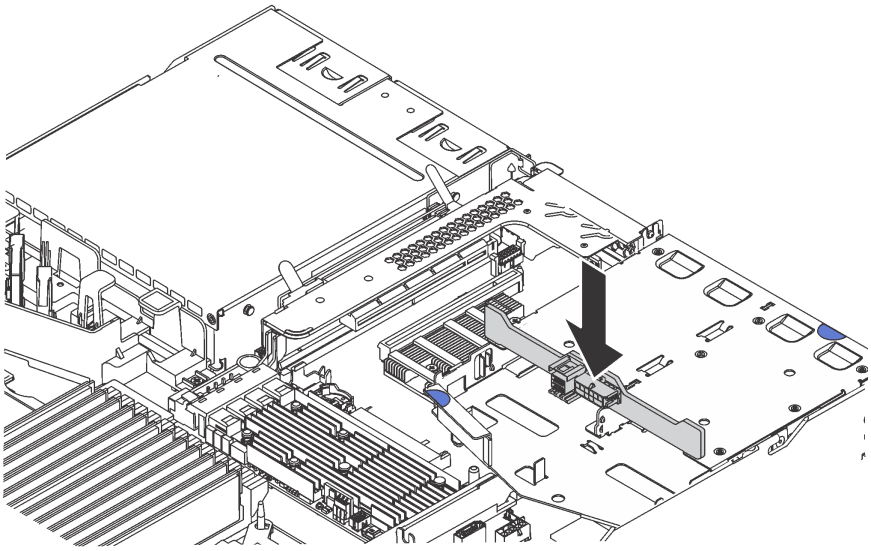


Figure 97. Rear backplane installation

Step 2. Connect the SAS signal cable to connector 1 on the rear backplane and connect the power cable to connector 2 on the rear backplane.

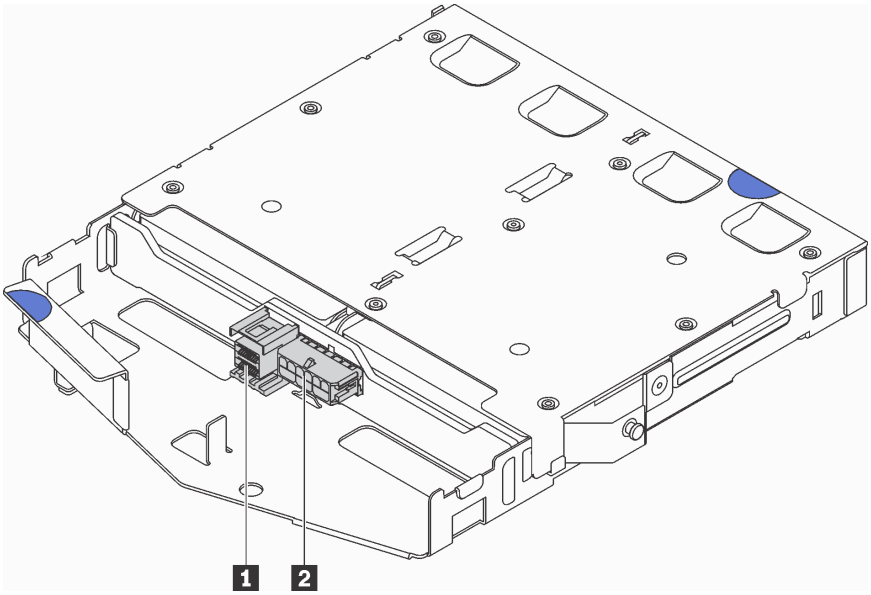


Figure 98. Rear backplane connectors

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

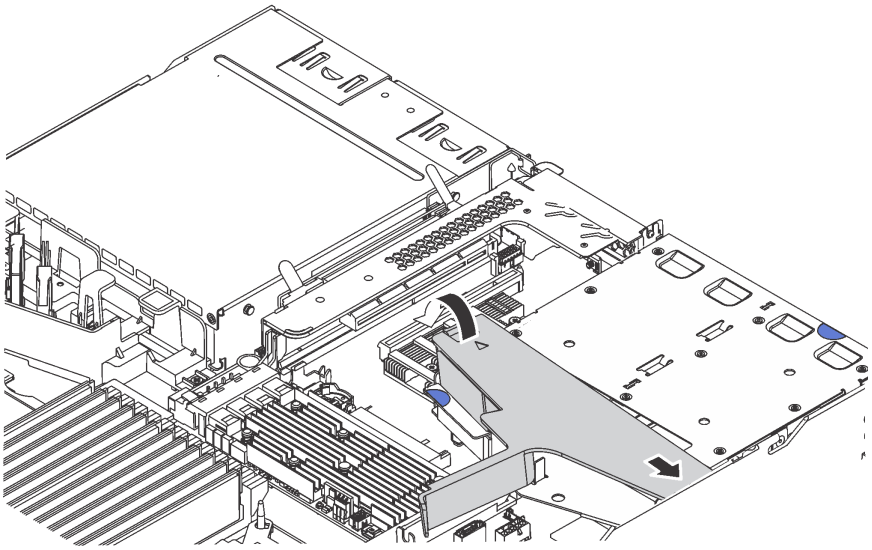


Figure 99. Air baffle installation

After installing the rear backplane:

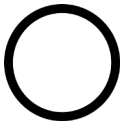
1. Reinstall the drives or drive fillers into the rear hot-swap drive assembly. See "Install a hot-swap drive" on page 101.
2. Complete the parts replacement. See "Complete the parts replacement" on page 177.

CMOS battery replacement

Use this information to remove and install the CMOS battery.

Remove the CMOS battery

Use this information to remove the CMOS battery.

		
"**Read** the installation Guidelines" on page 65	"**Power off** the server for this task" on page 17	"**ATTENTION: Static Sensitive Device** Ground package before opening" on page 68

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

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

  Note: In the U.S., call 1-800-IBM-4333 for information about battery disposal.
- If you replace the original lithium battery with a heavy-metal battery or a battery with heavy-metal components, be aware of the following environmental consideration. Batteries and accumulators that contain heavy metals must not be disposed of with normal domestic waste. They will be taken back free of charge by the manufacturer, distributor, or representative, to be recycled or disposed of in a proper manner.
- To order replacement batteries, call 1-800-IBM-SERV within the U.S., and 1-800-465-7999 or 1-800-465-6666 within Canada. Outside the U.S. and Canada, call your support center or business partner.

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

S004



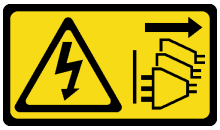
CAUTION:
When replacing the lithium battery, use only Lenovo specified part number or an equivalent type battery recommended by the manufacturer. If your system has a module containing a lithium battery, replace it only with the same module type made by the same manufacturer. The battery contains lithium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

Do not:

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

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

S002



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

Before removing the CMOS battery:

1. Remove the top cover. See "Remove the top cover" on page 68.
2. Remove any parts and disconnect any cables that might impede your access to the CMOS battery.

To remove the CMOS battery, complete the following steps:

Watch the procedure

A video of this procedure is available at https://www.youtube.com/playlist?list=PLYV5R7hVcs-C_GGjNudxYy8-c69INMcmE.

Step 1. Locate the CMOS battery. See "System board components" on page 30.

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

Attention:

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

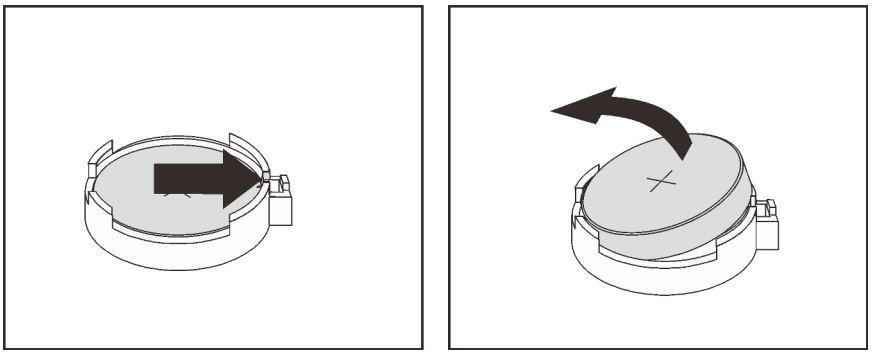


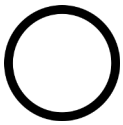
Figure 100. CMOS battery removal

After removing the CMOS battery:

1. Install a new one. See “Install the CMOS battery” on page 125.
2. Dispose of the CMOS battery as required by local ordinances or regulations.

Install the CMOS battery

Use this information to install the CMOS battery.

		
“**Read** the installation Guidelines” on page 65	“**Power off** the server for this task” on page 17	“**ATTENTION: Static Sensitive Device** Ground package before opening” on page 68

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

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

  Note: In the U. S., call 1-800-IBM-4333 for information about battery disposal.
- If you replace the original lithium battery with a heavy-metal battery or a battery with heavy-metal components, be aware of the following environmental consideration. Batteries and accumulators that contain heavy metals must not be disposed of with normal domestic waste. They will be taken back free of charge by the manufacturer, distributor, or representative, to be recycled or disposed of in a proper manner.
- To order replacement batteries, call 1-800-IBM-SERV within the U.S., and 1-800-465-7999 or 1-800-465-6666 within Canada. Outside the U.S. and Canada, call your support center or business partner.

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

S004



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

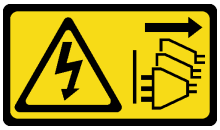
replace it only with the same module type made by the same manufacturer. The battery contains lithium and can explode if not properly used, handled, or disposed of.

Do not:

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

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

S002



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

To install the CMOS battery, complete the following steps:

Watch the procedure

A video of this procedure is available at https://www.youtube.com/playlist?list=PLYV5R7hVcs-C_GGjNudxYy8-c69INMcmE.

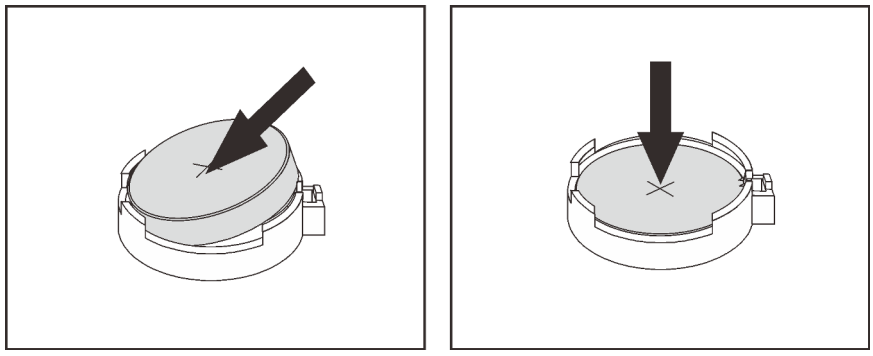


Figure 101. CMOS battery installation

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

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

After installing the CMOS battery:

1. Complete the parts replacement. See “Complete the parts replacement” on page 177.
2. Use the Setup utility to set the date, time, and any passwords.

TCM/TPM adapter replacement (for Chinese Mainland only)

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

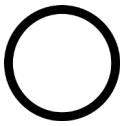
For customers in Chinese Mainland, integrated TPM is not supported. However, customers in Chinese Mainland can install a Trusted Cryptographic Module (TCM) adapter or a TPM adapter (sometimes called a daughter card).

Remove the TCM/TPM adapter (for Chinese Mainland only)

Use this information to remove the TCM/TPM adapter.



"**Read** the installation Guidelines" on page 65



"**Power off** the server for this task" on page 17



"**ATTENTION: Static Sensitive Device** Ground package before opening" on page 68

Before removing the TCM/TPM adapter, remove the top cover. See "Remove the top cover" on page 68.

To remove the TCM/TPM adapter, complete the following steps:

Watch the procedure

A video of this procedure is available at https://www.youtube.com/playlist?list=PLYV5R7hVcs-C_GGjNudxYy8-c69INMcmE.

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

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

Notes:

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

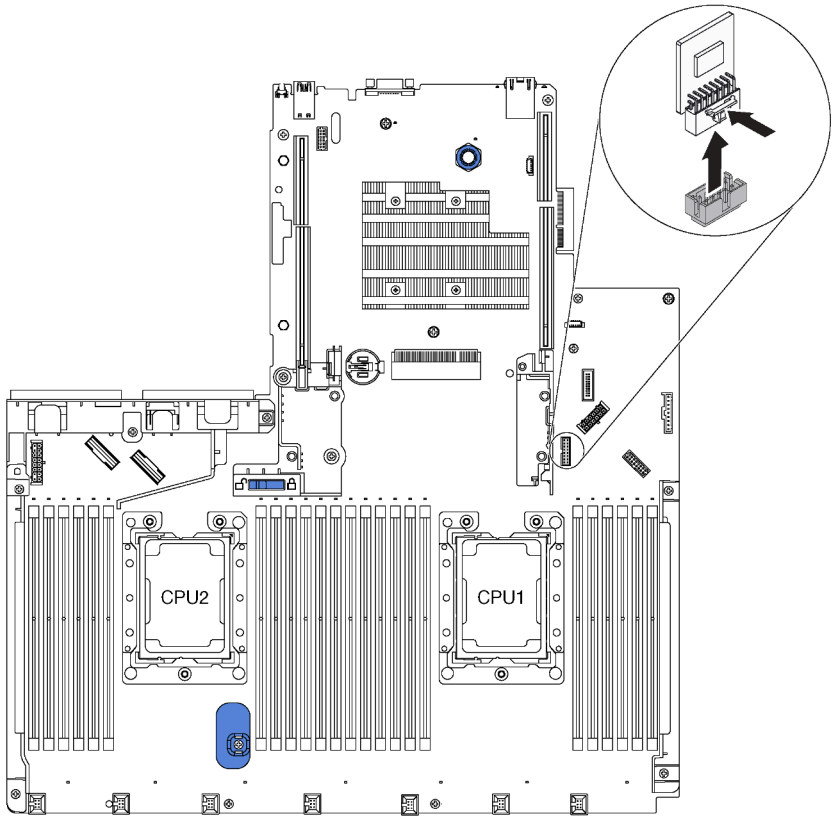


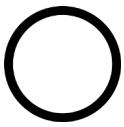
Figure 102. TCM/TPM adapter removal

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

Install the TCM/TPM adapter (for Chinese Mainland only)

Use this information to install the TCM/TPM adapter.


"**Read** the installation Guidelines" on page 65


"**Power off** the server for this task" on page 17


"**ATTENTION: Static Sensitive Device** Ground package before opening" on page 68

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

To install the TCM/TPM adapter, complete the following steps:

Watch the procedure

A video of this procedure is available at https://www.youtube.com/playlist?list=PLYV5R7hVcs-C_GGjNudxYy8-c69INMcmE.

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

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

Notes:

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

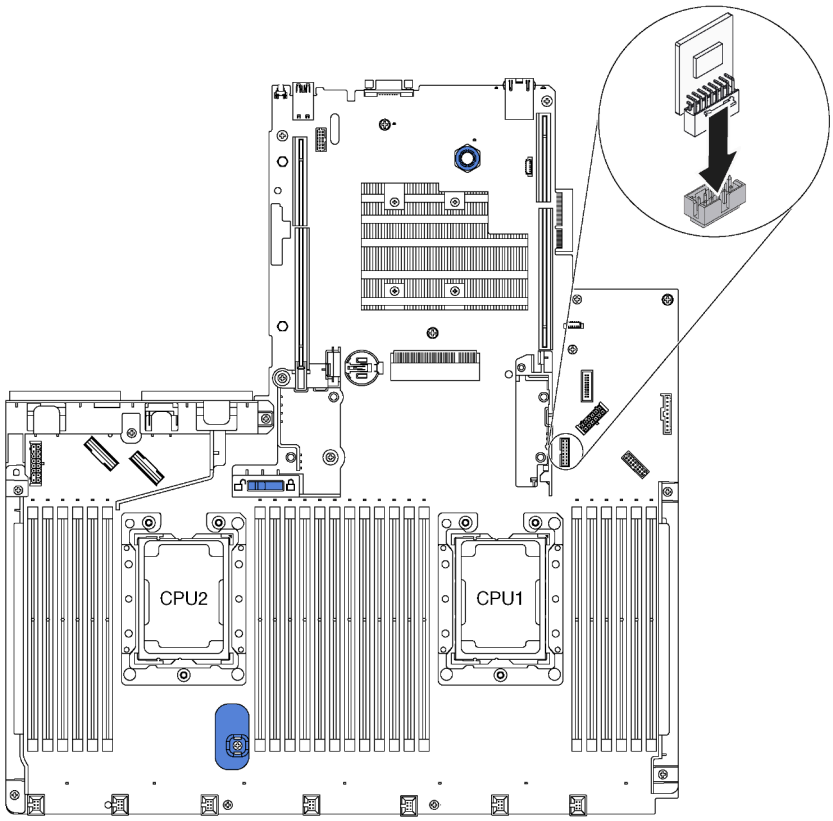


Figure 103. TCM/TPM adapter installation

After installing the TCM/TPM adapter, complete the parts replacement. See “Complete the parts replacement” on page 177.

Rear hot-swap drive assembly replacement

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

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

Remove the rear hot-swap drive assembly

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

“**Read** the installation Guidelines” on page 65

“**Power off** the server for this task” on page 17

“**ATTENTION: Static Sensitive Device** Ground package before opening” on page 68

Before removing the rear hot-swap drive assembly:

1. Remove the top cover. See “Remove the top cover” on page 68.
2. Remove the drives or drive fillers installed in the rear hot-swap drive assembly. See “Remove a hot-swap drive” on page 100 and “Install a hot-swap drive” on page 101.
3. Disconnect the rear hot-swap drive assembly cables from the system board and the RAID adapter.

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

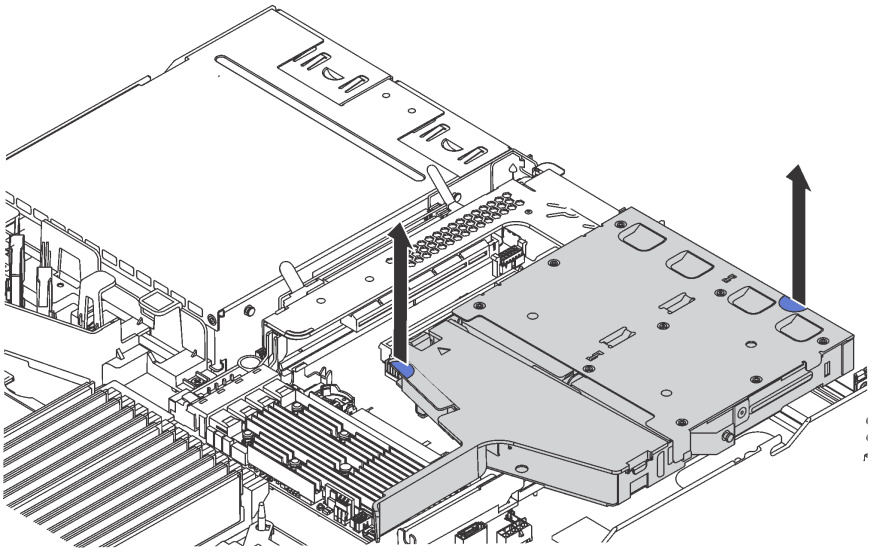


Figure 104. Rear hot-swap drive assembly removal

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

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

Install the rear hot-swap drive assembly

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

“**Read** the installation Guidelines” on page 65

“**Power off** the server for this task” on page 17

“**ATTENTION: Static Sensitive Device** Ground package before opening” on page 68

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

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

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

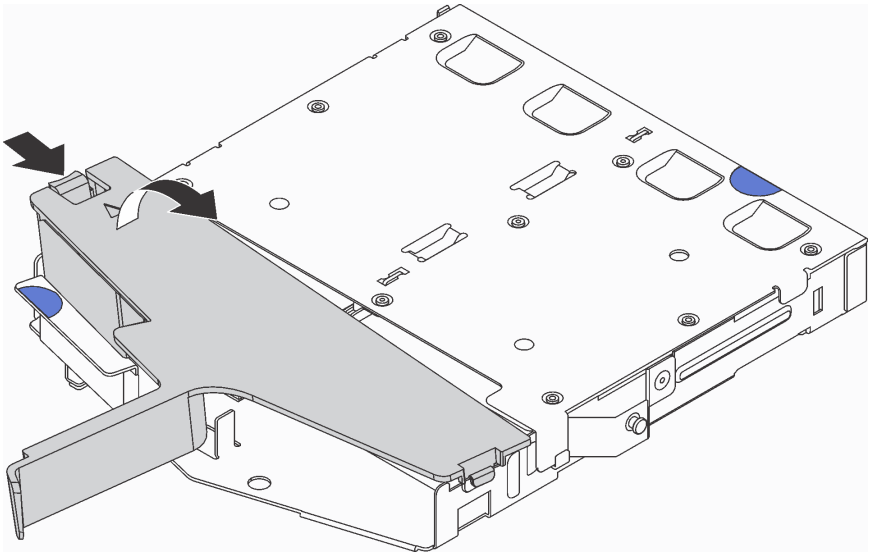


Figure 105. Air baffle removal

Step 2. Connect the SAS signal cable to connector 1 on the rear backplane and connect the power cable to connector 2 on the rear backplane.

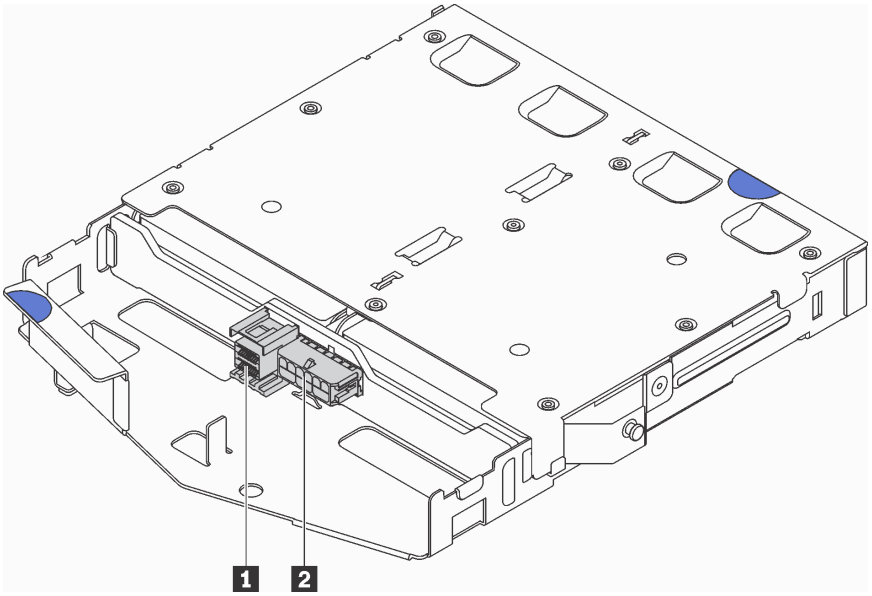


Figure 106. Rear backplane connectors

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

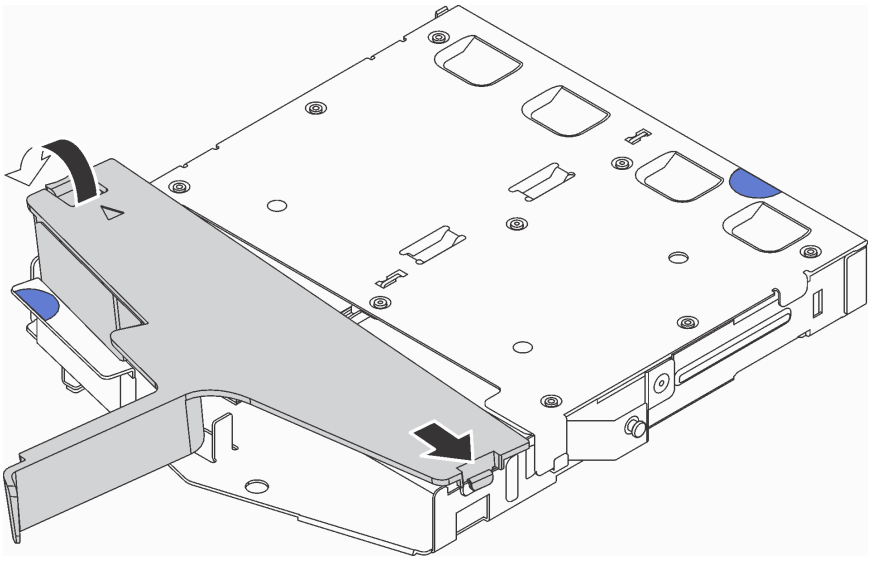


Figure 107. Air baffle installation

Step 4. Align the three pins on the rear hot-swap drive assembly with the holes and slot in the chassis. Then, lower the rear hot-swap drive assembly into the chassis until it is fully seated.

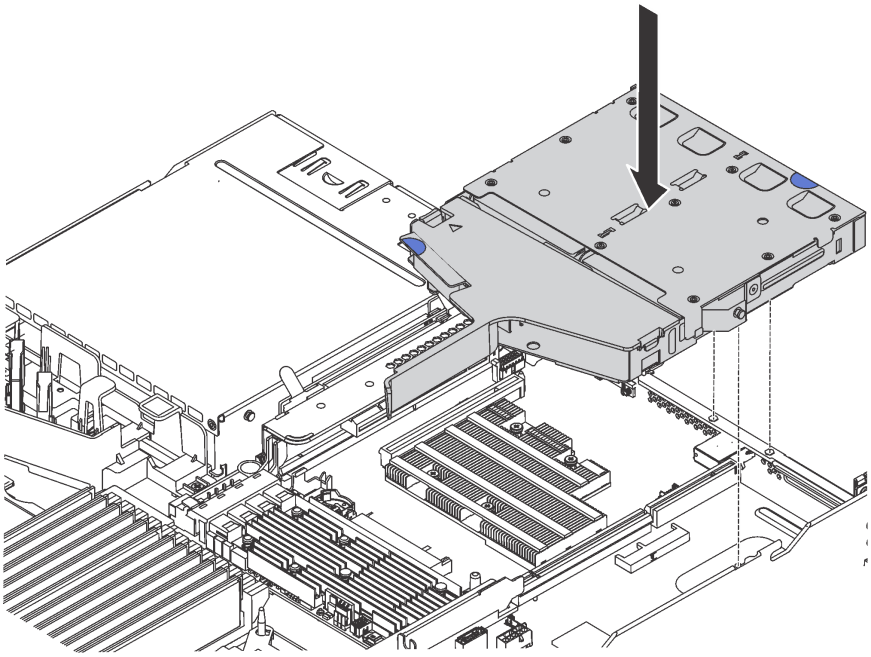


Figure 108. Rear hot-swap drive assembly installation

Step 5. Connect the SAS signal cable to the RAID adapter and connect the power cable to the system board. See “Internal cable routing” on page 34.

After installing the rear hot-swap drive assembly:

1. Reinstall the drives or drive fillers into the rear hot-swap drive assembly. See “Install a hot-swap drive” on page 101.
2. Complete the parts replacement. See “Complete the parts replacement” on page 177.

RAID adapter replacement

Use this information to remove and install the RAID adapter on the system board.

Notes:

- For a list of the supported RAID adapters, see: https://static.lenovo.com/us/en/serverproven/index.shtml
- Depending on the specific type, your RAID adapter might look different from the illustrations in this topic.

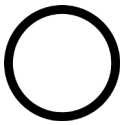
Attention: Replacing the RAID adapter might impact your RAID configurations. Back up your data before you begin to avoid any data loss due to a RAID configuration change.

Remove the RAID adapter

Use this information to remove the RAID adapter on the system board.



"**Read** the installation Guidelines" on page 65



"**Power off** the server for this task" on page 17



"**ATTENTION: Static Sensitive Device** Ground package before opening" on page 68

Note: The following procedure applies to the RAID adapter installed on the system board. For the procedure about removing the RAID adapter installed on the riser assembly, refer to "Remove a PCIe adapter" on page 109.

Before removing the RAID adapter:

1. Remove the top cover. See "Remove the top cover" on page 68.
2. Disconnect any cables that might impede your access to the RAID adapter.
3. Record the cable connections on the RAID adapter and then disconnect all cables from the RAID adapter. For more information about the cable connection, see "Internal cable routing" on page 34.

To remove the RAID adapter on the system board, complete the following steps:

Watch the procedure

A video of this procedure is available at https://www.youtube.com/playlist?list=PLYV5R7hVcs-C_GGjNudxYy8-c69INMcmE.

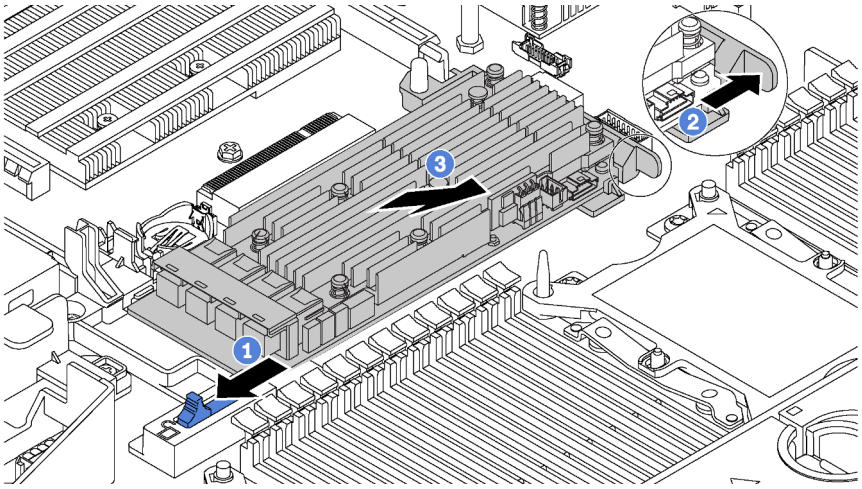


Figure 109. RAID adapter removal

Step 1. Slide the left-side latch to the unlocked position.

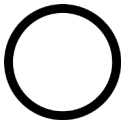
Step 2. Push and hold the right-side latch in the direction as shown.

Step 3. Grasp the RAID adapter by its edges and carefully remove it from the RAID adapter slot on the system board.

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

Install the RAID adapter

Use this information to install the RAID adapter on the system board.

	“**Read** the installation Guidelines” on page 65	 “**Power off** the server for this task” on page 17
	“**ATTENTION: Static Sensitive Device** Ground package before opening” on page 68	

Note: The following procedure applies to RAID adapter installed on the system board. For the procedure about installing the RAID adapter installed on the riser assembly, refer to “Install a PCIe adapter” on page 110.

Before installing the RAID adapter:

1. Touch the static-protective package that contains the new RAID adapter to any unpainted surface on the outside of the server. Then, take the new RAID adapter out of the package and place it on a static-protective surface.
2. If the new RAID adapter is installed with a bracket, remove the bracket.

To install the RAID adapter on the system board, complete the following steps:

Watch the procedure

A video of this procedure is available at https://www.youtube.com/playlist?list=PLYV5R7hVcs-C_GGjNudxYy8-c69INMcmE.

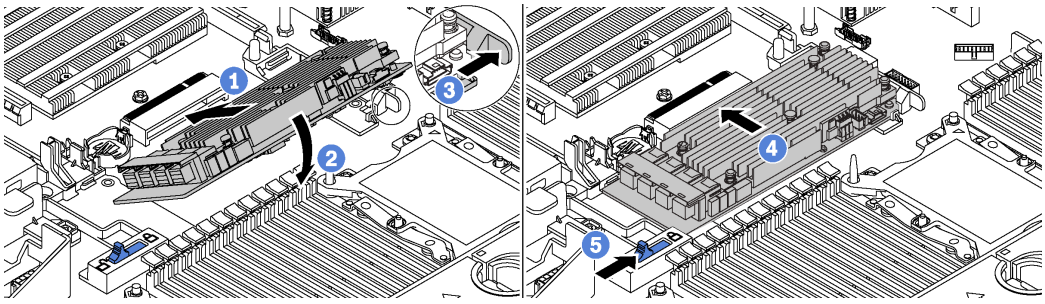


Figure 110. RAID adapter installation

Step 1. Place the RAID adapter into the slot at an angle.

Step 2. Rotate the RAID adapter down.

Step 3. Push the right-side latch open.

Step 4. Push the RAID adapter to the fully horizontal position and insert it into the RAID adapter slot.

Step 5. Slide the left-side latch to the locked position.

After installing the RAID adapter on the system board:

1. Connect cables to the new RAID adapter. See "Internal cable routing" on page 34.
2. Complete the parts replacement. See "Complete the parts replacement" on page 177.

Serial port module replacement

Use this information to remove and install the serial port module.

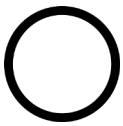
Note: The serial port module is available only on some models.

Remove the serial port module

Use this information to remove the serial port module.



"**Read** the installation Guidelines" on page 65



"**Power off** the server for this task" on page 17



"**ATTENTION: Static Sensitive Device** Ground package before opening" on page 68

Before removing the serial port module, remove the top cover. See "Remove the top cover" on page 68.

To remove the serial port module, complete the following steps:

Note: The serial port module might be installed on riser 1 assembly or riser 2 assembly. The following steps are based on the scenario that the serial port module is installed on riser 2 assembly. The removal procedure is the same for the serial port module installed on riser 1 assembly.

Step 1. Disconnect the cable of the serial port module from the system board.

Step 2. Grasp the riser assembly with the serial port module and carefully lift it out of the server.

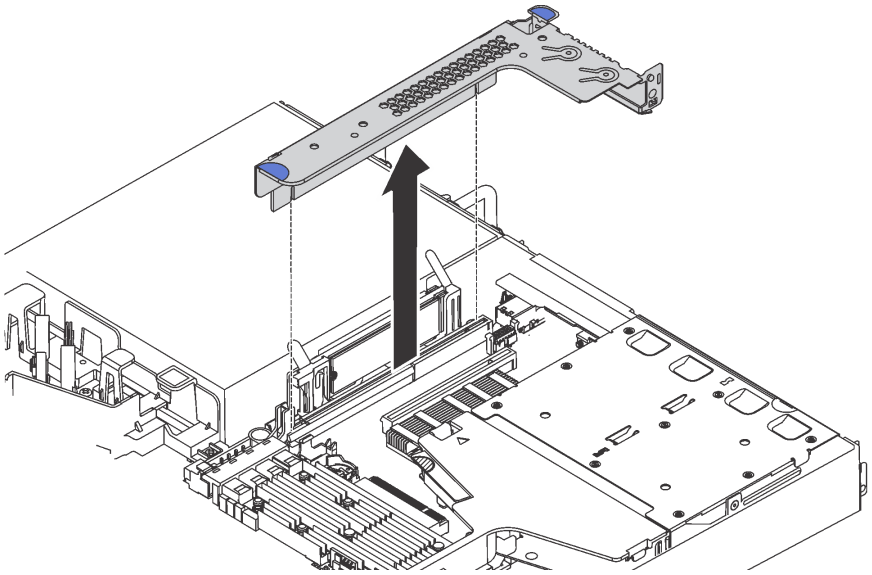


Figure 111. Riser assembly removal

Step 3. Slide the serial port module out of the riser assembly.

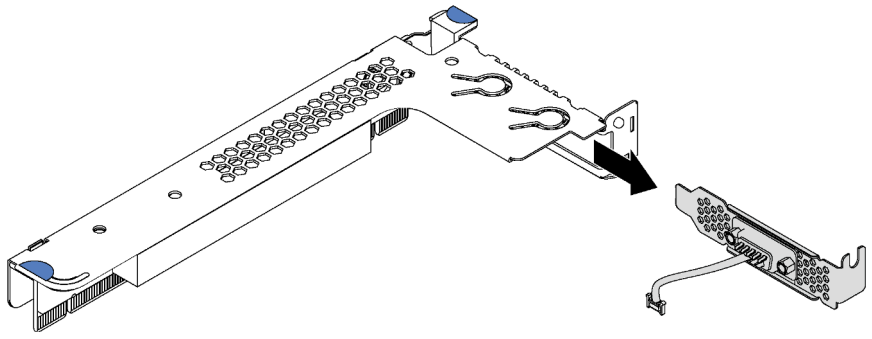


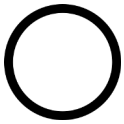
Figure 112. Serial port module removal

After removing the serial port module:

1. Install a new serial port module, a PCIe adapter, or a PCIe slot bracket to cover the place.
2. If you are instructed to return the old serial port module, follow all packaging instructions and use any packaging materials that are provided.

Install the serial port module

Use this information to install the serial port module.

		
"**Read** the installation Guidelines" on page 65	"**Power off** the server for this task" on page 17	"**ATTENTION: Static Sensitive Device** Ground package before opening" on page 68

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

To install the serial port module, complete the following steps:

Note: The serial port module can be installed on riser 1 assembly or riser 2 assembly. The following steps are based on the scenario that the serial port module is to be installed on riser 2 assembly. The installation procedure is the same for the serial port module to be installed on riser 1 assembly.

Step 1. Grasp the riser assembly by its edges and carefully lift it out of the server.

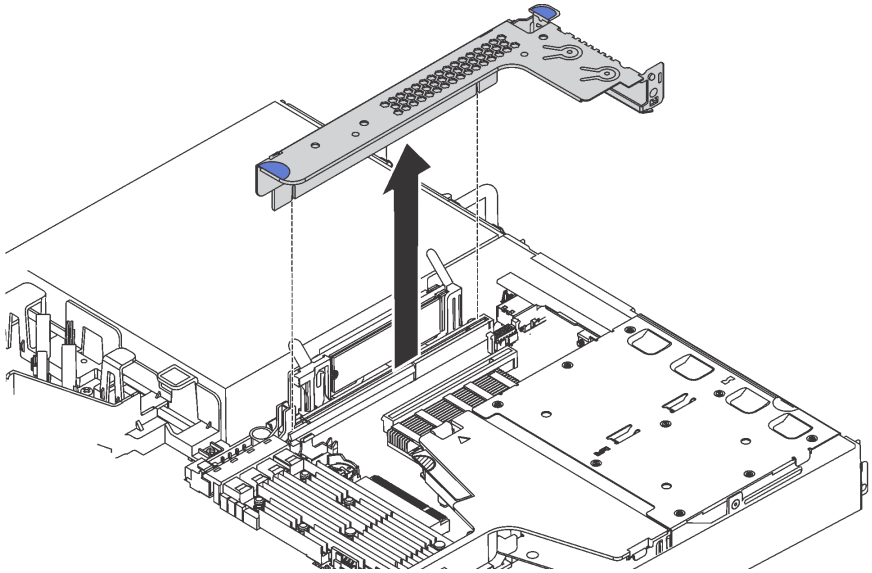


Figure 113. Riser assembly removal

Step 2. If the riser assembly is covered with a PCIe slot bracket, remove the bracket first. Then, install the serial port module into the riser assembly.

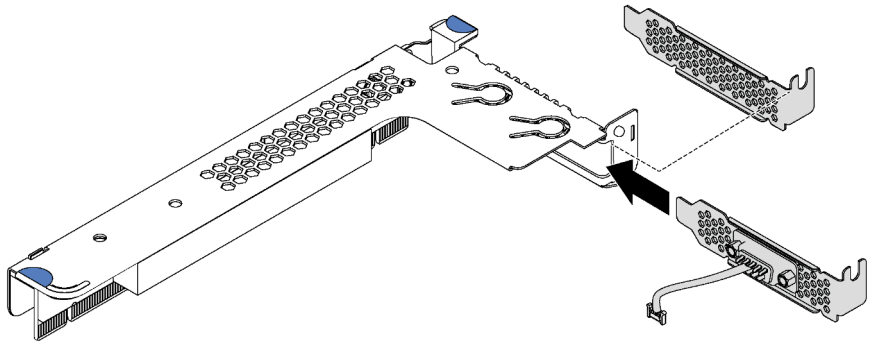


Figure 114. Serial port module installation

Step 3. Insert the riser assembly into the riser slot on the system board. Ensure that the riser assembly is fully seated.

Step 4. Connect the cable of the serial port module to the serial-port-module connector on the system board. For the location of the serial-port-module connector, refer to "System board components" on page 30. If the serial port module is installed in PCIe slot 1, route the cable of the serial port module as shown.

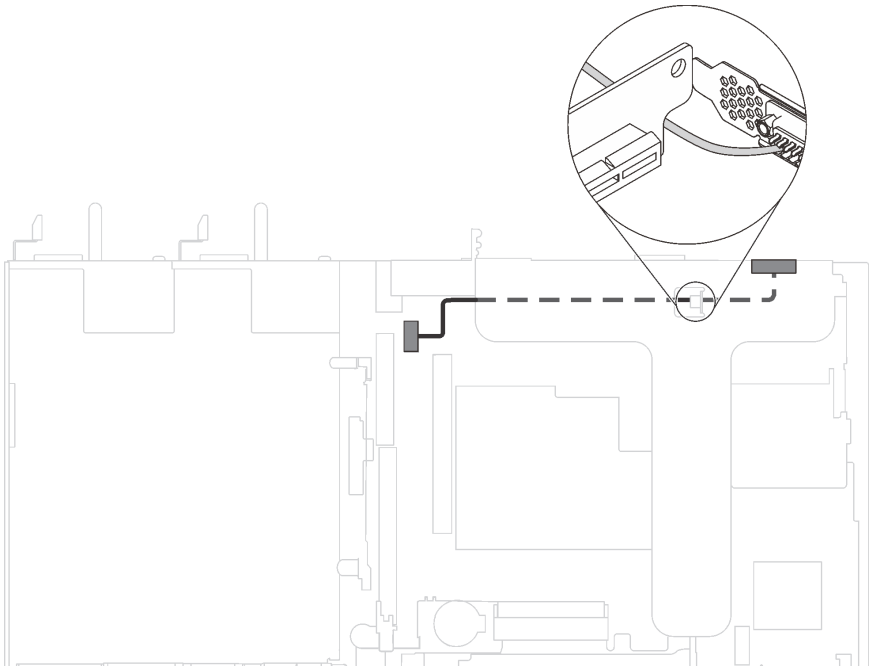


Figure 115. Cable routing for serial port module installed in PCIe slot 1

After installing the serial port module:

1. Complete the parts replacement. See "Complete the parts replacement" on page 177.
2. To enable the serial port module, do one of the following according to the installed operating system:
   - For Linux operating system:

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

     ```
     -I lanplus -H IP -U USERID -P PASSWORD sol deactivate
     ```
   - For Microsoft Windows operating system:
     a. Open the ipmitool and enter the following command to disable the SOL feature:

        ```
        -I lanplus -H IP -U USERID -P PASSWORD sol deactivate
        ```
     b. Open Windows PowerShell and enter the following command to disable the Emergency Management Services (EMS) feature:

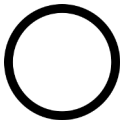
        ```
        Bcdedit /ems no
        ```
     c. Restart the server to ensure that the EMS setting takes effect.

M.2 backplane and M.2 drive replacement

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

Remove the M.2 backplane and M.2 drive

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

		
“**Read** the installation Guidelines” on page 65	“**Power off** the server for this task” on page 17	“**ATTENTION: Static Sensitive Device** Ground package before opening” on page 68

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

1. Remove the top cover. See “Remove the top cover” on page 68.
2. For easier operation, remove the riser assembly next to the M.2 backplane. See “Remove a riser card” on page 106.

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

Watch the procedure

A video of this procedure is available at https://www.youtube.com/playlist?list=PLYV5R7hVcs-C_GGjNudxYy8-c69INMcmE.

Step 1. Grasp the M.2 backplane at both ends and pull it straight up to remove it from the system board.

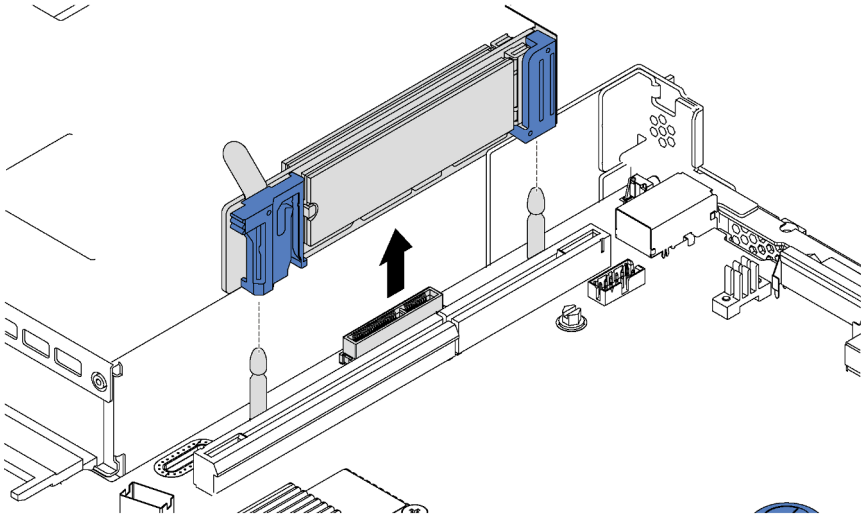


Figure 116. M.2 backplane removal

Step 2. Remove the M.2 drive from the M.2 backplane.

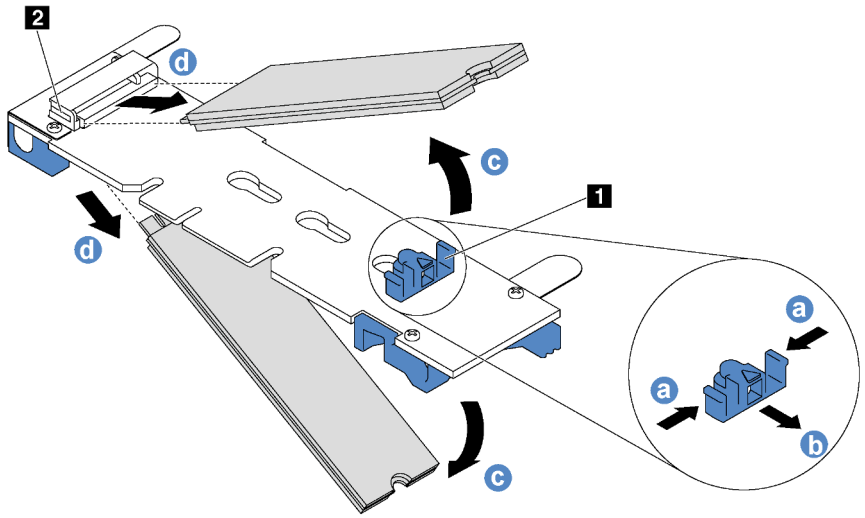


Figure 117. M.2 drive removal

a. Press both sides of the retainer 1.
b. Slide the retainer backward to loosen the M.2 drive from the M.2 backplane.

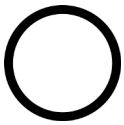
   Note: If the M.2 backplane has two M.2 drives, they will both release outward when you slide the retainer backward.
c. Rotate the M.2 drive away from the M.2 backplane.
d. Pull it away from the connector 2 at an angle of approximately 30 degrees.

If you are instructed to return the old M.2 backplane or M.2 drive, follow all packaging instructions and use any packaging materials that are provided.

Adjust the retainer on the M.2 backplane

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


"**Read** the installation Guidelines" on page 65


"**Power off** the server for this task" on page 17


"**ATTENTION: Static Sensitive Device** Ground package before opening" on page 68

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

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

Watch the procedure

A video of this procedure is available at https://www.youtube.com/playlist?list=PLYV5R7hVcs-C_GGjNudxYy8-c69INMcmE.

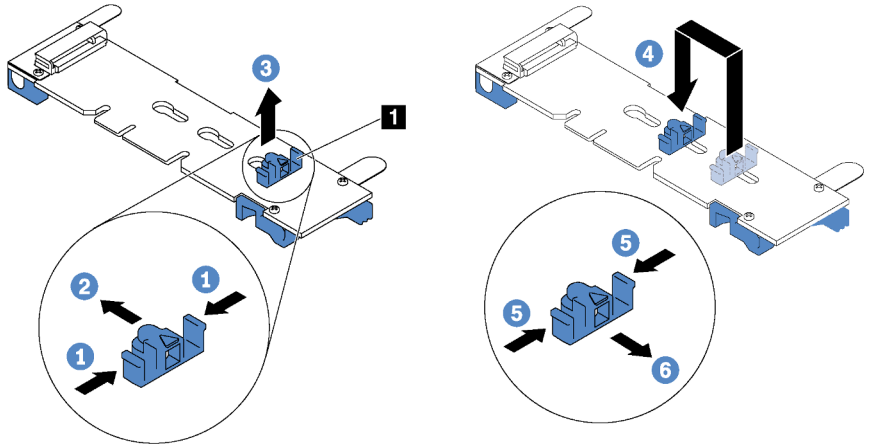


Figure 118. M.2 retainer adjustment

Step 1. Press both sides of the retainer 1.

Step 2. Move the retainer forward until it is in the large opening of the keyhole.

Step 3. Take the retainer out of the keyhole.

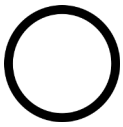
Step 4. Insert the retainer into the correct keyhole.

Step 5. Press both sides of the retainer.

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

Install the M.2 backplane and M.2 drive

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

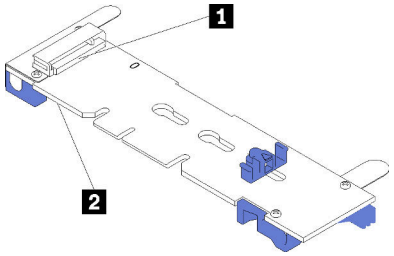
		
"**Read** the installation Guidelines" on page 65	"**Power off** the server for this task" on page 17	"**ATTENTION: Static Sensitive Device** Ground package before opening" on page 68

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

1. Touch the static-protective package that contains the new M.2 backplane and M.2 drive to any unpainted surface on the outside of the server. Then, take the new M.2 backplane and M.2 drive out of the package and place them on a static-protective surface.
2. Adjust the retainer on the M.2 backplane to accommodate the particular size of the M.2 drive you wish to install. See "Adjust the retainer on the M.2 backplane" on page 140.
3. Locate the connector on each side of the M.2 backplane.

Notes:

- Some M.2 backplanes support two identical M.2 drives. When two M.2 drives are installed, align and support both M.2 drives when sliding the retainer forward to secure the M.2 drives.
- Install the M.2 drive in slot 0 first.



1 Slot 0
2 Slot 1

Figure 119. M.2 drive slot

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

Watch the procedure

A video of this procedure is available at https://www.youtube.com/playlist?list=PLYV5R7hVcs-C_GGjNudxYy8-c69INMcmE.

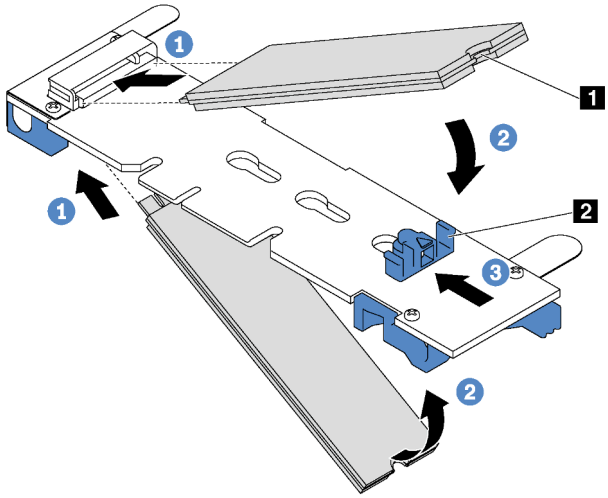


Figure 120. M.2 drive installation

Step 1. Insert the M.2 drive at an angle of approximately 30 degrees into the connector.

Note: If your M.2 backplane supports two M.2 drives, insert the M.2 drives into the connectors at both sides.

Step 2. Rotate the M.2 drive down until the notch 1 catches on the lip of the retainer 2.

Step 3. Slide the retainer forward (toward the connector) to secure the M.2 drive into place.

Attention: When sliding the retainer forward, ensure that the two nubs 3 on the retainer enter the small holes 4 on the M.2 backplane. Once they enter the holes, you will hear a soft “click” sound.

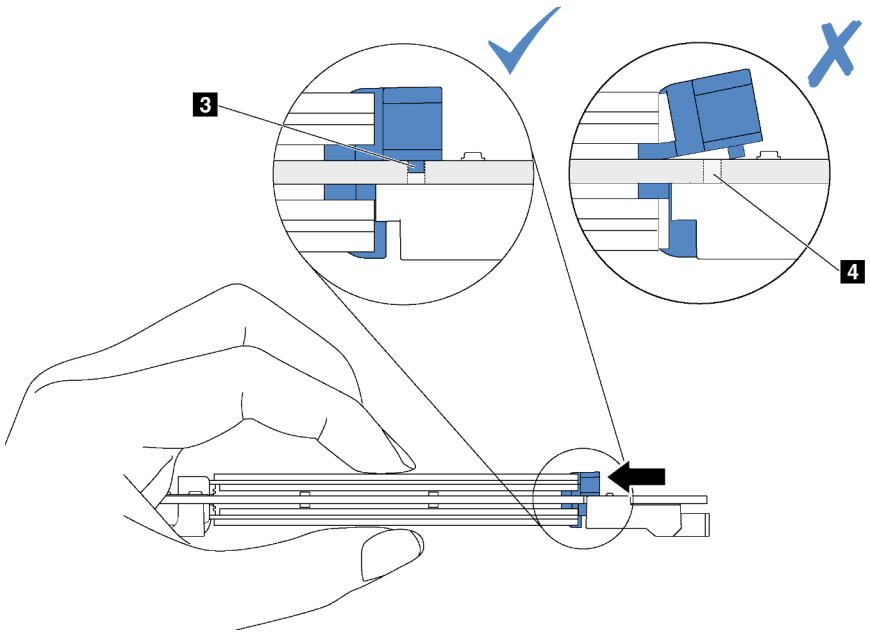


Figure 121. Instruction for sliding the retainer

Step 4. Align the blue plastic supports at each end of the M.2 backplane with the guide pins on the system board. Then, insert the M.2 backplane into the M.2 slot on the system board and press it down to fully seat it.

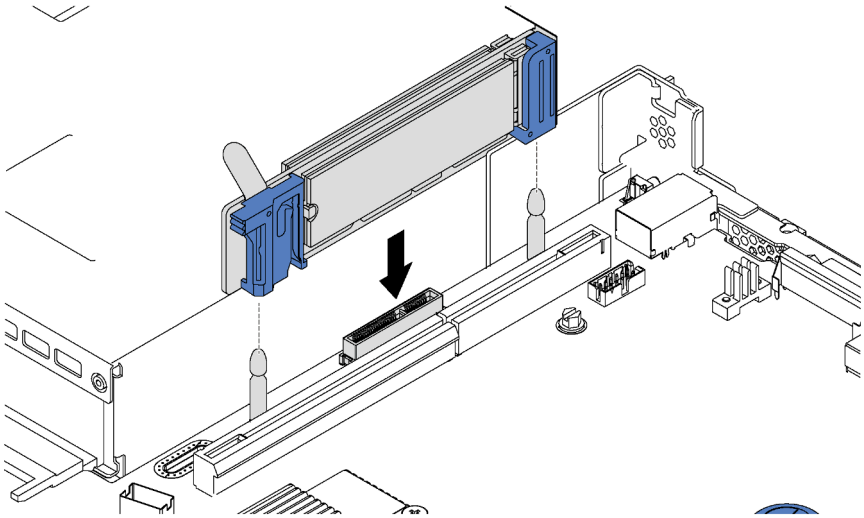


Figure 122. M.2 backplane installation

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

1. Reinstall the riser assembly next to the M.2 backplane. See “Install a riser card” on page 107.
2. Complete the parts replacement. See “Complete the parts replacement” on page 177.
3. Use the Lenovo XClarity Provisioning Manager to configure the RAID. For more information, see: http://sysmgt.lenovofiles.com/help/topic/LXPM/RAID_setup.html

RAID super capacitor module replacement

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

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

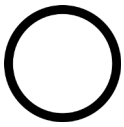
For a list of supported options, see:
https://static.lenovo.com/us/en/serverproven/index.shtml

Remove a RAID super capacitor module on the bottom of the air baffle

Use this information to remove a RAID super capacitor module on the bottom of the air baffle.



"**Read** the installation Guidelines" on page 65



"**Power off** the server for this task" on page 17



"**ATTENTION: Static Sensitive Device** Ground package before opening" on page 68

Before removing a RAID super capacitor module on the bottom of the air baffle:

1. Remove the top cover. See "Remove the top cover" on page 68.
2. Remove the air baffle. See "Remove the air baffle" on page 71.

To remove a RAID super capacitor module on the bottom of the air baffle, complete the following steps:

Watch the procedure

A video of this procedure is available at https://www.youtube.com/playlist?list=PLYV5R7hVcs-C_GGjNudxYy8-c69INMcmE.

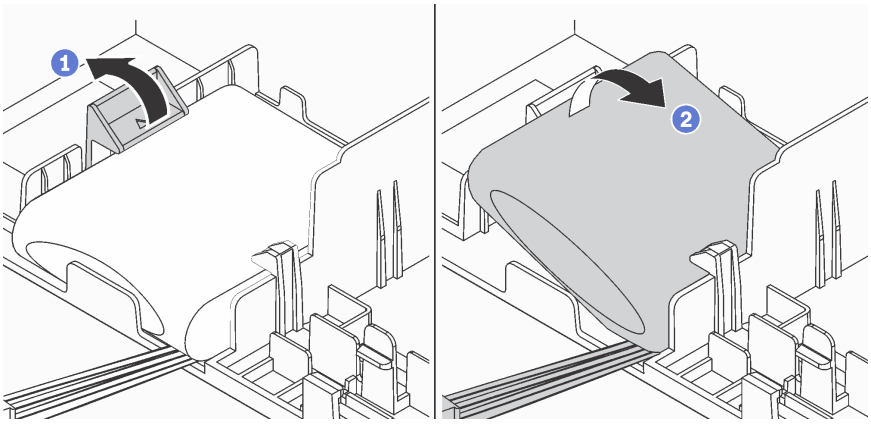


Figure 123. Removal of a RAID super capacitor module on the bottom of the air baffle

Step 1. Gently press the tab on the air baffle as shown.

Step 2. Remove the RAID super capacitor module from the air baffle.

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

Install a RAID super capacitor module on the bottom of the air baffle

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

"**Read** the installation Guidelines" on page 65

"**Power off** the server for this task" on page 17

"**ATTENTION: Static Sensitive Device** Ground package before opening" on page 68

Notes: Your server supports up to two RAID super capacitor modules.

- For server models with 3.5-inch drive bays, install the first RAID super capacitor module in location 1 and install the second RAID super capacitor module in location 2.
- For server models with 2.5-inch drive bays:
  - If you have a RAID super capacitor module holder in location 3, install the first RAID super capacitor module in location 3 and install the second RAID super capacitor module in location 1.
  - If you do not have a RAID super capacitor module holder in location 3, you can install the first RAID super capacitor module in location 1 and install the second RAID super capacitor module in location 2.

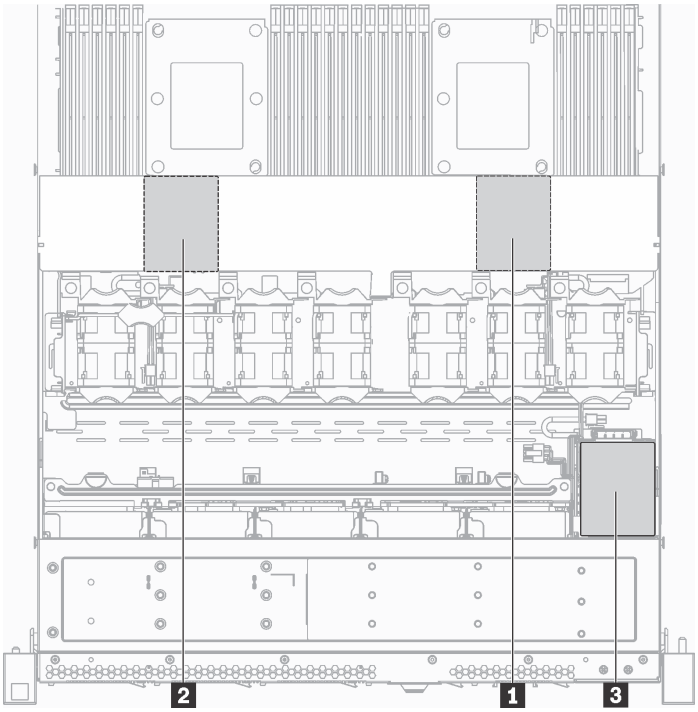


Figure 124. RAID super capacitor module location

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

To install a RAID super capacitor module on the bottom of the air baffle, complete the following steps:

Watch the procedure

A video of this procedure is available at https://www.youtube.com/playlist?list=PLYV5R7hVcs-C_GGjNudxYy8-c69INMcmE.

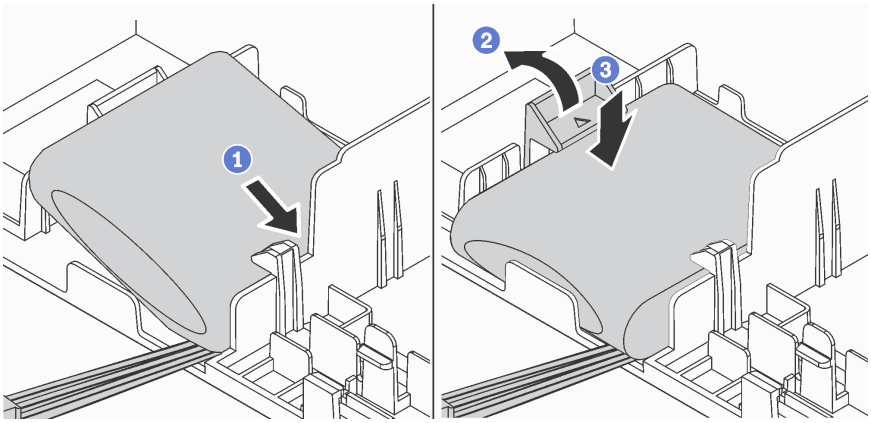


Figure 125. Installation of a RAID super capacitor module on the bottom of the air baffle

Step 1. Insert the RAID super capacitor module into the slot at the bottom of the air baffle as shown.

Step 2. Gently press the tab on the air baffle as shown.

Step 3. Press down the RAID super capacitor module to install it into the slot.

After installing the RAID super capacitor module:

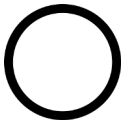
1. Connect the RAID super capacitor module to a RAID adapter with the extension cable that comes with the RAID super capacitor module.
2. Complete the parts replacement. See "Complete the parts replacement" on page 177.

Remove the RAID super capacitor module on the chassis

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



"**Read** the installation Guidelines" on page 65



"**Power off** the server for this task" on page 17



"**ATTENTION: Static Sensitive Device** Ground package before opening" on page 68

Before removing the RAID super capacitor module on the chassis:

1. Remove the top cover. See "Remove the top cover" on page 68.
2. Disconnect the cable of the RAID super capacitor module.

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

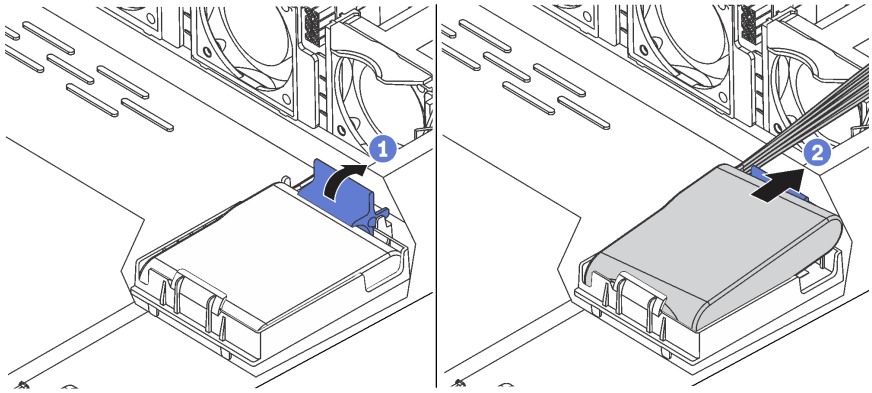


Figure 126. Removal of the RAID super capacitor module on the chassis

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

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

Step 3. Remove the RAID super capacitor module holder as shown if necessary.

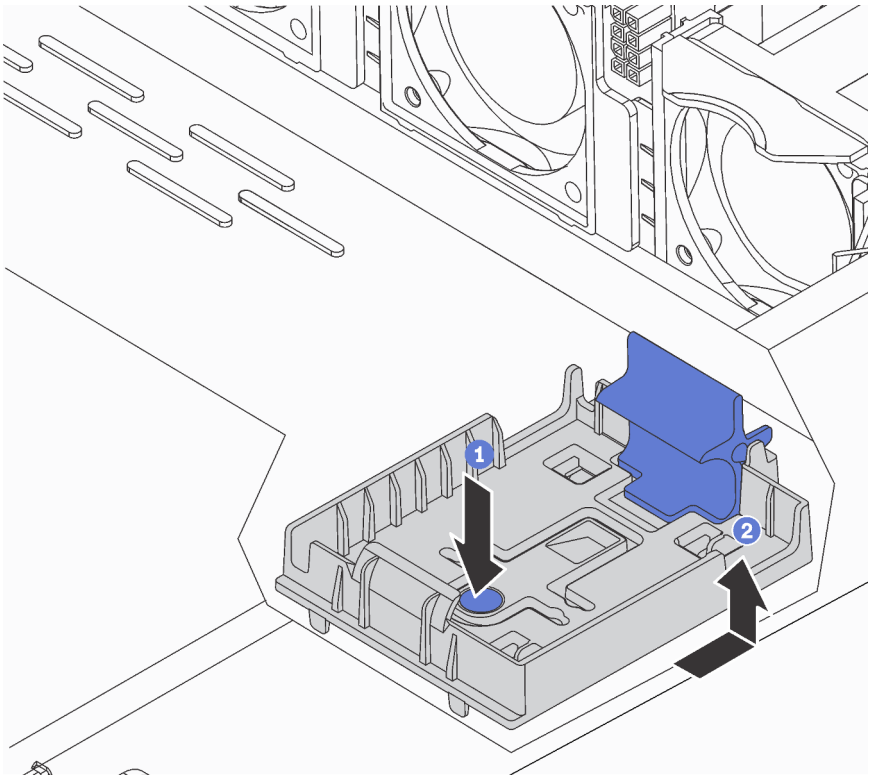


Figure 127. RAID super capacitor module holder removal

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

Install the RAID super capacitor module on the chassis

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

“**Read** the installation Guidelines” on page 65

“**Power off** the server for this task” on page 17

“**ATTENTION: Static Sensitive Device** Ground package before opening” on page 68

Notes: Your server supports up to two RAID super capacitor modules.

- For server models with 3.5-inch drive bays, install the first RAID super capacitor module in location 1 and install the second RAID super capacitor module in location 2.
- For server models with 2.5-inch drive bays:
  - If you have a RAID super capacitor module holder in location 3, install the first RAID super capacitor module in location 3 and install the second RAID super capacitor module in location 1.
  - If you do not have a RAID super capacitor module holder in location 3, you can install the first RAID super capacitor module in location 1 and install the second RAID super capacitor module in location 2.

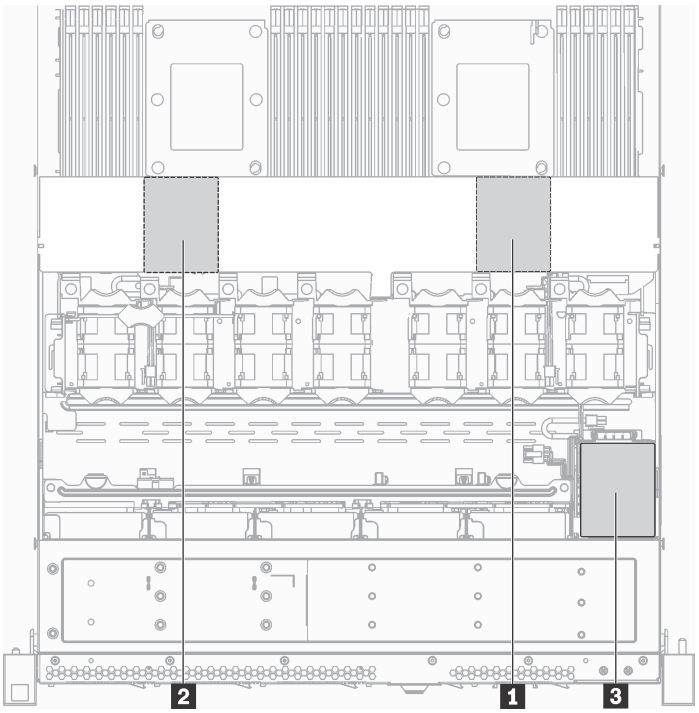


Figure 128. RAID super capacitor module location

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

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

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

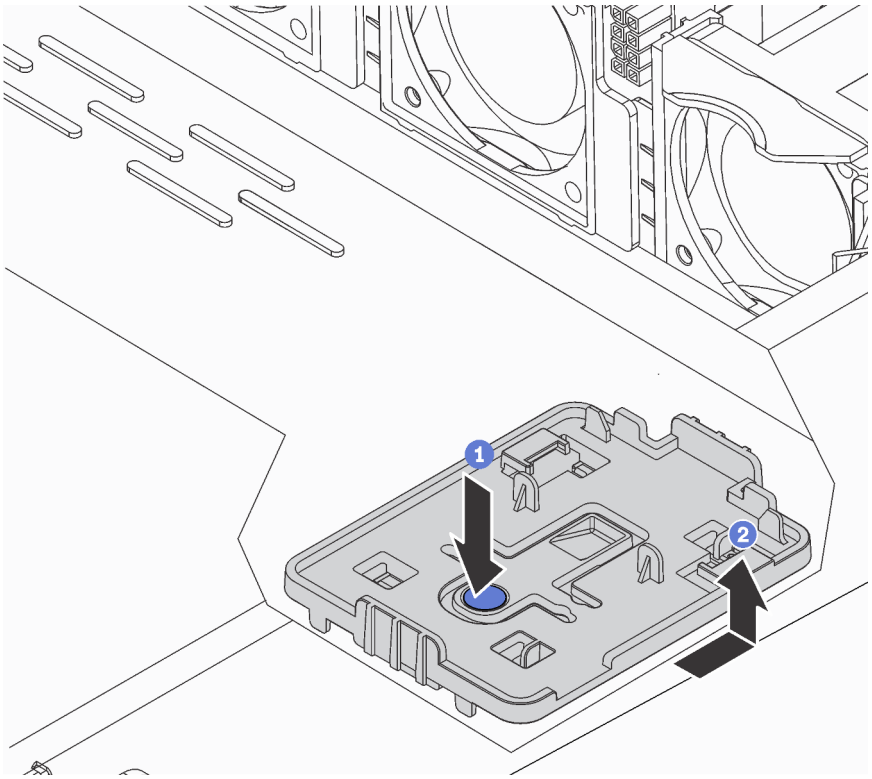


Figure 129. Tray removal

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

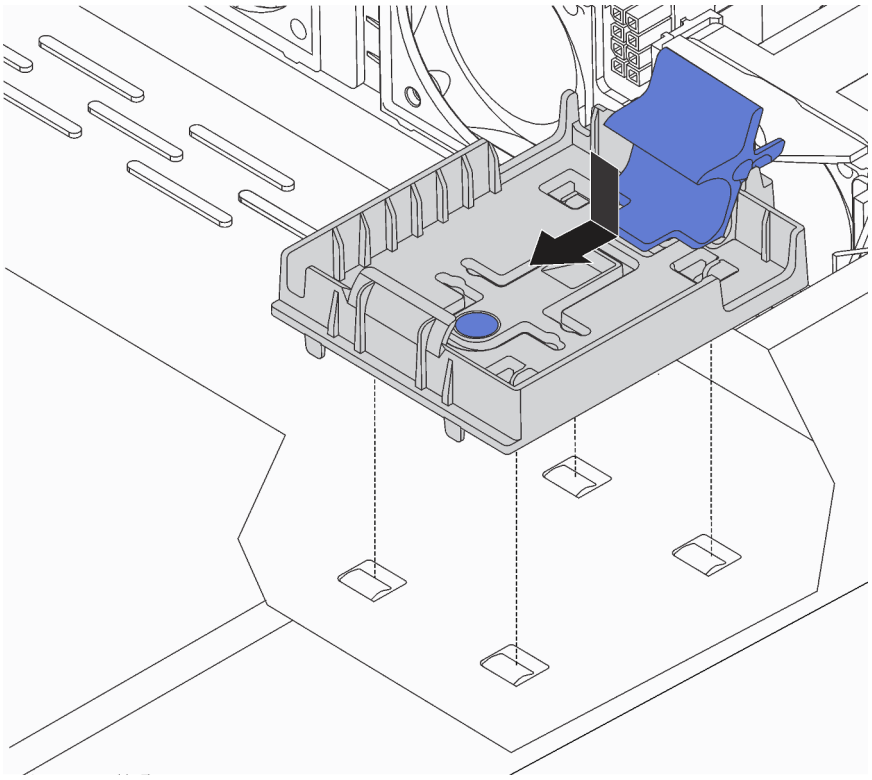


Figure 130. RAID super capacitor module holder installation

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

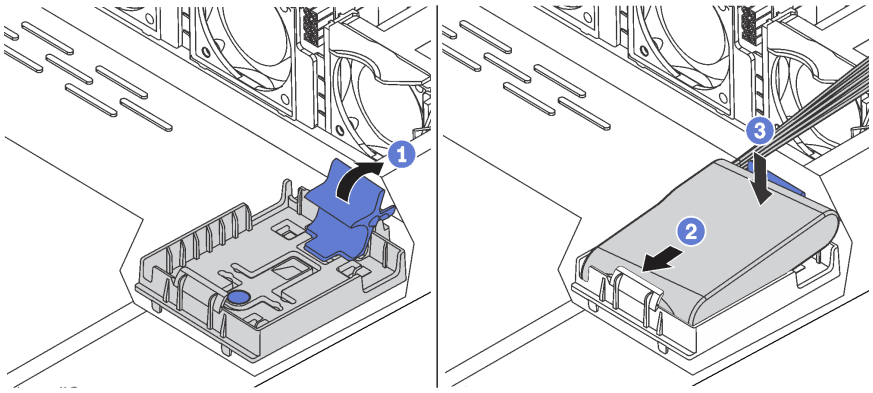


Figure 131. Installation of the RAID super capacitor module on the chassis

After installing the RAID super capacitor module:

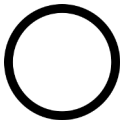
1. Connect the RAID super capacitor module to a RAID adapter with the extension cable that comes with the RAID super capacitor module.
2. Complete the parts replacement. See “Complete the parts replacement” on page 177.

Front I/O assembly replacement

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

Remove the front I/O assembly

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

		
"**Read** the installation Guidelines" on page 65	"**Power off** the server for this task" on page 17	"**ATTENTION: Static Sensitive Device** Ground package before opening" on page 68

Before removing the front I/O assembly:

1. Remove the top cover. See "Remove the top cover" on page 68.
2. If the security bezel is installed, remove it. See "Remove the security bezel" on page 77.
3. Disconnect cables of the front I/O assembly from the system board.

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

Watch the procedure

A video of this procedure is available at https://www.youtube.com/playlist?list=PLYV5R7hVcs-C_GGjNudxYy8-c69INMcmE.

Table 31. Front I/O assembly removal

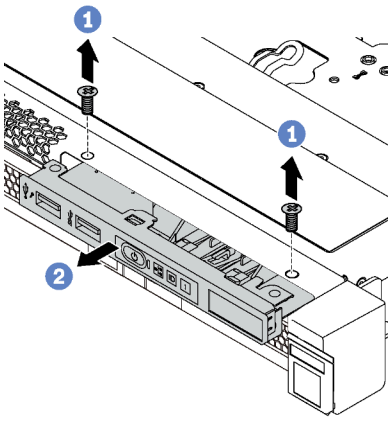


Figure 132. Server models with four 3.5-inch drive bays

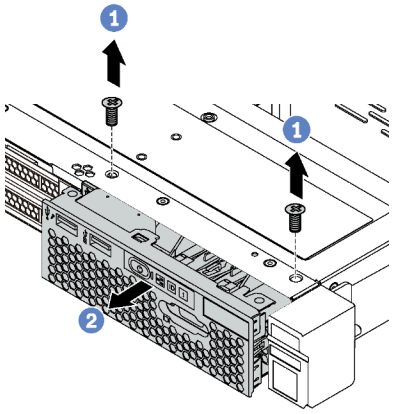


Figure 133. Server models with eight 2.5-inch drive bays

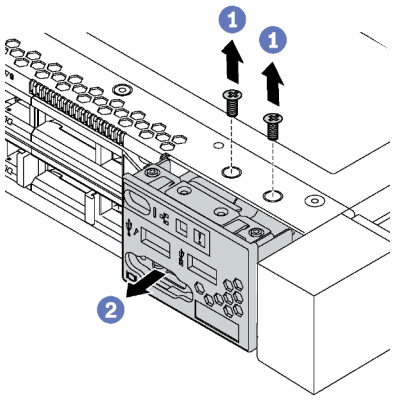


Figure 134. Server models with ten 2.5-inch drive bays

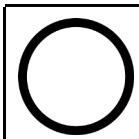
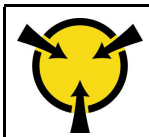
Step 1. Remove the screws that secure the front I/O assembly.

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

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

Install the front I/O assembly

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

		
"**Read** the installation Guidelines" on page 65	"**Power off** the server for this task" on page 17	"**ATTENTION: Static Sensitive Device** Ground package before opening" on page 68

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

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

Watch the procedure

A video of this procedure is available at https://www.youtube.com/playlist?list=PLYV5R7hVcs-C_GGjNudxYy8-c69INMcmE.

Table 32. Front I/O assembly installation

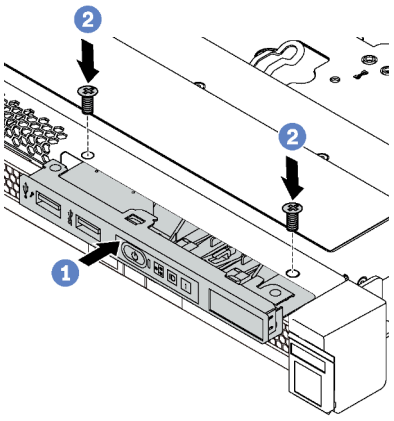


Figure 135. Server models with four 3.5-inch drive bays

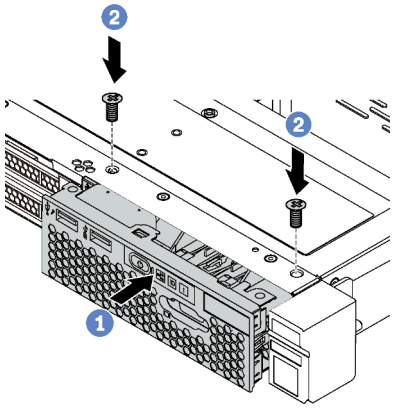


Figure 136. Server models with eight 2.5-inch drive bays

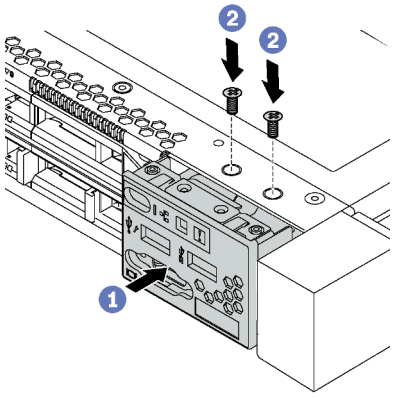


Figure 137. Server models with ten 2.5-inch drive bays

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

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

After installing the front I/O assembly:

1. Connect the cables of the front I/O assembly to the system board. For the location of the connectors on the system board, refer to "System board components" on page 30.
2. Complete the parts replacement. See "Complete the parts replacement" on page 177.

Hot-swap power supply replacement

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

Remove a hot-swap power supply

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

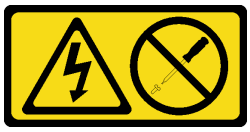


"**Read** the installation Guidelines" on page 65



"**ATTENTION: Static Sensitive Device** Ground package before opening" on page 68

S035



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

S002



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

S001



DANGER

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

- **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 138. Hot-swap power supply label on the cover

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

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

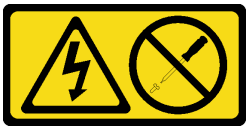
CAUTION:
240 V dc input (input range: 180-300 V dc) is supported in Chinese Mainland ONLY. Power supply with 240 V dc input cannot support hot plugging power cord function. Before removing the power supply with dc input, please turn off server or disconnect dc power sources at the breaker panel or by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



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

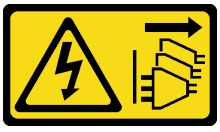
NEVER CONNECT AND DISCONNECT THE POWER SUPPLY CABLE AND EQUIPMENT WHILE YOUR EQUIPMENT IS POWERED ON WITH DC SUPPLY (hot-plugging). Otherwise you may damage the equipment and result in data loss, the damages and losses result from incorrect operation of the equipment will not be covered by the manufacturers' warranty.

S035



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

S019



CAUTION:
The power-control button on the device does not turn off the electrical current supplied to the device. The device also might have more than one connection to dc power. To remove all electrical current from the device, ensure that all connections to dc power are disconnected at the dc power input terminals.

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

Watch the procedure

A video of this procedure is available at https://www.youtube.com/playlist?list=PLYV5R7hVcs-C_GGjNudxYy8-c69INMcmE.

Step 1. If the server is in a rack, adjust the cable management arm (CMA) to gain access to the power supply.

If you have installed the 1U CMA Upgrade Kit for Toolless Slide Rail or Toolless Slide Rail Kit with 1U CMA, do the following:

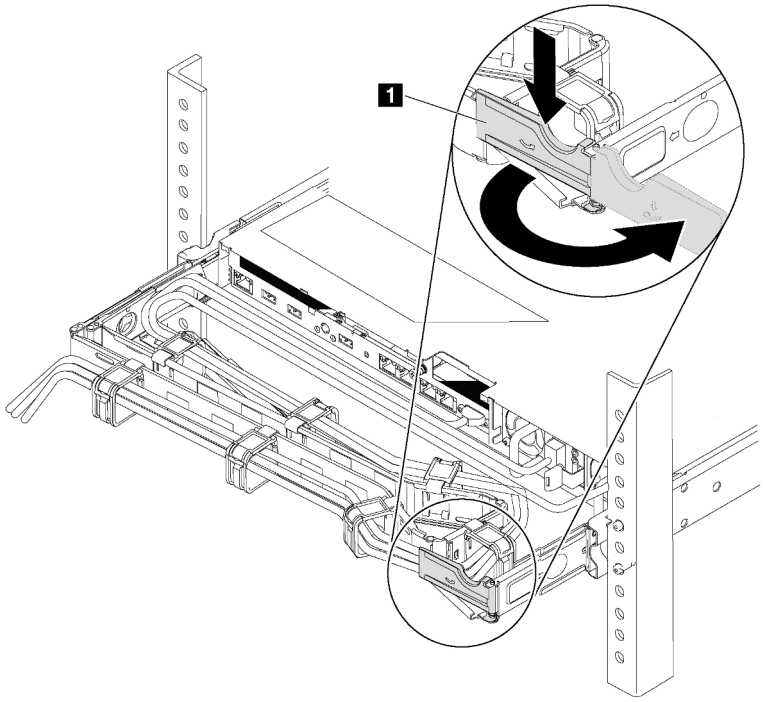


Figure 139. CMA adjustment

a. Press down the stop bracket 1 and rotate it to the open position.

b. Rotate the CMA out of the way to gain access to the power supply.

Step 2. Disconnect the power cord from the hot-swap power supply.

Note: If you are replacing two power supplies, do the power supply replacement one by one to ensure that the power supply to the server is not interrupted. Do not disconnect the power cord from the secondly replaced power supply until the power output LED for the firstly replaced power supply is lit. For the location of the power output LED, refer to "Rear view LEDs" on page 28.

Step 3. Press the release tab toward the handle and carefully pull the handle at the same time to slide the hot-swap power supply out of the chassis.

Note: Slightly pull the power supply upwards when sliding the power supply out of the chassis, if you have installed one of the following CMA kits:

- 1U CMA Upgrade Kit for Toolless Slide Rail
- Toolless Slide Rail Kit with 1U CMA

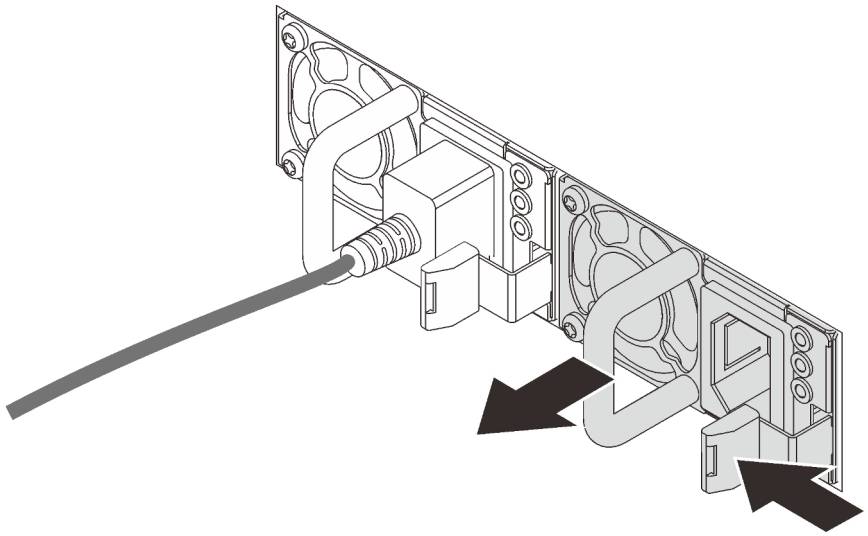


Figure 140. Hot-swap power supply removal

After removing the power supply:

1. Install a new power supply or install the power-supply filler to cover the power supply bay. See “Install a hot-swap power supply” on page 156.

   Important: To ensure proper cooling during normal server operation, both of the power supply bays must be occupied. This means that each bay must have a power supply installed; or one has a power supply installed and the other has a power supply filler installed.
2. If you are instructed to return the old hot-swap power supply, follow all packaging instructions and use any packaging materials that are provided.

Install a hot-swap power supply

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



“**Read** the installation Guidelines” on page 65



“**ATTENTION: Static Sensitive Device** Ground package before opening” on page 68

The following tips describe the type of power supply that the server supports and other information that you must consider when you install a power supply:

- The standard shipping has only one power supply installed in the server. For redundancy and hot-swap support, you must install an additional hot-swap power supply. Certain customized models might be shipped with two power supplies installed.
- Ensure that the devices that you are installing are supported. For a list of supported optional devices for the server, see https://static.lenovo.com/us/en/serverproven/index.shtml

Notes:

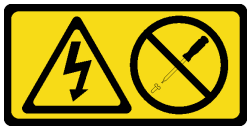
- Ensure that the two power supplies installed on the server have the same wattage.

- If you are replacing the existing power supply with a new power supply of different wattage, attach the power rating label that comes with this option onto the existing label on the top cover near the power supply.



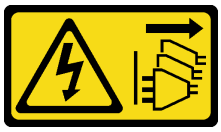
Figure 141. Hot-swap power supply label on the cover

S035



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

S002



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

S001



DANGER

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

- **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.**

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

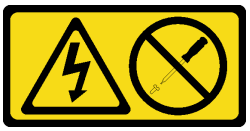
CAUTION:
240 V dc input (input range: 180-300 V dc) is supported in Chinese Mainland ONLY. Power supply with 240 V dc input cannot support hot plugging power cord function. Before removing the power supply with dc input, please turn off server or disconnect dc power sources at the breaker panel or by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



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

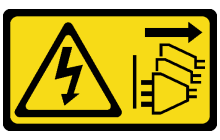
NEVER CONNECT AND DISCONNECT THE POWER SUPPLY CABLE AND EQUIPMENT WHILE YOUR EQUIPMENT IS POWERED ON WITH DC SUPPLY (hot-plugging). Otherwise you may damage the equipment and result in data loss, the damages and losses result from incorrect operation of the equipment will not be covered by the manufacturers' warranty.

S035



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

S019



CAUTION:
The power-control button on the device does not turn off the electrical current supplied to the device. The device also might have more than one connection to dc power. To remove all electrical current from the device, ensure that all connections to dc power are disconnected at the dc power input terminals.

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

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

Watch the procedure

A video of this procedure is available at https://www.youtube.com/playlist?list=PLYV5R7hVcs-C_GGjNudxYy8-c69INMcmE.

Step 1. If the server is in a rack, adjust the CMA to gain access to the power supply bay.
If you have installed the 1U CMA Upgrade Kit for Toolless Slide Rail or Toolless Slide Rail Kit with 1U CMA, do the following:

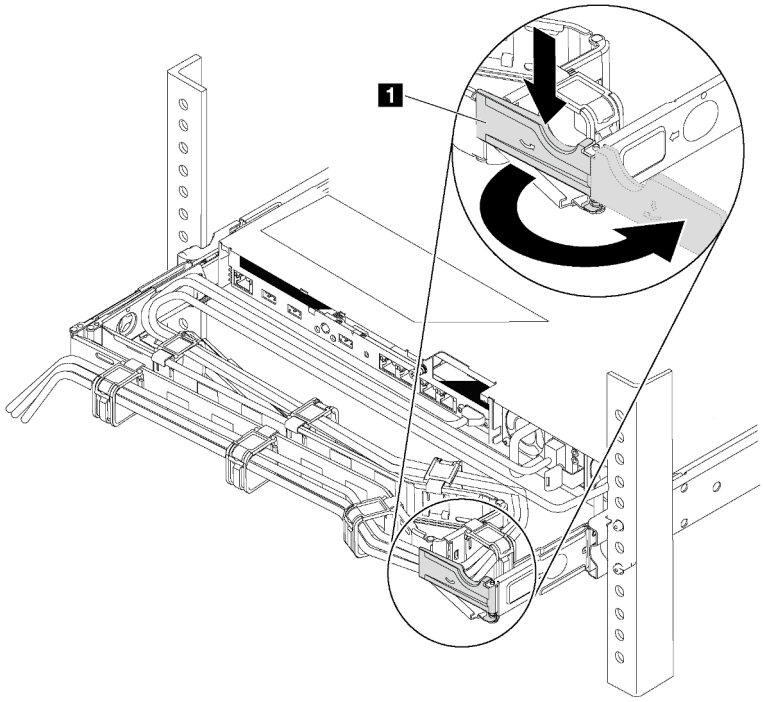


Figure 142. CMA adjustment

a. Press down the stop bracket 1 and rotate it to the open position.
b. Rotate the CMA out of the way to gain access to the power supply bay.

Step 2. Remove the power-supply filler.

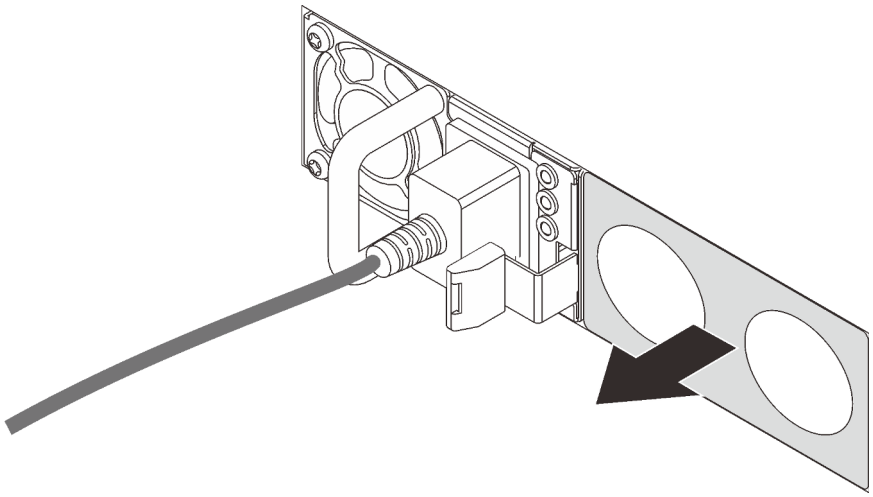


Figure 143. Hot-swap power supply filler removal

Step 3. Slide the new hot-swap power supply into the bay until the release latch clicks into place.

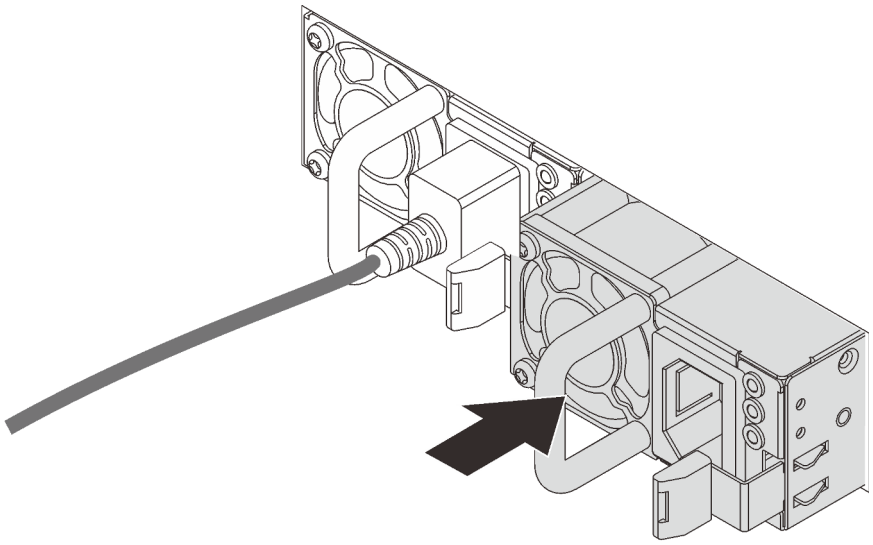


Figure 144. Hot-swap power supply installation

After installing the power supply:

1. Connect one end of the power cord to the new power supply connector; then, connect the other end of the power cord into a properly grounded electrical outlet.
2. If the server is powered off, power on the server. Ensure that both the power input LED and power output LED on the power supply are lit, indicating that the power supply is operating properly.

Processor and heat sink replacement

Use the following procedures to replace an assembled processor and heat sink, known as a processor-heat-sink module (PHM), a processor, or a heat sink.

Attention: Before you begin replacing a processor, make sure that you are using Lenovo proven alcohol cleaning pad and thermal grease.

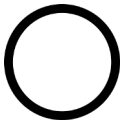
Important: The processor in your server can throttle in response to thermal conditions, temporarily lowering its speed to reduce heat output. In instances where a few processor cores are throttled for an extremely short time period (100 ms or less), the only indication might be an entry in the operating system event log with no corresponding entry in the system XCC event log. If this situation occurs, the event can be ignored and processor replacement is not required.

Remove a processor and heat sink

This task has instructions for removing an assembled processor and heat sink, known as a processor-heat-sink module (PHM), a processor, and a heat sink. All of these tasks require a Torx T30 driver.



"**Read** the installation Guidelines" on page 65



"**Power off** the server for this task" on page 17



"**ATTENTION: Static Sensitive Device** Ground package before opening" on page 68

Attention:

- Intel Xeon SP Gen 2 are supported on the system board with part number 01PE846. If you use the system board with part number 01GV276, 00MX552, 01PE248, or 01PE933, update your system firmware to the latest level before installing a Intel Xeon SP Gen 2. Otherwise, the system cannot be powered on.
- Each processor socket must always contain a cover or a PHM. When removing or installing a PHM, protect empty processor sockets with a cover.
- Do not touch the processor socket or processor contacts. Processor-socket contacts are very fragile and easily damaged. Contaminants on the processor contacts, such as oil from your skin, can cause connection failures.
- Remove and install only one PHM at a time. If the system board supports multiple processors, install the PHMs starting with the first processor socket.
- Do not allow the thermal grease on the processor or heat sink to come in contact with anything. Contact with any surface can compromise the thermal grease, rendering it ineffective. Thermal grease can damage components, such as electrical connectors in the processor socket. Do not remove the grease cover from a heat sink until you are instructed to do so.
- To ensure the best performance, check the manufacturing date on the new heat sink and make sure it does not exceed 2 years. Otherwise, wipe off the existing thermal grease and apply the new grease onto it for optimal thermal performance.

Before you remove a PHM:

Note: The heat sink, processor, and processor retainer for your system might be different than those shown in the illustrations.

1. Remove the top cover. See "Remove the top cover" on page 68.
2. If your server comes with an air baffle, remove it first. See "Remove the air baffle" on page 71.
3. Remove any parts and disconnect any cables that might impede your access to the PHM.

Complete the following steps to remove a PHM.

Watch the procedure

A video of this procedure is available at https://www.youtube.com/playlist?list=PLYV5R7hVcs-C_GGjNudxYy8-c69INMcmE.

Step 1. Remove the PHM from the system board.

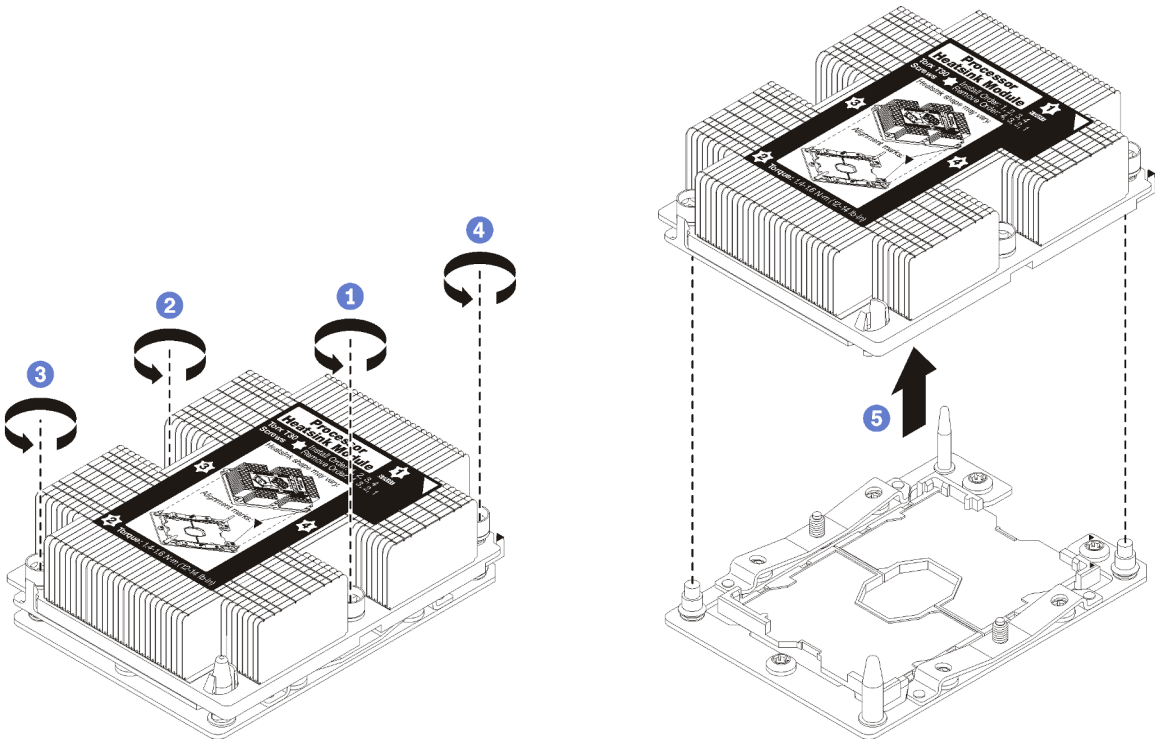


Figure 145. Removing a PHM

Attention: To prevent damage to components, make sure that you follow the indicated loosening sequence.

a. Fully loosen the Torx T30 captive fasteners on the processor-heat-sink module *in the removal sequence shown* on the heat-sink label.

b. Lift the processor-heat-sink module from the processor socket.

After you remove a PHM:

- If you are removing the PHM as part of a system board replacement, set the PHM aside.
- If you are replacing the processor or heat sink, separate the processor and its retainer from the heat sink.

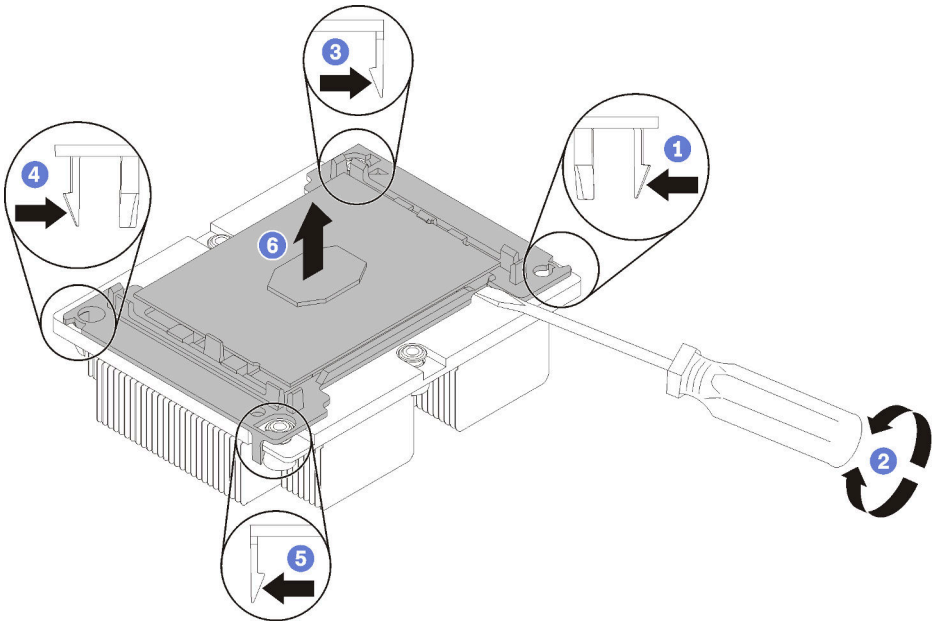


Figure 146. Separating a heat sink from a processor

1. Press the retaining clip at the corner of the processor retainer closest to the pry point; then, gently pry this corner of the retainer away from the heat sink with a flat-bladed screwdriver, using a twisting motion to break the processor-to-heat-sink seal.
2. Release the remaining retaining clips and lift the processor and retainer from the heat sink.
3. After separating the processor and retainer from the heat sink, hold the processor and retainer with the thermal-grease side down and the processor-contact side up to prevent the processor from falling out of the retainer.

   Note: The processor retainer will be removed and discarded in a later step and replaced with a new one.

- If you are replacing the processor, you will be reusing the heat sink. Wipe the thermal grease from the bottom of the heat sink using an alcohol cleaning pad.
- If you are replacing the heat sink, you will be reusing the processor. Wipe the thermal grease from the top of the processor using an alcohol cleaning pad.

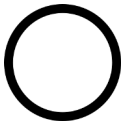
If you are instructed to return the processor or heat sink, follow all packaging instructions and use any packaging materials that are provided.

Install a processor and heat sink

This task has instructions for installing an assembled processor and heat sink, known as a processor-heat-sink module (PHM), a processor, and a heat sink. All of these tasks require a Torx T30 driver.



"**Read** the installation Guidelines" on page 65



"**Power off** the server for this task" on page 17



"**ATTENTION: Static Sensitive Device** Ground package before opening" on page 68

Attention:

- Intel Xeon SP Gen 2 are supported on the system board with part number 01PE846. If you use the system board with part number 01GV276, 00MX552, 01PE248, or 01PE933, update your system firmware to the latest level before installing a Intel Xeon SP Gen 2. Otherwise, the system cannot be powered on.
- Each processor socket must always contain a cover or a PHM. When removing or installing a PHM, protect empty processor sockets with a cover.
- Do not touch the processor socket or processor contacts. Processor-socket contacts are very fragile and easily damaged. Contaminants on the processor contacts, such as oil from your skin, can cause connection failures.
- Remove and install only one PHM at a time. If the system board supports multiple processors, install the PHMs starting with the first processor socket.
- Do not allow the thermal grease on the processor or heat sink to come in contact with anything. Contact with any surface can compromise the thermal grease, rendering it ineffective. Thermal grease can damage components, such as electrical connectors in the processor socket. Do not remove the grease cover from a heat sink until you are instructed to do so.
- To ensure the best performance, check the manufacturing date on the new heat sink and make sure it does not exceed 2 years. Otherwise, wipe off the existing thermal grease and apply the new grease onto it for optimal thermal performance.

Notes:

- PHMs are keyed for the socket where they can be installed and for their orientation in the socket.
- See https://static.lenovo.com/us/en/serverproven/index.shtml for a list of processors supported for your server. All processors on the system board must have the same speed, number of cores, and frequency.
- Before you install a new PHM or replacement processor, update your system firmware to the latest level. See "Firmware updates" on page 13.
- Installing an additional PHM can change the memory requirements for your system. See "Memory module installation rules" on page 85 for a list of processor-to-memory relationships.
- Optional devices available for your system might have specific processor requirements. See the documentation that comes with the optional device for information.
- For some important information about system board, processor, and heat sink, refer to "Important information for system board, processor, and heat sink" on page 10.

Before you install a PHM:

Note: The heat sink, processor, and processor retainer for your system might be different than those shown in the illustrations.

1. Remove the existing PHM, if one is installed. See "Remove a processor and heat sink" on page 161.

   Note: Replacement processors come with both rectangular and square processor retainers. A rectangular retainer comes attached to the processor. The square retainer can be discarded.

2. If you are replacing a heat sink, replace the processor retainer. *Processor retainers should not be reused.*
   a. Remove the old processor retainer.

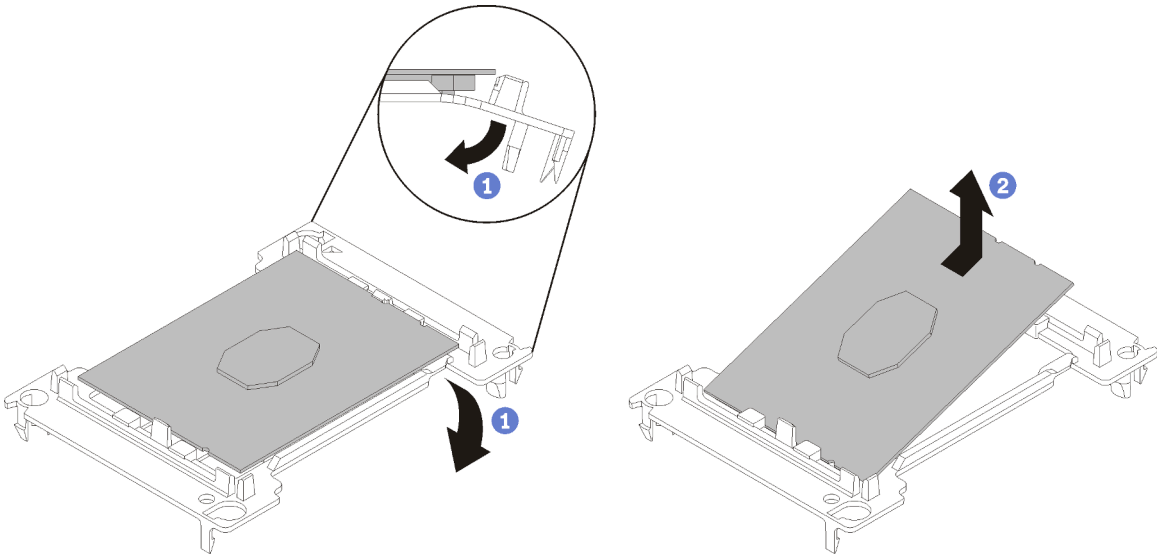


Figure 147. Removing a processor retainer

Note: When the processor is out of its retainer, hold the processor by the long edges to prevent touching the contacts or the thermal grease, if it is applied.

With the processor-contact side up, flex the ends of the retainer down and away from the processor to release the retaining clips; then, remove the processor from the retainer. Discard the old retainer.

   b. Install a new processor retainer.

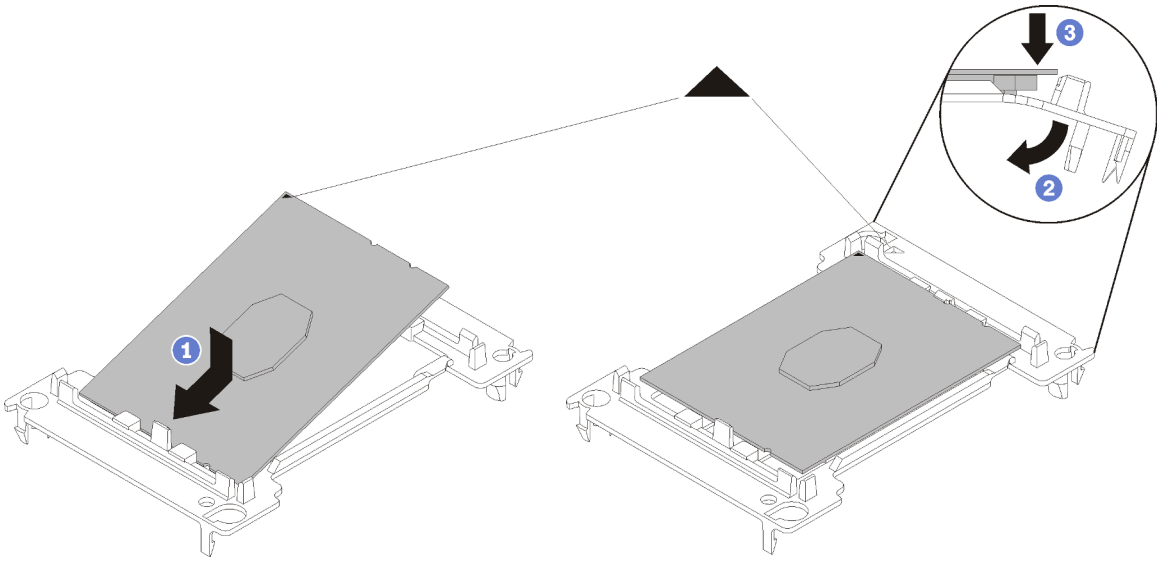


Figure 148. Installing a processor retainer

1) Position the processor on the new retainer so that the triangular marks align; then, insert the unmarked end of the processor into the retainer.

2) Holding the inserted end of the processor in place, flex the opposite end of the retainer down and away from the processor until you can press the processor under the clip on the retainer.

   To prevent the processor from falling out of the retainer after it is inserted, keep the processor-contact side up and hold the processor-retainer assembly by the sides of the retainer.

3) If there is any old thermal grease on the processor, gently clean the top of the processor using an alcohol cleaning pad.

   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.

3. If you are replacing a processor:
   a. Remove the processor identification label from the heat sink and replace it with the new label that comes with the replacement processor.
   b. To ensure the best performance, check the manufacturing date on the new heat sink and make sure it does not exceed 2 years. Otherwise, wipe off the existing thermal grease and apply the new grease onto it for optimal thermal performance.
   c. 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.

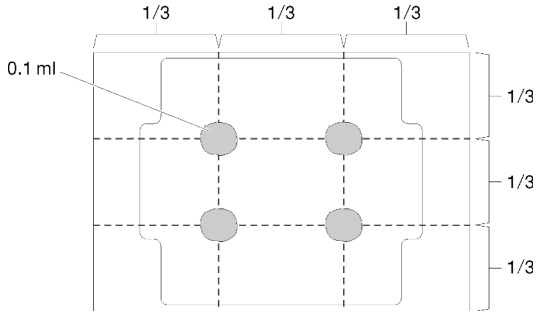


Figure 149. Proper shape of the thermal grease

4. If you are replacing a heat sink, remove the processor identification label from the old heat sink and place it on the new heat sink in the same location. The label is on the side of the heat sink closest to the triangular alignment mark.

   If you are unable to remove the label and place it on the new heat sink, or if the label is damaged during transfer, write the processor serial number from the processor identification label on the new heat sink in the same location as the label would be placed using a permanent marker.

5. Assemble the processor and heat sink, if these components are separate.

   Notes:

   - If you are replacing a processor, install the heat sink onto the processor and retainer while the processor and retainer are in the shipping tray.
   - If you are replacing a heat sink, remove the heat sink from its shipping tray and place the processor and retainer in the opposite half of the heat sink shipping tray with the processor-contact side down. To prevent the processor from falling out of the retainer, hold the processor-retainer assembly by its sides with the processor-contact side up until you turn it over to fit in the shipping tray.

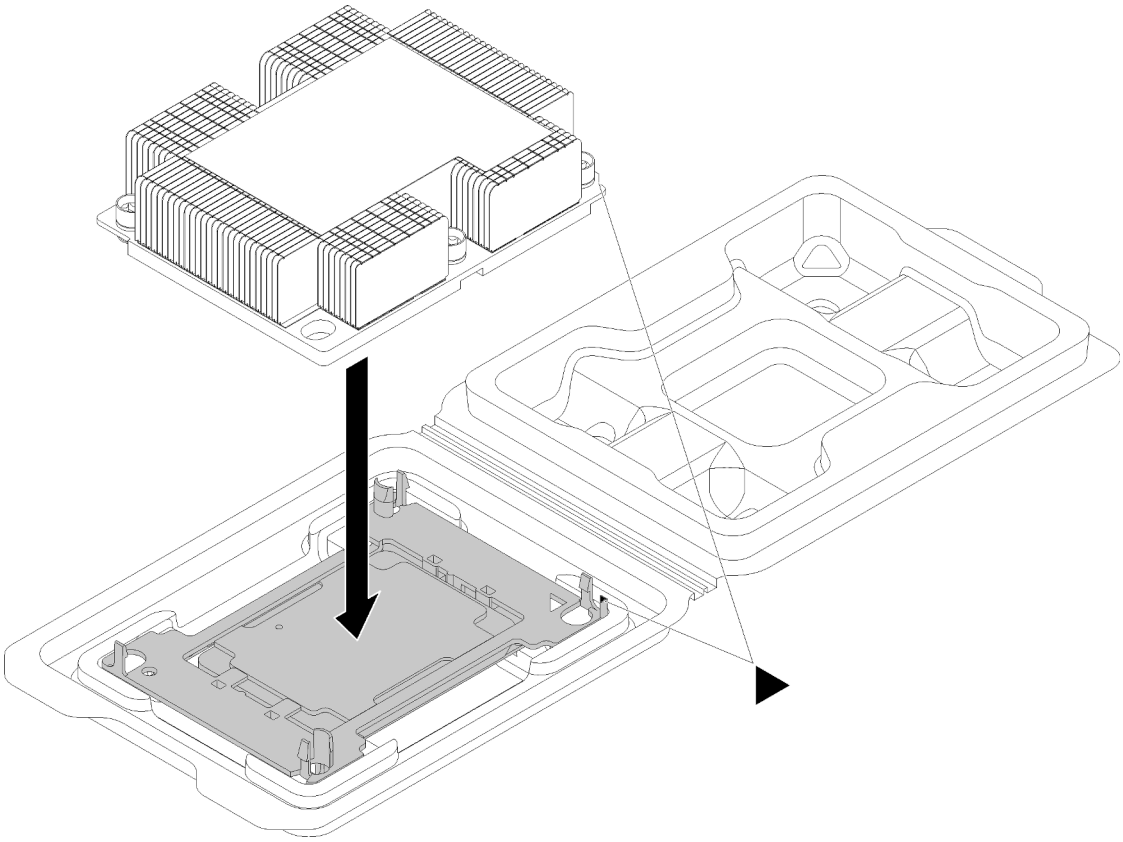


Figure 150. Assembling a PHM in the shipping tray

a. Align the triangular marks on the processor retainer and the heat sink or align the triangular mark on the processor retainer with the notched corner of the heat sink.
b. Insert the processor-retainer clips into the holes on the heat sink.
c. Press the retainer into place until the clips at all four corners engage.

Complete the following steps to install a PHM.

Watch the procedure

A video of this procedure is available at https://www.youtube.com/playlist?list=PLYV5R7hVcs-C_GGjNudxYy8-c69INMcmE

Step 1. Remove the processor socket cover, if one is installed on the processor socket, by placing your fingers in the half-circles at each end of the cover and lifting it from the system board.

Step 2. Install the processor-heat-sink module on the system board.

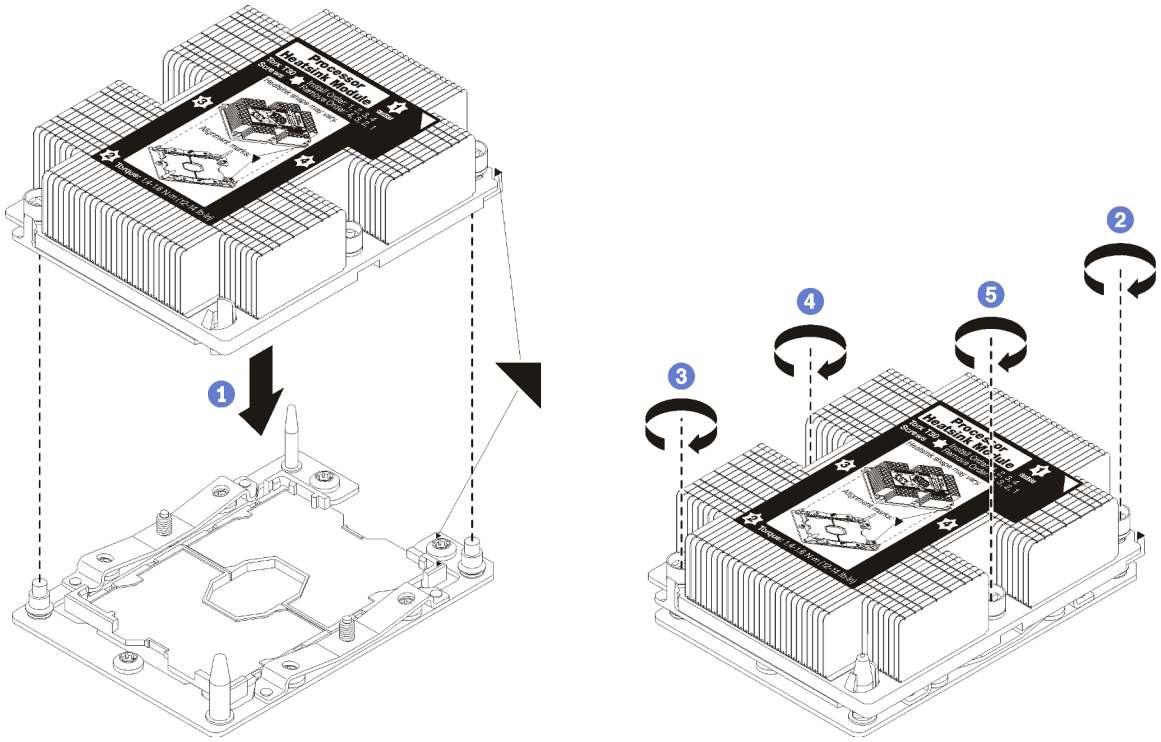


Figure 151. Installing a PHM

a. Align the triangular marks and guide pins on the processor socket with the PHM; then, insert the PHM into the processor socket.

   Attention: To prevent damage to components, make sure that you follow the indicated tightening sequence.

b. Fully tighten the Torx T30 captive fasteners *in the installation sequence shown* on the heat-sink label. Tighten the screws until they stop; then, visually inspect to make sure that there is no gap between the screw shoulder beneath the heat sink and the processor socket. (For reference, the torque required for the nuts to fully tighten is 1.4 - 1.6 newton-meters, 12 — 14 inch-pounds).

After you install a PHM:

1. Complete the parts replacement. See “Complete the parts replacement” on page 177.

System board replacement

Use this information to remove and install the system board.

Important: Before you return the system board, make sure that you install the CPU socket dust covers from the new system board. To replace a CPU socket dust cover:

1. Take a dust cover from the CPU socket assembly on the new system board and orient it correctly above the CPU socket assembly on the removed system board.
2. Gently press down the dust cover legs to the CPU 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 CPU socket assembly.

S017



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

S012



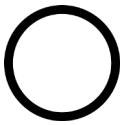
CAUTION:
Hot surface nearby.

Remove the system board

Use this information to remove the system board.



"**Read** the installation Guidelines" on page 65



"**Power off** the server for this task" on page 17



"**ATTENTION: Static Sensitive Device** Ground package before opening" on page 68

Before removing the system board:

1. Remove the top cover. See "Remove the top cover" on page 68.
2. If your server comes with an air baffle, remove it first. See "Remove the air baffle" on page 71.
3. Record where the cables are connected to the system board; then, disconnect all the cables.

   Attention: Disengage all latches, cable clips, release tabs, or locks on cable connectors beforehand. Failing to release them before removing the cables will damage the cable connectors on the system board. Any damage to the cable connectors may require replacing the system board.
4. Remove any of the following components that are installed on the system board and put them in a safe, static-protective place. See the related topics in this chapter.
   - System fans
   - Processor-heat-sink module (PHM)

     Note: Do not disassemble the PHM.
   - Memory modules
   - LOM adapter
   - M.2 backplane
   - Riser assemblies
   - RAID adapter on the system board
   - Rear hot-swap drive assembly
   - RAID super capacitor module
   - CMOS battery
   - TCM/TPM (only available in Chinese Mainland)

5. Pull out the power supplies slightly. Ensure that they are disconnected from the system board.

To remove the system board, complete the following steps:

Watch the procedure

A video of this procedure is available at https://www.youtube.com/playlist?list=PLYV5R7hVcs-C_GGjNudxYy8-c69INMcmE.

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

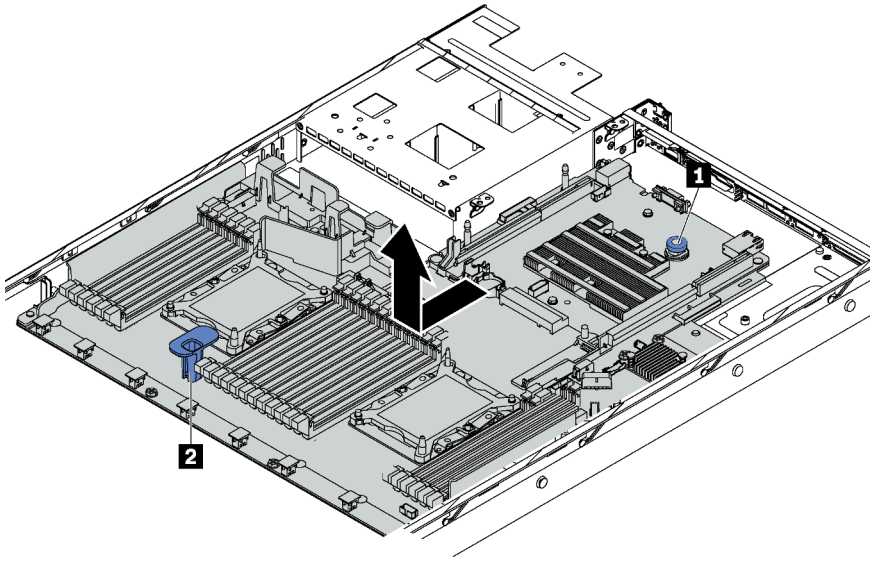


Figure 152. System board removal

Step 1. Lift the release pin 1 and hold the lift handle 2 at the same time and slide the system board toward the front of the server.

Step 2. Lift the system board out of the chassis.

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

Important: Before you return the system board, make sure that you install the CPU socket dust covers from the new system board. To replace a CPU socket dust cover:

1. Take a dust cover from the CPU socket assembly on the new system board and orient it correctly above the CPU socket assembly on the removed system board.
2. Gently press down the dust cover legs to the CPU 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 CPU socket assembly.

If you are planning to recycle the system board, follow the instructions in “Disassemble the system board for recycle” on page 199 for compliance with local regulations.

Install the system board

Use this information to install the system board.

“**Read** the installation Guidelines” on page 65

“**Power off** the server for this task” on page 17

“**ATTENTION: Static Sensitive Device** Ground package before opening” on page 68

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

To install the system board, complete the following steps:

Watch the procedure

A video of this procedure is available at https://www.youtube.com/playlist?list=PLYV5R7hVcs-C_GGjNudxYy8-c69INMcmE.

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

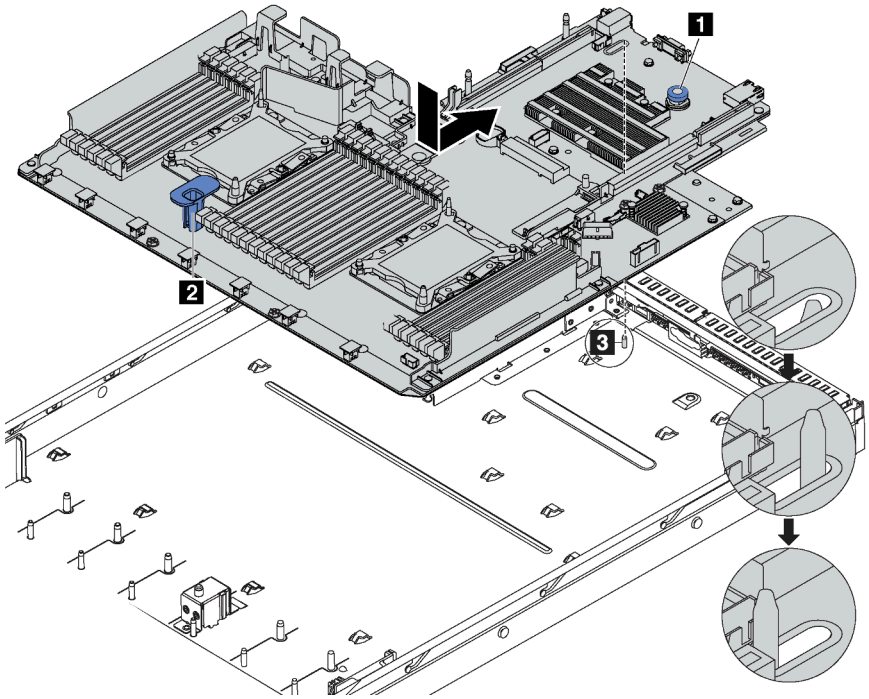


Figure 153. System board installation

Step 1. Hold the release pin 1 and the lift handle 2 at the same time to lower the system board into the chassis.

Step 2. Slide the system board to the rear of the server until the system board snaps into position. Ensure that:

- The new system board is engaged by the mounting stud 3 on the chassis.
- The rear connectors on the new system board are inserted into the corresponding holes in the rear panel.
- The release pin 1 secures the system board in place.

After installing the system board:

1. Push the power supplies into the bays until they click into place.
2. Install any components that you removed from the failing system board. See the related topics in Chapter 3 “Hardware replacement procedures” on page 65.
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 172.
4. Enable TCM/TPM. See “Enable TCM/TPM” on page 173.
5. Optionally, enable Secure Boot. See “Enable UEFI Secure Boot” on page 177.

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 `mtm 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 *zzzzzzz* 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. Go to https://sysmgt.lenovofiles.com/help/topic/com.lenovo.systems.management.xcc.doc/NN1ia_c_resettingthexcc.html for more information.

Enable TCM/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 Trusted Cryptographic Module (TCM) adapter or a NationZ TPM adapter (sometimes

called a daughter card). Customers in Chinese Mainland should download Lenovo Business Vantage to enable TCM. For more information, see href=https://datacentersupport.lenovo.com/en/en/downloads/ds548665-18alenovo_business_vantage_-release_letter-_20171205_v221770130-for-unknown-os and https://download.lenovo.com/servers/mig/2021/02/09/43299/LBV_v2.2.177.0130_readme_20180903.txt.

When a system board is replaced, you must make sure that the TCM/TPM policy is set correctly.

CAUTION:
Take special care when setting the TCM/TPM policy. If it is not set correctly, the system board can become unusable.

Set the TPM/TCM policy

By default, a replacement system board is shipped with the TPM/TCM 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.
     - **TCM enabled - Chinese Mainland only**. Customers in Chinese Mainland should choose this setting if a TCM adapter is installed.
     - **TPM 2.0 enabled - Chinese Mainland only**. Customers in Chinese Mainland should choose this setting if a TPM 2.0 adapter is installed.
     - **TPM enabled - ROW**. Customers outside of Chinese Mainland should choose this setting.
     - **Permanently disabled**. Customers in Chinese Mainland should use this setting if no TPM or TCM 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 the customer in Chinese Mainland with no TCM/TPM:
       ```
       OneCli.exe config set imm.TpmTcmPolicy "NeitherTpmNorTcm" --override --imm <userid>:<password>@<ip_address>
       ```
     - For the customer in Chinese Mainland that has installed TCM/TPM module on the original system (TCM/TPM module should be moved to the FRU prior to changing policy)
       ```
       OneCli.exe config set imm.TpmTcmPolicy "TcmOnly" --override --imm <userid>:<password>@<ip_address>
       ```

- For the customer outside of Chinese Mainland:
  `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 “TcmOnly”, which means TCM_ALLOWED.
   - Below 4 steps must also be used to ‘lock’ the TPM_TCM_POLICY when using OneCli 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 invalid, UEFI will lock the TPM_TCM_POLICY setting.

   The valid value for imm.TpmTcmPolicy includes 'NeitherTpmNorTcm', 'TpmOnly' and 'TpmOnly'.

   If the imm.TpmTcmPolicy is set as 'Enabled' but imm.TpmTcmPolicy value is invalid, UEFI will reject the 'lock' request and change imm.TpmTcmPolicy 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 use string “Enabled" , which means lock the policy. Other values are not accepted.

   Procedure also requires that Physical Presence is enabled. The Default value for FRU will be enabled.
   `PhysicalPresencePolicyConfiguration.PhysicalPresencePolicy=Enable`

Assert Physical Presence

Before you can assert Physical Presence, the Physical Presence Policy must be enabled. By default, the Physical Presence Policy is enabled with a timeout of 30 minutes.

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

Notes: If the Physical Presence Policy has been disabled:

1. Set the hardware Physical Presence jumper on the system board to assert Physical Presence.
2. Enable the Physical Presence Policy using either F1 (UEFI Settings) or Lenovo XClarity Essentials OneCLI.

Assert Physical Presence through the Lenovo XClarity Controller

Complete the following steps to assert Physical Presence through the Lenovo XClarity Controller:

1. Log in to the Lenovo XClarity Controller interface.

   For information about logging in to the Lenovo XClarity Controller, see:

   http://sysmgt.lenovofiles.com/help/topic/com.lenovo.systems.management.xcc.doc/dw1lm_c_chapter2_openingandusing.html
2. Click **BMC Configuration → Security** and verify that Physical Presence is set to **assert**.

Assert Physical Presence through the hardware

You can also assert hardware Physical Presence through the use of a jumper on the system board. For more information about asserting hardware Physical Presence through the use of a jumper, see: "System board jumpers" on page 32.

Set the TPM version

To be able to set the TPM version, Physical Presence must be asserted.

The Lenovo XClarity Provisioning Manager or the Lenovo XClarity Essentials OneCLI can be used to set the TPM version.

To set the TPM version:

1. Download and install Lenovo XClarity Essentials OneCLI.
   a. Go to http://datacentersupport.lenovo.com and navigate to the support page for your server.
   b. Click **Drivers & Software**.
   c. Navigate to the version of Lenovo XClarity Essentials OneCLI for your operating system and download the package.
2. Run the following command to set the TPM version:

   Note: You can change the TPM version from 1.2 to 2.0 and back again. However, you can toggle between versions a maximum of 128 times.

   To set the TPM version to version 2.0:

   ```
   OneCli.exe config set TrustedComputingGroup.DeviceOperation "Update to TPM2.0 compliant"
              --bmc userid:password@ip_address
   ```

   To set the TPM version to version 1.2:

   ```
   OneCli.exe config set TrustedComputingGroup.DeviceOperation "Update to TPM1.2 compliant"
             --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 PASSW0RD (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/toolsctr_cli_lenovo/onecli_r_set_command.html

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 PASSW0RD (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/toolsctr_cli_lenovo/onecli_r_set_command.html

Complete the parts replacement

Use this information to complete the parts replacement.

To complete the parts replacement, do the following:

1. Ensure that all components have been reassembled correctly and that no tools or loose screws are left inside your server.
2. Properly route and secure the cables in the server. Refer to the cable connecting and routing information for each component.
3. If you have removed the top cover, reinstall it. See “Install the top cover” on page 69.
4. Reconnect external cables and power cords to the server.

   Attention: To avoid component damage, connect the power cords last.
5. Update the server configuration if necessary.
   - Download and install the latest device drivers: http://datacentersupport.lenovo.com
   - Update the system firmware. See “Firmware updates” on page 13.
   - Use the Lenovo XClarity Provisioning Manager to update the UEFI configuration. For more information, see:
     http://sysmgt.lenovofiles.com/help/topic/LXPM/UEFI_setup.html

- Use the Lenovo XClarity Provisioning Manager to configure the RAID if you have installed or removed a hot-swap drive, a RAID adapter, or the M.2 backplane and M.2 drive. For more information, see: http://sysmgt.lenovofiles.com/help/topic/LXPM/RAID_setup.html

Note: Make sure the latest version of ThinkSystem M.2 with Mirroring Enablement Kit Firmware is applied to avoid virtual disk/array missing after system board replacement.

Chapter 4. Problem determination

Use the information in this section to isolate and resolve issues that you might encounter while using your server.

Lenovo servers can be configured to automatically notify Lenovo Support if certain events are generated. You can configure automatic notification, also known as Call Home, from management applications, such as the Lenovo XClarity Administrator. If you configure automatic problem notification, Lenovo Support is automatically alerted whenever a server encounters a potentially significant event.

To isolate a problem, you should typically begin with the event log of the application that is managing the server:

- If you are managing the server from the Lenovo XClarity Administrator, begin with the Lenovo XClarity Administrator event log.
- If you are using some other management application, begin with the Lenovo 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/7X01/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.

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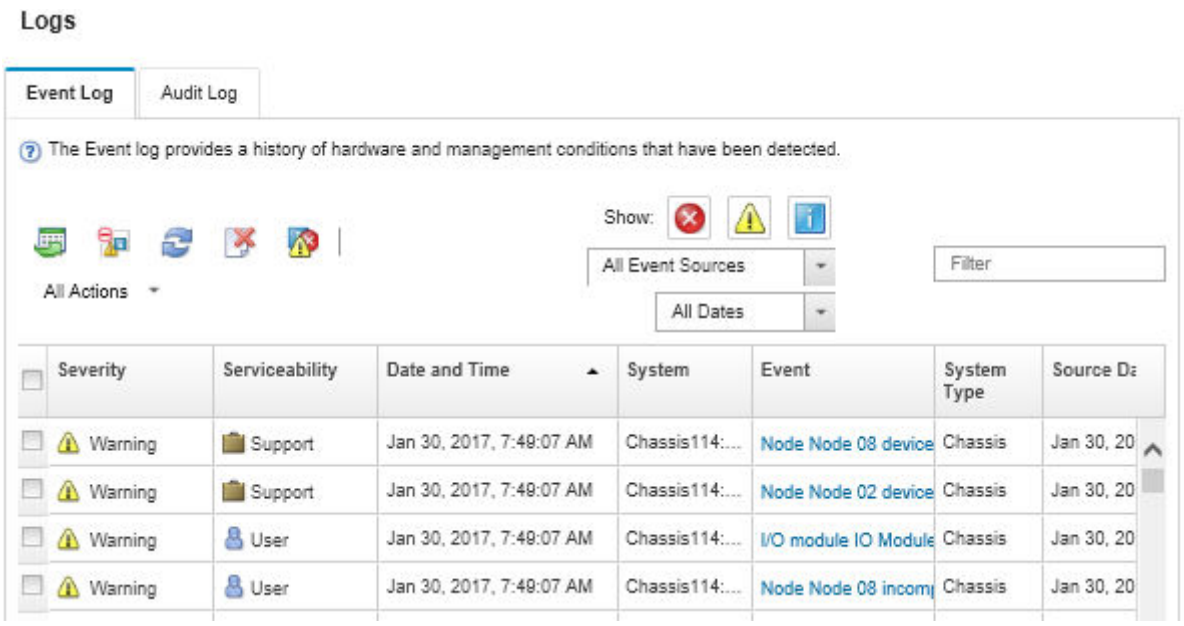


Figure 154. Lenovo XClarity Administrator event log

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

http://sysmgt.lenovofiles.com/help/topic/com.lenovo.lxca.doc/events_vieweventlog.html

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.

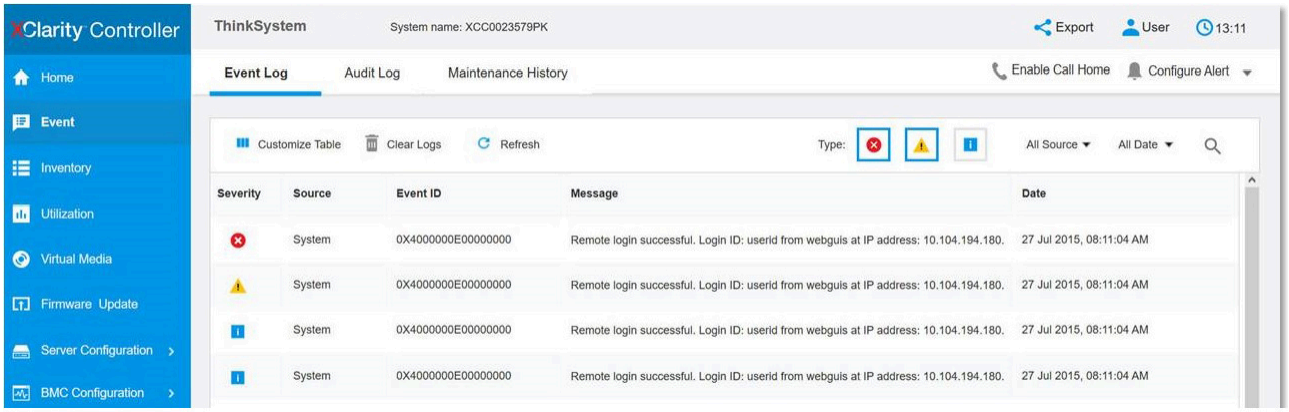


Figure 155. Lenovo XClarity Controller event log

For more information about accessing the Lenovo XClarity Controller event log, see:

http://sysmgt.lenovofiles.com/help/topic/com.lenovo.systems.management.xcc.doc/event_log.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.

   Note: For minimal configuration for debugging, see "Specifications" on page 2.
4. Power on the server.

If the problem is solved when you remove an adapter from the server, but the problem recurs when you install the same adapter again, suspect the adapter. If the problem recurs when you replace the adapter with a different one, try a different PCIe slot.

If the problem appears to be a networking problem and the server passes all system tests, suspect a network cabling problem that is external to the server.

Resolving suspected power problems

Power problems can be difficult to solve. For example, a short circuit can exist anywhere on any of the power distribution buses. Usually, a short circuit will cause the power subsystem to shut down because of an overcurrent condition.

Complete the following steps to diagnose and resolve a suspected power problem.

Step 1. Check the event log and resolve any errors related to the power.

Note: Start with the event log of the application that is managing the server. For more information about event logs, see "Event logs" on page 179.

Step 2. Check for short circuits, for example, if a loose screw is causing a short circuit on a circuit board.

Step 3. Remove the adapters and disconnect the cables and power cords to all internal and external devices until the server is at the minimum configuration that is required for the server to start. See "Specifications" on page 2 to determine the minimum configuration for your server.

Step 4. Reconnect all ac power cords and turn on the server. If the server starts successfully, reseat 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

Use this information to find solutions to problems that have identifiable symptoms.

To use the symptom-based troubleshooting information in this section, complete the following steps:

1. Check the event log of the application that is managing the server and follow the suggested actions to resolve any event codes.
   - If you are managing the server from the Lenovo XClarity Administrator, begin with the Lenovo XClarity Administrator event log.
   - If you are using some other management application, begin with the Lenovo XClarity Controller event log.

   For more information about event logs, see “Event logs” on page 179.
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 203).

Power on and power off problems

Use this information to resolve issues when powering on or powering off the server.

- "Embedded hypervisor is not in the boot list" on page 183
- "The power-control button does not work, and the reset button does work (server does not start)" on page 183
- "Server does not power on" on page 184
- "Server does not power off" on page 184

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:

   http://sysmgt.lenovofiles.com/help/topic/com.lenovo.systems.management.xcc.doc/dw1lm_c_chapter2_openingandusing.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-control button does not work, and the reset button does work (server does not start)

Note: The power-control button will not function until approximately 1 to 3 minutes after the server has been connected to ac power.

Complete the following steps until the problem is resolved:

1. Make sure that the power-control button on the server is working correctly:
   a. Disconnect the server power cords.
   b. Reconnect the server power cords.
   c. Reseat the operator information panel cable, and then repeat steps a and b.
      - If the server starts, reseat the operator information panel.
      - If the problem remains, replace the operator information panel.
2. Make sure that:
   - The power cords are correctly connected to the server and to a working electrical outlet.
   - The LEDs on the power supply do not indicate a problem.
3. Reseat the power supplies.
4. Replace each power supply, restarting the server each time:
   - Memory modules

- Power supplies

5. If you just installed an optional device, remove it, and restart the server. If the server starts, you might have installed more devices than the power supply supports.

Server does not power on

Complete the following steps until the problem is resolved:

1. 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-control button and holding it down for 5 seconds.
   c. Restart the server.
   d. If the server fails POST and the power-control button does not work, disconnect the power cord for 20 seconds; then, reconnect the power cord and restart the server.
2. If the problem remains or if you are using an ACPI-aware operating system, suspect the system board.

Memory problems

Use this information to resolve issues related to memory.

- "Displayed system memory less than installed physical memory" on page 184
- "Multiple memory modules in a channel identified as failing" on page 185
- "Attempt to change to another DCPMM mode fails" on page 186
- "Extra namespace appears in an interleaved region" on page 186

Displayed system memory less than installed physical memory

Complete the following steps until the problem is solved:

Note: Each time you install or remove a memory module, you must disconnect the solution from the power source; then, wait 10 seconds before restarting the solution.

1. Make sure that:
   - No error LEDs are lit on the operator information panel.
   - Memory mirrored channel does not account for the discrepancy.
   - The memory modules are seated correctly.
   - You have installed the correct type of memory module (see "Specifications" on page 2 for requirements).
   - If you changed the memory, you updated the memory configuration in the Setup utility.
   - All banks of memory are enabled. The solution 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 solution is at the minimum memory configuration.
- When DCPMMs are installed:
  a. If the memory is set in App Direct or Mixed Memory Mode, all the saved data have been backed up, and created namespaces are deleted before any DCPMM is replaced.
  b. Refer to "DC Persistent Memory Module (DCPMM) setup" in *Setup Guide* and see if the displayed memory fits the mode description.
  c. If DCPMMs are recently set in Memory Mode, turn it back to App Direct Mode and examine if there is namespace that has not been deleted (see "DC Persistent Memory Module (DCPMM) setup" in *Setup Guide*).
  d. Go to the Setup Utility, select **System Configuration and Boot Management → Intel Optane DCPMMs → Security**, and make sure all the DCPMM units are unlocked.

2. Reseat the memory modules, and then restart the solution.
3. Check the POST error log:
   - If a memory module was disabled by a systems-management interrupt (SMI), replace the memory module.
   - If a memory module was disabled by the user or by POST, reseat the memory module; then, run the Setup utility and enable the memory module.
4. Run memory diagnostics. Power on the system and press **F1** when the logo screen appears, the Lenovo XClarity Provisioning Manager interface will start. Perform memory diagnostics with this interface. Go to **Diagnostics → Run Diagnostic → Memory test** or **DCPMM test**.

   When DCPMMs are installed, run diagnostics based on the current DCPMM mode:
   - App Direct Mode
     – Run **DCPMM Test** for DCPMMs.
     – Run **Memory Test** for DRAM DIMMs.
   - Memory Mode and Mixed Memory Mode
     – Run **DCPMM Test** for App Direct capacity of DCPMMs.
     – Run **Memory Test** for memory capacity of DCPMMs.

     Note: DRAM DIMMs in these two modes act as cache, and are not applicable to memory diagnostics.
5. Reverse the modules between the channels (of the same processor), and then restart the solution. If the problem is related to a memory module, replace the failing memory module.

   Note: When DCPMMs are installed, only adopt this method in Memory Mode.
6. Re-enable all memory modules using the Setup Utility, and restart the system.
7. (Trained technician only) Install the failing memory module into a memory module connector for processor 2 (if installed) to verify that the problem is not the processor or the memory module connector.
8. (Trained technician only) Replace the node.

Multiple memory modules in a channel identified as failing

Note: Each time you install or remove a memory module, you must disconnect the solution from the power source; then, wait 10 seconds before restarting the solution.

1. Reseat the memory modules; then, restart the solution.
2. Remove the highest-numbered memory module of those that are identified and replace it with an identical known good memory module; then, restart the solution. Repeat as necessary. If the failures continue after all identified memory modules are replaced, go to step 4.

3. Return the removed memory modules, one at a time, to their original connectors, restarting the solution after each memory module, until a memory module fails. Replace each failing memory module with an identical known good memory module, restarting the solution after each memory module replacement. Repeat step 3 until you have tested all removed memory modules.
4. Replace the highest-numbered memory module of those identified; then, restart the solution. Repeat as necessary.
5. Reverse the memory modules between the channels (of the same processor), and then restart the solution. If the problem is related to a memory module, replace the failing memory module.
6. (Trained technician only) Install the failing memory module into a memory module connector for processor 2 (if installed) to verify that the problem is not the processor or the memory module connector.
7. (Trained technician only) Replace the system board.

Attempt to change to another DCPMM mode fails

After the DCPMM mode is changed and the system is successfully restarted, if the DCPMM mode stays the same instead of being changed, check the DRAM DIMMs and DCPMM capacity to see if it meets the requirement of the new mode (see “DC Persistent Memory Module (DCPMM) setup” in *Setup Guide*).

Extra namespace appears in an interleaved region

If there are two created namespaces in one interleaved region, VMware ESXi ignores the created namespaces and creates an extra new namespace during system booting. To solve this problem, delete the created namespaces in either the Setup Utility or the operating system before the first booting with ESXi.

Hard disk drive problems

Use this information to resolve issues related to the hard disk drives.

- “Server cannot recognize a hard drive” on page 186
- “Multiple hard drives fail” on page 187
- “Multiple hard drives are offline” on page 187
- “A replacement hard disk drive does not rebuild” on page 187
- “Green hard disk drive activity LED does not represent actual state of associated drive” on page 187
- “Yellow hard disk drive status LED does not represent actual state of associated drive” on page 188

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 Lenovo XClarity Provisioning Manager 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 Lenovo XClarity Provisioning Manager 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 Lenovo XClarity Provisioning Manager 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

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

- "Incorrect characters are displayed" on page 188
- "Screen is blank" on page 188
- "Screen goes blank when you start some application programs" on page 189
- "The monitor has screen jitter, or the screen image is wavy, unreadable, rolling, or distorted." on page 189
- "The wrong characters appear on the screen" on page 189

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 13.

Screen is blank

1. If the server is attached to a KVM switch, bypass the KVM switch to eliminate it as a possible cause of the problem: connect the monitor cable directly to the correct connector on the rear of the server.
2. The management controller remote presence function is disabled if you install an optional video adapter. To use the management controller remote presence function, remove the optional video adapter.
3. If the server installed with the graphical adapters while turning on the server, the Lenovo logo displays on the screen after approximately 3 minutes. This is normal operation while the system loads.
4. Make sure that:
   - The server is turned on. If there is no power to the server.
   - The monitor cables are connected correctly.
   - The monitor is turned on and the brightness and contrast controls are adjusted correctly.
5. Make sure that the correct server is controlling the monitor, if applicable.
6. Make sure that corrupted server firmware is not affecting the video; see "Firmware updates" on page 13.
7. Observe the checkpoint LEDs on the system board; if the codes are changing, go to step 6.
8. Replace the following components one at a time, in the order shown, restarting the server each time:
   a. Monitor

b. Video adapter (if one is installed)
c. (Trained technician only) System board

Screen goes blank when you start some application programs

1. Make sure that:
   - The application program is not setting a display mode that is higher than the capability of the monitor.
   - You installed the necessary device drivers for the application.

The monitor has screen jitter, or the screen image is wavy, unreadable, rolling, or distorted.

1. If the monitor self-tests show that the monitor is working correctly, consider the location of the monitor. Magnetic fields around other devices (such as transformers, appliances, fluorescents, and other monitors) can cause screen jitter or wavy, unreadable, rolling, or distorted screen images. If this happens, turn off the monitor.

   Attention: Moving a color monitor while it is turned on might cause screen discoloration.

   Move the device and the monitor at least 305 mm (12 in.) apart, and turn on the monitor.

   Notes:

   a. To prevent diskette drive read/write errors, make sure that the distance between the monitor and any external diskette drive is at least 76 mm (3 in.).
   b. Non-Lenovo monitor cables might cause unpredictable problems.
2. Reseat the monitor cable.
3. Replace the components listed in step 2 one at a time, in the order shown, restarting the server each time:
   a. Monitor cable
   b. Video adapter (if one is installed)
   c. Monitor
   d. (Trained technician only) System board

The wrong characters appear on the screen

Complete the following steps until the problem is solved:

1. Verify that the language and locality settings are correct for the keyboard and operating system.
2. If the wrong language is displayed, update the server firmware to the latest level. See “Firmware updates” on page 13.

Keyboard, mouse, or USB-device problems

Use this information to solve problems related to a keyboard, mouse, or USB device.

- “All or some keys on the keyboard do not work.” on page 189
- “Mouse does not work.” on page 190
- “USB-device does not work.” on page 190

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 Lenovo XClarity Provisioning Manager 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

Use this information to solve problems related to optional devices.

- "External USB device not recognized" on page 190
- "PCIe adapter is not recognized or is not functioning" on page 190
- "A Lenovo optional device that worked previously does not work now. " on page 191
- "A Lenovo optional device that was just installed does not work." on page 191
- "A Lenovo optional device that worked previously does not work now. " on page 191

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

Use this information to solve problems with serial ports or devices.

- “Number of displayed serial ports is less than the number of installed serial ports” on page 192
- “Serial device does not work” on page 192

Number of displayed serial ports is less than the number of installed serial ports

Complete the following steps until the problem is solved.

1. Make sure that:
   - Each port is assigned a unique address in the Setup utility and none of the serial ports is disabled.
   - The serial-port adapter (if one is present) is seated correctly
2. Reseat the serial port adapter.
3. Replace the serial port adapter.

Serial device does not work

1. Make sure that:
   - The device is compatible with the server.
   - The serial port is enabled and is assigned a unique address.
   - The device is connected to the correct connector.
2. Reseat the following components:
   a. Failing serial device.
   b. Serial cable.
3. Replace the following components:
   a. Failing serial device.
   b. Serial cable.
4. (Trained technician only) Replace the system board.

Intermittent problems

Use this information to solve intermittent problems.

- “Intermittent external device problems” on page 192
- “Intermittent KVM problems” on page 192
- “Intermittent unexpected reboots” on page 193

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 Lenovo XClarity Provisioning Manager 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 memory module 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 Lenovo XClarity Provisioning Manager 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 179 for information about viewing the event log.

Power problems

Use this information to resolve issues related to power.

System error LED is on and event log "Power supply has lost input" is displayed

To resolve the problem, ensure that:

1. The power supply is properly connected to a power cord.
2. The power cord is connected to a properly grounded electrical outlet for the server.

Network problems

Use this information to resolve issues related to networking.

- “Cannot wake server using Wake on LAN” on page 193
- “Could not log in using LDAP account with SSL enabled” on page 194

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 179), make sure:

   a. Fan 3 is running in standby mode, if Emulex dual port 10GBase-T embedded adapter is installed.

b. The room temperature is not too high (see “Specifications” on page 2).
c. The air vents are not blocked.
d. The air baffle is installed securely.

2. Reseat the dual-port network adapter.
3. Turn off the server and disconnect it from the power source; then, wait 10 seconds before restarting the server.
4. If the problem still remains, replace the dual-port network adapter.

Could not log in using LDAP account with SSL enabled

Complete the following steps until the problem is resolved:

1. Make sure that the license key is valid.
2. Generate a new license key and log in again.

Observable problems

Use this information to solve observable problems.

- “Server hangs during the UEFI boot process” on page 194
- “The server immediately displays the POST Event Viewer when it is turned on” on page 194
- “Server is unresponsive (POST is complete and operating system is running)” on page 195
- “Server is unresponsive (cannot press F1 to start System Setup)” on page 195
- “Voltage planar fault is displayed in the event log” on page 196
- “Unusual smell” on page 196
- “Server seems to be running hot” on page 196
- “Cannot enter legacy mode after installing a new adapter” on page 196
- “Cracked parts or cracked chassis” on page 196

Server hangs during the UEFI boot process

If the system hangs during the UEFI boot process with the message `UEFI: DXE INIT` on the display, make sure that Option ROMs were not configured with a setting of **Legacy**. You can remotely view the current settings for Option ROMs by running the following command using the Lenovo XClarity Essentials OneCLI:

```
onecli config show EnableDisableAdapterOptionROMSupport --bmc xcc_userid:xcc_password@xcc_ipaddress
```

To recover a system that hangs during the boot process with Legacy Option ROM settings, see the following Tech Tip:

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

If legacy Option ROMs must be used, do not set slot Option ROMs to **Legacy** on the Devices and I/O Ports menu. Instead, set slot Option ROMs to **Auto** (the default setting), and set the System Boot Mode to **Legacy Mode**. Legacy option ROMs will be invoked shortly before the system boots.

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 to 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 Lenovo XClarity Provisioning Manager 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 2 for the minimally required number of processors and memory modules.
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 2).
2. Check the management processor event log for rising temperature events. If there are no events, the compute node is running within normal system operating temperatures. Note that you can expect some variation in temperature.

Cannot enter legacy mode after installing a new adapter

Complete the following procedure to solve the problem.

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

Cracked parts or cracked chassis

Contact Lenovo Support.

Software problems

Use this information to solve software problems.

1. To determine whether the problem is caused by the software, make sure that:
   - The server has the minimum memory that is needed to use the software. For memory requirements, see the information that comes with the software.

Note: If you have just installed an adapter or memory, the server might have a memory-address conflict.

- The software is designed to operate on the server.
- Other software works on the server.
- The software works on another server.

2. If you receive any error messages while you use the software, see the information that comes with the software for a description of the messages and suggested solutions to the problem.
3. Contact your place of purchase of the software.

Appendix A. Hardware disassembling for recycle

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

Disassemble the system board for recycle

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

Before disassembling the system board:

1. Remove the system board from the server (see “Remove the system board” on page 169).
2. Refer to local environmental, waste or disposal regulations to ensure compliance.

Complete the following steps to disassemble the system board:

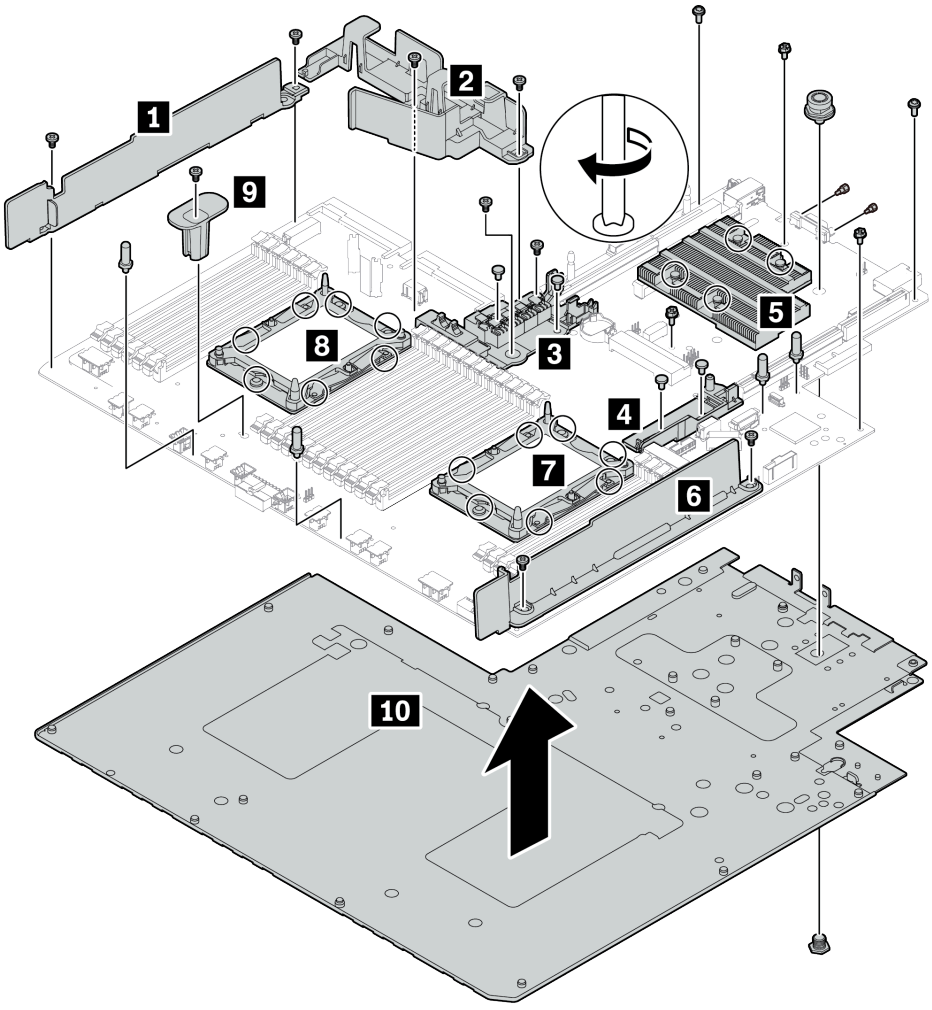


Figure 156. Disassembling the system board

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Step 1. Remove the following components as illustrated:

- 14 philip screws (with PH2 screwdriver)
- 14 torx screws on the PHM bolster plates 7 8 (with T20 torx screwdriver)
- Four PH2 captive screws on the heat sink 5 (with PH2 screwdriver)
- Four plastic rivets on two internal raid holder 3 4 (with screwdriver)
- Four standoffs (with 7 mm wrench)
- Two hexagon bolts on VGA connector (with 5 mm wrench)
- One plunger (with 11 mm and 16 mm wrench)

Step 2. Separate the components 1 2 3 4 5 6 7 8 9 10 from the system board.

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

Appendix B. Getting help and technical assistance

If you need help, service, or technical assistance or just want more information about Lenovo products, you will find a wide variety of sources available from Lenovo to assist you.

On the World Wide Web, up-to-date information about Lenovo systems, optional devices, services, and support are available at:

http://datacentersupport.lenovo.com

Note: IBM is Lenovo's preferred-service provider for ThinkSystem.

Before you call

Before you call, there are several steps that you can take to try and solve the problem yourself. If you decide that you do need to call for assistance, gather the information that will be needed by the service technician to more quickly resolve your problem.

Attempt to resolve the problem yourself

You can solve many problems without outside assistance by following the troubleshooting procedures that Lenovo provides in the online help or in the Lenovo product documentation. The Lenovo product documentation also describes the diagnostic tests that you can perform. The documentation for most systems, operating systems, and programs contains troubleshooting procedures and explanations of error messages and error codes. If you suspect a software problem, see the documentation for the operating system or program.

You can find the product documentation for your ThinkSystem products at the following location:

http://thinksystem.lenovofiles.com/help/index.jsp

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

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

Gathering information needed to call Support

If you believe that you require warranty service for your Lenovo product, the service technicians will be able to assist you more efficiently if you prepare before you call. You can also see http://datacentersupport.lenovo.com/warrantylookup for more information about your product warranty.

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Gather the following information to provide to the service technician. This data will help the service technician quickly provide a solution to your problem and ensure that you receive the level of service for which you might have contracted.

- Hardware and Software Maintenance agreement contract numbers, if applicable
- Machine type number (Lenovo 4-digit machine identifier)
- Model number
- Serial number
- Current system UEFI and firmware levels
- Other pertinent information such as error messages and logs

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

Collecting service data

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

Service data can be collected through the following tools:

- **Lenovo XClarity Provisioning Manager**

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

- **Lenovo XClarity Controller**

  You can use the Lenovo XClarity Controller web interface or the CLI to collect service data for the server. The file can be saved and sent to Lenovo Support.

  - For more information about using the web interface to collect service data, see http://sysmgt.lenovofiles.com/help/topic/com.lenovo.systems.management.xcc.doc/NN1ia_c_servicesandsupport.html.
  - For more information about using the CLI to collect service data, see http://sysmgt.lenovofiles.com/help/topic/com.lenovo.systems.management.xcc.doc/nn1ia_r_ffdccommand.html.

- **Lenovo XClarity Administrator**

  Lenovo XClarity Administrator can be set up to collect and send diagnostic files automatically to Lenovo Support when certain serviceable events occur in Lenovo XClarity Administrator and the managed endpoints. You can choose to send diagnostic files to Lenovo Support using Call Home or to another service provider using SFTP. You can also manually collect diagnostic files, open a problem record, and send diagnostic files to the Lenovo Support Center.

  You can find more information about setting up automatic problem notification within the Lenovo XClarity Administrator at http://sysmgt.lenovofiles.com/help/topic/com.lenovo.lxca.doc/admin_setupcallhome.html.

- **Lenovo XClarity Essentials OneCLI**

  Lenovo XClarity Essentials OneCLI has inventory application to collect service data. It can run both in-band and out-of-band. When running in-band within the host operating system on the server, OneCLI can collect information about the operating system, such as the operating system event log, in addition to the hardware service data.

To obtain service data, you can run the `getinfor` command. For more information about running the `getinfor`, see http://sysmgt.lenovofiles.com/help/topic/toolsctr_cli_lenovo/onecli_r_getinfor_command.html.

Contacting Support

You can contact Support to obtain help for your issue.

You can receive hardware service through a Lenovo Authorized Service Provider. To locate a service provider authorized by Lenovo to provide warranty service, go to https://datacentersupport.lenovo.com/serviceprovider and use filter searching for different countries. For Lenovo support telephone numbers, see https://datacentersupport.lenovo.com/supportphonelist for your region support details.

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Electronic emission notices

When you attach a monitor to the equipment, you must use the designated monitor cable and any interference suppression devices that are supplied with the monitor.

Additional electronic emissions notices are available at:

http://thinksystem.lenovofiles.com/help/index.jsp

Taiwan Region BSMI RoHS declaration

單元 Unit	限用物質及其化學符號 Restricted substances and its chemical symbols					
	鉛Lead (PB)	汞Mercury (Hg)	鎘Cadmium (Cd)	六價鉻 Hexavalent chromium (Cr^{+6})	多溴聯苯 Polybrominated biphenyls (PBB)	多溴二苯醚 Polybrominated diphenyl ethers (PBDE)
機架	○	○	○	○	○	○
外部蓋板	○	○	○	○	○	○
機械組合件	–	○	○	○	○	○
空氣傳動設備	–	○	○	○	○	○
冷卻組合件	–	○	○	○	○	○
內存模組	–	○	○	○	○	○
處理器模組	–	○	○	○	○	○
電纜組合件	–	○	○	○	○	○
電源供應器	–	○	○	○	○	○
儲備設備	–	○	○	○	○	○
印刷電路板	–	○	○	○	○	○

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 Region import and export contact information

Contacts are available for Taiwan Region import and export information.

委製商/進口商名稱: 台灣聯想環球科技股份有限公司
進口商地址: 台北市南港區三重路 66 號 8 樓
進口商電話: 0800-000-702

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