



ThinkSystem SR630 V2 Maintenance Manual



Machine Types: 7Z70 and 7Z71

Note

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

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

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

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

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Safety

Before installing this product, read the Safety Information.

قبل تركيب هذا المنتج، يجب قراءة الملاحظات الأمنية

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

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

安裝本產品之前，請先閱讀「安全資訊」。

Prije instalacije ovog produkta obavezno pročitajte Sigurnosne Upute.

Před instalací tohoto produktu si přečtěte příručku bezpečnostních instrukcí.

Læs sikkerhedsforskrifterne, før du installerer dette produkt.

Lees voordat u dit product installeert eerst de veiligheidsvoorschriften.

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

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

Vor der Installation dieses Produkts die Sicherheitshinweise lesen.

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

לפני שתתקינו מוצר זה, קראו את הוראות הבטיחות.

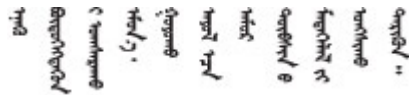
A termék telepítése előtt olvassa el a Biztonsági előírásokat!

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

製品の設置の前に、安全情報をお読みください。

본 제품을 설치하기 전에 안전 정보를 읽으십시오.

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



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

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

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

Перед установкой продукта прочтите инструкции по технике безопасности.

Pred inštaláciou tohto zariadenia si pečítajte Bezpečnostné predpisy.

Pred namestitvijo tega proizvoda preberite Varnostne informacije.

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

Läs säkerhetsinformationen innan du installerar den här produkten.

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

Bu ürünü kurmadan önce güvenlik bilgilerini okuyun.

مەزكۇر مەھسۇلاتنى ئورنىتىشتىن بۇرۇن بىخەتەرلىك ئۇچۇرلىرىنى ئوقۇپ چىقىڭ.

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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:

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

CAUTION:

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

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

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

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

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

- a. Go to:

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

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

Chapter 1. Introduction

The ThinkSystem™ SR630 V2 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.

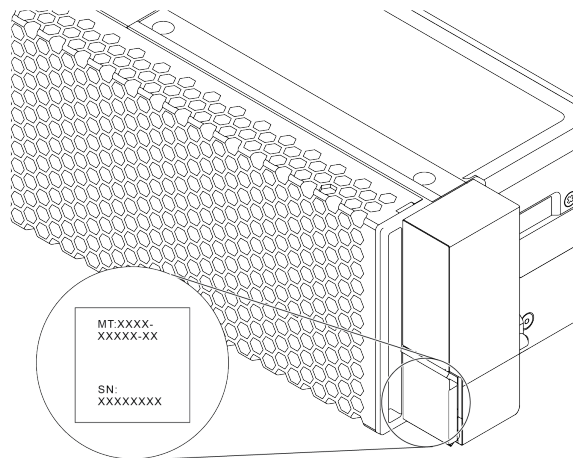


Figure 1. Location of the ID label

XClarity Controller network access label

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

Note: The pull-out information tab is located on the right bottom of the front side of your server. For detailed information, see “Front view” on page 19.

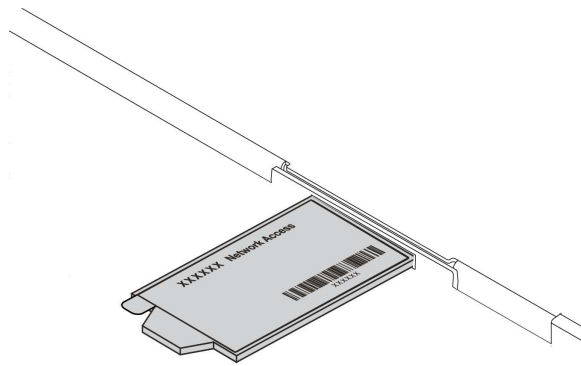


Figure 2. Location of the XClarity Controller network access label

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://datacentersupport.lenovo.com/products/servers/thinksystem/sr630v2/7z70>



Figure 3. QR code

Specifications

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

Table 1. Server specifications

Specification	Description
Dimension	<ul style="list-style-type: none"> • 1U • Height: 43.0 mm (1.69 inches) • Width: 439.2 mm (17.29 inches) • Depth: 772.6 mm (30.42 inches) <p>Note: The depth is measured without PSU handles or security bezel installed.</p>
Package weight	Up to 26.3 kg (57.98 lb)
Processor	<p>Supports multi-core Intel Xeon processors, with integrated memory controller and Intel Mesh Ultra Path Interconnect (UPI) topology.</p> <ul style="list-style-type: none"> • Up to two Intel® Xeon® processors • Designed for Land Grid Array (LGA) 4189 socket • Scalable up to 40 cores per socket, 80 cores in total • Thermal Design Power (TDP): up to 270 watts • Supports 3 UPI links up to 11.2 GT/s <p>For a list of supported processors, see https://static.lenovo.com/us/en/serverproven/index.shtml.</p> <p>Only one processor is supported if you use the 8351N processor or processor with the suffix of “U”.</p> <p>For technical rules for processors and heat sinks, see “Technical rules for processors and heat sinks” on page 86.</p>
Heat sink	<ul style="list-style-type: none"> • Standard heat sink • High-performance heat sink (T-shape) <p>For technical rules for processors and heat sinks, see “Technical rules for processors and heat sinks” on page 86.</p>

Table 1. Server specifications (continued)

Specification	Description
Memory	<ul style="list-style-type: none"> • Slots: 32 memory module slots • Supported memory module type: <ul style="list-style-type: none"> – TruDDR4 3200, dual-rank, 16 GB/32 GB/64 GB RDIMM – TruDDR4 3200, quad-rank, 128 GB 3DS RDIMM – TruDDR4 3200, 128 GB/256 GB Intel® Optane™ Persistent Memory (PMEM) • Minimum memory: 16 GB • Maximum memory: <ul style="list-style-type: none"> – 2 TB using RDIMMs – 4 TB using 3DS RDIMMs <p>Notes:</p> <ul style="list-style-type: none"> • The operating speed and total memory capacity depend on the processor model and UEFI settings. • All Icelake Platinum and Gold CPUs support PMEM. For Icelake Silver CPUs, only processor 4314 supports PMEM. <p>For a list of supported memory options, see https://static.lenovo.com/us/en/serverproven/index.shtml.</p> <p>For technical rules for memory modules, see “Memory module installation rules and order” on page 150.</p>
Operating systems	<p>Supported and certified operating systems:</p> <ul style="list-style-type: none"> • Microsoft Windows Server • VMware ESXi • Red Hat Enterprise Linux • SUSE Linux Enterprise Server • Canonical Ubuntu <p>References:</p> <ul style="list-style-type: none"> • Complete list of available operating systems: https://lenovopress.com/osig. • OS deployment instructions: Follow the adopted combination to install all the PMEMs and DRAM DIMMs (see “Install the operating system” in <i>Setup Guide</i>).

Table 1. Server specifications (continued)

Specification	Description
Internal drives	<p>Front:</p> <ul style="list-style-type: none"> • Up to four 3.5-inch hot-swap SAS/SATA drives • Up to four 3.5-inch hot-swap AnyBay (SAS/SATA/NVMe) drives • Up to four 2.5-inch hot-swap SAS/SATA drives • Up to eight 2.5-inch hot-swap SAS/SATA/U.3 NVMe drives • Up to six 2.5-inch hot-swap SAS/SATA and four 2.5-inch hot-swap AnyBay (SAS/SATA/NVMe) drives • Up to six 2.5-inch hot-swap SAS/SATA and four 2.5-inch hot-swap NVMe drives • Up to six 2.5-inch hot-swap SAS/SATA and two 2.5-inch hot-swap AnyBay (SAS/SATA/NVMe) drives and two 2.5-inch hot-swap NVMe drives • Up to ten 2.5-inch hot-swap NVMe drives • Up to ten 2.5-inch hot-swap AnyBay (SAS/SATA/NVMe) drives • Up to 16 hot-swap EDSFF drives <p>Inside:</p> <ul style="list-style-type: none"> • Up to two internal SATA or NVMe M.2 drives <p>Rear:</p> <ul style="list-style-type: none"> • Up to two 2.5-inch hot-swap SAS/SATA or NVMe drives • Up to two 7mm hot-swap SATA or NVMe drives <p>Notes:</p> <ul style="list-style-type: none"> • M.2 and 7mm drives are not supported at the same time. • If PMEM or 256 GB DIMM is used, rear 2.5-inch drives are not supported. • For the server model with 16 front EDSFF drives, M.2 drives are not supported. • For technical rules for drives, see “Technical rules for drives” on page 87.
Expansion slots	<p>Depending on the model, your server supports up to three PCIe slots in the rear.</p> <ul style="list-style-type: none"> • PCIe x16, low-profile • PCIe x16/x16, low-profile + low profile • PCIe x16/x16, low profile + full-height <p>For locations and technical rules for PCIe slots, see “Rear view” on page 39 and “Technical rules for PCIe adapters” on page 88.</p>
Graphics processing unit (GPU)	<p>Your server supports the following GPUs:</p> <ul style="list-style-type: none"> • Low-profile, half-length, single-wide: NVIDIA® Tesla T4 16GB Base Card (for China only), NVIDIA® Quadro® P620, NVIDIA® Tesla® T4 • Full-height, 3/4 length, single-wide: NVIDIA® Quadro® P2200 <p>For technical rules for GPU, see “Technical rules for GPU adapters” on page 89.</p>

Table 1. Server specifications (continued)

Specification	Description
Input/Output (I/O) features	<ul style="list-style-type: none"> • Front: <ul style="list-style-type: none"> – One VGA connector (optional) – One USB 2.0 connector – One USB 3.2 Gen 1 (5Gbps) connector – One external diagnostics connector – One diagnostics panel (optional) – One LCD diagnostics panel (optional) • Rear: <ul style="list-style-type: none"> – One VGA connector – Three USB 3.2 Gen 1 (5Gbps) connectors – Ethernet connectors on OCP 3.0 Ethernet adapter (optional) – One RJ45 BMC management network connector – One serial port (optional) <p>For detailed information about each component, see “Front view” on page 19 and “Rear view” on page 39.</p>
HBA/RAID adapters (depending on the model)	<p>Support for JBOD mode and RAID level 0, 1, 10:</p> <ul style="list-style-type: none"> • 530-16i PCIe 12Gb RAID Adapter <p>Support for JBOD mode and RAID level 0, 1, 5, 10, 50:</p> <ul style="list-style-type: none"> • 530-8i PCIe 12Gb RAID Adapter <p>Support for JBOD mode and RAID level 0, 1, 5, 6, 10, 50, 60:</p> <ul style="list-style-type: none"> • 930-8i 2GB Flash PCIe 12Gb RAID Adapter • 930-8e 4GB Flash PCIe 12Gb RAID Adapter • 930-16i 4GB Flash PCIe 12Gb RAID Adapter • 940-8i 4GB Flash PCIe Gen4 12Gb RAID Adapter • 940-8i 8GB Flash PCIe Gen4 12Gb RAID Adapter • 940-16i 8GB Flash PCIe Gen4 12Gb RAID Adapter • 940-16i 8GB Flash PCIe Gen4 12Gb Internal RAID Adapter <p>Support the following HBAs:</p> <ul style="list-style-type: none"> • 430-8i SAS/SATA 12Gb HBA • 430-8e SAS/SATA 12Gb HBA • 430-16i SAS/SATA 12Gb HBA • 430-16e SAS/SATA 12Gb HBA • 440-16i SAS/SATA PCIe Gen4 12Gb Internal HBA <p>For technical rules for storage controller adapters, see “Technical rules for PCIe adapters” on page 88.</p> <p>For technical rules for RAID configuration, see “Technical rules for RAID configuration” on page 87.</p>

Table 1. Server specifications (continued)

Specification	Description
System fans	Up to eight dual-rotor hot-swap fans (including two redundant fans) <ul style="list-style-type: none">• Standard fan 4056 (21000 RPM)• Performance fan 4056 (28000 RPM) For technical rules for system fans, see “Technical rules for system fans” on page 90.
Minimal configuration for debugging	<ul style="list-style-type: none">• One processor in processor socket 1• One memory module in slot 3• One power supply• One HDD/SSD drive, one M.2 drive, or one 7mm drive (if OS is needed for debugging)• Six system fans (with one processor)

Table 1. Server specifications (continued)

Specification	Description					
Acoustical noise emissions	The server has the following acoustic noise emissions declaration:					
	<i>Table 2. Acoustic noise emissions declaration</i>					
	Scenario	Sound power level (L_{WAd})		Sound pressure level (L_{pAm}):		Used configuration
		Idling	Operating	Idling	Operating	
	Typical	6.0 Bel	7.1 Bel	45 dBA	56 dBA	<ul style="list-style-type: none"> Two 165 W processors Eight 64 GB DIMMs Eight SAS hard disk drives RAID 440-16i adapter Intel X710-T2L 10GBASE-T 2-port OCP adapter Two 750-watt power supply units
Storage rich	7.5 Bel	7.7 Bel	61 dBA	62 dBA	<ul style="list-style-type: none"> Two 165 W processors Sixteen 64 GB DIMMs Twelve SAS hard disk drives RAID 940-16i adapter Intel X710-T2L 10GBASE-T 2-port OCP adapter Two 750-watt power supply units 	
GPU rich	7.6 Bel	8.3 Bel	62 dBA	69 dBA	<ul style="list-style-type: none"> Two 205 W processors Sixteen 64 GB DIMMs Ten SAS hard disk drives RAID 940-16i adapter Intel X710-T2L 10GBASE-T 2-port OCP adapter Two NVIDIA Tesla T4 GPUs Two 1100-watt power supply units 	
<p>Notes:</p> <ul style="list-style-type: none"> These sound power levels are measured in controlled acoustical environments according to procedures specified by ISO 7779 and are reported in accordance with ISO 9296. The declared sound levels may change depending on configuration/conditions, for example high-power NICs, high-power processors and GPUs, such as ThinkSystem Mellanox ConnectX-6 HDR/200GbE QSFP56 1-port/2-port PCIe Adapter, ThinkSystem Broadcom 57454 10GBASE-T 4-port OCP Ethernet Adapter. Government regulations (such as those prescribed by OSHA or European Community Directives) may govern noise level exposure in the workplace and may 						

Table 1. Server specifications (continued)

Specification	Description																																			
	<p>apply to you and your server installation. The actual sound pressure levels in your installation depend upon a variety of factors, including the number of racks in the installation; the size, materials, and configuration of the room; the noise levels from other equipment; the room ambient temperature, and employee's location in relation to the equipment. Further, compliance with such government regulations depends on a variety of additional factors, including the duration of employees' exposure and whether employees wear hearing protection. Lenovo recommends that you consult with qualified experts in this field to determine whether you are in compliance with the applicable regulations.</p>																																			
Electrical input	<p>One or two hot-swap power supplies for redundancy support:</p> <p><i>Table 3. Electrical input for power supplies</i></p> <table border="1" data-bbox="548 653 1453 1136"> <thead> <tr> <th data-bbox="548 653 784 722">Power supply</th> <th data-bbox="784 653 938 722">100–127 V ac</th> <th data-bbox="938 653 1122 722">200–240 V ac</th> <th data-bbox="1122 653 1289 722">240 V dc</th> <th data-bbox="1289 653 1453 722">-48 V dc</th> </tr> </thead> <tbody> <tr> <td data-bbox="548 722 784 793">500-watt 80 PLUS Platinum</td> <td data-bbox="784 722 938 793">√</td> <td data-bbox="938 722 1122 793">√</td> <td data-bbox="1122 722 1289 793">√</td> <td data-bbox="1289 722 1453 793"></td> </tr> <tr> <td data-bbox="548 793 784 865">750-watt 80 PLUS Platinum</td> <td data-bbox="784 793 938 865">√</td> <td data-bbox="938 793 1122 865">√</td> <td data-bbox="1122 793 1289 865">√</td> <td data-bbox="1289 793 1453 865"></td> </tr> <tr> <td data-bbox="548 865 784 936">1100-watt 80 PLUS Platinum</td> <td data-bbox="784 865 938 936">√</td> <td data-bbox="938 865 1122 936">√</td> <td data-bbox="1122 865 1289 936">√</td> <td data-bbox="1289 865 1453 936"></td> </tr> <tr> <td data-bbox="548 936 784 1008">1800-watt 80 PLUS Platinum</td> <td data-bbox="784 936 938 1008"></td> <td data-bbox="938 936 1122 1008">√</td> <td data-bbox="1122 936 1289 1008">√</td> <td data-bbox="1289 936 1453 1008"></td> </tr> <tr> <td data-bbox="548 1008 784 1079">750-watt 80 PLUS Titanium</td> <td data-bbox="784 1008 938 1079"></td> <td data-bbox="938 1008 1122 1079">√</td> <td data-bbox="1122 1008 1289 1079">√</td> <td data-bbox="1289 1008 1453 1079"></td> </tr> <tr> <td data-bbox="548 1079 784 1136">1100-watt</td> <td data-bbox="784 1079 938 1136"></td> <td data-bbox="938 1079 1122 1136"></td> <td data-bbox="1122 1079 1289 1136"></td> <td data-bbox="1289 1079 1453 1136">√</td> </tr> </tbody> </table> <p>CAUTION:</p> <ul style="list-style-type: none"> • 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. 	Power supply	100–127 V ac	200–240 V ac	240 V dc	-48 V dc	500-watt 80 PLUS Platinum	√	√	√		750-watt 80 PLUS Platinum	√	√	√		1100-watt 80 PLUS Platinum	√	√	√		1800-watt 80 PLUS Platinum		√	√		750-watt 80 PLUS Titanium		√	√		1100-watt				√
Power supply	100–127 V ac	200–240 V ac	240 V dc	-48 V dc																																
500-watt 80 PLUS Platinum	√	√	√																																	
750-watt 80 PLUS Platinum	√	√	√																																	
1100-watt 80 PLUS Platinum	√	√	√																																	
1800-watt 80 PLUS Platinum		√	√																																	
750-watt 80 PLUS Titanium		√	√																																	
1100-watt				√																																
Environment	<p>The server is supported in the following environment:</p> <ul style="list-style-type: none"> • Air temperature: <ul style="list-style-type: none"> – Operating: <ul style="list-style-type: none"> – ASHRAE class A2: 10–35°C (50–95°F); when the altitude exceeds 900 m (2953 ft), the maximum ambient temperature value decreases by 1°C (1.8°F) with every 300 m (984 ft) of altitude increase. – ASHRAE class A3: 5–40°C (41–104°F); when the altitude exceeds 900 m (2953 ft), the maximum ambient temperature value decreases by 1°C (1.8°F) with every 175 m (574 ft) of altitude increase. – ASHRAE class A4: 5–45°C (41–113°F); when the altitude exceeds 900 m (2953 ft), the maximum ambient temperature value decreases by 1°C (1.8°F) with every 125 m (410 ft) of altitude increase. – Server off: 5–45°C (41–113°F) – Shipping or storage: -40–60°C (-40–140°F) 																																			

Table 1. Server specifications (continued)

Specification	Description
	<ul style="list-style-type: none"> • Maximum altitude: 3050 m (10 000 ft) • Relative humidity (non-condensing): <ul style="list-style-type: none"> – Operating: <ul style="list-style-type: none"> – ASHRAE Class A2: 8%–80%, maximum dew point: 21°C (70°F) – ASHRAE Class A3: 8%–85%, maximum dew point: 24°C (75°F) – ASHRAE Class A4: 8%–90%, maximum dew point: 24°C (75°F) – Shipment or storage: 8%–90% • Particulate contamination <p>Attention: Airborne particulates and reactive gases acting alone or in combination with other environmental factors such as humidity or temperature might pose a risk to the server. For information about the limits for particulates and gases, see “Particulate contamination” on page 10.</p> <p>The server is designed for standard data center environment and is recommended to be placed in industrial data center. Depending on hardware configurations, the server complies with ASHRAE Class A2, A3, or A4 specifications with certain thermal restrictions. System performance may be impacted when operating temperature is outside permitted conditions.</p> <p>The restrictions to ASHRAE support are as follows:</p> <ul style="list-style-type: none"> • The ambient temperature must be no more than 30°C if your server meets any of the following conditions: <ul style="list-style-type: none"> – 205 W < TDP ≤ 270 W – Installed with any rear 2.5-inch NVMe drive – Installed with any 256 GB DIMM or PMEM – Installed with any passive GPU • The ambient temperature must be no more than 35°C if your server meets any of the following conditions: <ul style="list-style-type: none"> – 165 W < TDP ≤ 205 W – Installed with any front NVMe drive or rear NVMe AIC SSD – Installed with any 7mm boot drive – Installed with any M.2 NVMe drive – Installed with any rear 2.5-inch SAS/SATA drive • The ambient temperature must be no more than 45°C if the CPU TDP is equal to or smaller than 165 W.

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 4. Limits for particulates and gases

Contaminant	Limits
Reactive gases	Severity level G1 as per ANSI/ISA 71.04-1985 ¹ : <ul style="list-style-type: none"> The copper reactivity level shall be less than 300 Å/month (around 0.0039 µg/cm²-hour weight gain).² The silver reactivity level shall be less than 200 Å/month (around 0.0035 µg/cm²-hour weight gain).³ The reactive monitoring of gaseous corrosivity must be conducted approximately 5 cm (2 in.) in front of the rack on the air inlet side at one-quarter and three-quarter frame height off the floor or where the air velocity is much higher.
Airborne particulates	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: <ul style="list-style-type: none"> The room air might be continuously filtered with MERV 8 filters. Air entering a data center might be filtered with MERV 11 or preferably MERV 13 filters. 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. <ul style="list-style-type: none"> The deliquescent relative humidity of the particulate contamination should be more than 60% RH.⁴ Data centers must be free of zinc whiskers.⁵
<p>¹ ANSI/ISA-71.04-1985. <i>Environmental conditions for process measurement and control systems: Airborne contaminants</i>. Instrument Society of America, Research Triangle Park, North Carolina, U.S.A.</p> <p>² The derivation of the equivalence between the rate of copper corrosion growth in the thickness of the corrosion product in Å/month and the rate of weight gain assumes that Cu₂S and Cu₂O grow in equal proportions.</p> <p>³ The derivation of the equivalence between the rate of silver corrosion growth in the thickness of the corrosion product in Å/month and the rate of weight gain assumes that Ag₂S is the only corrosion product.</p> <p>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.</p> <p>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.</p>	

Firmware updates

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

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

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

updating firmware for both the Lenovo XClarity Controller and UEFI, update the firmware for Lenovo XClarity Controller first.

Best practices related to updating firmware are available at the following location:

<http://lenovopress.com/LP0656>

Important terminology

- **In-band update.** The installation or update is performed using a tool or application within an operating system that is executing on the server's core CPU.
- **Out-of-band update.** The installation or update is performed by the 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:

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

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

Tool	In-band update	Out-of-band update	On-target update	Off-target update	Graphical user interface	Command-line interface	Supports UXSPs
Lenovo XClarity Provisioning Manager V3 Limited to core system firmware only	√ ²			√	√		√
Lenovo XClarity Controller Supports core system firmware and most advanced I/O option firmware updates		√		√	√	√	
Lenovo XClarity Essentials OneCLI Supports all core system firmware, I/O firmware, and installed operating system driver updates	√	√	√	√		√	√

Tool	In-band update	Out-of-band update	On-target update	Off-target update	Graphical user interface	Command-line interface	Supports UXSPs
Lenovo XClarity Essentials UpdateXpress Supports all core system firmware, I/O firmware, and installed operating system driver updates	√	√	√	√	√		√
Lenovo XClarity Essentials Bootable Media Creator Supports core system firmware and I/O firmware updates. You can update the Microsoft® Windows® operating system, but device drivers are not included on the bootable image	√			√	√	√	√
Lenovo XClarity Administrator Supports core system firmware and I/O firmware updates	√ ¹	√ ²		√	√		
Lenovo XClarity Integrator for VMware vCenter Supports all core system firmware, I/O firmware, and installed operating system driver updates		√		√	√		√
Lenovo XClarity Integrator for Microsoft Windows Admin Center Supports all core system firmware, I/O firmware, and installed operating system driver updates	√	√	√	√	√		

Tool	In-band update	Out-of-band update	On-target update	Off-target update	Graphical user interface	Command-line interface	Supports UXSPs
Lenovo XClarity Integrator for Microsoft System Center Configuration Manager Supports all core system firmware, I/O firmware, and installed operating system driver updates	√		√		√		√
Notes: <ol style="list-style-type: none"> 1. For I/O firmware updates. 2. For BMC and UEFI firmware updates. 							

The latest firmware can be found at the following site:

<https://datacentersupport.lenovo.com/products/servers/thinksystem/sr630v2/7z70/downloads/driver-list/>

- **Lenovo XClarity Provisioning Manager V3**

From Lenovo XClarity Provisioning Manager V3, you can update the Lenovo XClarity Controller firmware, the UEFI firmware, and the Lenovo XClarity Provisioning Manager V3 software.

Note: By default, the Lenovo XClarity Provisioning Manager V3 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 V3 to update firmware is available at:

https://sysmgt.lenovofiles.com/help/topic/LXPMv3/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/Invo-xpress>

- **Lenovo XClarity Essentials Bootable Media Creator**

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

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

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

- **Lenovo XClarity Administrator**

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

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

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

- **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 your server might encounter. These Tech Tips (also called retain tips or service bulletins) provide procedures to work around issues or solve problems related to the operation of your server.

To find the Tech Tips available for your server:

1. Go to <http://datacentersupport.lenovo.com> and navigate to the support page for your server.
2. Click **Documentation** from the navigation pane.

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

Security advisories

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

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

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

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 respond to remote power-on requests sent to Lenovo XClarity Controller via Lenovo XClarity Essentials OneCLI, IPMITool, or SSH CLI.

For example, run the following command on Lenovo XClarity Essentials OneCLI to power on your server:

```
OneCli.exe ospower turnon --bmc USERID:PASSWORD@host
```

For more information about running the **ospower** command, see https://sysmgt.lenovofiles.com/help/topic/toolctr_cli_lenovo/onecli_r_ospower_command.html.

If the system UEFI power policy is set to “always on”, the system will be powered on automatically when an AC source is plugged in.

For information about powering off the server, see “Power off the server” on page 16.

System boot/startup time

The system boot/startup time varies by hardware configurations and may change depending on your server configuration and conditions.

- For typical configurations without PMEM memory modules, it takes about 3 minutes for the system to start up.

Configuration example: 2 x processors, 16 x RDIMMs, 1 x RAID adapter, 1 x NIC adapter

- For configurations with PMEM memory modules installed, it may take up to 15 minutes for the system to start up.

Configuration example: 2 x processors, 16 x RDIMMs, 16 x PMEMs, 1 x RAID adapter, 1 x NIC adapter

- For configurations with PMEM memory modules installed and Intel Volume Management Device (VMD) enabled, it may take about 20 minutes or longer for the system to start up.

Configuration example: 2 x processors, 16 x RDIMMs, 16 x PMEMs, 1 x RAID adapter, 1 x NIC adapter

Power off the server

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

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

Note: The 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.
- Send remote power-off commands to Lenovo XClarity Controller via Lenovo XClarity Essentials OneCLI, IPMItool, or SSH CLI.

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 16.

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.

Refer to the following front view for different server models:

- “Server models with four 2.5-inch front drive bays” on page 19
- “Server models with eight 2.5-inch front drive bays” on page 20
- “Server models with ten 2.5-inch front drive bays” on page 21
- “Server models with 16 EDSFF front drives” on page 21
- “Server models with four 3.5-inch front drive bays” on page 22
- “Server models with 2.5-inch front drive bays (backplane-less)” on page 23
- “Server models with 3.5-inch front drive bays (backplane-less)” on page 23
- “Server models with eight 2.5-inch front drive bays (with LCD diagnostics panel)” on page 24
- “Server models with 16 EDSFF front drives (with LCD diagnostics panel)” on page 24

Server model with four 2.5-inch drive bays

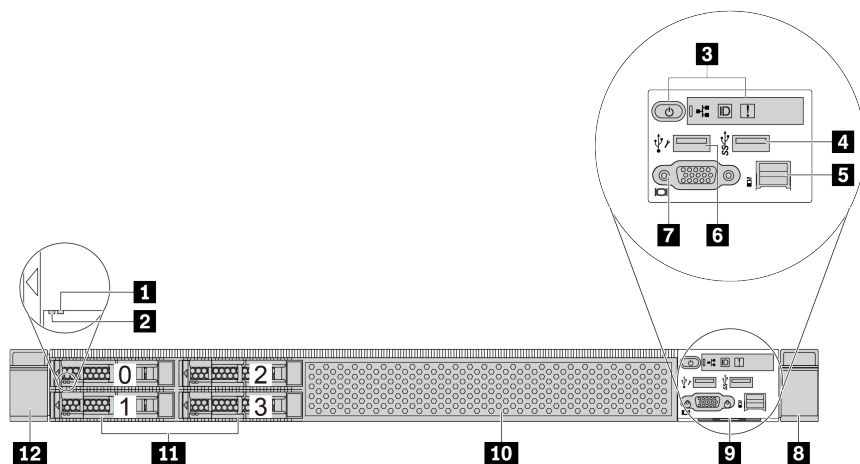


Table 5. Components on the front of the server

Callout	Callout
1 Drive status LED	2 Drive activity LED
3 Diagnostics panel	4 USB 3.2 Gen 1 (5Gbps) connector
5 External diagnostics connector	6 XClarity Controller USB connector
7 VGA connector (optional)	8 Rack latch (right)

Table 5. Components on the front of the server (continued)

Callout	Callout
9 Pull-out information tab	10 Drive filler (1)
11 Drive bays (4)	12 Rack latch (left)

Note: For more information about each component, see “Front components overview” on page 25.

Server model with eight 2.5-inch drive bays

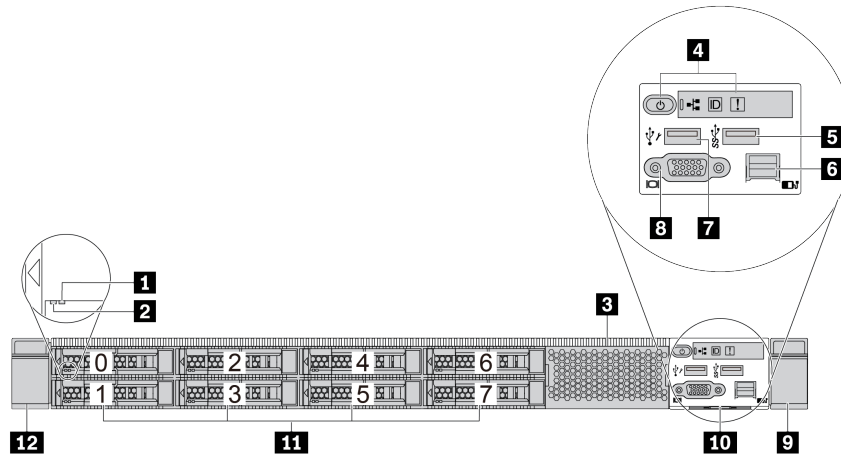


Table 6. Components on the front of the server

Callout	Callout
1 Drive status LED	2 Drive activity LED
3 Drive filler (1)	4 Diagnostics panel
5 USB 3.2 Gen 1 (5Gbps) connector	6 External diagnostics connector
7 XClarity Controller USB connector	8 VGA connector (optional)
9 Rack latch (right)	10 Pull-out information tab
11 Drive bays (8)	12 Rack latch (left)

Note: For more information about each component, see “Front components overview” on page 25.

Server model with ten 2.5-inch drive bays

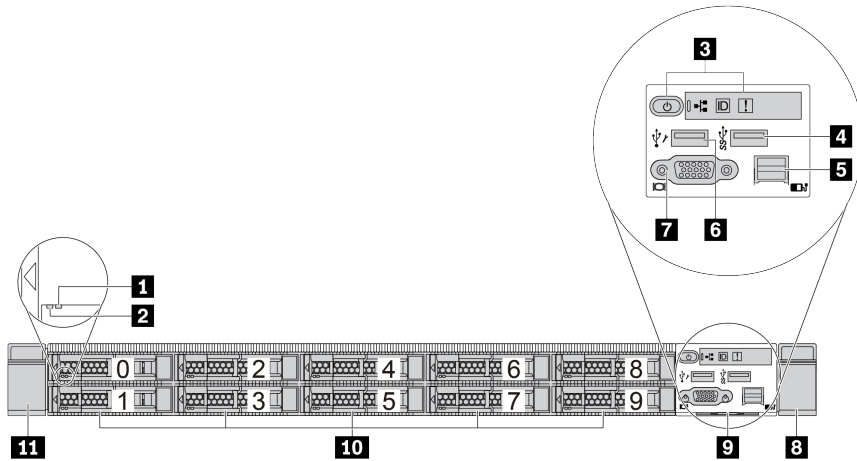


Table 7. Components on the front of the server

Callout	Callout
1 Drive status LED	2 Drive activity LED
3 Diagnostics panel	4 USB 3.2 Gen 1 (5Gbps) connector
5 External diagnostics connector	6 XClarity Controller USB connector
7 VGA connector (optional)	8 Rack latch (right)
9 Pull-out information tab	10 Drive bays (10)
11 Rack latch (left)	

Note: For more information about each component, see “Front components overview” on page 25.

Server model with 16 EDSFF drives

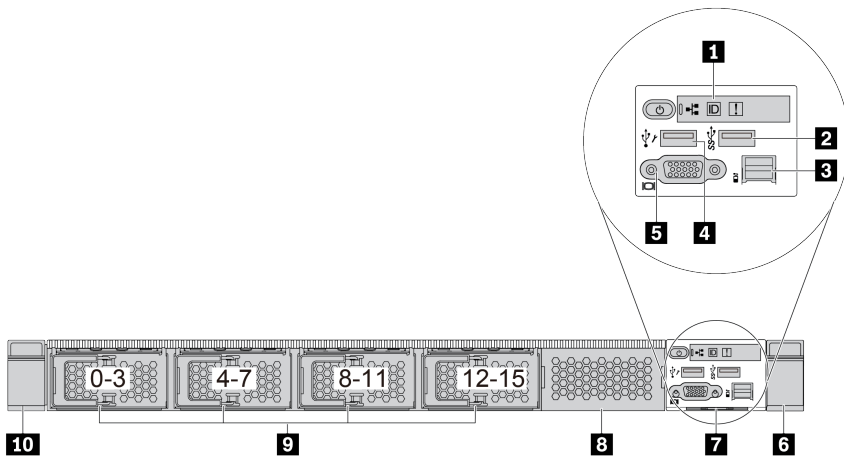


Table 8. Components on the front of the server

Callout	Callout
1 Diagnostics panel	2 USB 3.2 Gen 1 (5Gbps) connector
3 External diagnostics connector	4 XClarity Controller USB connector
5 VGA connector (optional)	6 Rack latch (right)
7 Pull-out information tab	8 Drive filler (1)
9 Drive bays (16)	10 Rack latch (left)

Note: For more information about each component, see “Front components overview” on page 25.

Server model with four 3.5-inch drive bays

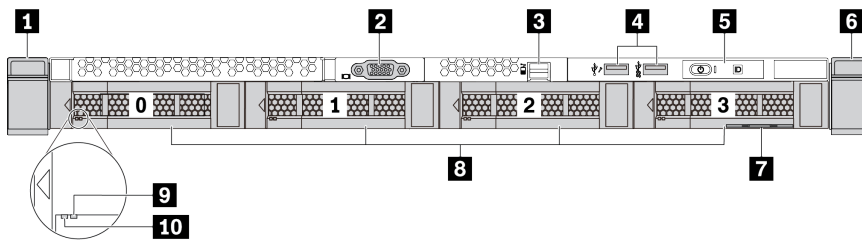


Table 9. Components on the front of the server

Callout	Callout
1 Rack latch (left)	2 VGA connector (optional)
3 External diagnostics connector	4 XClarity Controller USB connector and USB 3.2 Gen 1 (5Gbps) connector
5 Diagnostics panel	6 Rack latch (right)
7 Pull-out information tab	8 Drive bays (4)
9 Drive status LED	10 Drive activity LED

Note: For more information about each component, see “Front components overview” on page 25.

Server model with 2.5-inch drive bays (backplane-less)

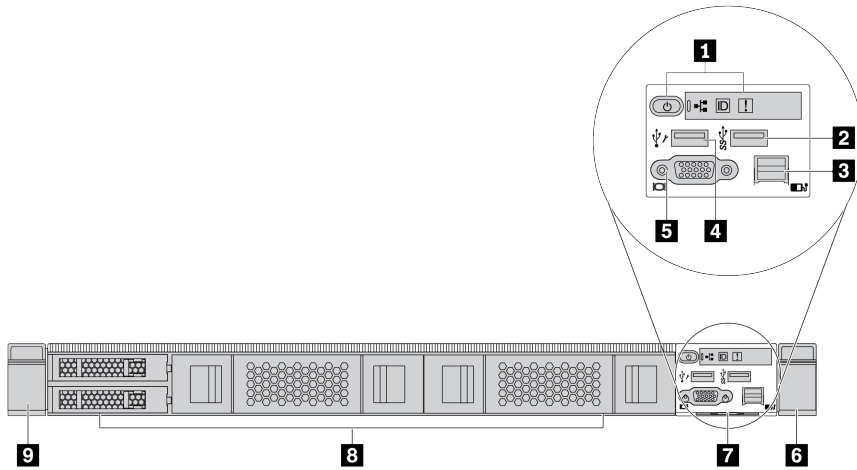


Table 10. Components on the front of the server

Callout	Callout
1 Diagnostics panel	2 USB 3.2 Gen 1 (5Gbps) connector
3 External diagnostics connector (reserved)	4 XClarity Controller USB connector
5 VGA connector (optional)	6 Rack latch (right)
7 Pull-out information tab	8 Drive fillers (4)
9 Rack latch (left)	

Note: For more information about each component, see “Front components overview” on page 25.

Server model with 3.5-inch drive bays (backplane-less)

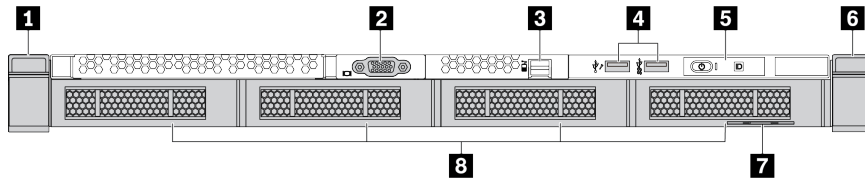


Table 11. Components on the front of the server

Callout	Callout
1 Rack latch (left)	2 VGA connector (optional)
3 External diagnostics connector	4 XClarity Controller USB connector and USB 3.2 Gen 1 (5Gbps) connector
5 Diagnostics panel	6 Rack latch (right)
7 Pull-out information tab	8 Drive fillers (4)

Note: For more information about each component, see “Front components overview” on page 25.

Server model with eight 2.5-inch drive bays (with LCD diagnostics panel assembly)

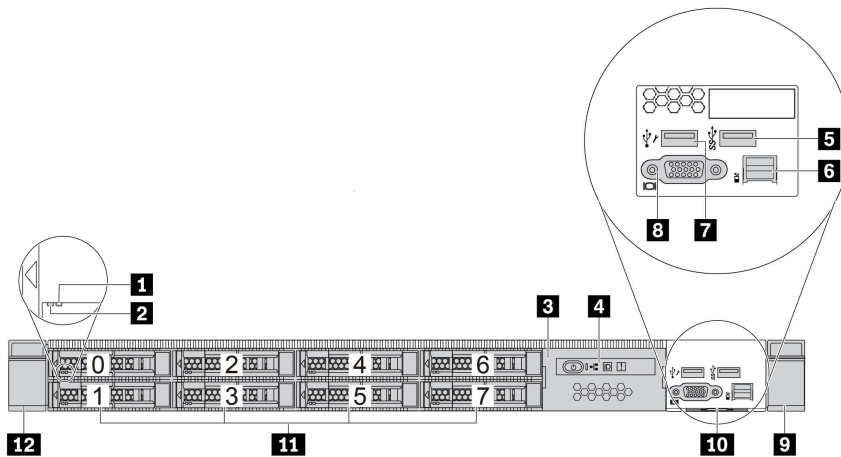


Table 12. Components on the front of the server

Callout	Callout
1 Drive status LED	2 Drive activity LED
3 LCD diagnostics panel assembly	4 LCD diagnostics panel
5 USB 3.2 Gen 1 (5Gbps) connector	6 External diagnostics connector
7 XClarity Controller USB connector	8 VGA connector (optional)
9 Rack latch (right)	10 Pull-out information tab
11 Drive bays (8)	12 Rack latch (left)

Note: For more information about each component, see “Front components overview” on page 25.

Server model with 16 EDSFF drives (with LCD diagnostics panel assembly)

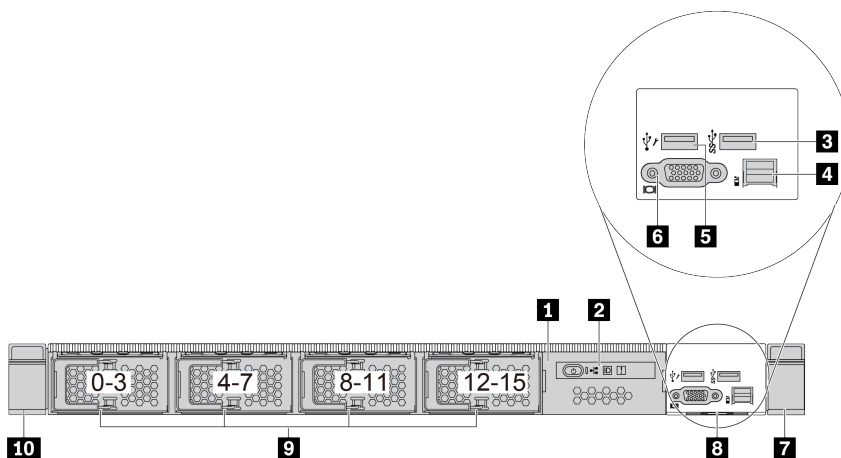


Table 13. Components on the front of the server

Callout	Callout
1 LCD diagnostics panel assembly	2 LCD diagnostics panel
3 USB 3.2 Gen 1 (5Gbps) connector	4 External diagnostics connector
5 XClarity Controller USB connector	6 VGA connector (optional)
7 Rack latch (right)	8 Pull-out information tab
9 Drive bays (16)	10 Rack latch (left)

Note: For more information about each component, see “Front components overview” on page 25.

Front components overview

Diagnostics panel

The diagnostics panel is integrated in front I/O assembly on some models. For information about the controls and status LEDs on the diagnostics panel, see “Diagnostics panel” on page 26.

Drive LEDs

Each hot-swap drive comes with an activity LED and status LED and the signals are controlled by the backplanes. Different colors and speeds indicate different activities or status of the drive. The following illustration shows the LEDs on a Hard disk drive or solid-state drive.

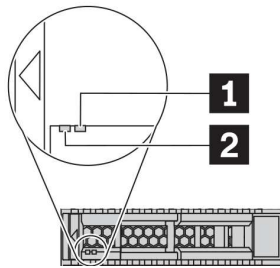


Figure 4. Drive LEDs

Drive LED	Status	Description
1 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.
2 Drive activity LED (left)	Solid green	The drive is powered but not active.
	Blinking green	The drive is active.

External diagnostics port

The connector is for connecting an external diagnostics handset. For more about its functions, see “External LCD diagnostics handset” on page 33.

Hot-swap drives and drive bays

The drive bays on the front and rear of your server are designed for hot-swap drives. 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. Vacant drive bays must be occupied by drive fillers.

LCD diagnostics panel assembly

The assembly comes with an integrated LCD diagnostics panel that can be used to quickly obtain system status, firmware levels, network information, and health information about the system. For more about the panel functions, see “LCD diagnostics panel” on page 28.

Pull-out information tab

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

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.

USB 3.2 Gen 1 (5Gbps) connectors

The USB 3.2 Gen 1 (5Gbps) connectors can be used to attach a USB-compatible device, such as a USB keyboard, USB mouse, or USB storage device.

VGA connector

The VGA connectors on the front and rear of the server can be used to attach a high-performance monitor, a direct-drive monitor, or other devices that use a VGA connector.

XClarity Controller USB connector

The XClarity Controller USB connector can function as a regular USB 2.0 connector to the host OS. In addition, it can also be used to connect the server to an android or iOS device, where you can then install and launch the Lenovo XClarity Mobile app to manage the system using XClarity Controller.

For details about using the Lenovo XClarity Mobile app, refer to http://sysmgt.lenovofiles.com/help/topic/com.lenovo.lxca.doc/lxca_usemobileapp.html.

Diagnostics panel

The diagnostics panel provides controls, connectors, and LEDs.

Note: Diagnostics panel with an LCD display is available for some models. For details, see “LCD diagnostics panel” on page 28 and “External LCD diagnostics handset” on page 33.

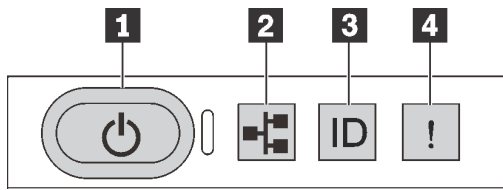


Figure 5. Diagnostics panel

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

Compatibility of the NIC adapter and the network activity LED

NIC adapter	Network activity LED
OCP 3.0 Ethernet adapter	Support
PCIe NIC adapter	Not support

When an OCP 3.0 Ethernet adapter is installed, the network activity LED on the front I/O assembly helps you identify the network connectivity and activity. If no OCP 3.0 Ethernet adapter is installed, this LED is off.

Status	Color	Description
On	Green	The server is connected to a network.
Blinking	Green	The network is connected and active.
Off	None	The server is disconnected from the network. Note: If the network activity LED is off when an OCP 3.0 Ethernet adapter is installed, check the network ports in the rear of your server to determine which port is disconnected.

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

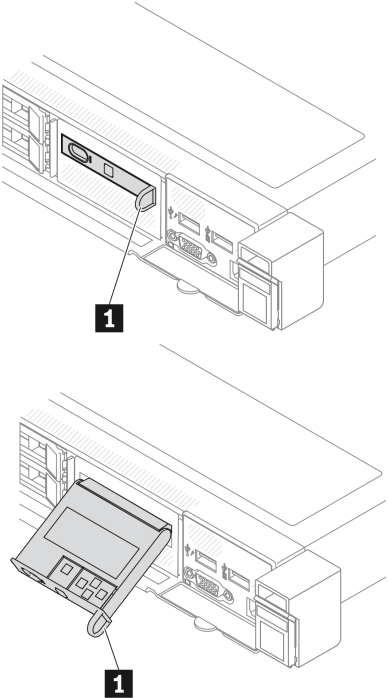
The system error LED helps you to determine if there are any system errors.

Status	Color	Description	Action
On	Yellow	<p>An error has been detected on the server. Causes might include but are not limited to the following errors:</p> <ul style="list-style-type: none"> • 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. 	<p>Check the event log to determine the exact cause of the error. Alternatively, follow the light path diagnostics to determine if additional LEDs are lit that will direct you to identify the cause of the error.</p>
Off	None	The server is off or the server is on and is working correctly.	None.

LCD diagnostics panel

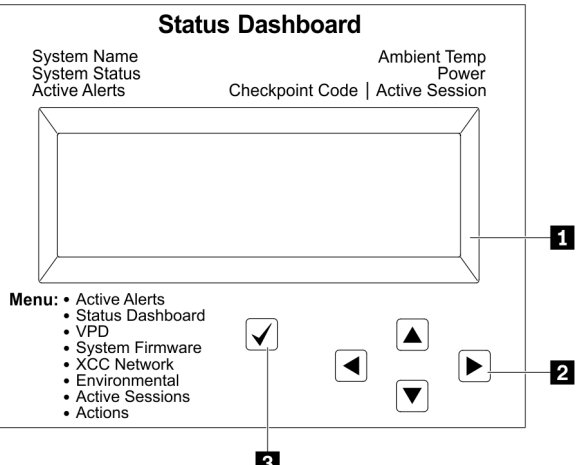
The LCD diagnostics panel is attached to the front of the server, while it allows quick access to system information such as errors, system status, firmware, network, and health information.

Location of the LCD diagnostics panel

<p>Location</p>	<p>The LCD diagnostics panel is attached to the front of the server.</p> 
<p>Callout</p>	<p>1 The handle with which the panel can be pulled out from the server.</p> <p>Notes:</p> <ul style="list-style-type: none"> • The panel can be pushed in or pulled out regardless of the system power status. • When pulling it out, do it gently to avoid damage.

Display panel overview

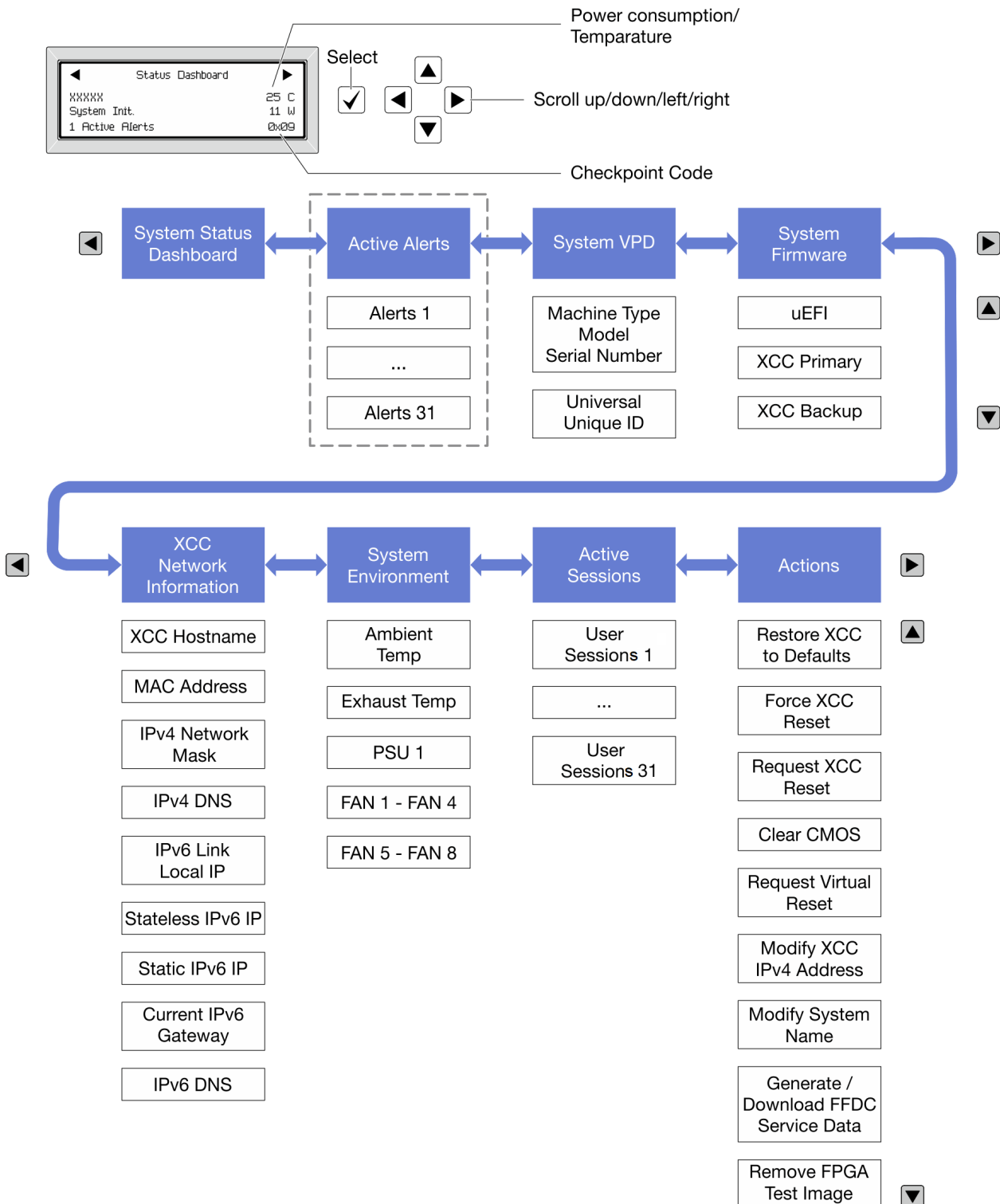
The diagnostics device consists of an LCD display and 5 navigation buttons.

	<p>1 LCD display</p> <p>2 Scroll buttons (up/down/left/right) Press the scroll buttons to locate and select system information.</p> <p>3 Select button Press the select button to select from the options in the menu.</p>
---	---

Option flow diagram

The LCD diagnostics panel displays various system information. Navigate through the options with the scroll buttons.

The external LCD diagnostics handset displays various system information. Navigate through the options with the scroll buttons.



Full menu list

Following is the list of available options. Switch between an option and the subordinate information entries with the select button, and switch among options or information entries with the scroll buttons.

Home Menu (System Status Dashboard)

Home Menu	Example
<ul style="list-style-type: none"> 1 System name 2 System status 3 Active alert quantity 4 Temperature 5 Power consumption 6 Checkpoint code 	<p>The screenshot shows a 'Status Dashboard' menu with the following items: 'xxxxxx', 'System Init.', '1 Active Alerts', '25 C', '11 W', and '0x09'. Numbered callouts point to these items: 1 points to 'xxxxxx', 2 to 'System Init.', 3 to '1 Active Alerts', 4 to '25 C', 5 to '11 W', and 6 to '0x09'.</p>

Active Alerts

Sub Menu	Example
Home screen: Active error quantity Note: The “Active Alerts” menu displays only the quantity of active errors. If no errors occur, the “Active Alerts” menu will not be available during navigation.	1 Active Alerts
Details screen: <ul style="list-style-type: none"> • Error message ID (Type: Error/Warning/Information) • Occurrence time • Possible sources of the error 	Active Alerts: 1 Press ▼ to view alert details FQXSPPU009N(Error) 04/07/2020 02:37:39 PM CPU 1 Status: Configuration Error

System VPD Information

Sub Menu	Example
<ul style="list-style-type: none"> • Machine type and serial number • Universal Unique ID (UUID) 	Machine Type: xxxx Serial Num: xxxxxx Universal Unique ID: xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx

System Firmware

Sub Menu	Example
UEFI <ul style="list-style-type: none"> Firmware level (status) Build ID Version number Release date 	UEFI (Inactive) Build: D0E101P Version: 1.00 Date: 2019-12-26
XCC Primary <ul style="list-style-type: none"> Firmware level (status) Build ID Version number Release date 	XCC Primary (Active) Build: DVI399T Version: 4.07 Date: 2020-04-07
XCC Backup <ul style="list-style-type: none"> Firmware level (status) Build ID Version number Release date 	XCC Backup (Active) Build: D8BT05I Version: 1.00 Date: 2019-12-30

XCC Network Information

Sub Menu	Example
<ul style="list-style-type: none"> XCC hostname MAC address IPv4 Network Mask IPv4 DNS IPv6 Link Local IP Stateless IPv6 IP Static IPv6 IP Current IPv6 Gateway IPv6 DNS <p>Note: Only the MAC address that is currently in use is displayed (extension or shared).</p>	XCC Network Information XCC Hostname: XCC-xxxx-SN MAC Address: xx:xx:xx:xx:xx:xx IPv4 IP: xx.xx.xx.xx IPv4 Network Mask :x.x.x.x IPv4 Default Gateway : x.x.x.x

System Environmental Information

Sub Menu	Example
<ul style="list-style-type: none">• Ambient temperature• Exhaust temperature• PSU status• Spinning speed of fans by RPM	Ambient Temp: 24 C Exhaust Temp: 30 C PSU1: Vin= 213 w Inlet= 26 C FAN1 Front: 21000 RPM FAN2 Front: 21000 RPM FAN3 Front: 21000 RPM FAN4 Front: 21000 RPM

Active Sessions

Sub Menu	Example
Quantity of active sessions	Active User Sessions: 1

Actions

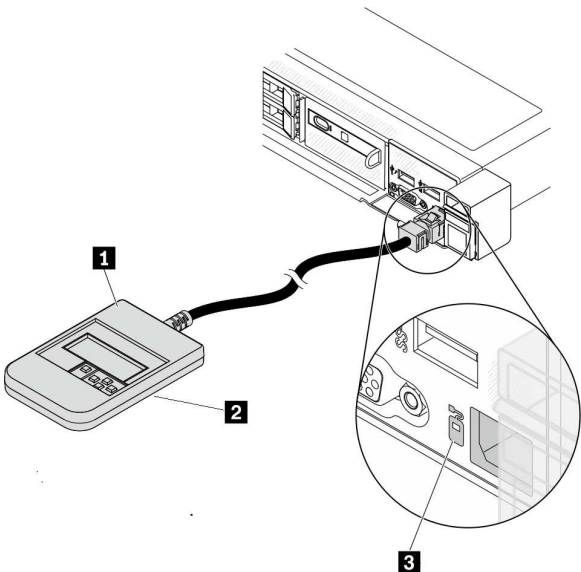
Sub Menu	Example
Several quick actions are available: <ul style="list-style-type: none">• Restore XCC to Defaults• Force XCC Reset• Request XCC Reset• Clear CMOS• Request Virtual Reseat• Modify XCC Static IPv4 Address/Net mask/Gateway• Modify System Name• Generate/Download FFDC Service Data• Remove FPGA Test Image	Request XCC Reset? This will request the BMC to reboot itself. Hold <input checked="" type="checkbox"/> for 3 seconds

External LCD diagnostics handset

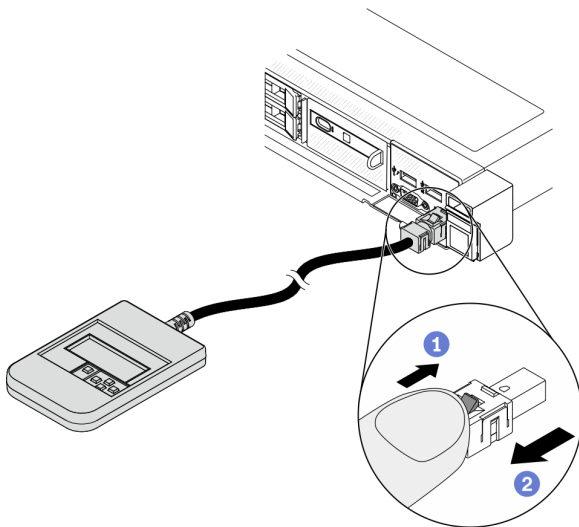
The external LCD diagnostics handset is an external device that is connected to the server with a cable, and it allows quick access to system information such as errors, system status, firmware, network, and health information.

Note: The external LCD diagnostics handset is an optional part that needs to be purchased separately.

Location of the external LCD diagnostics handset

Location	Callouts
<p>The external LCD diagnostics handset is connected to the server with an external cable.</p> 	<p>1 External LCD diagnostics handset</p> <p>2 Magnetic bottom With this component, the diagnostic handset can be attached to the top or side of the rack with hands spared for service tasks.</p> <p>3 External diagnostics connector This connector is located on the front of the server, and is used to connect an external LCD diagnostics handset.</p>

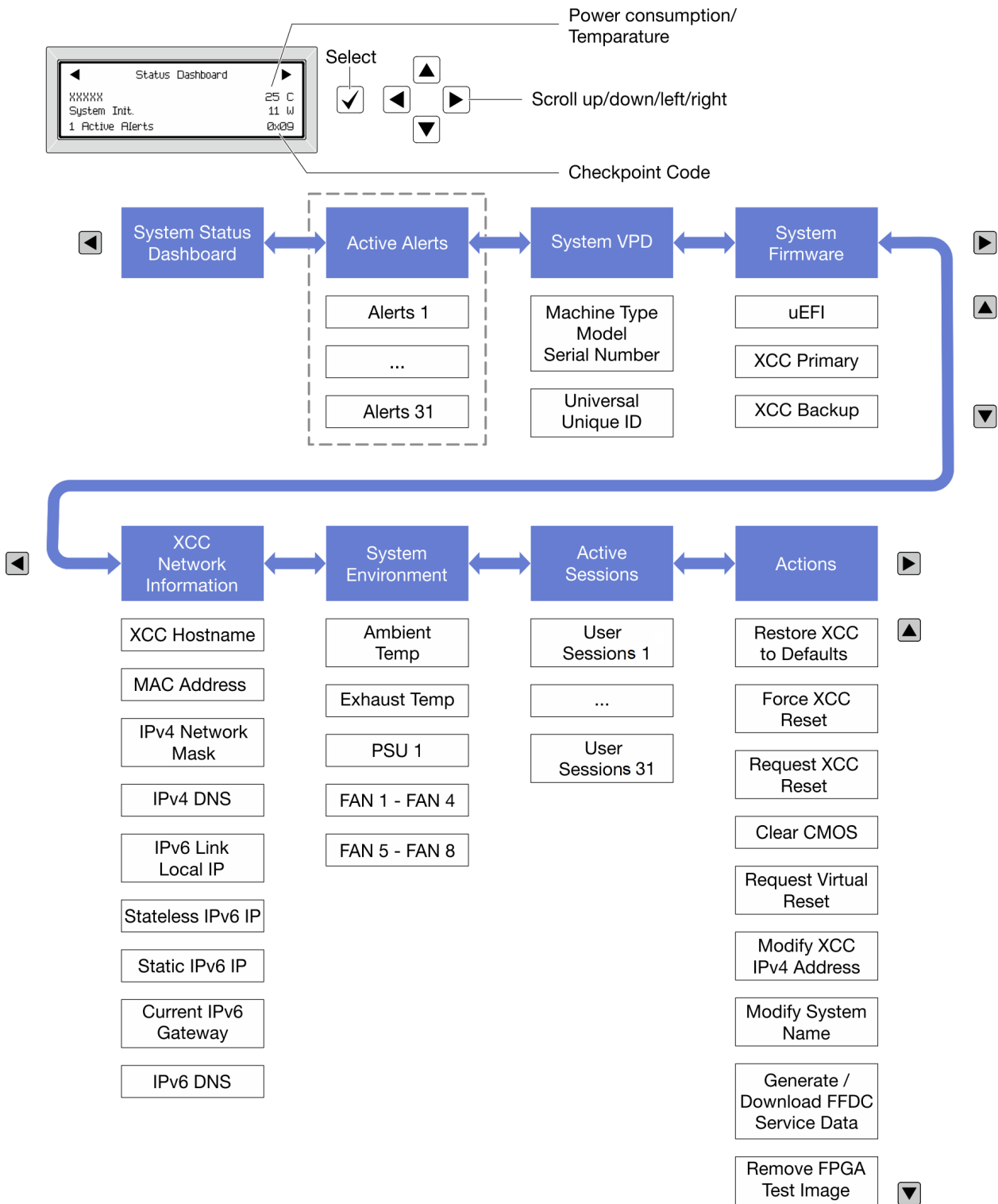
Note: When unplugging the external handset, see the following instructions:



- 1** Press the plastic clip on the plug forward.
- 2** Hold the clip and remove the cable from the connector.

Display panel overview

The diagnostics device consists of an LCD display and 5 navigation buttons.



Full menu list

Following is the list of available options. Switch between an option and the subordinate information entries with the select button, and switch among options or information entries with the scroll buttons.

Home Menu (System Status Dashboard)

Home Menu	Example
<ul style="list-style-type: none"> 1 System name 2 System status 3 Active alert quantity 4 Temperature 5 Power consumption 6 Checkpoint code 	<p>The screenshot shows a 'Status Dashboard' with the following information: <ul style="list-style-type: none"> 1: System name (xxxxxx) 2: System status (System Init.) 3: Active alert quantity (1 Active Alerts) 4: Temperature (25 C) 5: Power consumption (11 W) 6: Checkpoint code (0x09) </p>

Active Alerts

Sub Menu	Example
<p>Home screen: Active error quantity</p> <p>Note: The “Active Alerts” menu displays only the quantity of active errors. If no errors occur, the “Active Alerts” menu will not be available during navigation.</p>	<p>1 Active Alerts</p>
<p>Details screen:</p> <ul style="list-style-type: none"> • Error message ID (Type: Error/Warning/Information) • Occurrence time • Possible sources of the error 	<p>Active Alerts: 1 Press ▼ to view alert details FQXSPPU009N(Error) 04/07/2020 02:37:39 PM CPU 1 Status: Configuration Error</p>

System VPD Information

Sub Menu	Example
<ul style="list-style-type: none"> • Machine type and serial number • Universal Unique ID (UUID) 	<p>Machine Type: xxxx Serial Num: xxxxxx Universal Unique ID: xx</p>

System Firmware

Sub Menu	Example
UEFI <ul style="list-style-type: none"> Firmware level (status) Build ID Version number Release date 	UEFI (Inactive) Build: D0E101P Version: 1.00 Date: 2019-12-26
XCC Primary <ul style="list-style-type: none"> Firmware level (status) Build ID Version number Release date 	XCC Primary (Active) Build: DVI399T Version: 4.07 Date: 2020-04-07
XCC Backup <ul style="list-style-type: none"> Firmware level (status) Build ID Version number Release date 	XCC Backup (Active) Build: D8BT05I Version: 1.00 Date: 2019-12-30

XCC Network Information

Sub Menu	Example
<ul style="list-style-type: none"> XCC hostname MAC address IPv4 Network Mask IPv4 DNS IPv6 Link Local IP Stateless IPv6 IP Static IPv6 IP Current IPv6 Gateway IPv6 DNS <p>Note: Only the MAC address that is currently in use is displayed (extension or shared).</p>	XCC Network Information XCC Hostname: XCC-xxxx-SN MAC Address: xx:xx:xx:xx:xx:xx IPv4 IP: xx.xx.xx.xx IPv4 Network Mask :x.x.x.x IPv4 Default Gateway : x.x.x.x

System Environmental Information

Sub Menu	Example
<ul style="list-style-type: none">• Ambient temperature• Exhaust temperature• PSU status• Spinning speed of fans by RPM	Ambient Temp: 24 C Exhaust Temp: 30 C PSU1: Vin= 213 w Inlet= 26 C FAN1 Front: 21000 RPM FAN2 Front: 21000 RPM FAN3 Front: 21000 RPM FAN4 Front: 21000 RPM

Active Sessions

Sub Menu	Example
Quantity of active sessions	Active User Sessions: 1

Actions

Sub Menu	Example
Several quick actions are available: <ul style="list-style-type: none">• Restore XCC to Defaults• Force XCC Reset• Request XCC Reset• Clear CMOS• Request Virtual Reseat• Modify XCC Static IPv4 Address/Net mask/Gateway• Modify System Name• Generate/Download FFDC Service Data• Remove FPGA Test Image	Request XCC Reset? This will request the BMC to reboot itself. Hold <input checked="" type="checkbox"/> for 3 seconds

Rear view

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

Refer to the following rear view for different server models:

- “Server model with three PCIe slots” on page 39
- “Server model with two PCIe slots” on page 40
- “Server model with two hot-swap 2.5-inch rear drive bays and one PCIe slot” on page 40
- “Server model with two hot-swap 7mm rear drive bays and two PCIe slots” on page 41

Server model with three PCIe slots

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

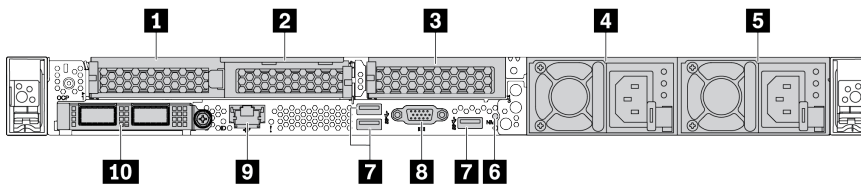


Table 14. Components on the rear of the server

Callout	Callout
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 2 (optional)
5 Power supply 1	6 NMI button
7 USB 3.2 Gen 1 (5Gbps) connectors (3 DCIs)	8 VGA connector
9 XClarity Controller network connector	10 Ethernet connectors on OCP 3.0 Ethernet adapter (optional)

Note: For more information about each component, see “Rear components overview” on page 41.

Server model with two PCIe slots

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

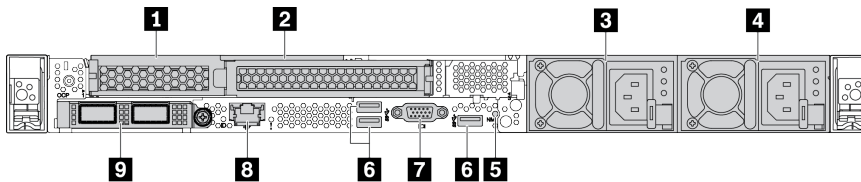


Table 15. Components on the rear of the server

Callout	Callout
1 PCIe slot 1 on riser 1 assembly	2 PCIe slot 2 on riser 1 assembly
3 Power supply 2 (optional)	4 Power supply 1
5 NMI button	6 USB 3.2 Gen 1 (5Gbps) connectors (3 DCIs)
7 VGA connector	8 XClarity Controller network connector
9 Ethernet connectors on OCP 3.0 Ethernet adapter (optional, two or four connectors may be available)	

Note: For more information about each component, see “Rear components overview” on page 41.

Server model with two 2.5-inch hot-swap rear drive bays and one PCIe slot

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

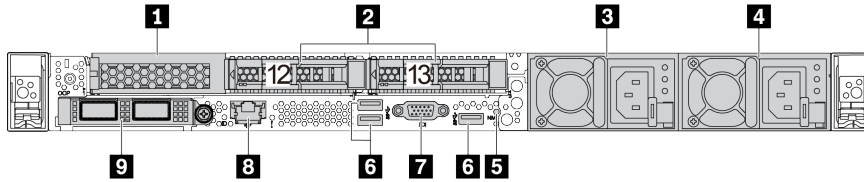


Table 16. Components on the rear of the server

1 PCIe slot 1 on riser 1 assembly	2 Rear 2.5-inch drive bays (2)
3 Power supply 2 (optional)	4 Power supply 1
5 NMI button	6 USB 3.2 Gen 1 (5Gbps) connectors (3 DCIs)
7 VGA connector	8 XClarity Controller network connector
9 Ethernet connectors on OCP 3.0 Ethernet adapter (optional, two or four connectors may be available)	

Note: For more information about each component, see “Rear components overview” on page 41.

Server model with two 7mm hot-swap rear drive bays and two PCIe slots

The following illustration shows the rear view of the server model with two 7mm hot-swap rear drive bays and two PCIe slots. Depending on the model, your server might look slightly different from the illustration below.

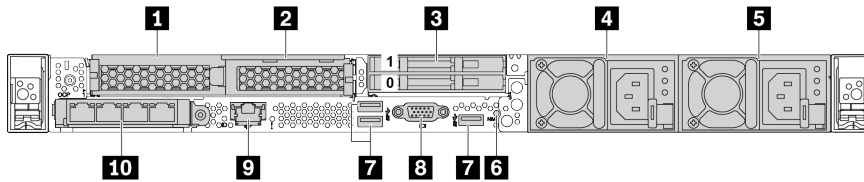


Table 17. Components on the rear of the server

1 PCIe slot 1 on riser 1 assembly	2 PCIe slot 2 on riser 1 assembly
3 Rear 7mm drive bays (2)	4 Power supply 2 (optional)
5 Power supply 1	6 NMI button
7 USB 3.2 Gen 1 (5Gbps) connectors (3 DCIs)	8 VGA connector
9 XClarity Controller network connector	10 Ethernet connectors on OCP 3.0 Ethernet adapter (optional, two or four connectors may be available)

Note: For more information about each component, see “Rear components overview” on page 41.

Rear components overview

Drive LEDs

Each hot-swap drive comes with an activity LED and status LED and the signals are controlled by the backplanes. Different colors and speeds indicate different activities or status of the drive. The following illustration shows the LEDs on a Hard disk drive or solid-state drive.

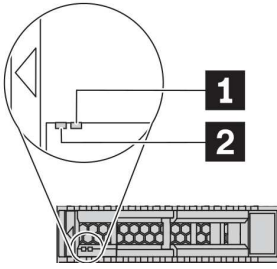


Figure 6. Drive LEDs

Drive LED	Status	Description
1 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.
2 Drive activity LED (left)	Solid green	The drive is powered but not active.
	Blinking green	The drive is active.

Ethernet connectors



Figure 7. OCP 3.0 Ethernet adapter (two connectors, seen from the rear)

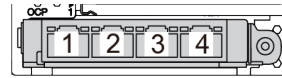


Figure 8. OCP 3.0 Ethernet adapter (four connectors, seen from the rear)

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

By default, Ethernet connector 1 (the first port starting from the left in the rear server view) on the OCP 3.0 Ethernet adapter can also function as a management connector using the shared management capacity. If the shared management connector fails, traffic can automatically switch over to another connector on the adapter.

Hot-swap drives and drive bays

The drive bays on the front and rear of your server are designed for hot-swap drives. 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. Vacant drive bays must be occupied by drive fillers.

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.

PCIe slots

The PCIe slots are on the rear of the server and your server supports up to three PCIe slots on riser 1 and 2 assemblies.

Power supply units

The hot-swap redundant power supply helps 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 43.

USB 3.2 Gen 1 (5Gbps) connectors

The USB 3.2 Gen 1 (5Gbps) connectors are direct connect interfaces (DCIs) for debugging, which can be used to attach a USB-compatible device, such as a USB keyboard, USB mouse, or USB storage device.

VGA connector

The VGA connectors on the front and rear of the server can be used to attach a high-performance monitor, a direct-drive monitor, or other devices that use a VGA connector.

XClarity Controller network connector

The XClarity Controller network connector can be used to attach an Ethernet cable to manage the baseboard management controller (BMC).

Rear view LEDs

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

Server rear view LEDs

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

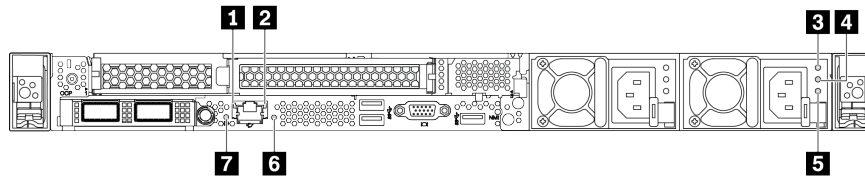


Figure 9. Rear view LEDs

Table 18. 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 BMC network connector has two status LEDs.

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

3 4 5 Power supply LEDs

Each hot-swap power supply has three status LEDs.

LED	Description
3 Power input LED	<ul style="list-style-type: none"> Green: The power supply is connected to the ac power source. Off: The power supply is disconnected from the ac power source or a power problem occurs.
4 Power output LED	<ul style="list-style-type: none"> Green: The server is on and the power supply is working normally. Blinking green: The power supply is in the zero-output mode (standby). When the server power load is low, one of the installed power supplies enters into the standby state while the other one delivers the entire load. When the power load increases, the standby power supply will switch to active state to provide sufficient power to the system. <p>To disable zero-output mode, log in to the Lenovo XClarity Controller web interface, choose Server Configuration → Power Policy, disable Zero Output Mode, and then click Apply. If you disable the zero-out mode, both power supplies will be in the active state.</p> <ul style="list-style-type: none"> Off: The server is powered off, or the power supply is not working properly. If the server is powered on but the LED is off, replace the power supply.
5 Power supply error LED	<ul style="list-style-type: none"> Yellow: The power supply has failed. To resolve the issue, replace the power supply. Off: The power supply is working normally.

6 System error LED

The system error LED helps you to determine if there are any system errors. For details, see “Diagnostics panel” on page 26.

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.

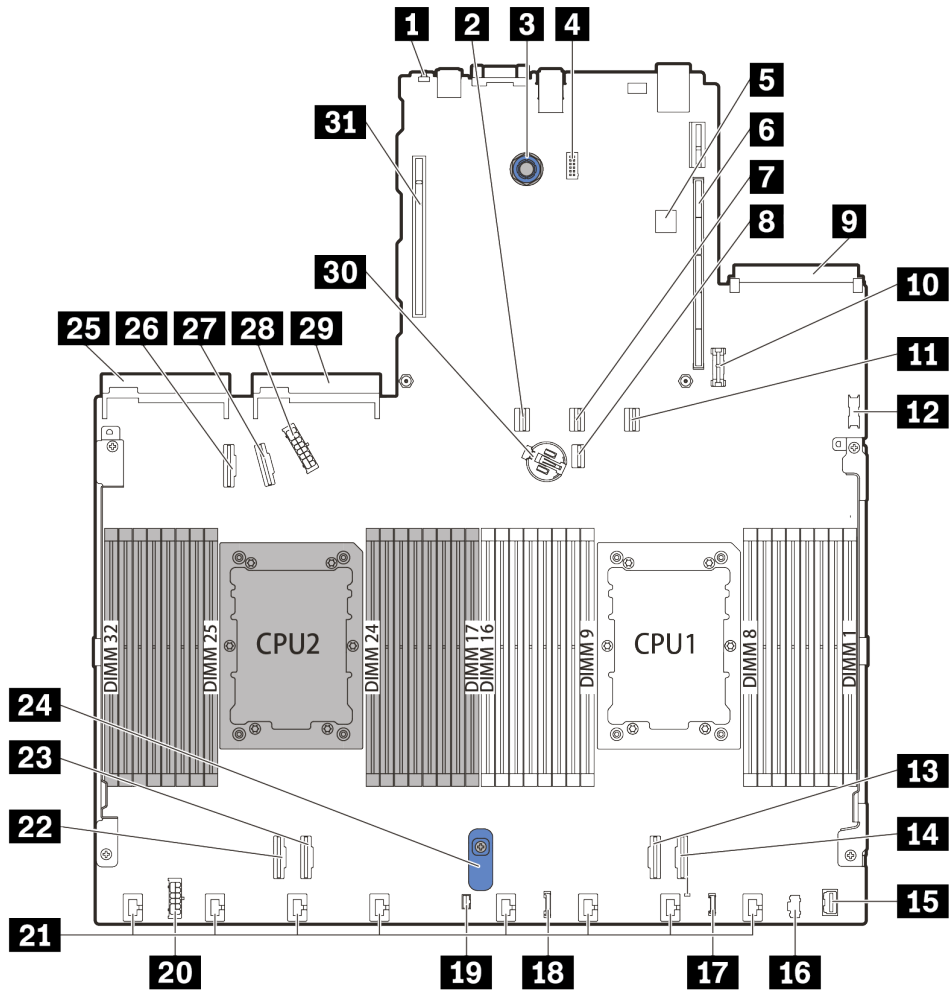


Figure 10. System board components

1 NMI Button	21 Fan 1-8 Connectors
2 SATA Connector 0	22 PCIe Connector 3
3 System Board Release Pin	23 PCIe Connector 4
4 Serial Port Module Connector	24 System Board Lift Handle
5 Internal USB Connector	25 Power Supply 1 Connector
6 Riser 1 Slot	26 PCIe Connector 5
7 SATA Connector 1	
8 7mm/M.2 Signal Connector	
9 OCP 3.0 Network Card Connector	
10 TPM Module Connector	
11 SATA 2/Rear Backplane Signal Connector	
12 Front USB Connector	
13 PCIe Connector 1	
14 PCIe Connector 2	
15 Front VGA Connector	
16 M.2 Power Connector	
17 External LCD Connector	
18 Front Panel Connector	
19 Intrusion Switch Connector	
20 Internal RAID Power Connector	

27 PCIe Connector 6	28 Front Backplane Power Connector
29 Power Supply 2 Connector	30 3V Battery (CR2032)
31 Riser 2 slot	

System board LEDs

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

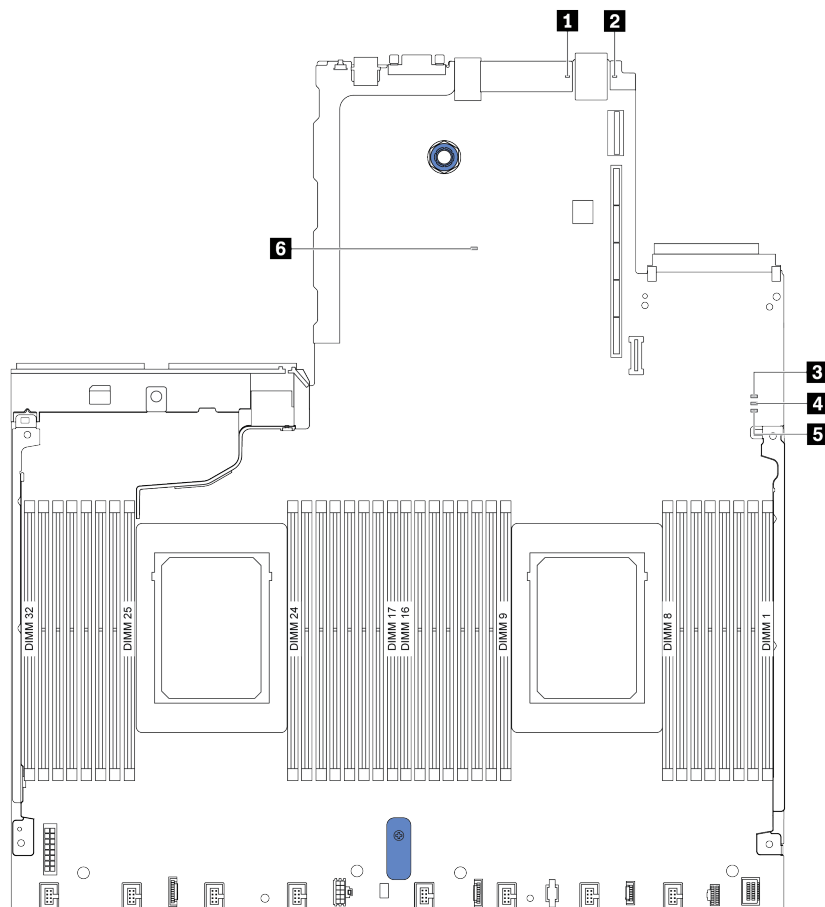


Figure 11. System board LEDs

Table 19. LEDs on the system board

Callout	Callout
1 System error LED	2 System ID LED
3 FPGA error LED	4 FPGA power LED
5 FPGA heart beat LED	6 BMC heart beat LED

1 System error LED

When this yellow LED is lit, one or more LEDs elsewhere in the server might also be lit to direct you to the source of the error. For more information, see “Rear view LEDs” on page 43.

2 System ID LED

The blue system ID LED helps you to visually locate the server. A system ID LED is also located on the front of the server. Each time you press the system ID button, the state of both the system ID LEDs changes. The LEDs can be changed to on, blinking, or off.

3 FPGA error LED

The FPGA error LED helps you identify different FPGA errors.

Status	Color	Description
On	Green	FPGA running image is test build image.
Blinking	Green	<ul style="list-style-type: none">Blinking (blinking slowly, about one flash per second): One or more power fault occur.Blinking (blinking rapidly, about four flashes per second): FPGA does not assert RSMRST_N.
Off	None	No power faults occur.

4 FPGA power LED

The FPGA power LED helps you identify different FPGA errors.

Status	Color	Description
On	Green	The FPGA power is on.
Blinking	Green	<ul style="list-style-type: none">Blinking (blinking slowly, about one flash per second): The FPGA power is off.Blinking (blinking rapidly, about four flashes per second): The FPGA permission is delayed.

5 FPGA heart beat LED

The FPGA heart beat LED helps you identify different FPGA errors.

Status	Color	Description
On or Off	Green	FPGA does not work.
Blinking	Green	FPGA works normally.

6 BMC heart beat LED

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

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

Switch block

The following illustrates the location and functions of the switch block on the system board.

Important:

- Before you move any switch, turn off the server; then, disconnect all power cords and external cables. Do not open your server or attempt any repair before reading and understanding the following information:
 - http://thinksystem.lenovofiles.com/help/topic/safety_documentation/pdf_files.html
 - “Handling static-sensitive devices” on page 85
- If there is a clear protective sticker on the top of the switch block, you must remove and discard it to access the switches.
- Any system-board switch or jumper block that is not shown in the illustrations in this document is reserved.

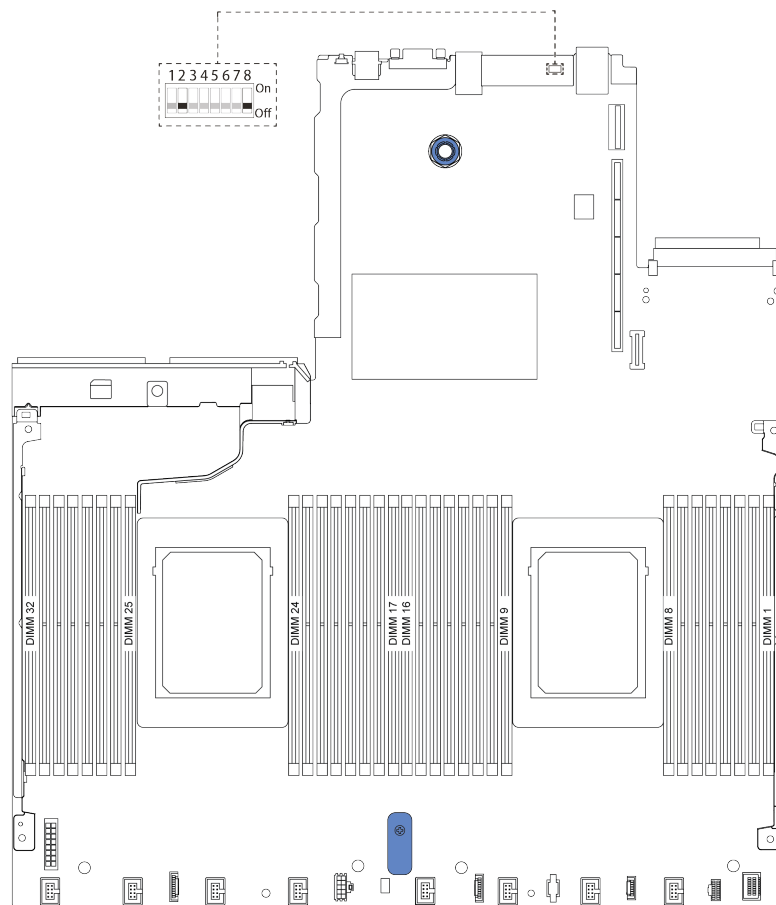


Figure 12. Switch block location on the system board

Table 20. Switch description

Switch number	Switch name	Description
1 SW8-1	ME firmware security override switch	<ul style="list-style-type: none"> • OFF: The switch is in default setting. • ON: Enable Flash security override.
2 SW8-2	Clear CMOS switch	<ul style="list-style-type: none"> • OFF: The switch is in default setting. • ON: Clear the real-time clock (RTC) registry.

Table 20. Switch description (continued)

Switch number	Switch name	Description
3 SW8-3	Force XCC reset switch	<ul style="list-style-type: none"> • OFF: The switch is in default setting. • ON: Reset the Lenovo XClarity Controller.
4 SW8-4	Force XCC update switch	<ul style="list-style-type: none"> • OFF: The switch is in default setting. • ON: Force XClarity Controller firmware to enter the booting mode (for development purpose only).
5 SW8-5	XCC SPI0 half ROM switch	<ul style="list-style-type: none"> • OFF: The switch is in default setting. • ON: Force XClarity Controller to boot from a backup image.
6 SW8-6	Low security switch	<ul style="list-style-type: none"> • OFF: The switch is in default setting. • ON: Enable low security mode for XClarity Controller firmware (For development purpose only).
7 SW8-7	Reserved	Reserved
8 SW8-8	Override power-on password switch	<ul style="list-style-type: none"> • OFF: The switch is in default setting. • ON: Override the power-on password.

Parts list

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

For more information about ordering the parts shown in Figure 13 “Server components” on page 50:

<https://datacentersupport.lenovo.com/products/servers/thinksystem/sr630v2/7z70/parts>

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

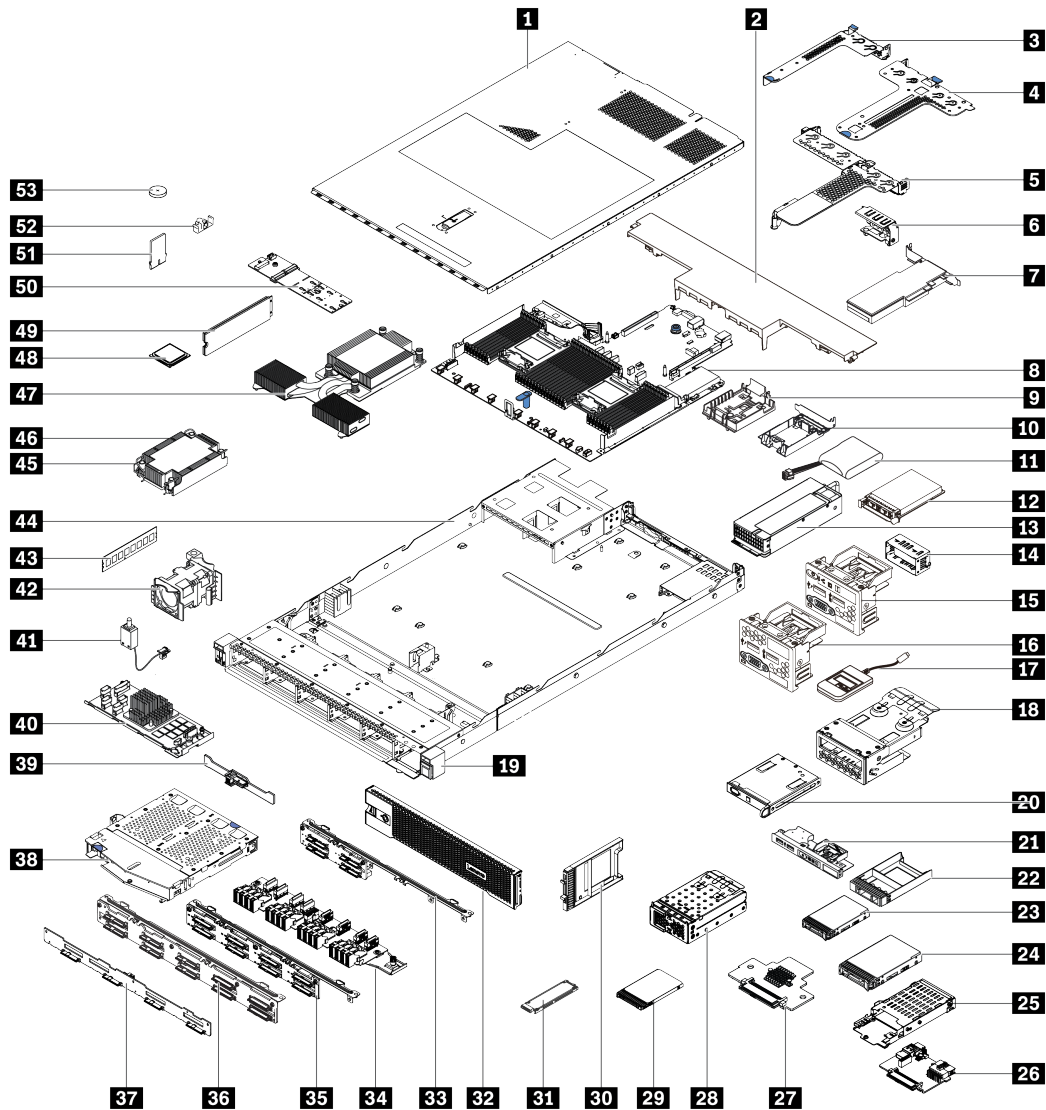


Figure 13. Server components

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

- **Tier 1 customer replaceable unit (CRU):** Replacement of Tier 1 CRUs is your responsibility. If Lenovo installs a Tier 1 CRU at your request with no service agreement, you will be charged for the installation.
- **Tier 2 customer replaceable unit (CRU):** You may install a Tier 2 CRU yourself or request Lenovo to install it, at no additional charge, under the type of warranty service that is designated for your server.
- **Field replaceable unit (FRU):** FRUs must be installed only by trained service technicians.
- **Consumable and Structural parts:** Purchase and replacement of consumable and structural parts is your responsibility. If Lenovo acquires or installs a structural component at your request, you will be charged for the service.

Note: Unless otherwise specified in other agreements or contract terms, parts beyond their warranty terms and/or parts that have reached their maximum usage limitations do not qualify for warranty service.

Table 21. 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 13 “Server components” on page 50: https://datacentersupport.lenovo.com/products/servers/thinksystem/sr630v2/7z70/parts					
1	Top cover	√			
2	Standard air baffle	√			
3	Riser assembly (LP)	√			
4	Riser assembly (LP+LP)	√			
5	Riser assembly (LP+FH)	√			
6	Rearwall bracket				√
7	PCIe adapter	√			
8	System board			√	
9	RAID super capacitor holder (on chassis)				√
10	RAID super capacitor holder (in riser cage)				√
11	RAID super capacitor	√			
12	OCP 3.0 Ethernet adapter	√			
13	Power supply unit	√			
14	Power supply unit filler				√
15	Front I/O assembly with diagnostics panel (right)	√			
16	Front I/O assembly	√			
17	External LCD diagnostics handset	√			
18	LCD diagnostics panel assembly	√			
19	EIA (right)				√
20	LCD diagnostics panel	√			
21	Front I/O assembly with diagnostics panel (top)	√			
22	2.5-in drive bay filler				√
23	2.5-inch drive	√			
24	3.5-inch drive	√			
25	7mm drive cage	√			
26	7mm drive backplane (bottom)		√		
27	7mm drive backplane (top)		√		

Table 21. Parts list (continued)

Index	Description	Tier 1 CRU	Tier 2 CRU	FRU	Consumable and Structural parts
28	4-EDSFF cage	√			
29	7mm drive	√			
30	7mm drive bay filler				√
31	EDSFF drive	√			
32	Security bezel	√			
33	4 x 2.5-inch front drive backplane	√			
34	16-EDSFF front drive backplane	√			
35	8 x 2.5-inch front drive backplane	√			
36	10 x 2.5-inch front drive backplane		√		
37	4 x 3.5-inch front drive backplane	√			
38	2 x 2.5-inch rear drive cage	√			
39	2 x 2.5-inch rear drive backplane	√			
40	Internal RAID module		√		
41	Intrusion switch cable	√			
42	Fan module	√			
43	Memory module	√			
44	Chassis			√	
45	Heat sink PEEK nut		√		
46	Standard heat sink			√	
47	Performance heat sink (T-shape)			√	
48	Processor			√	
49	M.2 drive	√			
50	M.2 adapter	√			
51	TPM adapter (for Chinese Mainland only)			√	
52	M.2 retainer clip	√			
53	CMOS battery (CR2032)				√

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 of 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 of 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.

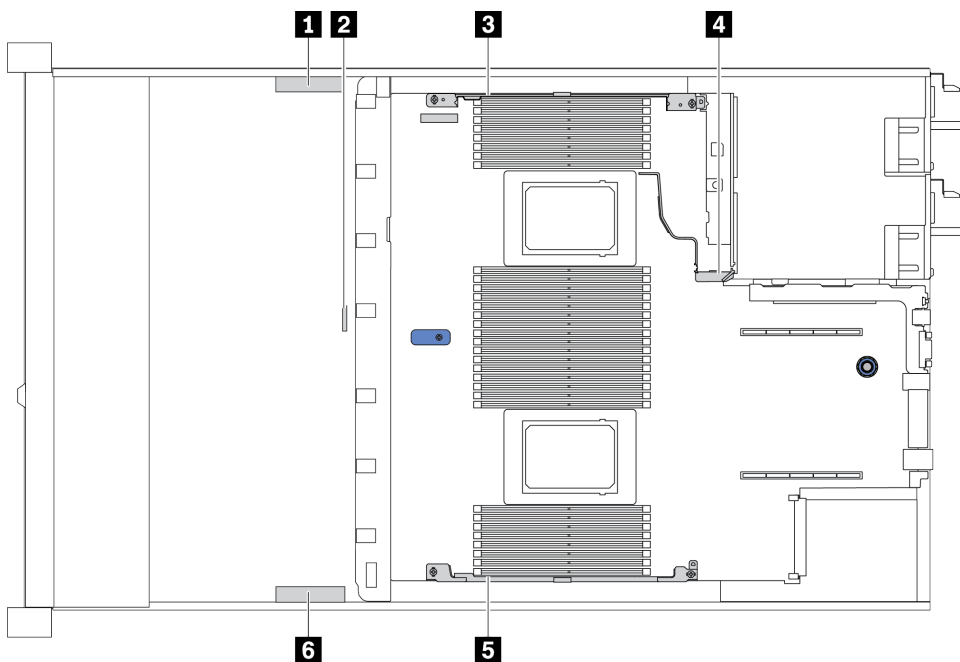
Chapter 3. Internal cable routing

Some of the components in the server have internal cables and cable connectors. For details, see the following cable routing sections:

- [“CFF HBA/RAID adapter” on page 57](#)
- [“Front I/O” on page 58](#)
- [“Intrusion switch” on page 59](#)
- [“RAID super capacitor modules” on page 60](#)
- [“M.2 drive backplane” on page 62](#)
- [“16-EDSFF drive backplane” on page 63](#)
- [“7mm drive backplane” on page 64](#)
- [“2.5-inch/3.5-inch drive backplane \(power\)” on page 65](#)
- [“2.5-inch/3.5-inch drive backplane \(signal\)” on page 66](#)

Read the following guidelines carefully before you connect any cables:

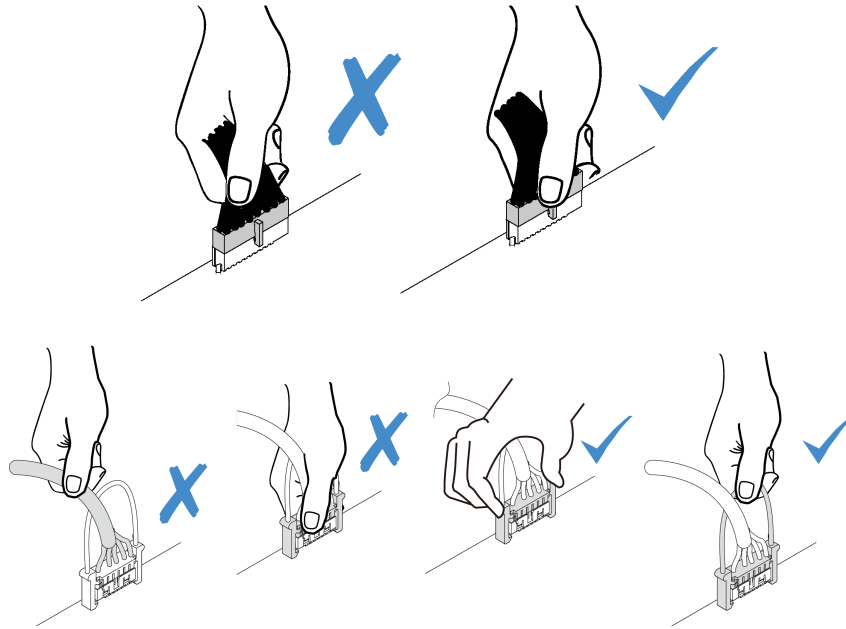
- Power off the server before you connect or disconnect any internal cables.
- See the documentation that comes with any external devices for additional cabling instructions. It might be easier for you to route cables before you connect the devices to the server.
- Cable identifiers of some cables are 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.



Cable holder	Route
1 3 4	Route to BP Pwr connector, RAID Pwr connector, and PCIe connectors (3, 4, 5, 6)

2	Route to intrusion switch cable
5 6	Route to FIO connector, LCD external connector, M.2 Pwr connector, VGA connector, Front USB connector, PCIe connectors (1, 2, 7, 8), 7mm/M.2 connector, SATA connectors (0, 1, 2), and RAID/HBA connectors

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

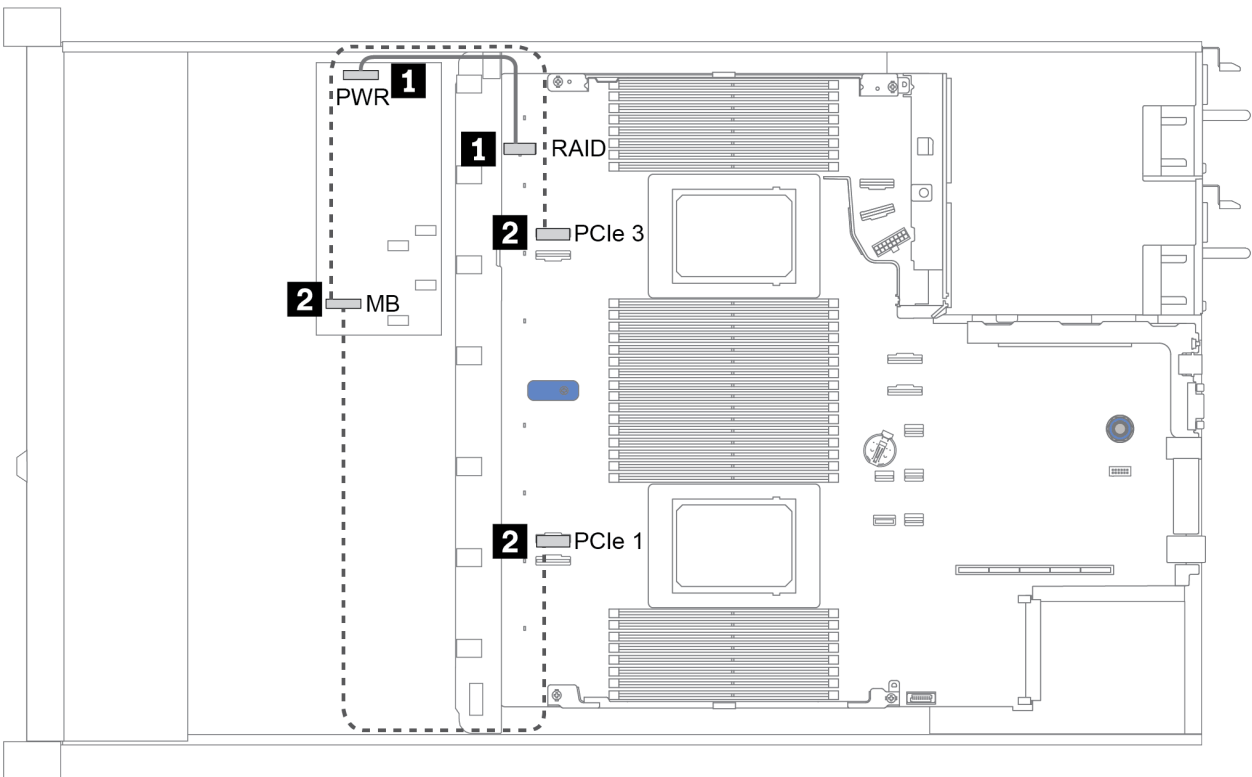


CFF HBA/RAID adapter

Use the section to understand the power cable and input cable routing for CFF HBA/RAID adapter.

Power cable routing for CFF HBA/RAID adapters

Note: The illustration only involves power cable and input cable routing. For signal cable routing of CFF HBA/RAID adapters, see “2.5-inch/3.5-inch drive backplane (signal)” on page 66



From	To
1 Power connector on the CFF HBA/RAID adapter	Internal RAID connector on the system board
2 Input connector on the CFF HBA/RAID adapter	PCIe 1 (for server model with 8 x 2.5-inch front drive bays) or PCIe 3 (for server model with 10 x 2.5-inch front drive bays)

Front I/O

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

Cable routing for Front I/O

Note: The illustration shows the cabling scenario for server models with four 3.5-inch front drive bays. Location of each connector on the front of the server varies by models. For detailed location of front I/O components for different models, see “Front view” on page 19.

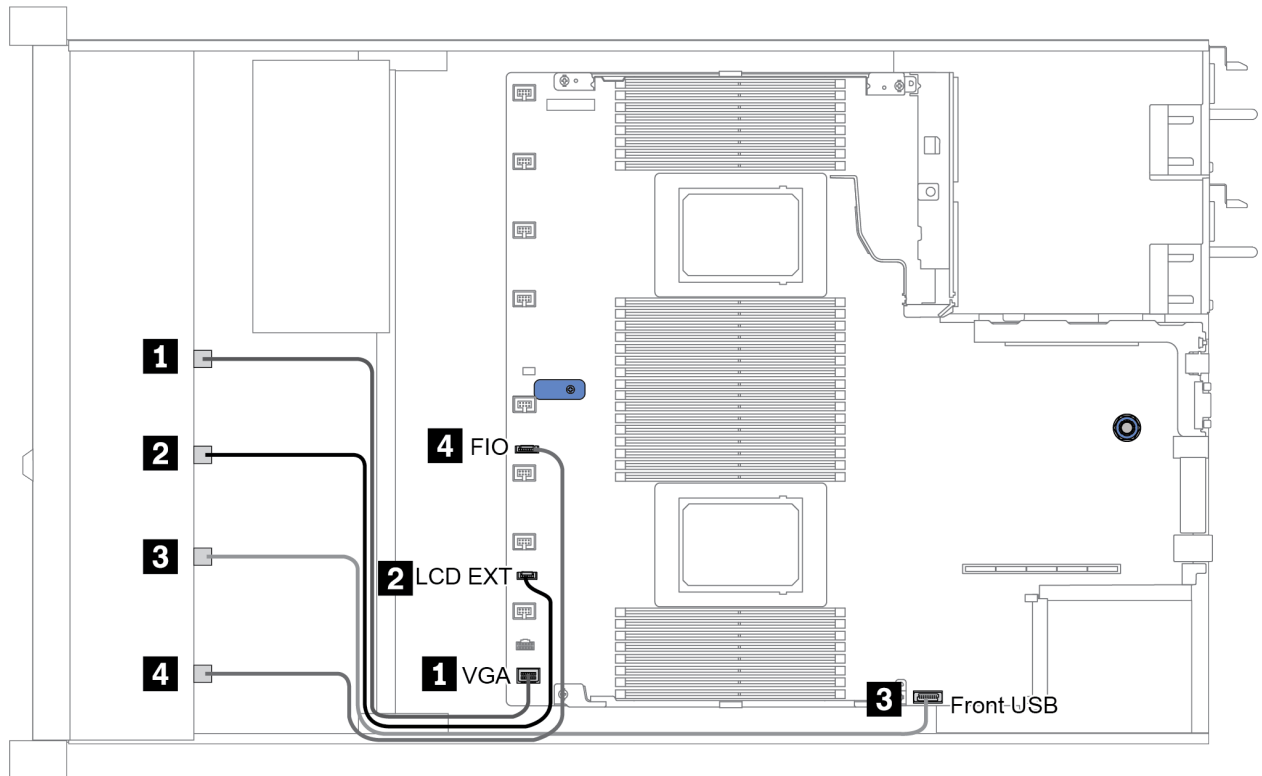


Figure 14. Cable routing for Front I/O

From	To
1 VGA cable	VGA connector on the system board
2 LCD external diagnostics handset cable	LCD EXT connector on the system board
3 USB cable	Front USB connector on the system board
4 Front diagnostic panel cable	FIO connector on the system board

Intrusion switch

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

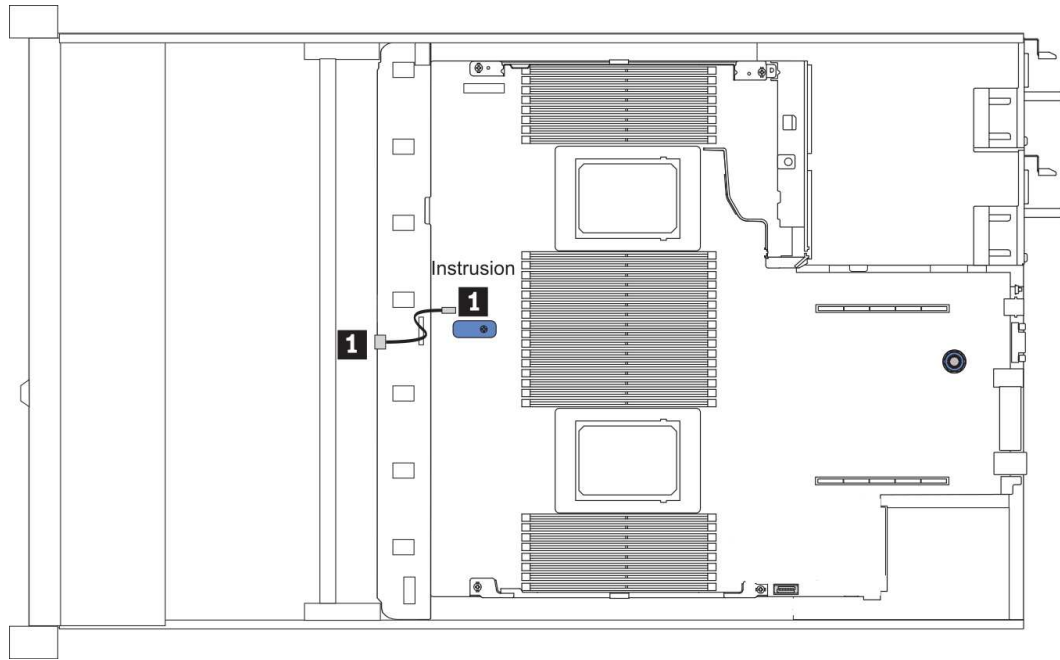


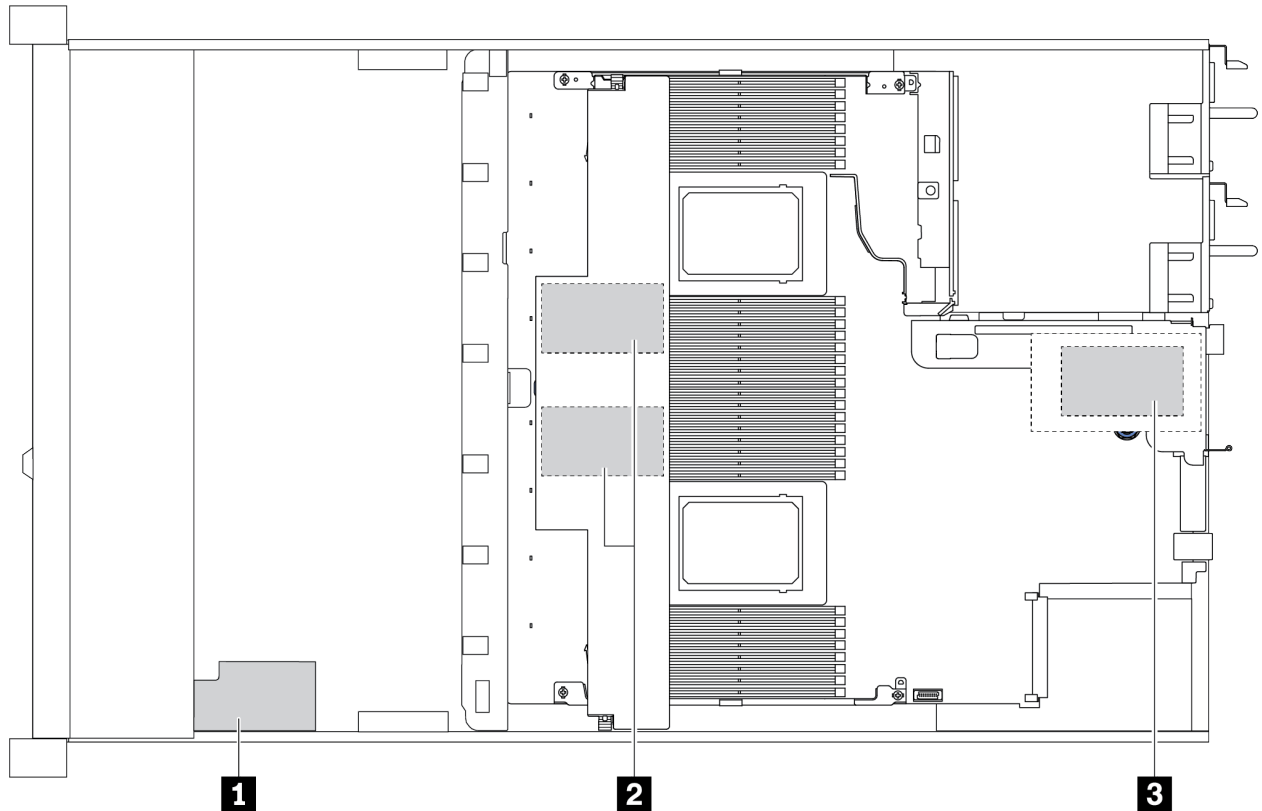
Figure 15. Intrusion switch cable routing

From	To
1 Intrusion switch cable on the fan cage	Intrusion switch connector on the system board

RAID super capacitor modules

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

RAID super capacitor module locations



No.	Location	Scenario
1	Super capacitor on the chassis	2.5" chassis installed with a standard or performance heat sink
2	Super capacitors in the air baffle	2.5" or 3.5" chassis installed with a standard heat sink
3	Super capacitors in the riser 1 slot	3.5" chassis installed with a performance heat sink

An extension cable is provided for each RAID super capacitor module for connection. Connect the super capacitor cable to the super capacitor connector on the corresponding RAID adapter as shown.

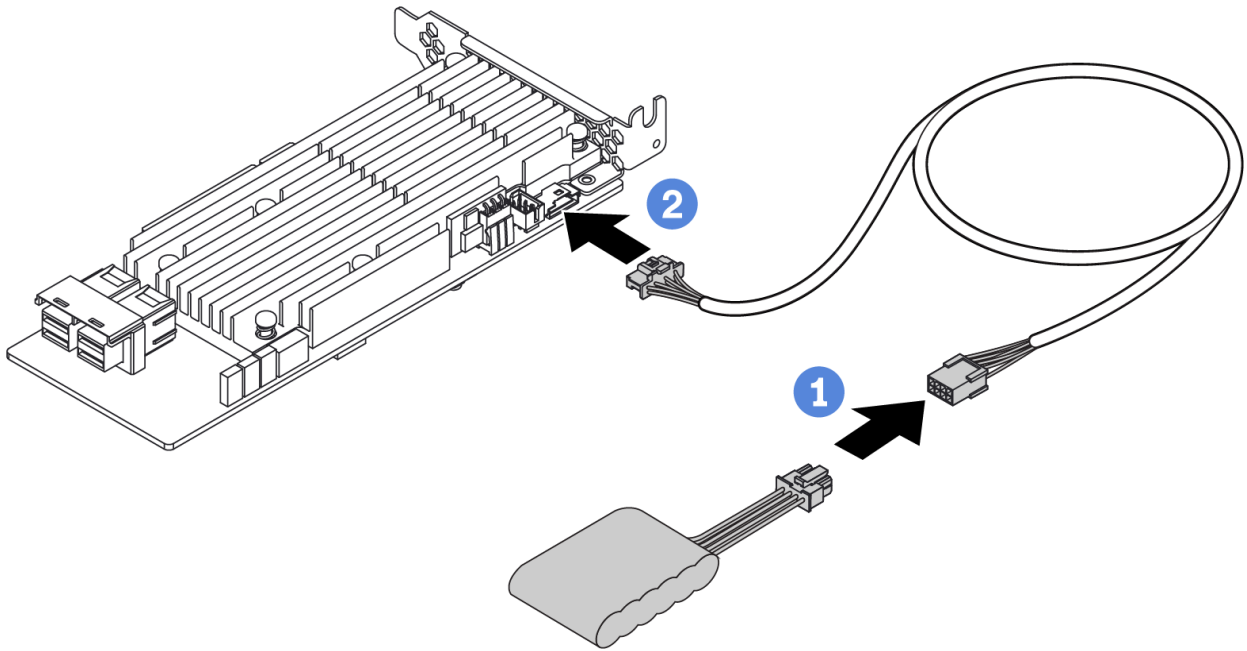


Figure 16. Power cable routing for super capacitor

From	To
RAID super capacitor module	Super capacitor connector on the RAID adapter

M.2 drive backplane

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

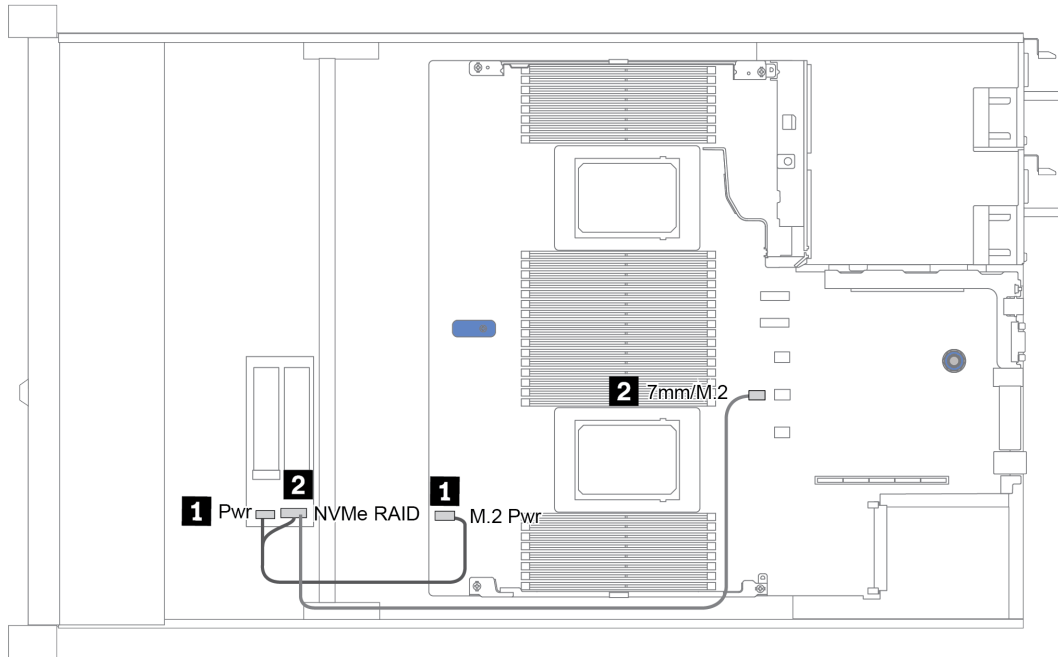


Figure 17. Cable routing for M.2 drives

From	To
1 Power cable	M.2 power connector on the system board
2 M.2 signal cable	7mm/M.2 signal connector on the system board

16-EDSFF drive backplane

This section provides cable routing information for the EDSFF drives.

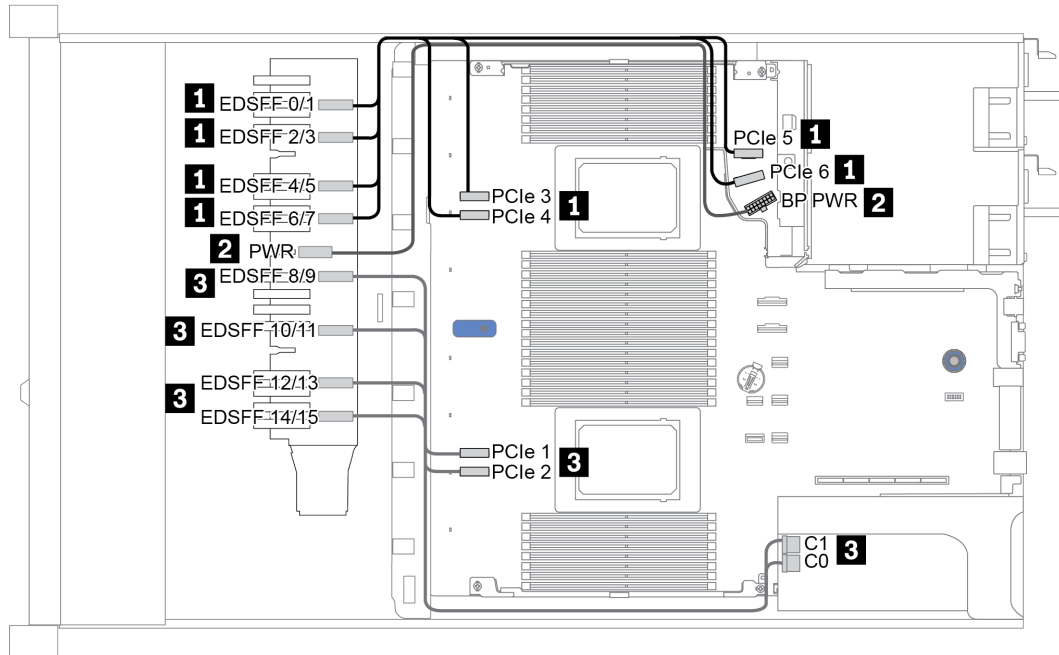


Figure 18. Cable routing for EDSFF drives

From	To
1 EDSFF 0/1	PCIe 6
1 EDSFF 2/3	PCIe 5
1 EDSFF 4/5	PCIe 4
1 EDSFF 6/7	PCIe 3
2 Power connector on the drive backplane	Front backplane power connector on the system board
3 EDSFF 8/9	C1 on the retimer card
3 EDSFF 10/11	C0 on the retimer card
3 EDSFF 12/13	PCIe 2
3 EDSFF 14/15	PCIe 1

7mm drive backplane

This section provides cable routing information for the 7mm drives.

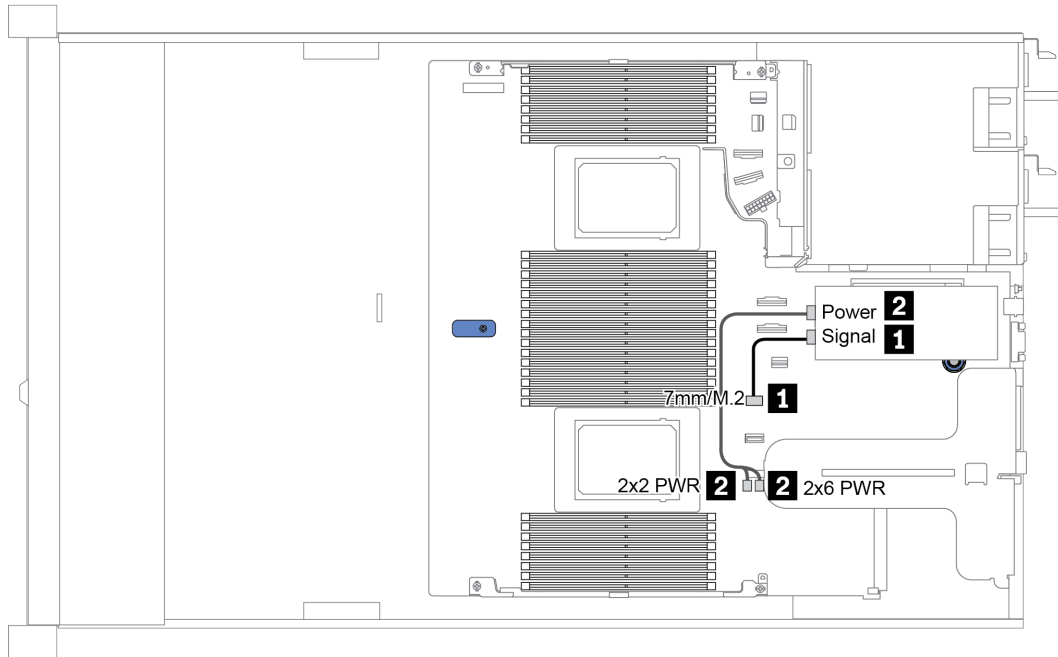


Figure 19. Cable routing for 7mm drives

From	To
1 7mm signal cable	7mm/M.2 signal connector on the system board
2 Power cable	Power connectors on the rise card on the riser 1 assembly

2.5-inch/3.5-inch drive backplane (power)

Use the section to understand the power cable routing for 2.5-inch or 3.5-inch drive backplanes.

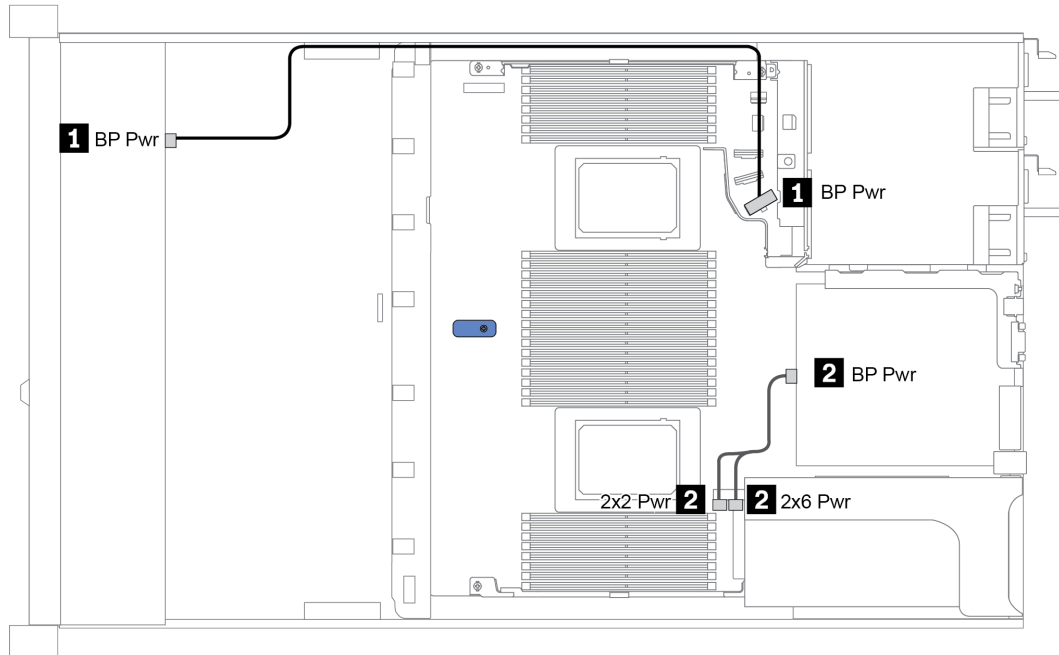


Figure 20. Backplane power cable connection

From	To
1 Power connector on the front drive backplane	Front backplane power connector on the system board
2 Power connector on the rear drive backplane	Power connectors on the riser card on the riser 1 assembly

2.5-inch/3.5-inch drive backplane (signal)

Use the section to understand the cable routing for signal cable connections for 2.5-inch/3.5-inch drive backplanes.

Your server supports the following server models with:

- [“4 x 3.5-inch front drive bays” on page 66](#)
- [“4 x 2.5-inch front drive bays” on page 70](#)
- [“8 x 2.5-inch front drive bays” on page 73](#)
- [“10 x 2.5-inch front drive bays” on page 78](#)

4 x 3.5-inch front drive bays

Use this section to understand the backplane cable routing for server model with four 3.5-inch front drives.

To connect cables for a 7mm drive backplane, refer to “7mm drive backplane” on page 64.

To connect power cables for a backplane for standard 2.5-inch or 3.5-inch drives, refer to “2.5-inch/3.5-inch drive backplane (power)” on page 65.

To connect signal cables for a backplane for standard 4 x 3.5-inch front drives, refer to the following cable routing scenarios depending on your server configuration:

- “Cable routing for onboard configuration” on page 67
- “Cable routing with an SFF HBA/RAID adapter” on page 68
- “Cable routing with an SFF RAID adapter (tri-mode)” on page 69

Cable routing for onboard configuration

The following table shows the mapping relationship between backplane connectors and system board connectors for onboard configuration.

Table 22. Mapping between backplane connectors and system board connectors for onboard configuration

Backplanes	From	To
Front BP (NVMe)	NVMe 0-1*, 2-3*	PCIe 1, PCIe 2
Front BP (SAS)	SAS	SATA 0
Rear BP (if any)	SAS	SATA 2
	NVMe 0, NVMe 1	PCIe 6

Note: *NVMe 0-1 and NVMe 2-3 connectors are available only when the 4 x 3.5" AnyBay front backplane is used.

The following figure illustrates the cable routing for the onboard configuration of 4 x 3.5-inch front AnyBay drive bays with a rear 2 x 2.5-inch NVMe drive cage. Connections between connectors: **1** ↔ **1**, **2** ↔ **2**, **3** ↔ **3**, ... **n** ↔ **n**

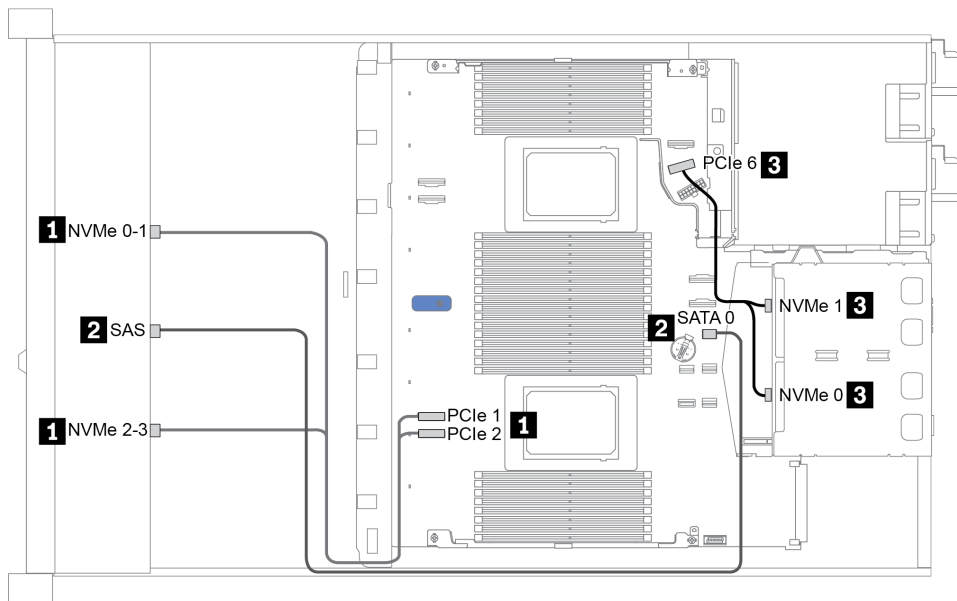


Figure 21. Cable routing for onboard configuration of 4 x 3.5-inch front AnyBay drive bays with a rear 2 x 2.5-inch NVMe drive cage

Cable routing with an SFF HBA/RAID adapter

The following table shows the mapping relationship between backplane connectors and system board/adapter connectors when an 8i SFF HBA/RAID adapter (Gen 3 or Gen 4) is installed.

Table 23. Mapping between backplane connectors and system board/adapter connectors when an SFF HBA/RAID adapter is installed

Backplanes	From	To
Front BP (NVMe)	NVMe 0-1*, 2-3*	PCIe 1, PCIe 2
Front BP (SAS)	SAS	C0
Rear BP (if any)	SAS	Gen 3: C1; Gen 4: C0
	NVMe 0, NVMe 1	PCIe 6

Notes:

- *NVMe 0-1 and NVMe 2-3 connectors are available only when the 4 x 3.5" AnyBay front backplane is used.
- Gen 3 and Gen 4 SFF HBA/RAID adapters are slightly different in their connectors, but the cable routing method is similar.

The following figure illustrates the cable routing for the configuration of 4 x 3.5-inch front AnyBay drive bays with an 8i SFF RAID adapter (Gen 4) and a rear 2 x 2.5-inch SAS/SATA drive cage. Connections between connectors: **1** ↔ **1**, **2** ↔ **2**, **3** ↔ **3**, ... **n** ↔ **n**

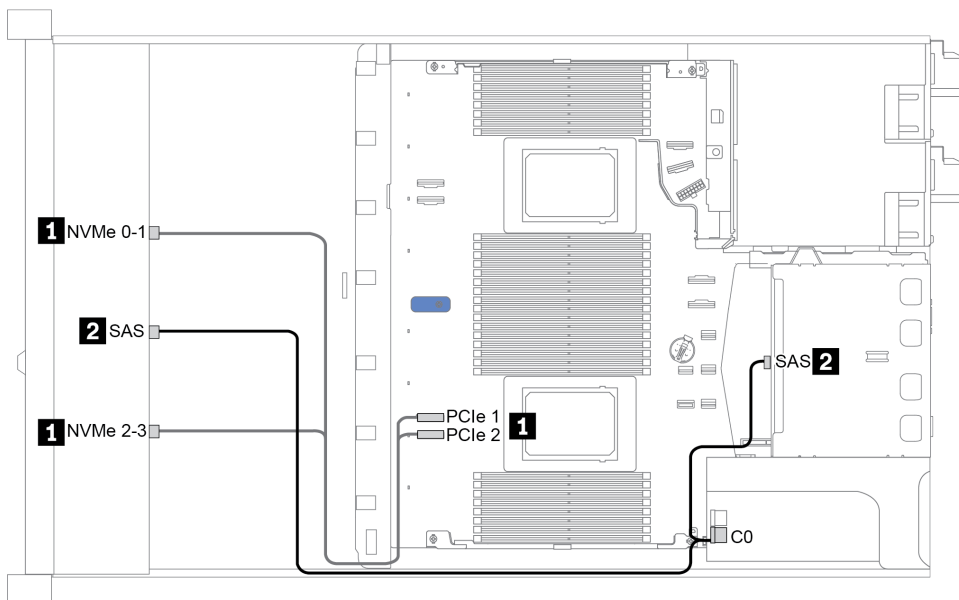


Figure 22. Cable routing for 4 x 3.5-inch front AnyBay drive bays with an 8i SFF RAID adapter (Gen 4) and a rear 2 x 2.5-inch SAS/SATA drive cage

Cable routing with an SFF RAID adapter (tri-mode)

The following table shows the mapping relationship between backplane connectors and adapter connectors when a Gen 4 8i SFF RAID adapter (tri-mode) is installed.

Table 24. Mapping between backplane connectors and adapter connectors when a Gen 4 8i SFF RAID adapter (tri-mode) is installed

Backplane	From	To
Front BP (SAS)	SAS 0	C0

Note: If a tri-mode RAID adapter is used, only U.3 front drives are supported, and U.2 front drives are not supported.

The following figure illustrates the cable routing for the configuration of 4 x 3.5-inch front U.3 drive bays with a 16i SFF RAID adapter (tri-mode). Connections between connectors: **1** ↔ **1**, **2** ↔ **2**, **3** ↔ **3**, ... **n** ↔ **n**

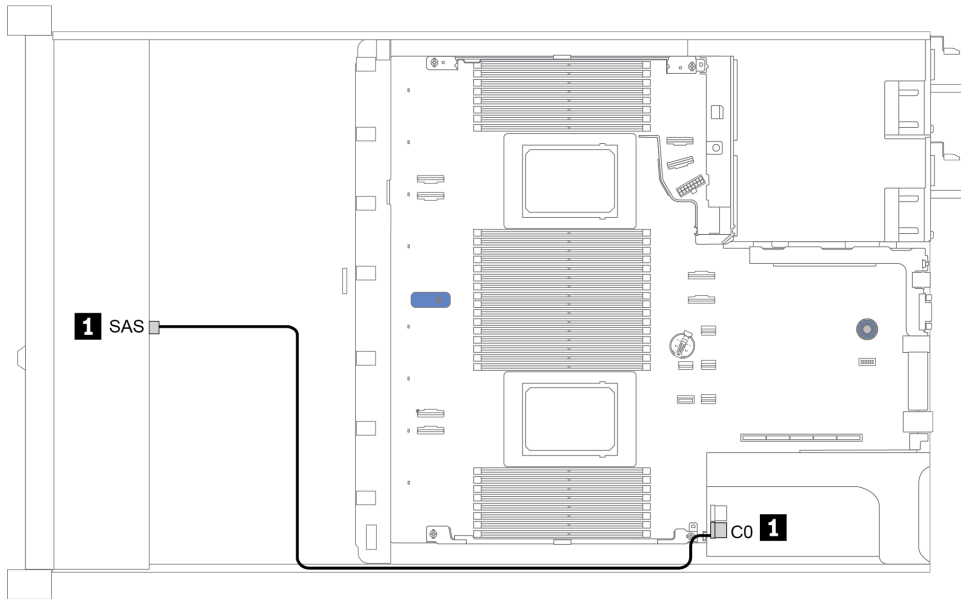


Figure 23. Cable routing for 4 x 3.5-inch front U.3 drive bays with a Gen 4 8i SFF RAID adapter (tri-mode)

4 x 2.5-inch front drive bays

Use this section to understand the backplane cable routing for server model with four 2.5-inch front drives.

To connect cables for a 7mm drive backplane, refer to “7mm drive backplane” on page 64.

To connect power cables for a backplane for standard 2.5-inch or 3.5-inch drives, refer to “2.5-inch/3.5-inch drive backplane (power)” on page 65.

To connect signal cables for a backplane for standard 4 x 2.5-inch front drives, refer to the following cable routing scenarios depending on your server configuration:

- “Cable routing for onboard configuration” on page 71
- “Cable routing with an SFF HBA/RAID adapter” on page 72

Cable routing for onboard configuration

The following table shows the mapping relationship between backplane connectors and system board connectors for onboard configuration.

Table 25. Mapping between backplane connectors and system board connectors for onboard configuration

Backplanes	From	To
Front BP (SAS)	SAS	SATA 0

The following figure illustrates the cable routing for the onboard configuration of 4 x 2.5-inch front SAS/SATA drive bays. Connections between connectors: **1** ↔ **1**, **2** ↔ **2**, **3** ↔ **3**, ... **n** ↔ **n**

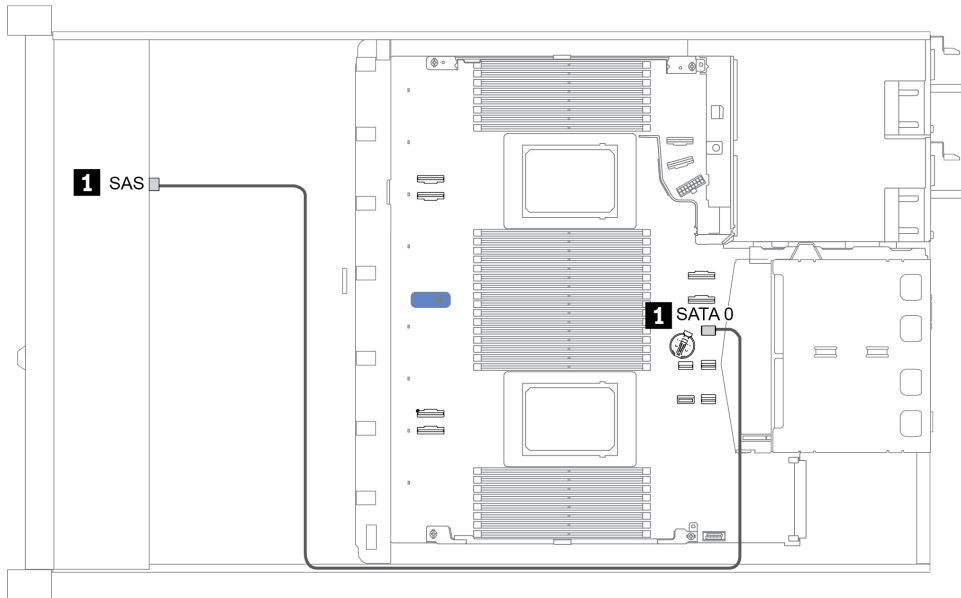


Figure 24. Cable routing for onboard configuration of 4 x 2.5-inch front SAS/SATA drive bays

Cable routing with an SFF HBA/RAID adapter

The following table shows the mapping relationship between backplane connectors and adapter connectors when an 8i SFF HBA/RAID adapter (Gen 3 or Gen 4) is installed.

Table 26. Mapping between backplane connectors and adapter connectors when an SFF HBA/RAID adapter is installed

Backplanes	From	To
Front BP (SAS)	SAS	C0

Note: Gen 3 and Gen 4 SFF HBA/RAID adapters are slightly different in their connectors, but the cable routing method is similar.

The following figure illustrates the cable routing for the configuration of 4 x 2.5-inch front SAS/SATA drive bays with an 8i SFF RAID adapter (Gen 4). Connections between connectors: **1** ↔ **1**, **2** ↔ **2**, **3** ↔ **3**, ... **n** ↔ **n**

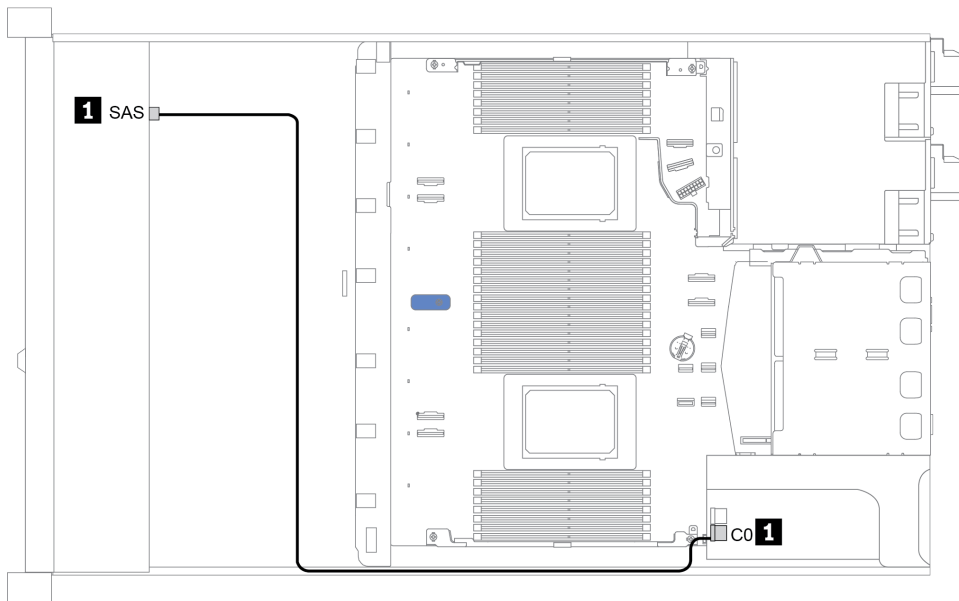


Figure 25. Cable routing for 4 x 2.5-inch front SAS/SATA drive bays with an 8i SFF RAID adapter (Gen 4)

8 x 2.5-inch front drive bays

Use this section to understand the backplane cable routing for server model with eight 2.5-inch front drives.

To connect cables for a 7mm drive backplane, refer to “7mm drive backplane” on page 64.

To connect power cables for a backplane for standard 2.5-inch or 3.5-inch drives, refer to “2.5-inch/3.5-inch drive backplane (power)” on page 65.

To connect signal cables for a backplane for standard 8 x 2.5-inch front drives, refer to the following cable routing scenarios depending on your server configuration:

- “Cable routing for onboard configuration” on page 74
- “Cable routing with an SFF HBA/RAID adapter” on page 75
- “Cable routing with an SFF RAID adapter (tri-mode)” on page 76
- “Cable routing with a CFF HBA/RAID adapter” on page 77

Cable routing for onboard configuration

The following table shows the mapping relationship between backplane connectors and system board connectors for onboard configuration.

Table 27. Mapping between backplane connectors and system board connectors for onboard configuration

Backplanes	From	To
Front BP (SAS)	SAS 0	SATA 0
	SAS 1	SATA 1
Rear BP (if any)	SAS	SATA 2

The following figure illustrates the cable routing for the onboard configuration of 8 x 2.5-inch front SAS/SATA drive bays with a rear 2 x 2.5-inch SAS/SATA drive cage. Connections between connectors: **1** ↔ **1**, **2** ↔ **2**, **3** ↔ **3**, ... **n** ↔ **n**

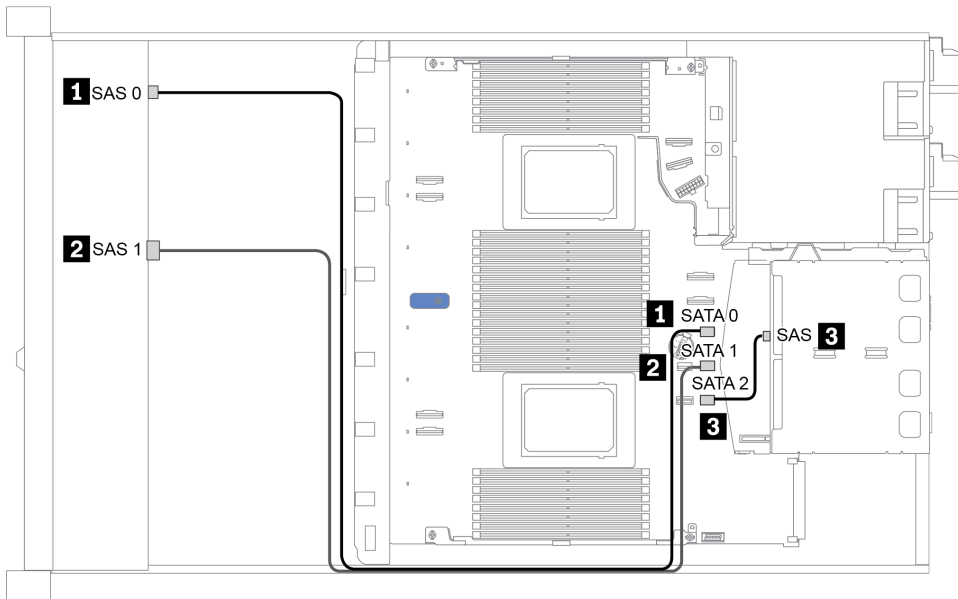


Figure 26. Cable routing for onboard configuration of 8 x 2.5-inch front SAS/SATA drive bays with a rear 2 x 2.5-inch SAS/SATA drive cage

Cable routing with an SFF HBA/RAID adapter

The following table shows the mapping relationship between backplane connectors and system board/adapter connectors when an 8i SFF HBA/RAID adapter (Gen 3 or Gen 4) is installed.

Table 28. Mapping between backplane connectors and system board/adapter connectors when an SFF HBA/RAID adapter is installed

Backplanes	From	To
Front BP (SAS)	SAS 0	C0
	SAS 1	Gen 3: C1; Gen 4: C0
Rear BP (if any)	SAS	SATA 2

Note: Gen 3 and Gen 4 SFF HBA/RAID adapters are slightly different in their connectors, but the cable routing method is similar.

The following figure illustrates the cable routing for the configuration of 8 x 2.5-inch front SAS/SATA drive bays with a 8i SFF RAID adapter (Gen 4) and a rear 2 x 2.5-inch SAS/SATA drive cage. Connections between connectors: **1** ↔ **1**, **2** ↔ **2**, **3** ↔ **3**, ... **n** ↔ **n**

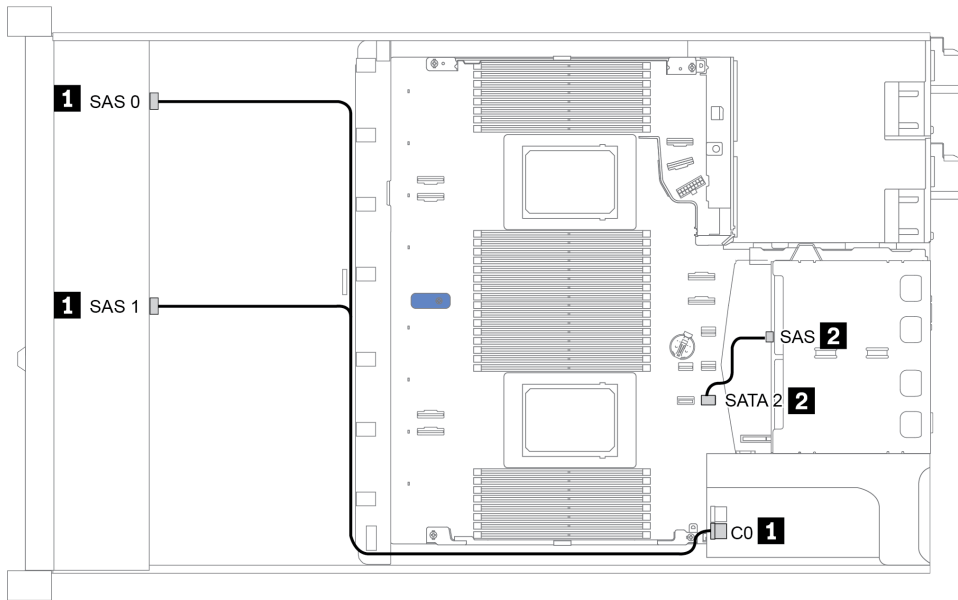


Figure 27. Cable routing for 8 x 2.5-inch front SAS/SATA drive bays with an 8i SFF RAID adapter (Gen 4) and a rear 2 x 2.5-inch SAS/SATA drive cage

Cable routing with an SFF RAID adapter (tri-mode)

The following table shows the mapping relationship between backplane connectors and adapter connectors when a Gen 4 8i SFF RAID adapter (tri-mode) is installed.

Table 29. Mapping between backplane connectors and adapter connectors when a Gen 4 8i SFF RAID adapter (tri-mode) is installed

Backplane	From	To
Front BP (SAS)	SAS 0, SAS 1	C0

Notes:

- For the server model with eight front 2.5-inch drives, the 10 x 2.5" AnyBay backplane is used to support the tri-mode configuration.
- If a tri-mode RAID adapter is used, only U.3 front drives are supported, and U.2 front drives are not supported.

The following figure illustrates the cable routing for the configuration of 8 x 2.5-inch front U.3 drive bays with a Gen 4 8i SFF RAID adapter (tri-mode). Connections between connectors: **1** ↔ **1**, **2** ↔ **2**, **3** ↔ **3**, ... **n** ↔ **n**

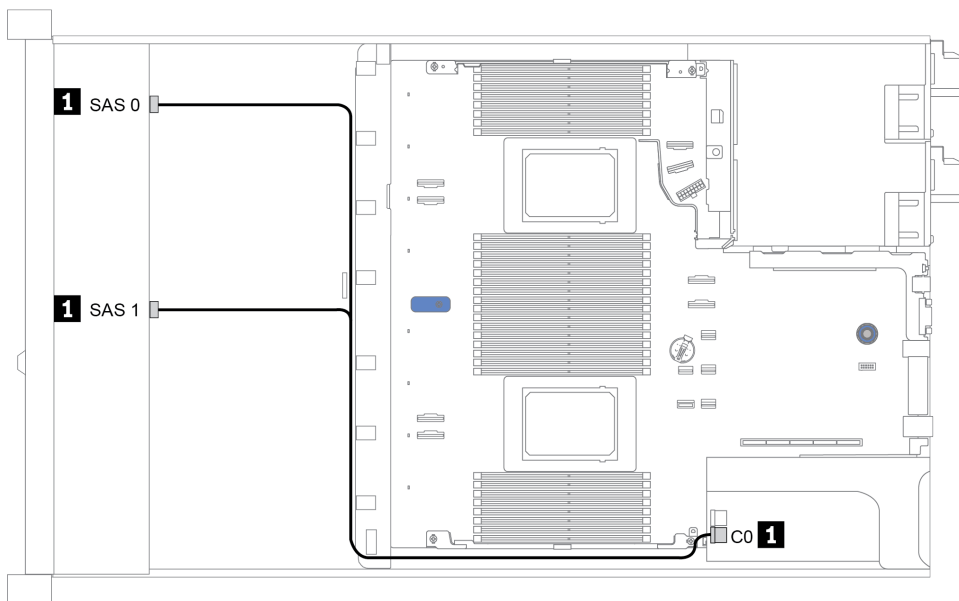


Figure 28. Cable routing for 8 x 2.5-inch front U.3 drive bays with a Gen 4 8i SFF RAID adapter (tri-mode)

Cable routing with a CFF HBA/RAID adapter

The following table shows the mapping relationship between backplane connectors and adapter connectors when a 16i CFF HBA/RAID adapter is installed.

Table 30. Mapping between backplane connectors and adapter connectors when a 16i CFF HBA/RAID adapter is installed

Backplanes	From	To
Front BP (SAS)	SAS 0	C0
	SAS 1	C1
Rear BP (if any)	SAS	C3

Note: For power and input cable connection of the CFF HBA/RAID adapter, refer to “CFF HBA/RAID adapter” on page 57.

The following figure illustrates the cable routing for the configuration of 8 x 2.5-inch front SAS/SATA drive bays with a 16i CFF RAID adapter and a rear 2 x 2.5-inch SAS/SATA drive cage. Connections between connectors: **1** ↔ **1**, **2** ↔ **2**, **3** ↔ **3**, ... **n** ↔ **n**

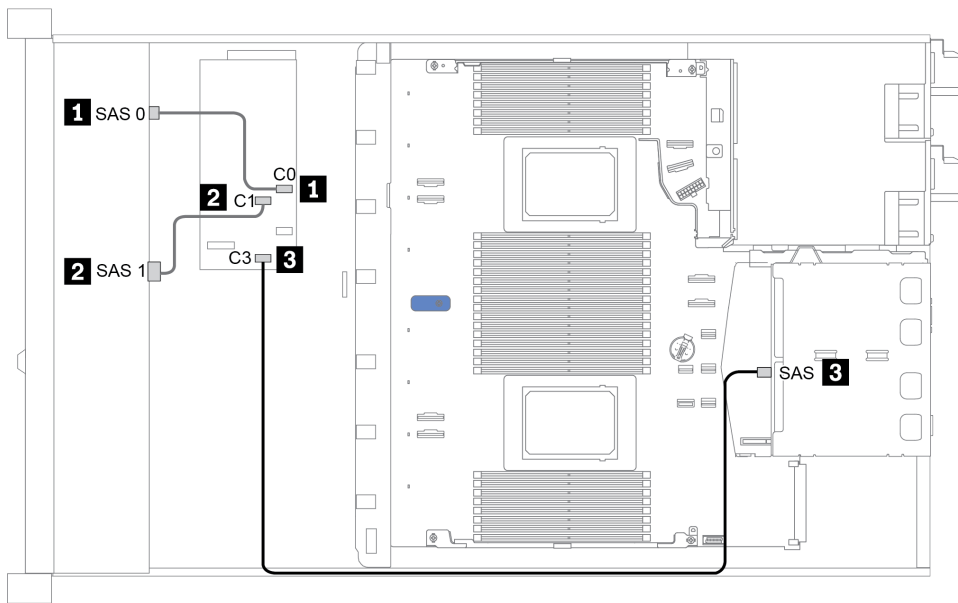


Figure 29. Cable routing for 8 x 2.5-inch front SAS/SATA drive bays with a 16i CFF RAID adapter and a rear 2 x 2.5-inch SAS/SATA drive cage

10 x 2.5-inch front drive bays

Use this section to understand the backplane cable routing for server model with ten 2.5-inch front drives.

To connect cables for a 7mm drive backplane, refer to “7mm drive backplane” on page 64.

To connect power cables for a backplane for standard 2.5-inch or 3.5-inch drives, refer to “2.5-inch/3.5-inch drive backplane (power)” on page 65.

To connect signal cables for a backplane for standard 10 x 2.5-inch front drives, refer to the following cable routing scenarios depending on your server configuration:

- “Cable routing for onboard configuration” on page 79
- “Cable routing with an SFF HBA/RAID adapter” on page 80
- “Cable routing with an SFF RAID adapter (tri-mode)” on page 81
- “Cable routing with a CFF HBA/RAID adapter” on page 82

Cable routing for onboard configuration

The following table shows the mapping relationship between backplane connectors and system board connectors for onboard configuration.

Table 31. Mapping between backplane connectors and system board connectors for onboard configuration

Backplanes	From	To
Front BP (NVMe)	NVMe 0-1, 2-3	PCIe 1, PCIe 2
	NVMe 4-5*, 6-7*, 8-9*	PCIe 3, PCIe 4, PCIe 5
Front BP (SAS)	SAS 0	SATA 0
	SAS 1	SATA 1
	SAS 2*	SATA 2
Rear BP (if any)	SAS	SATA 2
	NVMe 0, NVMe 1	PCIe 6

Notes:

- *NVMe 4-5, NVMe 6-7, and NVMe 8-9 connectors are available only when the 10 x 2.5" AnyBay front backplane is used.
- *The SAS 2 connector only needs to be connected in the front drive scenario of 10 x 2.5" AnyBay or 6 x 2.5" SAS/SATA + 4 x 2.5" AnyBay.
- In case of front 10 x 2.5" NVMe drive bay scenario, SAS connectors on the front backplane do not need to be connected.

The following figure illustrates the cable routing for the onboard configuration of 10 x 2.5-inch front drive bays (6 x SAS/SATA + 4 x NVMe) with a rear 2 x 2.5-inch SAS/SATA drive cage. Connections between connectors: **1** ↔ **1**, **2** ↔ **2**, **3** ↔ **3**, ... **n** ↔ **n**

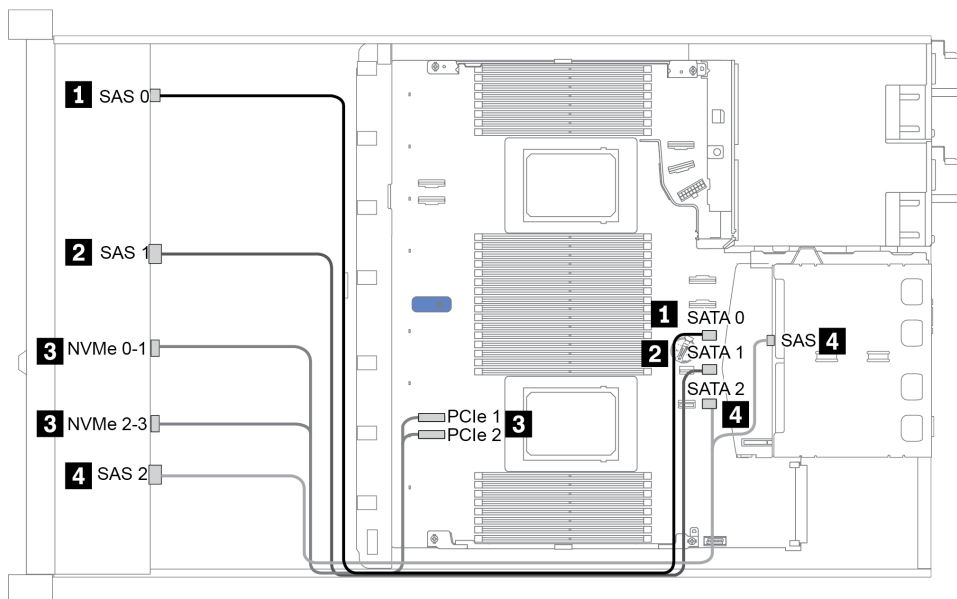


Figure 30. Cable routing for onboard configuration of 10 x 2.5-inch front drive bays (6 x SAS/SATA + 4 x NVMe) with a rear 2 x 2.5-inch SAS/SATA drive cage

Cable routing with an SFF HBA/RAID adapter

The following table shows the mapping relationship between backplane connectors and system board/adapter connectors when an 8i or 16i SFF HBA/RAID adapter (Gen 3 or Gen 4) is installed.

Table 32. Mapping between backplane connectors and system board/adapter connectors when an SFF HBA/RAID adapter is installed

Backplanes	From	To
Front BP (NVMe)	NVMe 0-1, 2-3	PCIe 1, PCIe 2
	NVMe 4-5*, 6-7*, 8-9*	PCIe 3, PCIe 4, PCIe 5
Front BP (SAS)	SAS 0	C0
	SAS 1	Gen 3: C1; Gen 4: C0
	SAS 2*	Gen 3: C2; Gen 4: C1
Rear BP (if any)	SAS	Gen 3: C3; Gen 4: C1
	NVMe 0, NVMe 1	PCIe 6

Notes:

- *NVMe 4-5, NVMe 6-7, and NVMe 8-9 connectors are available only when the 10 x 2.5" AnyBay front backplane is used.
- *The SAS 2 connector only needs to be connected in the front drive scenario of 10 x 2.5" AnyBay or 6 x 2.5" SAS/SATA + 4 x 2.5" AnyBay.
- Gen 3 and Gen 4 SFF HBA/RAID adapters are slightly different in their connectors, but the cable routing method is similar.

The following figure illustrates the cable routing for the configuration of 10 x 2.5-inch front AnyBay drive bays with a 16i SFF RAID adapter (Gen 4) and a rear 2 x 2.5-inch SAS/SATA drive cage. Connections between connectors: **1** ↔ **1**, **2** ↔ **2**, **3** ↔ **3**, ... **n** ↔ **n**

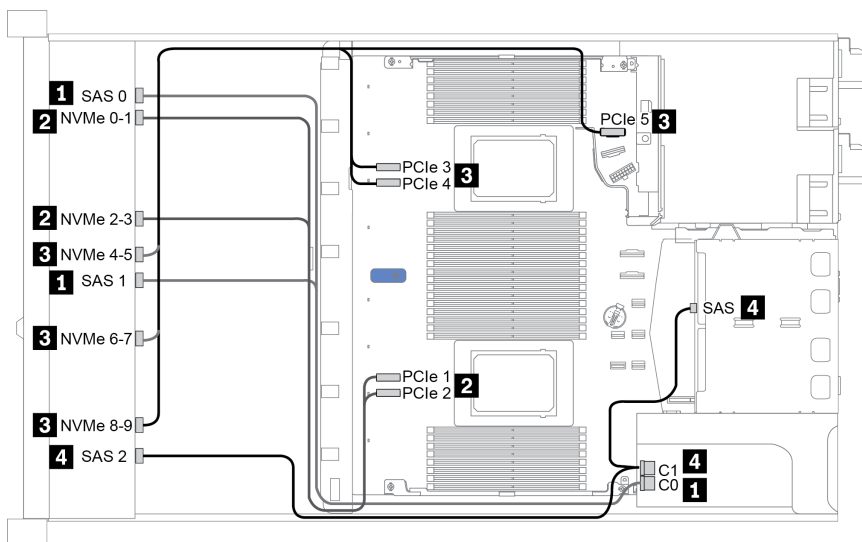


Figure 31. Cable routing for 10 x 2.5-inch front AnyBay drive bays with a 16i SFF RAID adapter (Gen 4) and a rear 2 x 2.5-inch SAS/SATA drive cage

Cable routing with an SFF RAID adapter (tri-mode)

The following table shows the mapping relationship between backplane connectors and adapter connectors when a Gen 4 16i SFF RAID adapter (tri-mode) is installed.

Table 33. Mapping between backplane connectors and adapter connectors when a Gen 4 16i SFF RAID adapter (tri-mode) is installed

Backplane	From	To
Front BP (SAS)	SAS 0, SAS 1	C0
	SAS 2	C1

Note: If a tri-mode RAID adapter is used, only U.3 front drives are supported, and U.2 front drives are not supported.

The following figure illustrates the cable routing for the configuration of 10 x 2.5-inch front U.3 drive bays with a 16i SFF RAID adapter (tri-mode). Connections between connectors: **1** ↔ **1**, **2** ↔ **2**, **3** ↔ **3**, ... **n** ↔ **n**

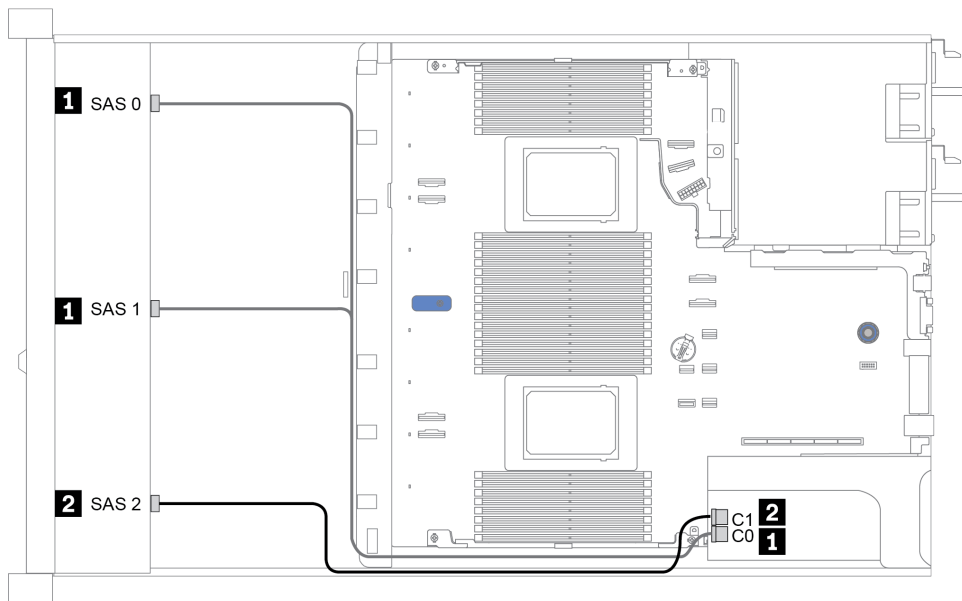


Figure 32. Cable routing for 10 x 2.5-inch front U.3 drive bays with a Gen 4 16i SFF RAID adapter (tri-mode)

Cable routing with a CFF HBA/RAID adapter

The following table shows the mapping relationship between backplane connectors and system board/adapter connectors when a 16i CFF HBA/RAID adapter is installed.

Table 34. Mapping between backplane connectors and system board/adapter connectors when a 16i CFF HBA/RAID adapter is installed

Backplanes	From	To
Front BP (NVMe)	NVMe 0-1, 2-3	PCIe 1, PCIe 2
Front BP (SAS)	SAS 0	C0
	SAS 1	C1
	SAS 2	C2
Rear BP (if any)	SAS	C3
	NVMe 0, NVMe 1	PCIe 6

Note: For power and input cable connection of the CFF HBA/RAID adapter, refer to “CFF HBA/RAID adapter” on page 57.

The following figure illustrates the cable routing for the configuration of 10 x 2.5-inch front drive bays (6 x SAS/SATA + 4 x AnyBay) with a 16i CFF RAID adapter and a rear 2 x 2.5-inch SAS/SATA drive cage. Connections between connectors: **1** ↔ **1**, **2** ↔ **2**, **3** ↔ **3**, ... **n** ↔ **n**

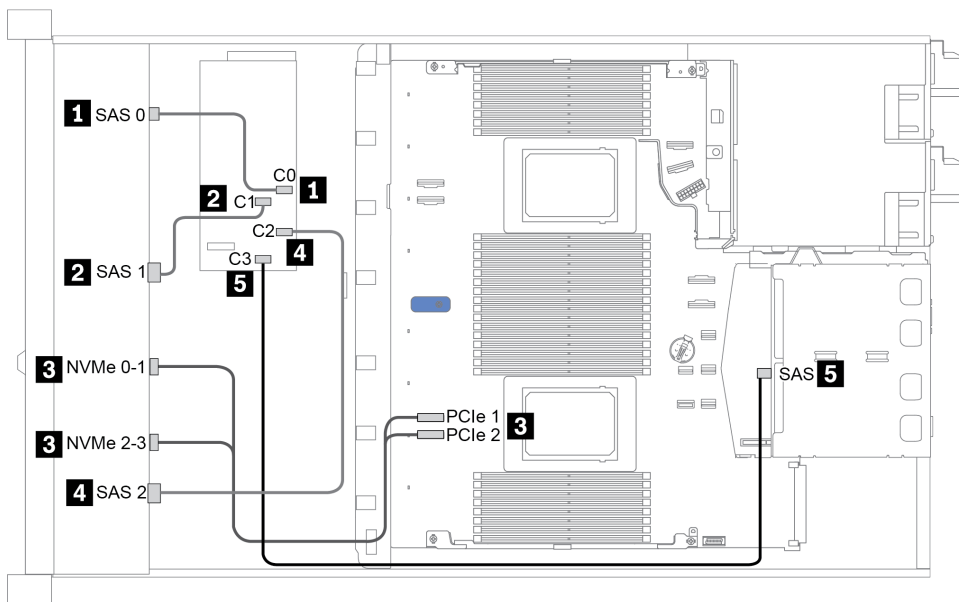


Figure 33. Cable routing for 10 x 2.5-inch front drive bays (6 x SAS/SATA + 4 x AnyBay) with a 16i CFF RAID adapter and a rear 2 x 2.5-inch SAS/SATA drive cage

Chapter 4. Hardware replacement procedures

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

For more information about ordering parts:

<https://datacentersupport.lenovo.com/products/servers/thinksystem/sr630v2/7z70/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 11.

Installation guidelines

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

Before installing optional devices, read the following notices carefully:

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

- Read the safety information and guidelines to ensure your safety at work:
http://thinksystem.lenovofiles.com/help/topic/safety_documentation/pdf_files.html
- 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 V2 Drivers and Software](#) to download firmware updates for your server.

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

- It is good practice to make sure that the server is working correctly before you install an optional component.
- Keep the working area clean, and place removed components on a flat and smooth surface that does not shake or tilt.
- Do not attempt to lift an object that might be too heavy for you. If you have to lift a heavy object, read the following precautions carefully:
 - Make sure that you can stand steadily without slipping.
 - Distribute the weight of the object equally between your feet.
 - Use a slow lifting force. Never move suddenly or twist when you lift a heavy object.
 - To avoid straining the muscles in your back, lift by standing or by pushing up with your leg muscles.
- Back up all important data before you make changes related to the disk drives.
- Have a small flat-blade screwdriver, a small Phillips screwdriver, and a T8 Torx screwdriver available.
- To view the error LEDs on the system board and internal components, leave the power on.
- You do not have to turn off the server to remove or install hot-swap power supplies, hot-swap fans, or hot-plug USB devices. However, you must turn off the server before you perform any steps that involve removing or installing adapter cables, and you must disconnect the power source from the server before you perform any steps that involve removing or installing a riser card, memory, or processor.

- 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:

- The product is not suitable for use at visual display workplaces according to §2 of the Workplace Regulations.
- 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:
 - 1) Click **Select Options/Parts for a Model**.
 - 2) Enter the machine type and model for your server.
 - c. Click the Power tab to see all line cords.
 - Make sure that the insulation is not frayed or worn.
3. Check for any obvious non-Lenovo alterations. Use good judgment as to the safety of any non-Lenovo alterations.

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

System reliability guidelines

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

Make sure the following requirements are met:

- When the server comes with redundant power, a power supply must be installed in each power-supply bay.
- Adequate space around the server must be spared to allow server cooling system to work properly. Leave approximately 50 mm (2.0 in.) of open space around the front and rear of the server. Do not place any object in front of the fans.
- For proper cooling and airflow, refit the server cover before you turn the power on. Do not operate the server for more than 30 minutes with the server cover removed, for it might damage server components.
- Cabling instructions that come with optional components must be followed.
- A failed fan must be replaced within 48 hours after 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 data loss 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 hair from dangling into the server.
- Remove jewelry, such as bracelets, necklaces, rings, cuff links, and wrist watches.
- Remove items from your shirt pocket, such as pens and pencils, in case they fall into the server as you lean over it.
- Avoid dropping any metallic objects, such as paper clips, hairpins, and screws, into the server.

Handling static-sensitive devices

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

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

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

Technical rules

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

Technical rules for processors and heat sinks

Understanding the technical rules helps you choose the correct heat sinks, fans, and other components based on what processors are configured for your server.

Processor quantity rules

Two CPUs and eight fans are required if your server is installed with any of the following:

- More than four NVMe SSDs (including EDSFF drives but excluding 7mm drives) connected to the front and rear backplanes
- Rear 2.5-inch NVMe SSD (excluding 7mm drive)
- 16-EDSFF drive backplane
- CFF HBA/RAID adapter used together with the 6 SATA/SAS + 4 Anybay backplane
- ThinkSystem Mellanox HDR/200GbE 2x PCIe Aux Kit

Processor TDP rules

The following lists the TDP rules for different configurations.

Table 35. Processor TDP rules for different configurations

Configuration	Max. TDP	Max. ambient temperature
GPU adapter with 4 x 2.5" SAS/SATA drive backplane used	270 W	Refer to the "Environment" section in "Specifications" on page 2.
10 x 2.5" AnyBay drive backplane or 16-EDSFF drive backplane	250 W	

Table 35. Processor TDP rules for different configurations (continued)

Configuration	Max. TDP	Max. ambient temperature
GPU adapter without 4 x 2.5" SAS/SATA drive backplane used	220 W	
Rear 2 x 2.5" SAS/SATA or NVMe drive backplane (excluding 7mm drive backplane)	205 W	

Supported heat sinks for processors

The following lists the required heat sinks when different processors are installed.

Table 36. Heat sinks supported for processors

Processor TDP	Heat sink type
<= 205 W	Standard
> 205 W	Performance

Note: For 6334, 4310T, 6338T, and 5320T processors, performance heat sinks must be used.

Technical rules for drives

Understanding the technical rules for drives helps you correctly install and configure drives in the system.

Drive installation rules

The following notes describe information that you must consider when you install a drive.

- 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 use drives from different vendors.
- The drives in a single RAID array must be of the same type, same size, and same capacity.
- You can mix drives of different types and different capacities in one system, but not in one RAID array. You can also use a 2.5-inch drive in a 3.5-inch drive bay.

For technical rules for RAID configuration, see “Technical rules for RAID configuration” on page 87.

Technical rules for RAID configuration

The following notes describe information that you must consider when you configure RAID.

- For software RAID, JBOD and RAID levels 0, 1, 5, and 10 are supported.
- Onboard NVMe configuration supports JBOD and RAID levels 0, 1, 5, and 10 when Intel NVMe SSDs are used.
- Both VROC Intel-SSD-Only and VROC Premium support JBOD and RAID levels 0, 1, 5, and 10, with the former using Intel NVMe drives while the latter using non-Intel NVMe drives.
 - Bootable volumes must be in the same volume management device (VMD) domain.
 - Data volumes can be deployed across VMD domains.
 - RAID volumes across CPUs are not supported.
 - VROC must be configured by referring to the following VMD domain matrix.

Table 37. VMD domain matrix

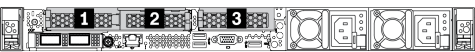
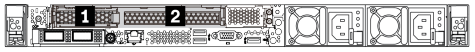
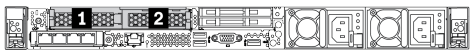
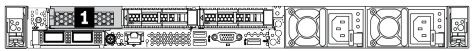
Server model	CPU 0								CPU 1							
	VMD domain				VMD domain				VMD domain				VMD domain			
	PCIe 1		PCIe 2		1 A	1 B	1 C	1 D	PCIe 3		PCIe 4		PCIe 5		PCIe 6	
– 6 SATA/SAS + 2 AnyBay + 2 NVMe – 6 SATA/SAS + 4 NVMe	6	7	8	9												
6 SATA/SAS + 4 AnyBay	6	7	8	9												
– 10 AnyBay – 10 NVMe	0	1	2	3					4	5	6	7	8	9		
16 EDSFF	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0

Technical rules for PCIe adapters

Understanding the technical rules for PCIe adapters helps you correctly install and configure PCIe adapters in the system.

PCIe adapters supported for different models

Table 38. PCIe adapters supported and their locations

Server rear view	Supported types and slot location
	<p>Riser 1 assembly</p> <ul style="list-style-type: none"> Slot 1: PCIe x16 (x8, x4, x1), low-profile Slot 2: PCIe x16 (x8, x4, x1), low-profile <p>Riser 2 assembly</p> <ul style="list-style-type: none"> Slot 3: PCIe x16 (x8, x4, x1), low-profile
	<p>Riser 1 assembly</p> <ul style="list-style-type: none"> Slot 1: PCIe x16 (x8, x4, x1), low-profile Slot 2: PCIe x16 (x8, x4, x1), full-height <p>Note: One rear wall bracket must be installed next to the two PCIe slots.</p>
	<p>Riser 1 assembly</p> <ul style="list-style-type: none"> Slot 1: PCIe x16 (x8, x4, x1), low-profile Slot 2: PCIe x16 (x8, x4, x1), low-profile
	<p>Riser 1 assembly</p> <ul style="list-style-type: none"> Slot 1: PCIe x16 (x8, x4, x1), low-profile

To locate the PCIe slots, see “Rear view” on page 39.

PCIe adapter installation rules and order

When installing different types of PCIe adapters, refer to the following suggested installation priority:

Table 39. Recommended installation priority for different types of PCIe adapters

1. OCP Ethernet adapter	6. InfiniBand adapter
2. Custom form factor (CFF) internal HBA/RAID adapter	7. Fiber channel adapter
3. Standard form factor (SFF) RAID adapter/Re-timer adapter	8. Network adapter
4. SFF HBA	9. NVMe PCIe flash adapter
5. GPU adapter	10. External HBA/RAID adapter

When installing a specific PCIe adapter, refer to the following suggested slot installation priority:

Table 40. Recommended slot installation priority for PCIe adapters

Recommended slot installation priority	PCIe adapters
Must be installed in slot 1	<ul style="list-style-type: none"> SFF HBA/RAID adapter ThinkSystem x16 Gen 4.0 Re-timer adapter (for 4x NVMe)
Must be installed in slot 2 (configured as a full-height slot)	<ul style="list-style-type: none"> ThinkSystem NVIDIA Quadro P2200 5GB PCIe Active GPU ThinkSystem Broadcom 57454 10/25GbE SFP28 4-port PCIe Ethernet Adapter
Must be installed in slot 3	ThinkSystem Mellanox HDR/200GbE 2x PCIe Aux Kit Note: ThinkSystem Mellanox HDR/200GbE 2x PCIe Aux Kit must be used together with Mellanox ConnectX-6 HDR IB/200GbE Single Port x16 PCIe Adapter and functions as the auxiliary adapter. Two CPUs are required if both adapters are used, with the primary adapter installed in slot 1 or slot 2 while the auxiliary adapter installed in slot 3.
Slot 1 > Slot 3 > Slot 2	<ul style="list-style-type: none"> ThinkSystem NVIDIA Tesla T4 16GB PCIe Passive GPU NVIDIA Tesla T4 16GB Base Card (for China only) NVIDIA Quadro P620 GPU Mellanox ConnectX-6 HDR100 IB/100GbE VPI 1-port x16 PCIe 3.0 HCA Mellanox ConnectX-6 HDR100 IB/100GbE VPI 2-port x16 PCIe 3.0 HCA Mellanox ConnectX-6 Dx 100GbE QSFP56 2-port PCIe Ethernet Adapter
Slot 2 > Slot 3	A COM port upgrade kit needs to be installed in slot 2 or 3 as a normal PCIe adapter. In this case, a riser and bracket are needed.
Slot 1 > Slot 2 > Slot 3	Other PCIe adapters not mentioned above Notes: For Mellanox ConnectX-6 HDR IB/200GbE Single Port x16 PCIe Adapter, refer to the following slot priority depending on the quantity of adapters to be installed: <ul style="list-style-type: none"> Two adapters: slot 1, slot 3 or slot 2, slot 3 Three adapters: slot 1, slot 2, slot 3

Technical rules for GPU adapters

Understanding the technical rules helps you choose the correct GPUs and install them in the supported slots based on what is configured for your server.

The following are rules for installing GPUs for your server:

- For GPU configuration, the CPU TDP must not be greater than 200 W. However, if the 4 x 2.5" SAS/SATA drive backplane is used or no backplane is used, the CPU TDP can support up to 270 W.
- If the passive GPU adapter (Tesla T4) is used, the performance fan must be used.
- Refer to the following slot priority when installing a GPU adapter:
 - Tesla T4, P620: slot 1, slot 3, slot 2
 - P2200: slot 2 (full-height)
- Up to one P2200 GPU adapter is supported, while a maximum of three Tesla T4 or P620 GPU adapters are supported.
- All GPUs installed must be identical.

Technical rules for system fans

Depending on models, the server supports:

- Standard fan (21000 RPM)
- Performance fan (28000 RPM)

Fan selection rules

The following lists the rules for selecting standard or performance fan.

Table 41. Fan selection rules for different conditions

Use	If your server meets any of the following conditions...
Standard or performance fan	TDP <= 165 W
Performance fan	<ul style="list-style-type: none"> • TDP > 165 W • Installed with the front 10 x 2.5" AnyBay drive backplane or 16-EDSFF drive backplane • Installed with the 2 x 2.5" rear backplane • Installed with any passive GPU • Installed with any of the following PCIe adapters: <ul style="list-style-type: none"> – ThinkSystem Broadcom 57454 10GBASE-T 4-port OCP Ethernet Adapter – ThinkSystem Broadcom 57508 100GbE QSFP56 2-port PCIe 4 Ethernet Adapter – Mellanox ConnectX-6 HDR100 IB/100GbE VPI 1-port x16 PCIe 3.0 HCA – Mellanox ConnectX-6 HDR IB/200GbE Single Port x16 PCIe Adapter – Mellanox ConnectX-6 HDR100 IB/100GbE VPI 2-port x16 PCIe 3.0 HCA – Mellanox ConnectX-6 Dx 100GbE QSFP56 2-port PCIe Ethernet Adapter

Notes:

- Standard fans are enough for low-wattage processors while you can still use performance fans for better cooling.

- If there is an OCP 3.0 Ethernet adapter installed, when the system is powered off but still plugged in to AC power, fans 1 and 2 will continue to spin at a much lower speed. This is the system design to provide proper cooling for the OCP 3.0 Ethernet adapter.

Air baffle replacement

Use this information to remove and install the air baffle.

Note: Air baffle is unavailable when performance heat sink is installed.

Remove the air baffle

Use this information to remove the air baffle.

About this task

Depending on the model, your server might not have an air baffle installed. The air baffle you want to remove might be different from the following illustrations, but the removal method is the same.

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.

Attention:

- Read “Installation guidelines” on page 83 to ensure that you work safely.
- Power off the server and disconnect all power cords for this task.

A video for this task is available at:

- YouTube: <https://www.youtube.com/playlist?list=PLYV5R7hVcs-Cmxb8e4L4PvMQ7J5PxxuOK>
- Youku: https://list.youku.com/albumlist/show/id_59643656

Procedure

- Step 1. Remove the top cover. See “Remove the top cover” on page 220.
- Step 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.

Step 3. Grasp the air baffle and carefully lift it out of the server.

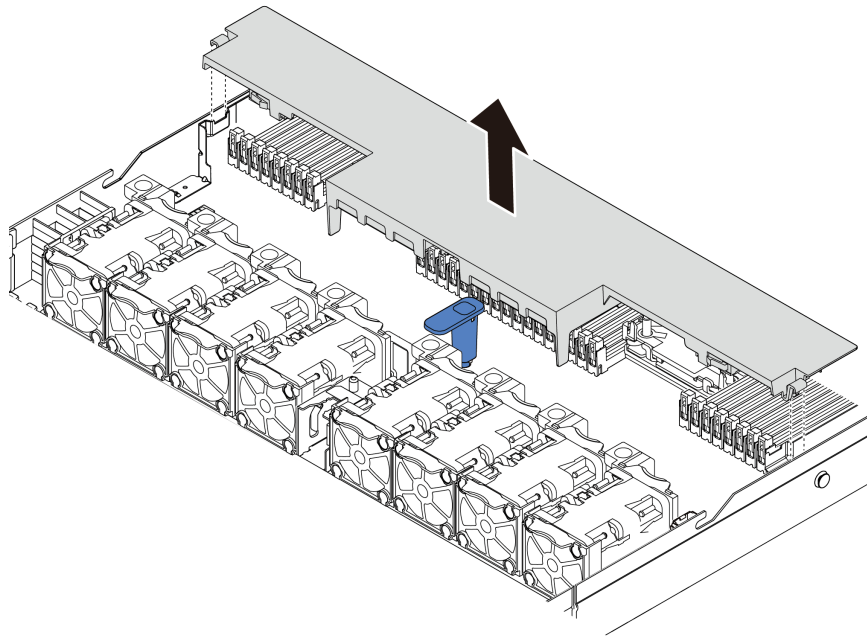


Figure 34. Air baffle removal

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

After you finish

If you would like to reuse the RAID super capacitor module installed on the bottom of the air baffle, remove it from the air baffle. See “Remove the RAID super capacitor module on the air baffle” on page 194.

Install the air baffle

Use this information to install the air baffle.

About this task

Depending on the model, your server might not have an air baffle installed. The air baffle you want to install might be different from the following illustrations, but the removal method is the same.

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.

Attention:

- Read “Installation guidelines” on page 83 to ensure that you work safely.
- Power off the server and disconnect all power cords for this task.

A video for this task is available at:

- YouTube: <https://www.youtube.com/playlist?list=PLYV5R7hVcs-Cmxb8e4L4PvMQ7J5PxvuOK>
- Youku: https://list.youku.com/albumlist/show/id_59643656

Procedure

- Step 1. If you need to install a RAID super capacitor module on the bottom of the air baffle, install it first. See “Install the RAID super capacitor module on the air baffle” on page 195.
- Step 2. Align the direction of the air baffle according to indications on it.

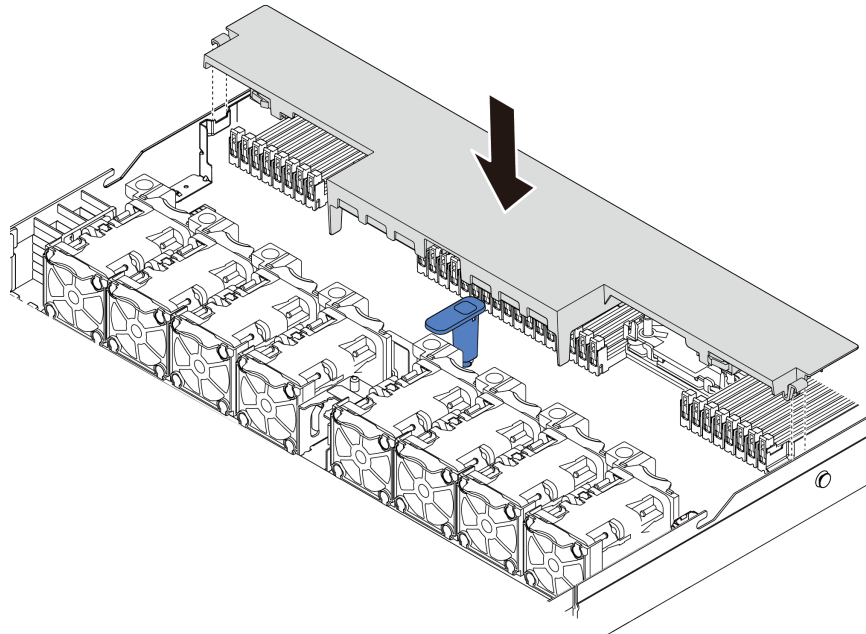


Figure 35. Air baffle installation

- Step 3. Lower the air baffle into the chassis and press the air baffle down until it is securely seated.

After you finish

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 224.

Backplane replacement

Use this information to remove and install a backplane.

Remove the front 2.5-inch drive backplane

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

About this task

The following describes how to remove the backplane for ten 2.5-inch hot-swap drives. You can remove the backplane for four or eight 2.5-inch hot-swap drives in the same way.

Attention:

- Read “Installation guidelines” on page 83 to ensure that you work safely.
- Power off the server and disconnect all power cords for this task.
- 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.

A video for this task is available at:

- YouTube: <https://www.youtube.com/playlist?list=PLYV5R7hVcs-Cmxb8e4L4PvMQ7J5PxvuOK>
- Youku: https://list.youku.com/albumlist/show/id_59643656

Procedure

- Step 1. Remove the top cover. See “Remove the top cover” on page 220.
- Step 2. Remove all the installed drives and drive fillers from the drive bays. See “Remove a 2.5/3.5-inch hot-swap drive” on page 124.
- Step 3. Grasp the backplane and carefully lift it out of the chassis.

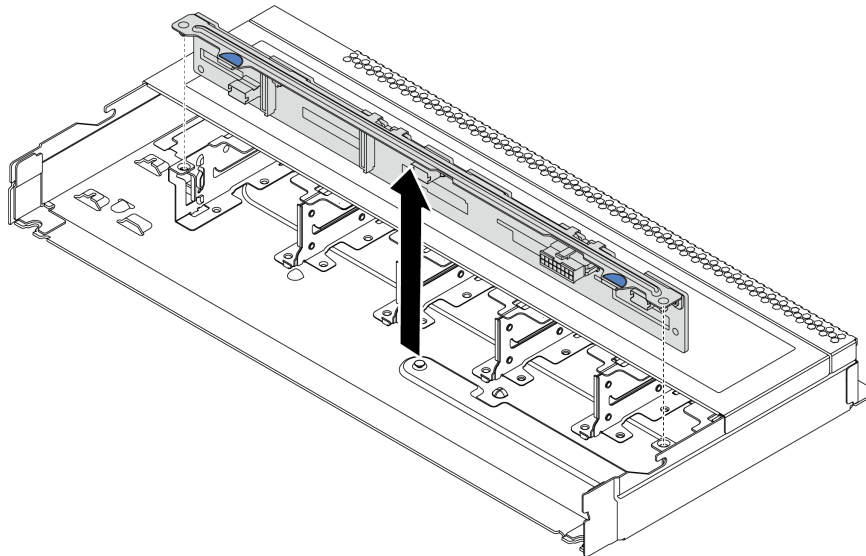


Figure 36. Removal of backplane for ten 2.5-inch hot-swap drives

Step 4. Disconnect the cables from the backplane. See “2.5-inch/3.5-inch drive backplane (power)” on page 65 and “2.5-inch/3.5-inch drive backplane (signal)” on page 66.

After you finish

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

Install the front 2.5-inch drive backplane

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

About this task

The following describes how to install the backplane for ten 2.5-inch hot-swap drives. You can install the backplane for four or eight 2.5-inch hot-swap drives in the same way.

Attention:

- Read “Installation guidelines” on page 83 to ensure that you work safely.
- Power off the server and disconnect all power cords for this task.
- 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.

A video for this task is available at:

- YouTube: <https://www.youtube.com/playlist?list=PLYV5R7hVcs-Cmxb8e4L4PvMQ7J5PxvuOK>
- Youku: https://list.youku.com/albumlist/show/id_59643656

Procedure

- Step 1. Touch the static-protective package that contains the backplane to any unpainted surface on the outside of the server. Then, take the backplane out of the package and place it on a static-protective surface.
- Step 2. Connect the cables to the backplane. See “2.5-inch/3.5-inch drive backplane (power)” on page 65 and “2.5-inch/3.5-inch drive backplane (signal)” on page 66.

Step 3. Align the two pins on the backplane with the corresponding holes in the chassis.

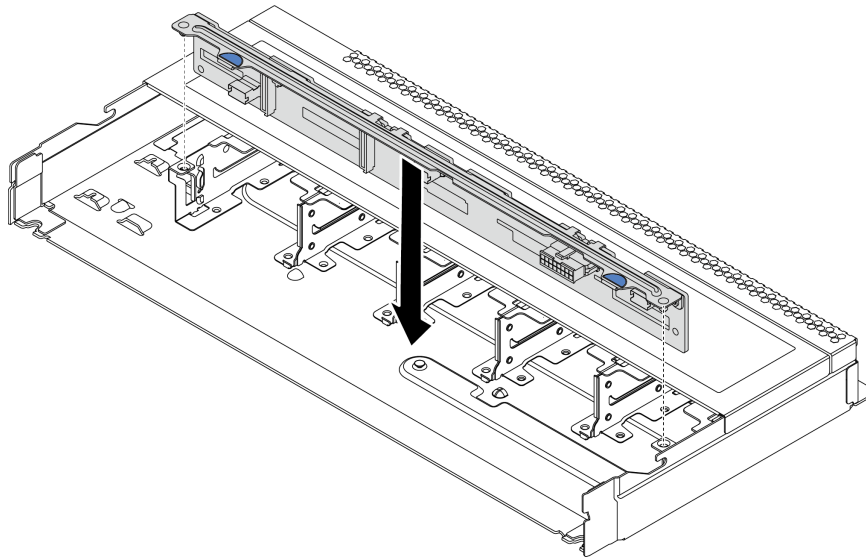


Figure 37. Installation of backplane for ten 2.5-inch hot-swap drives

Step 4. Lower the backplane into the chassis. Ensure that the pins pass through the holes and the backplane is fully seated in place.

Step 5. Connect the cables to the system board or expansion slots. See “2.5-inch/3.5-inch drive backplane (power)” on page 65 and “2.5-inch/3.5-inch drive backplane (signal)” on page 66.

After you finish

1. Reinstall all the drives and drive fillers into the drive bays. See “Install a 2.5/3.5-inch hot-swap drive” on page 125.
2. Complete the parts replacement. See “Complete the parts replacement” on page 224.

Remove the front 3.5-inch drive backplane

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

About this task

Attention:

- Read “Installation guidelines” on page 83 to ensure that you work safely.
- Power off the server and disconnect all power cords for this task.
- 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.

A video for this task is available at:

- YouTube: <https://www.youtube.com/playlist?list=PLYV5R7hVcs-Cmxb8e4L4PvMQ7J5PxvuOK>
- Youku: https://list.youku.com/albumlist/show/id_59643656

Procedure

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

Step 1. Prepare your server.

- a. Remove the top cover. See “Remove the top cover” on page 220.
- b. Remove the system fan cage for easier operation. See “Remove a system fan” on page 209.
- c. Remove all the installed drives and fillers (if any) from the drive bays. See “Remove a 2.5/3.5-inch hot-swap drive” on page 124.

Step 2. Remove the backplane from the chassis.

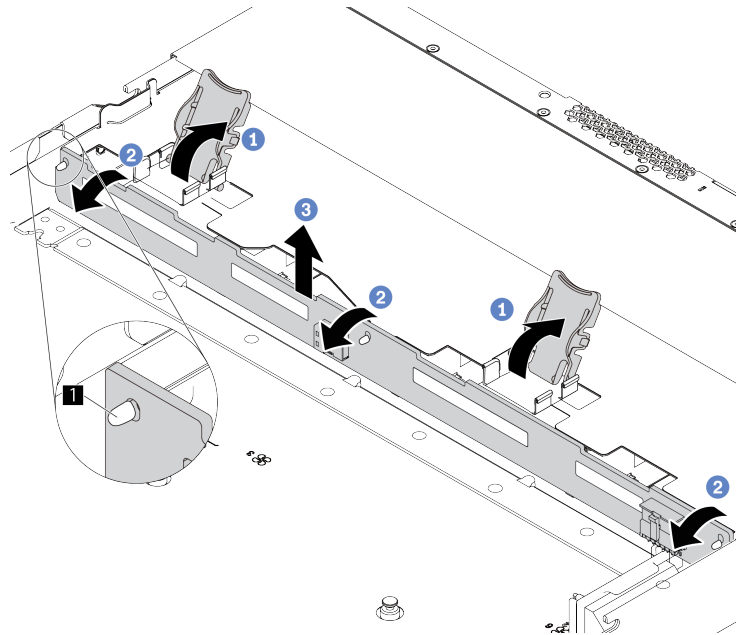


Figure 38. 3.5-inch-drive backplane removal

- a. Open the release latches that secure the backplane.
- b. Pivot the backplane backward slightly to release it from the three pins **1** on the chassis.
- c. Carefully remove the backplane out of the chassis.

Step 3. Record the cable connections on the backplane and then disconnect all cables from the backplane. See “2.5-inch/3.5-inch drive backplane (power)” on page 65 and “2.5-inch/3.5-inch drive backplane (signal)” on page 66.

After you finish

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

Install the front 3.5-inch drive backplane

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

About this task

Attention:

- Read “Installation guidelines” on page 83 to ensure that you work safely.

- Power off the server and disconnect all power cords for this task.
- 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.

A video for this task is available at:

- YouTube: <https://www.youtube.com/playlist?list=PLYV5R7hVcs-Cmxb8e4L4PvMQ7J5PxvuOK>
- Youku: https://list.youku.com/albumlist/show/id_59643656

Procedure

- Step 1. Touch the static-protective package that contains the backplane to any unpainted surface on the outside of the server. Then, take the backplane out of the package and place it on a static-protective surface.
- Step 2. Connect the cables to the backplane. See “2.5-inch/3.5-inch drive backplane (power)” on page 65 and “2.5-inch/3.5-inch drive backplane (signal)” on page 66.
- Step 3. Put the backplane down into place.

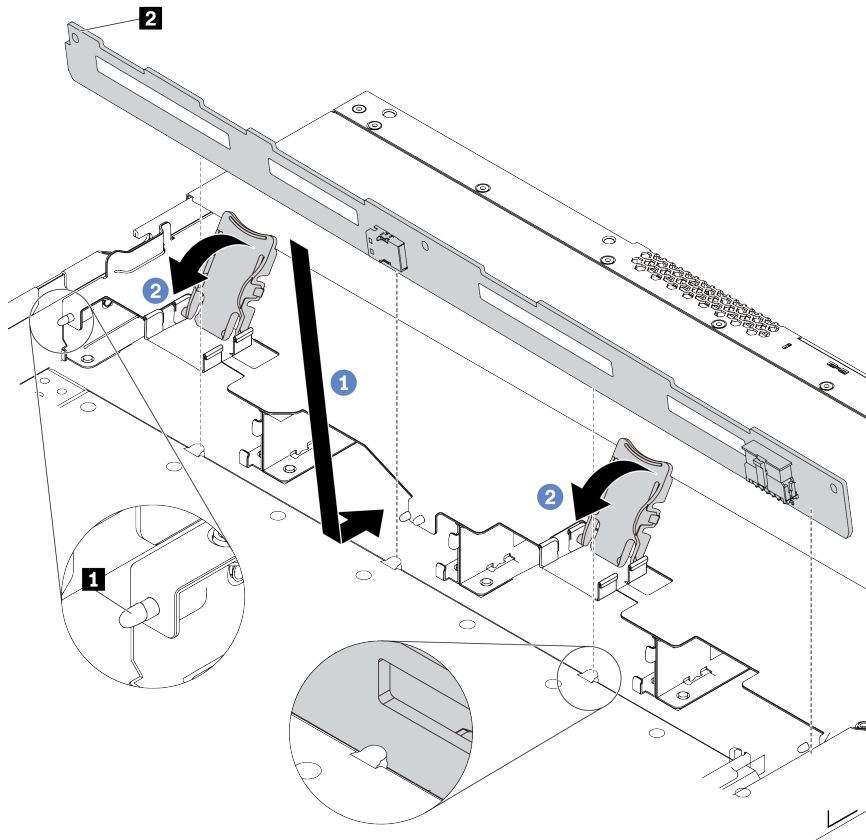


Figure 39. Installation of backplane for four 3.5-inch hot-swap drives

- a. 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.
- b. Close the release latches to secure the backplane in place.

Step 4. Connect the cables to the system board or expansion slots. See “2.5-inch/3.5-inch drive backplane (power)” on page 65 and “2.5-inch/3.5-inch drive backplane (signal)” on page 66.

After you finish

1. Reinstall all the drives and drive fillers into the drive bays. See “Install a 2.5/3.5-inch hot-swap drive” on page 125.
2. Complete the parts replacement. See “Complete the parts replacement” on page 224.

Remove the front 16-EDSFF drive backplane

Use this information to remove the backplane for front 16 EDSFF drives.

About this task

Attention:

- Read “Installation guidelines” on page 83 to ensure that you work safely.
- Power off the server and disconnect all power cords for this task.
- 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.

A video for this task is available at:

- YouTube: <https://www.youtube.com/playlist?list=PLYV5R7hVcs-Cmxb8e4L4PvMQ7J5PxvuOK>
- Youku: https://list.youku.com/albumlist/show/id_59643656

Procedure

Step 1. Remove the top cover. See “Remove the top cover” on page 220.

Step 2. Remove all the installed drives and drive cages from the drive bays. See “Remove an EDSFF drive” on page 126.

Step 3. Remove the backplane from the chassis.

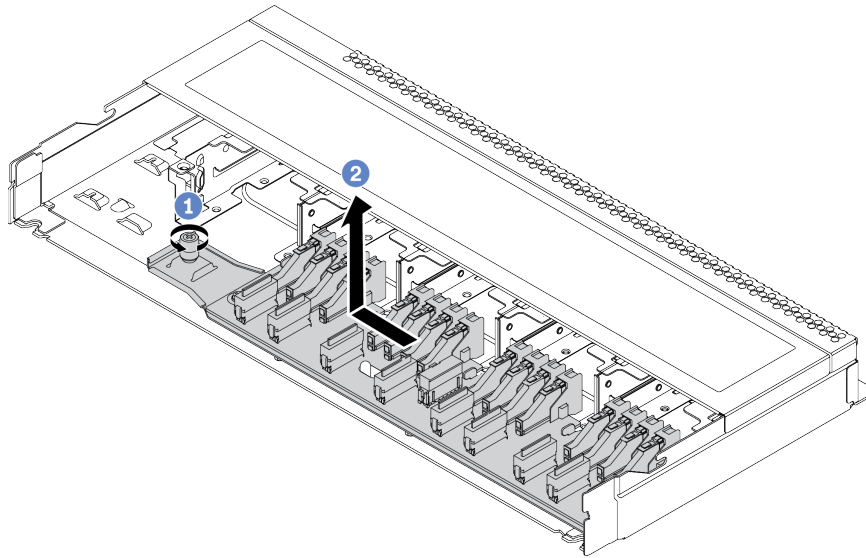


Figure 40. Removal of backplane for 16 EDSFF drives

- a. Loosen the screw.
- b. Slightly slide the backplane as shown and then lift it up.

Step 4. Disconnect the cables from the backplane. See “16-EDSFF drive backplane” on page 63.

After you finish

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

Install the front 16-EDSFF drive backplane

Use this information to install the backplane for front 16 EDSFF drives.

About this task

Attention:

- Read “Installation guidelines” on page 83 to ensure that you work safely.
- Power off the server and disconnect all power cords for this task.
- 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.

A video for this task is available at:

- YouTube: <https://www.youtube.com/playlist?list=PLYV5R7hVcs-Cmxb8e4L4PvMQ7J5PxvuOK>
- Youku: https://list.youku.com/albumlist/show/id_59643656

Procedure

- Step 1. Touch the static-protective package that contains the backplane to any unpainted surface on the outside of the server. Then, take the backplane out of the package and place it on a static-protective surface.
- Step 2. Connect the cables to the backplane. See “16-EDSFF drive backplane” on page 63.
- Step 3. Put the backplane down into place.

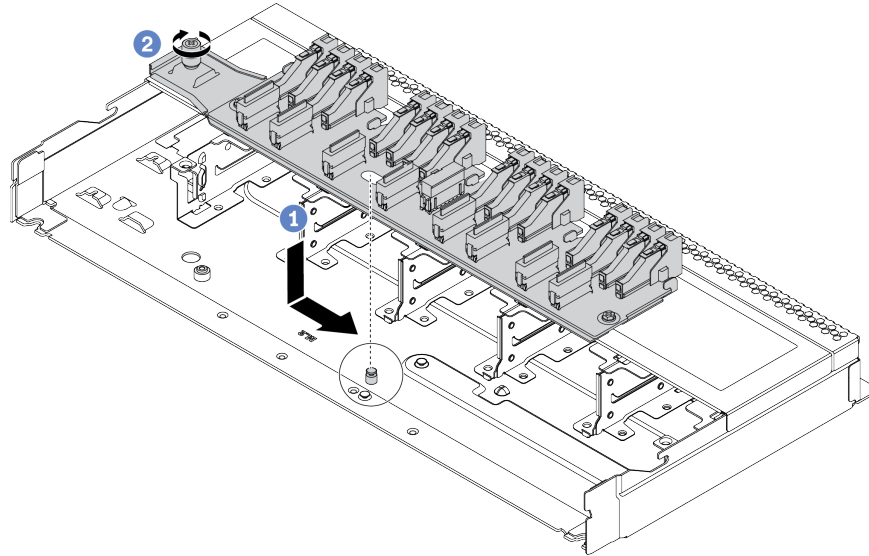


Figure 41. Installation of backplane for 16 EDSFF drives

- a. Align the hole on the backplane with the pin on the chassis, place it down, and slightly slide it as shown.
 - b. Tighten the screw to secure the backplane.
- Step 4. Connect the cables to the system board or expansion slots. See “16-EDSFF drive backplane” on page 63.

After you finish

1. Reinstall all the drives and drive cages into the drive bays. See “Install an EDSFF drive” on page 128.
2. Complete the parts replacement. See “Complete the parts replacement” on page 224.

Remove the 2.5-inch rear drive backplane

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

About this task

Attention:

- Read “Installation guidelines” on page 83 to ensure that you work safely.
- Power off the server and disconnect all power cords for this task.
- 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.

A video for this task is available at:

- YouTube: <https://www.youtube.com/playlist?list=PLYV5R7hVcs-Cmxb8e4L4PvMQ7J5PxvuOK>
- Youku: https://list.youku.com/albumlist/show/id_59643656

Procedure

Step 1. Prepare your server.

- a. Remove the top cover. See “Remove the top cover” on page 220.
- b. Remove all the installed drives and fillers (if any) from the drive bays. See “Remove a 2.5/3.5-inch hot-swap drive” on page 124.
- c. Record the cable connections for 7mm drives and then disconnect all cables from the backplanes. For information about the backplane cable routing, see “2.5-inch/3.5-inch drive backplane (power)” on page 65 and “2.5-inch/3.5-inch drive backplane (signal)” on page 66.

Step 2. Gently press and hold the tab on the rear hot-swap drive cage as shown and remove the air baffle from the rear hot-swap drive cage.

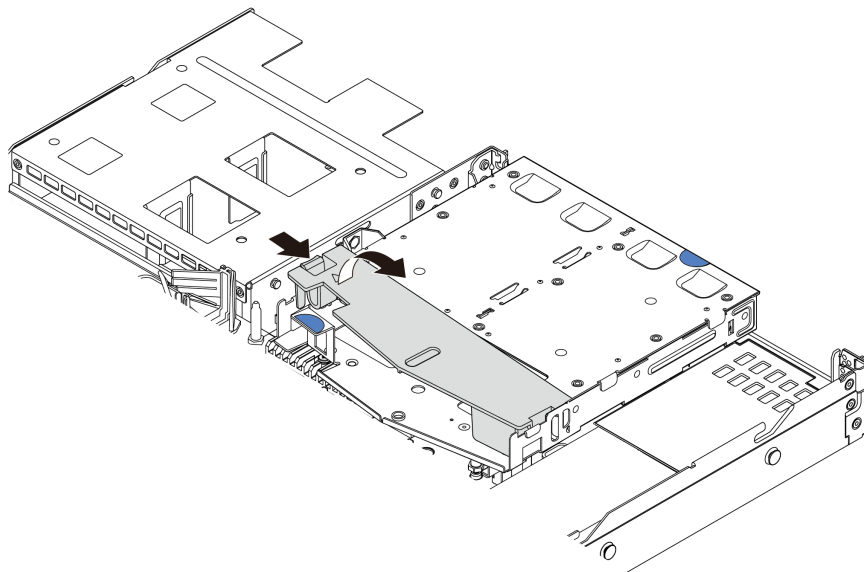


Figure 42. Air baffle removal

Step 3. Disconnect the cables from the 2.5-inch rear drive backplane.

Step 4. Carefully lift the 2.5-inch rear drive backplane out of the rear hot-swap drive cage.

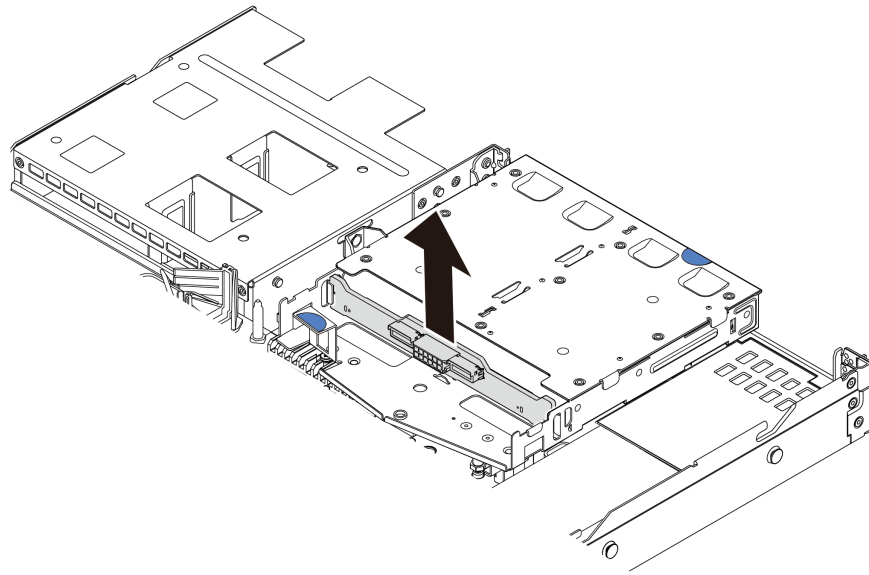


Figure 43. 2.5-inch rear drive backplane removal

After you finish

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

Install the 2.5-inch rear drive backplane

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

About this task

Attention:

- Read “Installation guidelines” on page 83 to ensure that you work safely.
- Power off the server and disconnect all power cords for this task.
- 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.

A video for this task is available at:

- YouTube: <https://www.youtube.com/playlist?list=PLYV5R7hVcs-Cmxb8e4L4PvMQ7J5PxvuOK>
- Youku: https://list.youku.com/albumlist/show/id_59643656

Procedure

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

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

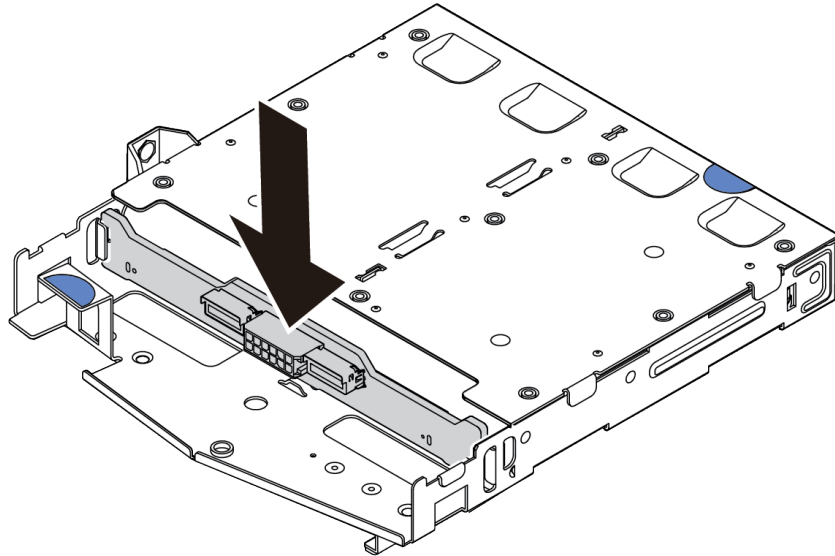


Figure 44. Rear backplane installation

Step 3. Connect the cables to the backplane. See “2.5-inch/3.5-inch drive backplane (power)” on page 65 and “2.5-inch/3.5-inch drive backplane (signal)” on page 66.

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

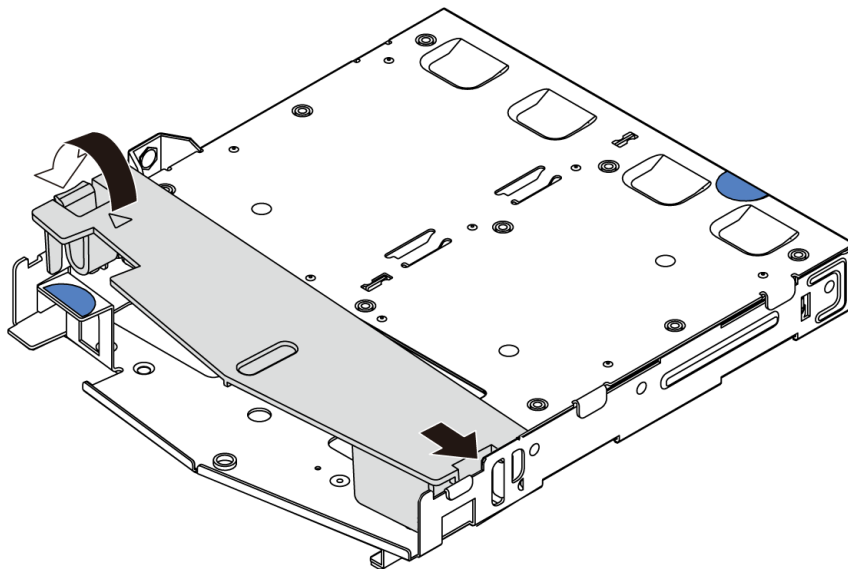


Figure 45. Air baffle installation

Step 5. Connect the cables to the system board or expansion slots. See “2.5-inch/3.5-inch drive backplane (power)” on page 65 and “2.5-inch/3.5-inch drive backplane (signal)” on page 66.

After you finish

1. Reinstall the drives or drive fillers into the rear hot-swap drive cage. See “Install a 2.5/3.5-inch hot-swap drive” on page 125.
2. Reinstall the drive assembly to the server. See “Install the hot-swap rear drive assembly” on page 141.
3. Complete the parts replacement. See “Complete the parts replacement” on page 224.

Remove the 7mm drive backplanes

Use this information to remove the 7mm drive backplanes.

About this task

Attention:

- Read “Installation guidelines” on page 83 to ensure that you work safely.
- Power off the server and disconnect all power cords for this task.
- 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.

A video for this task is available at:

- YouTube: <https://www.youtube.com/playlist?list=PLYV5R7hVcs-Cmxb8e4L4PvMQ7J5PxvuOK>
- Youku: https://list.youku.com/albumlist/show/id_59643656

Procedure

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

Step 1. Prepare your server.

- a. Remove the top cover. See “Remove the top cover” on page 220.
- b. Remove all the installed drives and fillers (if any) from the drive bays. See “Remove a 2.5/3.5-inch hot-swap drive” on page 124.
- c. Record the cable connections for 7mm drives and then disconnect all cables from the backplanes. For information about the backplane cable routing, see “7mm drive backplane” on page 64.
- d. Remove the 7mm drive assembly (if any) from the rear chassis. See “Remove the hot-swap rear drive assembly” on page 140.

Step 2. Remove the 7mm drive backplane on the top.

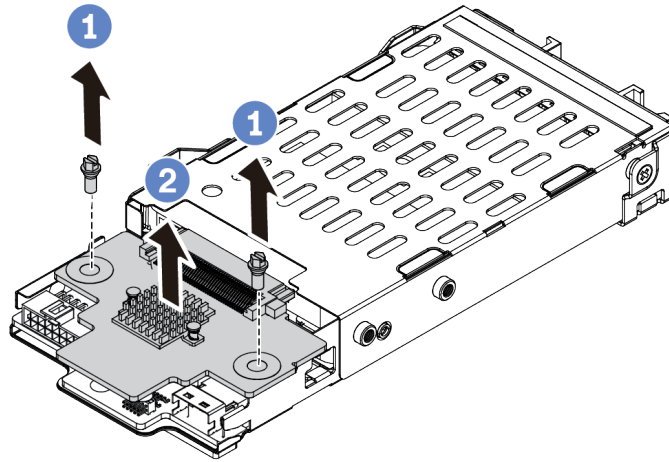


Figure 46. 7mm drive backplane removal (top)

- a. Remove the two screws as shown.
- b. Vertically lift the backplane up and put it aside.

Step 3. Remove the 7mm drive backplane at the bottom.

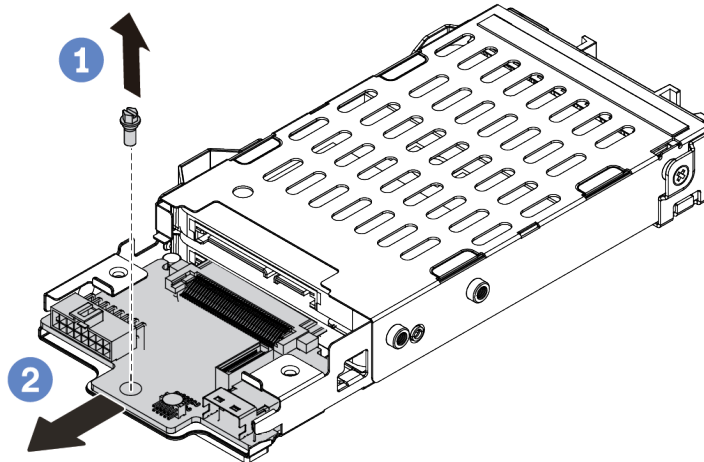


Figure 47. 7mm drive backplane removal (bottom)

- a. Remove the screw as shown.
- b. Remove the backplane horizontally from the cage as shown.

After you finish

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

Install the 7mm drive backplanes

Use this information to install the 7mm drive backplanes.

About this task

Attention:

- Read “Installation guidelines” on page 83 to ensure that you work safely.
- Power off the server and disconnect all power cords for this task.
- 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.

A video for this task is available at:

- YouTube: <https://www.youtube.com/playlist?list=PLYV5R7hVcs-Cmxb8e4L4PvMQ7J5PxvuOK>
- Youku: https://list.youku.com/albumlist/show/id_59643656

Procedure

- Step 1. Touch the static-protective package that contains the new backplanes to any unpainted surface on the outside of the server. Then, take the new backplanes out of the package and place them on a static-protective surface.
- Step 2. Install the 7mm drive backplane at the bottom.

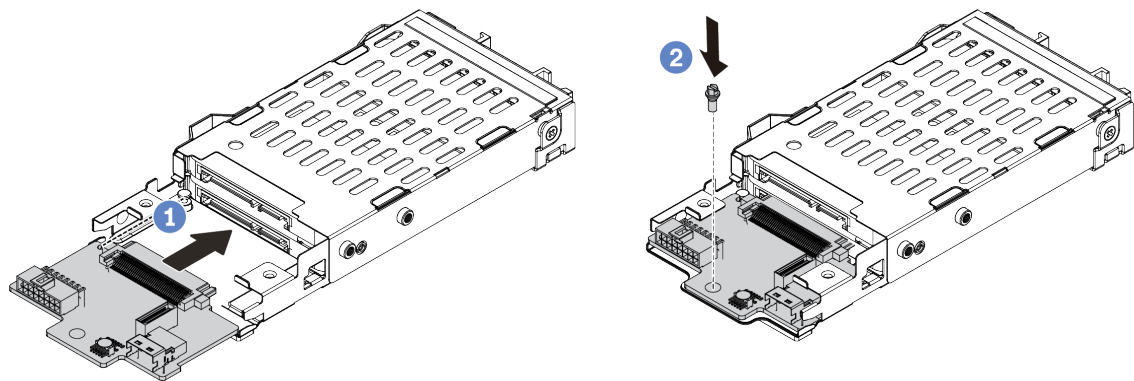


Figure 48. 7mm drive backplane installation (bottom)

- a. Align the pin on the cage and slightly slide the backplane into the cage until it is fully seated.
- b. Install the screw as shown.

- Step 3. Install the 7mm drive backplane on the top.

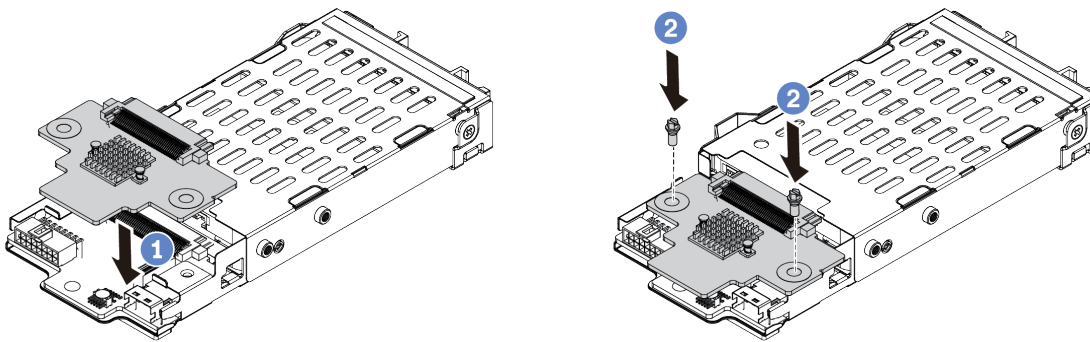


Figure 49. 7mm drive backplane installation (top)

- a. Put the backplane down on the cage as shown.
- b. Install the two screws to secure the backplane in place.

Step 4. Connect the cables from the backplanes to the system board and riser slot. See “7mm drive backplane” on page 64.

After you finish

1. Install the 7mm drive cage assembly on the rear chassis. See “Install the hot-swap rear drive assembly” on page 141.
2. Reinstall all the drives and fillers (if any) into the drive bays. See “Install a 2.5/3.5-inch hot-swap drive” on page 125.
3. Complete the parts replacement. See “Complete the parts replacement” on page 224.

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.

About this task

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 local ordinances or regulations for 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 your support center or business partner. For Lenovo support telephone numbers, see <https://datacentersupport.lenovo.com/supportphonenumberlist> for your region support details.

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.

Attention:

- Read “Installation guidelines” on page 83 to ensure that you work safely.
- Power off the server and disconnect all power cords for this task.
- 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.

A video for this task is available at:

- YouTube: <https://www.youtube.com/playlist?list=PLYV5R7hVcs-Cmxb8e4L4PvMQ7J5PxvuOK>
- Youku: https://list.youku.com/albumlist/show/id_59643656

Procedure

- Step 1. Remove the top cover. See “Remove the top cover” on page 220.
- Step 2. Remove any parts and disconnect any cables that might impede your access to the CMOS battery.
- Step 3. Locate the CMOS battery. See “System board components” on page 44.

Step 4. Open the battery clip as shown and carefully take the 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.

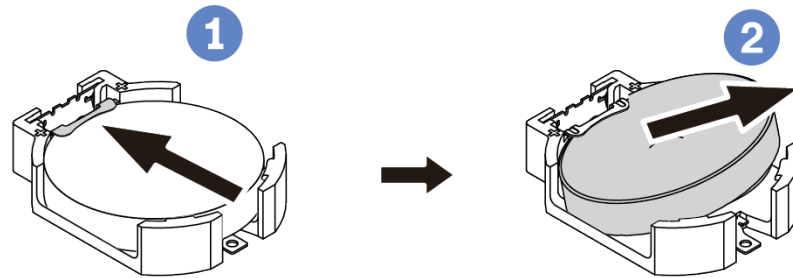


Figure 50. CMOS battery removal

After you finish

1. Install a new one. See “Install the CMOS battery” on page 110.
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.

About this task

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 CMOS battery must be handled correctly to avoid possible danger. If you replace the CMOS battery, you must adhere to local ordinances or regulations for 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 your support center or business partner. For Lenovo support telephone numbers, see <https://datacentersupport.lenovo.com/supportphonenumberlist> for your region support details.

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.

Attention:

- Read “Installation guidelines” on page 83 to ensure that you work safely.
- Power off the server and disconnect all power cords for this task.
- 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.

A video for this task is available at:

- YouTube: <https://www.youtube.com/playlist?list=PLYV5R7hVcs-Cmxb8e4L4PvMQ7J5PxvuOK>
- Youku: https://list.youku.com/albumlist/show/id_59643656

Procedure

- Step 1. Touch the static-protective package that contains the CMOS battery to any unpainted surface on the outside of the server. Then, take the CMOS battery out of the package.
- Step 2. Install the CMOS battery. Ensure that the CMOS battery is seated in place.

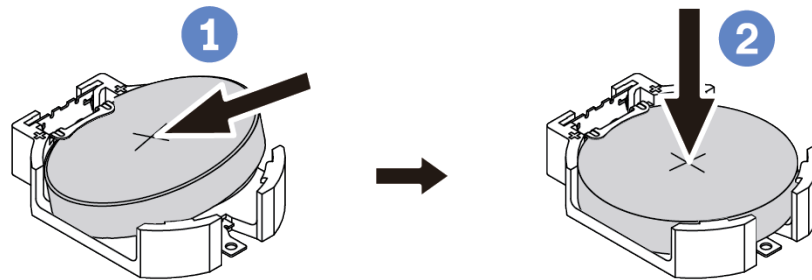


Figure 51. CMOS battery installation

After you finish

1. Complete the parts replacement. See “Complete the parts replacement” on page 224.
2. Use the Setup utility to set the date, time, and any passwords.

EDSFF cage replacement

Use this information to remove and install an EDSFF cage

Remove an EDSFF cage

Use this information to remove an EDSFF cage.

About this task

Attention:

- Read “Installation guidelines” on page 83 to ensure that you work safely.
- Power off the server and disconnect all power cords for this task.
- 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.

A video for this task is available at:

- YouTube: <https://www.youtube.com/playlist?list=PLYV5R7hVcs-Cmxb8e4L4PvMQ7J5PxvuOK>
- Youku: https://list.youku.com/albumlist/show/id_59643656

Procedure

- Step 1. If the security bezel is installed, remove it first. See “Remove the security bezel” on page 203.
- Step 2. Locate the EDSFF cage you need to remove, and then remove all the EDSFF drives installed in it. See “Remove an EDSFF drive” on page 126.

Step 3. Remove the EDSFF cage from the chassis.

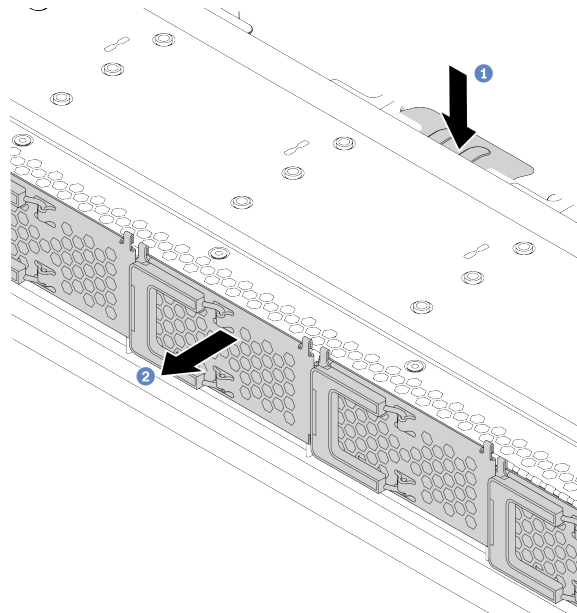


Figure 52. EDSFF cage removal

- a. Press down the extended tab on the other side of the front chassis.
- b. Slide the EDSFF cage out of the front chassis.

After you finish

1. Install a new EDSFF cage. See “Install an EDSFF cage” on page 113.
2. If you are instructed to return the old EDSFF cage, follow all packaging instructions and use any packaging materials that are provided.

Install an EDSFF cage

Use this information to install an EDSFF cage.

About this task

Attention:

- Read “Installation guidelines” on page 83 to ensure that you work safely.
- Power off the server and disconnect all power cords for this task.
- 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.

A video for this task is available at:

- YouTube: <https://www.youtube.com/playlist?list=PLYV5R7hVcs-Cmxb8e4L4PvMQ7J5PxxvOK>
- Youku: https://list.youku.com/albumlist/show/id_59643656

Procedure

- Step 1. Touch the static-protective package that contains the EDSFF cage to any unpainted surface on the outside of the server. Then, take the EDSFF cage out of the package and place it on a static-protective surface.
- Step 2. Slide the diagnostics panel assembly into the front chassis as shown. Ensure that it is seated in place.

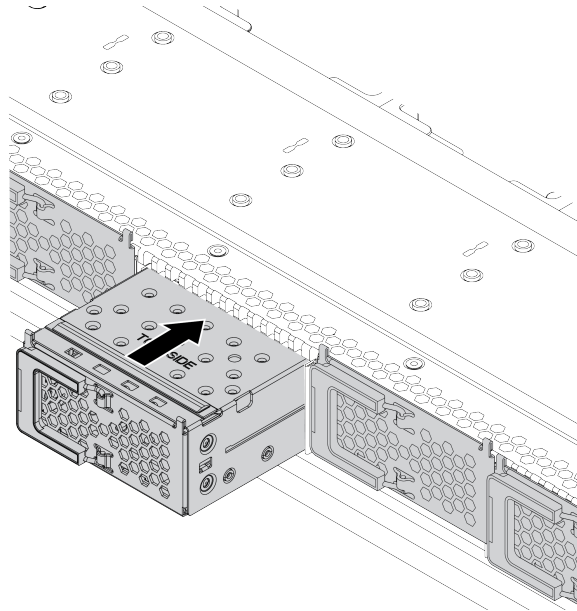


Figure 53. EDSFF cage installation

- Step 3. Remove the EDSFF drive cage cover.

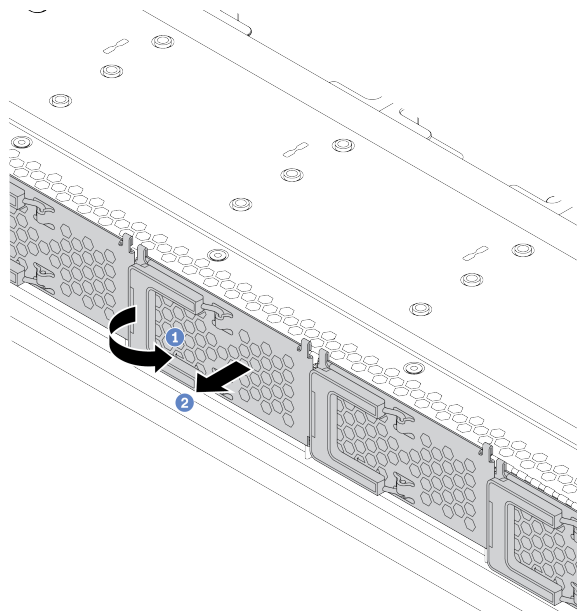


Figure 54. EDSFF drive cage cover removal

- a. Open the handle as shown.
- b. Grasp the handle and remove the drive cage cover.

Step 4. Install EDSFF drives into the EDSFF cage. See “Install an EDSFF drive” on page 128.

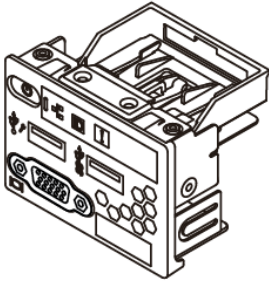
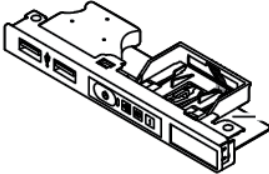
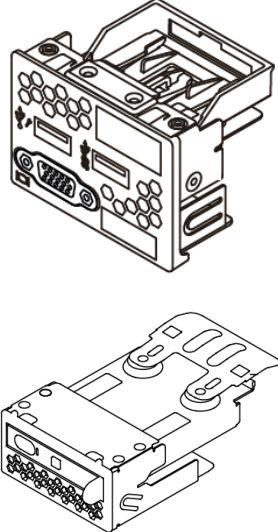
After you finish

Complete the parts replacement. See “Complete the parts replacement” on page 224.

Front I/O assembly replacement

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

Depending on server models, your server supports the following front I/O assemblies.

Type	Front I/O assembly
<p>For server models with</p> <ul style="list-style-type: none"> • four 2.5-inch front drive bays • ten 2.5-inch front drive bays • eight 2.5-inch front drive bays (1) • 16 EDSFF drives (1) 	<p>Front I/O assembly with diagnostics panel (right)</p> 
<p>For server models with four 3.5-inch front drive bays.</p>	<p>Front I/O assembly with diagnostics panel (top)</p> 
<p>For server models with</p> <ul style="list-style-type: none"> • eight 2.5-inch front drive bays (2) • 16 EDSFF drives (2) 	<p>Front I/O assembly+ LCD diagnostics panel assembly</p> 

Remove the front I/O assembly

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

About this task

The following illustrates how to remove the front I/O assembly with diagnostics panel. You can remove other front I/O assemblies in the same way.

Attention:

- Read “Installation guidelines” on page 83 to ensure that you work safely.
- Power off the server and disconnect all power cords for this task.
- 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.

A video for this task is available at:

- YouTube: <https://www.youtube.com/playlist?list=PLYV5R7hVcs-Cmxb8e4L4PvMQ7J5PxvuOK>
- Youku: https://list.youku.com/albumlist/show/id_59643656

Procedure

- Step 1. Remove the top cover. See “Remove the top cover” on page 220.
- Step 2. If the security bezel is installed, remove it. See “Remove the security bezel” on page 203.
- Step 3. Disconnect the front I/O cables from the system board.
- Step 4. Remove the front I/O assembly.

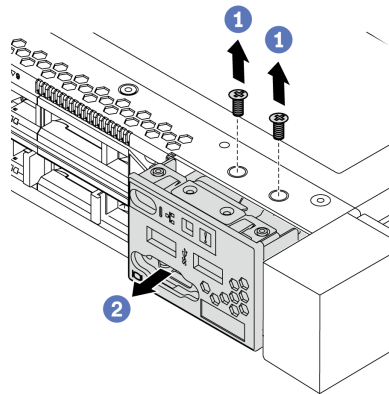


Figure 55. Removal of the front I/O assembly

- a. Remove the screws that secure the front I/O assembly.
- b. Slide the front I/O assembly out of the front chassis.

After you finish

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.

About this task

The following illustrates how to install the front I/O assembly with diagnostics panel. You can install other front I/O assemblies in the same way.

Attention:

- Read “Installation guidelines” on page 83 to ensure that you work safely.
- Power off the server and disconnect all power cords for this task.
- 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.

A video for this task is available at:

- YouTube: <https://www.youtube.com/playlist?list=PLYV5R7hVcs-Cmxb8e4L4PvMQ7J5PxvuOK>
- Youku: https://list.youku.com/albumlist/show/id_59643656

Procedure

- Step 1. Touch the static-protective package that contains the front I/O assembly to any unpainted surface on the outside of the server. Then, take the front I/O assembly out of the package and place it on a static-protective surface.
- Step 2. Install the front I/O assembly.

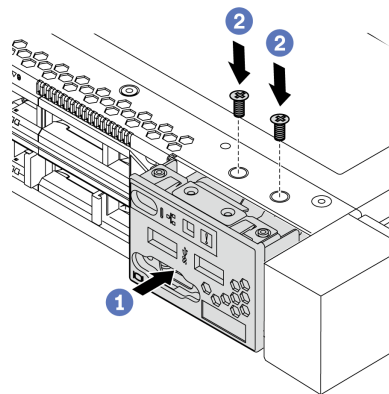


Figure 56. Installation of the front I/O assembly

- a. Insert the front I/O assembly into the front chassis.
- b. Install the screws to secure the front I/O assembly in place.

After you finish

1. Connect the front I/O cables to the system board. See “Front I/O” on page 58.
2. Complete the parts replacement. See “Complete the parts replacement” on page 224.

Remove the LCD diagnostics panel assembly

Use this information to remove the LCD diagnostics panel assembly.

About this task

Attention:

- Read “Installation guidelines” on page 83 to ensure that you work safely.
- Power off the server and disconnect all power cords for this task.
- 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.

A video for this task is available at:

- YouTube: <https://www.youtube.com/playlist?list=PLYV5R7hVcs-Cmxb8e4L4PvMQ7J5PxvuOK>
- Youku: https://list.youku.com/albumlist/show/id_59643656

Procedure

- Step 1. Remove the top cover. See “Remove the top cover” on page 220.
- Step 2. If the security bezel is installed, remove it. See “Remove the security bezel” on page 203.
- Step 3. Remove the LCD diagnostics panel assembly from the chassis.

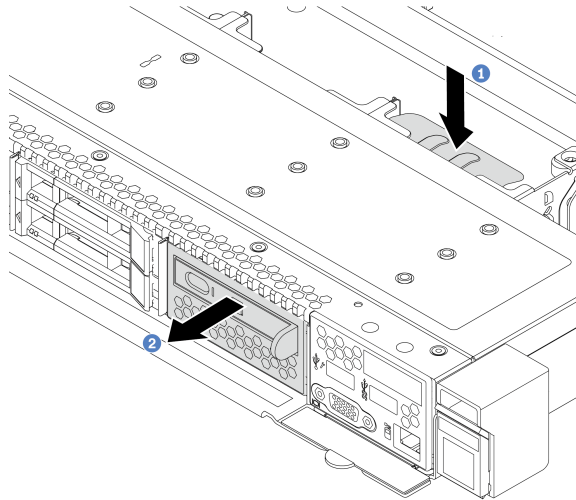


Figure 57. LCD diagnostics panel assembly removal

- a. Press down the extended tab on the other side of the front chassis.
- b. Slide the assembly out of the front chassis.

Step 4. Remove the LCD diagnostics panel from its assembly.

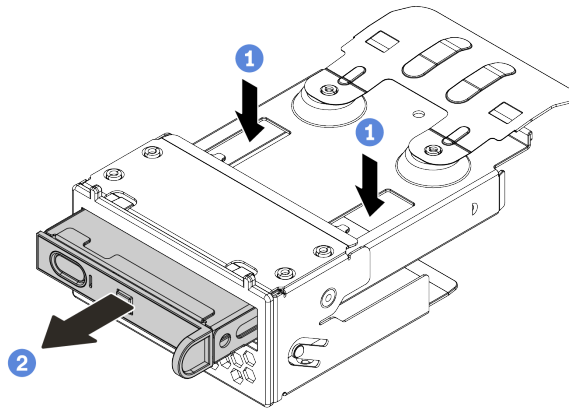


Figure 58. LCD diagnostics panel removal

- a. Press down the clips as shown.
- b. Pull the LCD diagnostics panel by its handle to get it out of its assembly.

After you finish

1. Install a new LCD diagnostics panel assembly or filler. See “Install the LCD diagnostics panel assembly” on page 119.
2. If you are instructed to return the old LCD diagnostics panel assembly, follow all packaging instructions and use any packaging materials that are provided.

Install the LCD diagnostics panel assembly

Use this information to install the diagnostics panel assembly.

About this task

Attention:

- Read “Installation guidelines” on page 83 to ensure that you work safely.
- Power off the server and disconnect all power cords for this task.
- 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.

A video for this task is available at:

- YouTube: <https://www.youtube.com/playlist?list=PLYV5R7hVcs-Cmxb8e4L4PvMQ7J5PxvuOK>
- Youku: https://list.youku.com/albumlist/show/id_59643656

Procedure

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

Step 2. If there is a filler installed on the front chassis, remove it as shown.

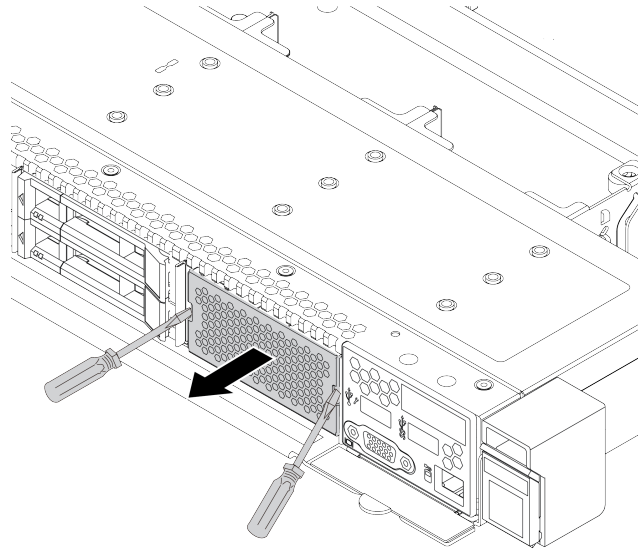


Figure 59. Filler removal

Step 3. Insert the LCD diagnostics panel into its assembly. Ensure that the panel is fully seated into its assembly.

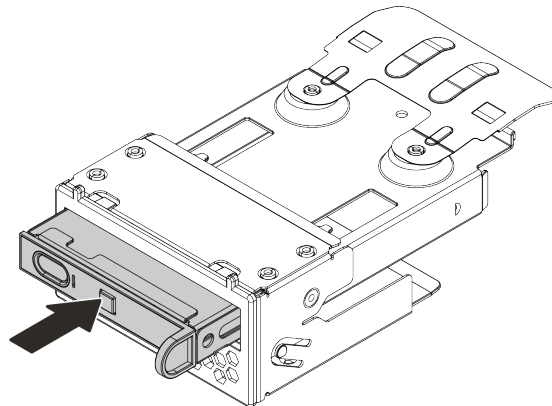


Figure 60. LCD diagnostics panel installation into its assembly

Step 4. Slide the diagnostics panel assembly into the front chassis as shown. Ensure that it is seated in place.

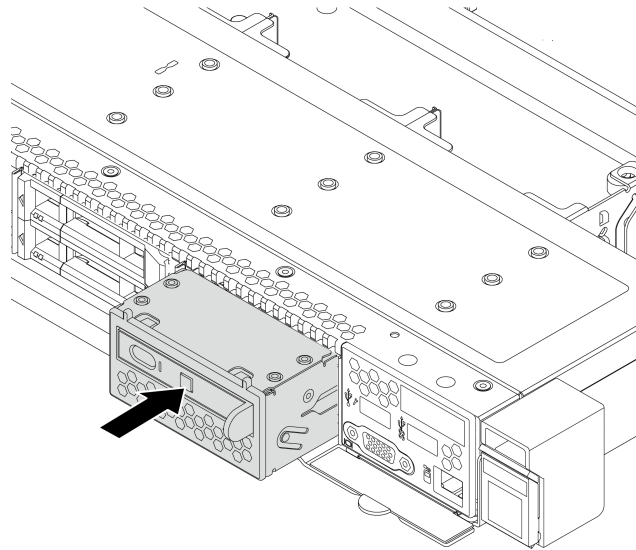


Figure 61. Diagnostics panel assembly installation

After you finish

Complete the parts replacement. See “Complete the parts replacement” on page 224.

Heat sink Torx T30 nut replacement

Use this information to remove and install a heat sink Torx T30 nut.

Remove a heat sink Torx T30 nut

This task has instructions for removing a PEEK (Polyether ether ketone) Torx T30 nut on the heat sink.

About this task

Attention:

- Read “Installation guidelines” on page 83 to ensure that you work safely.
- Power off the server and disconnect all power cords for this task.
- 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.
- If the server is in a rack, remove it from the rack.
- Do not touch the processor contacts. Contaminants on the processor contacts, such as oil from your skin, can cause connection failures.

Note: The heat sink, processor, and processor carrier for your system might be different from those shown in the illustrations.

A video for this task is available at:

- YouTube: <https://www.youtube.com/playlist?list=PLYV5R7hVcs-Cmxb8e4L4PvMQ7J5PxvuOK>

- Youku: https://list.youku.com/albumlist/show/id_59643656

Procedure

Step 1. Make preparations for this task.

- Remove the top cover. See “Remove the top cover” on page 220.
- Remove the PHM. See “Remove a processor and heat sink” on page 176.

Step 2. Remove the Torx T30 nut.

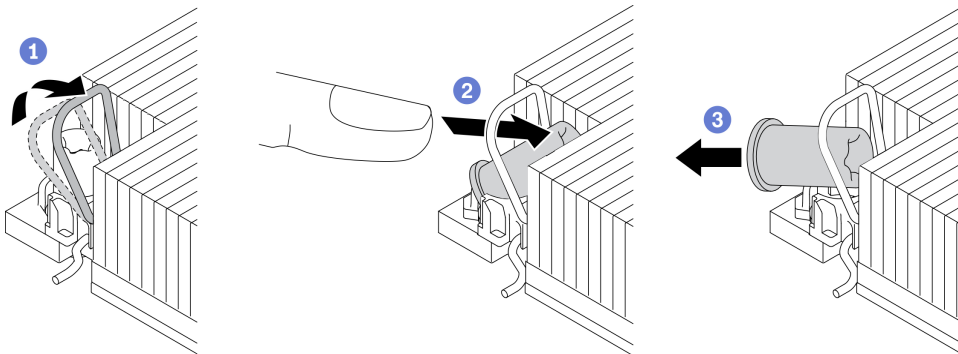


Figure 62. Removing a Torx T30 nut from the heat sink

Note: Do not touch the gold contacts on the bottom of the processor.

- Rotate the anti-tilt wire bail inwards.
- Push the upper edge of the Torx T30 nut towards the center of the heat sink until it disengages.
- Remove the Torx T30 nut.

Attention: Visually inspect the removed Torx T30 nut, if the nut is cracked or damaged, make sure no debris or broken pieces are left inside your server.

After you finish

- Install a new Torx T30 nut. See “Install a heat sink Torx T30 nut” on page 122.
- If you are instructed to return the defective component, please package the part to prevent any shipping damage. Reuse the packaging the new part arrived in and follow all packaging instructions.

Install a heat sink Torx T30 nut

This task has instructions for installing a PEEK (Polyether ether ketone) Torx T30 nut on the heat sink.

About this task

Attention:

- Read “Installation guidelines” on page 83 to ensure that you work safely.
- Power off the server and disconnect all power cords for this task.
- 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.
- Do not touch the processor contacts. Contaminants on the processor contacts, such as oil from your skin, can cause connection failures.

Note: The heat sink, processor, and processor carrier for your system might be different from those shown in the illustrations.

A video for this task is available at:

- YouTube: <https://www.youtube.com/playlist?list=PLYV5R7hVcs-Cmxb8e4L4PvMQ7J5PxvuOK>
- Youku: https://list.youku.com/albumlist/show/id_59643656

Procedure

Step 1. Install the Torx T30 nut.

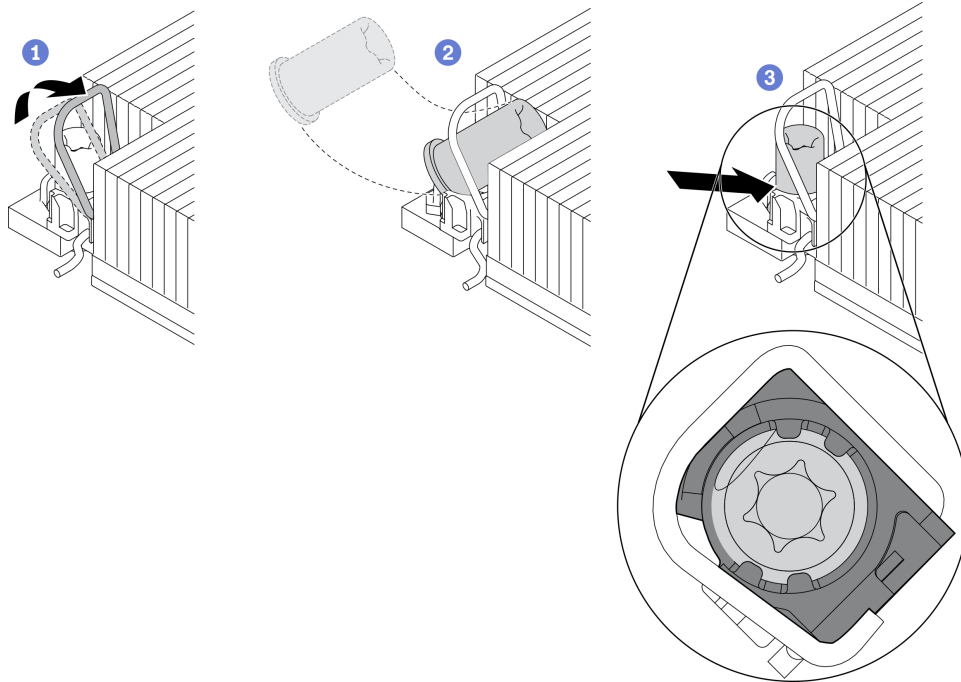


Figure 63. Installing a Torx T30 nut into the heat sink

Note: Do not touch the gold contacts on the bottom of the processor.

- a. Rotate the anti-tilt wire bail inwards.
- b. Orient the Torx T30 nut under the anti-tilt wire bail; then, align the Torx T30 nut with the socket at an angle as shown.
- c. Push the lower edge of the Torx T30 nut into the socket until it clicks into place. Make sure the Torx T30 nut is secured under the four clips in the socket.

After you finish

1. Reinstall the PHM. See “Install a processor and heat sink” on page 181.
2. Complete the parts replacement. See “Complete the parts replacement” on page 224.

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.
- 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 2.5/3.5-inch hot-swap drive

Use this information to remove a 2.5/3.5-inch hot-swap drive.

About this task

The following describes the information that you must consider for this task:

- Ensure that you have backed up data on your drive, especially if it is part of a RAID array.
 - Before you make changes to drives, RAID adapters, or drive backplanes, 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.
- 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). Log in to XClarity Controller and go to the **Storage** menu to identify and locate the drive type and corresponding drive bay number. If the drive bay numbers come with the term “NVMe”, it indicates the installed drives are NVMe drives.

Attention:

- Read “Installation guidelines” on page 83 to ensure that you work safely.
- 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.
- 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.

A video for this task is available at:

- YouTube: <https://www.youtube.com/playlist?list=PLYV5R7hVcs-Cmxb8e4L4PvMQ7J5PvuOK>
- Youku: https://list.youku.com/albumlist/show/id_59643656

Procedure

Step 1. If the security bezel is installed, remove it first. See “Remove the security bezel” on page 203.

Step 2. Slide the release latch to the left to open the drive tray handle.

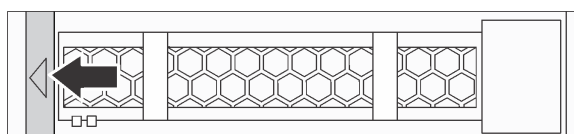


Figure 64. Opening the drive tray handle

Step 3. Grasp the handle and slide the drive out of the drive bay.

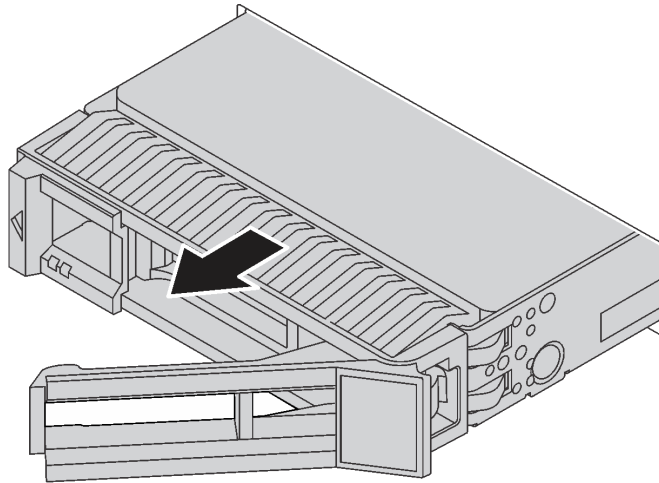


Figure 65. Hot-swap drive removal

After you finish

1. Install the drive filler or a new drive to cover the drive bay. See “Install a 2.5/3.5-inch hot-swap drive” on page 125.
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 2.5/3.5-inch hot-swap drive

Use this information to install a 2.5/3.5-inch hot-swap drive.

About this task

Attention:

- Read “Installation guidelines” on page 83 to ensure that you work safely.
- 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.

A video for this task is available at:

- YouTube: <https://www.youtube.com/playlist?list=PLYV5R7hVcs-Cmxb8e4L4PvMQ7J5PxvuOK>
- Youku: https://list.youku.com/albumlist/show/id_59643656

Procedure

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

Note: Ensure that drive installation meets “Technical rules for drives” on page 87.

Step 2. Remove the drive filler from the drive bay and keep the drive filler in a safe place.

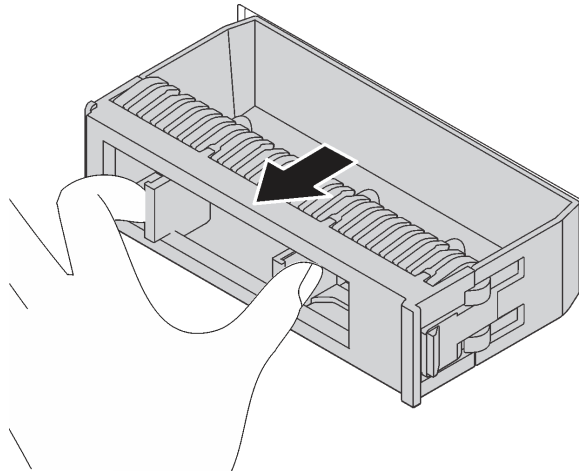


Figure 66. Drive filler removal

Step 3. Install the drive in the drive bay.

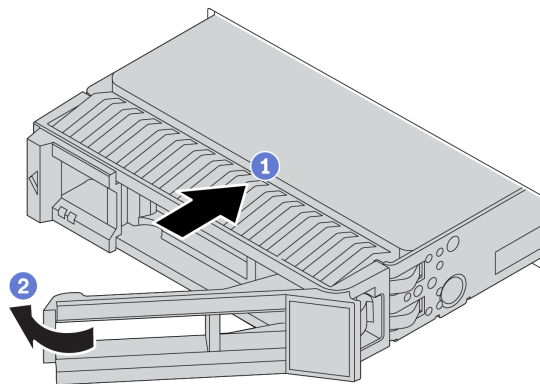


Figure 67. Hot-swap drive installation

- a. Ensure that the drive tray handle is in the open position. Slide the drive into the drive bay until it snaps into position.
- b. Close the drive tray handle to lock the drive in place.

Step 4. Check the drive LEDs to verify that the drive is operating correctly. For details, see “Drive LEDs” on page 25.

Step 5. Continue to install additional hot-swap drives if necessary.

After you finish

1. Reinstall the security bezel if you have removed it. See “Install the security bezel” on page 204.
2. Use the Lenovo XClarity Provisioning Manager V3 to configure the RAID if necessary. For more information, see:
https://sysmgt.lenovofiles.com/help/topic/ixpm_frontend/ixpm_v3_about.html

Remove an EDSFF drive

Use this information to remove an EDSFF drive.

About this task

The following describes the information that you must consider for this task:

- Ensure that you have backed up data on your drive, especially if it is part of a RAID array.
 - Before you make changes to drives, RAID adapters, or drive backplanes, 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.
- 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). Log in to XClarity Controller and go to the **Storage** menu to identify and locate the drive type and corresponding drive bay number. If the drive bay numbers come with the term “NVMe”, it indicates the installed drives are NVMe drives.

Attention:

- Read “Installation guidelines” on page 83 to ensure that you work safely.
- 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.
- 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.

A video for this task is available at:

- YouTube: <https://www.youtube.com/playlist?list=PLYV5R7hVcs-Cmxb8e4L4PvMQ7J5PxvuOK>
- Youku: https://list.youku.com/albumlist/show/id_59643656

Procedure

Step 1. If the security bezel is installed, remove it first. See “Remove the security bezel” on page 203.

Step 2. Remove the EDSFF drive cage cover.

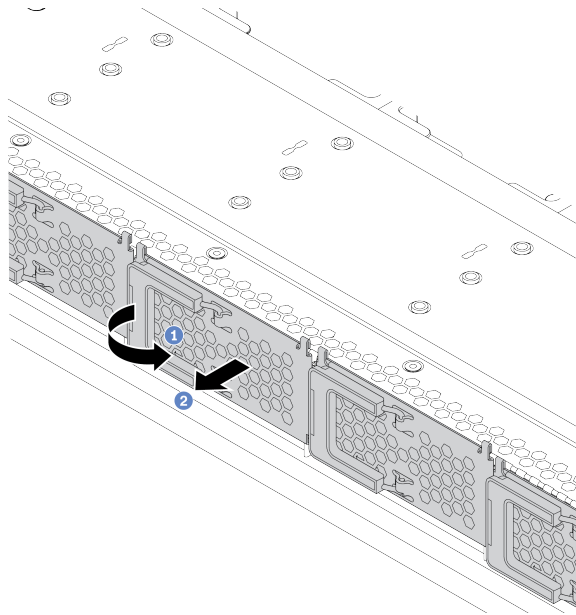


Figure 68. EDSFF drive cage cover removal

- a. Open the handle as shown.
- b. Grasp the handle and remove the drive cage cover.

Step 3. Remove the EDSFF drive.

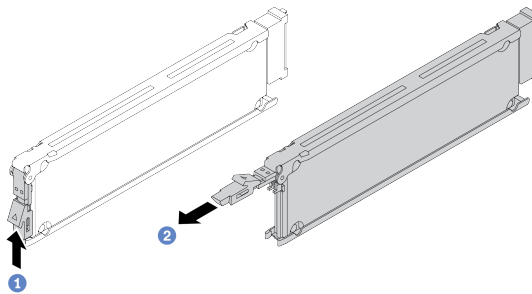


Figure 69. EDSFF drive removal

- a. Slide the release latch as shown to open the drive tray handle.
- b. Grasp the handle and slide the drive out of the drive bay.

After you finish

1. Install a new drive or install the drive cage cover to cover the drive bay. See “Install an EDSFF drive” on page 128.
2. If you are instructed to return the old EDSFF drive, follow all packaging instructions and use any packaging materials that are provided.

Install an EDSFF drive

Use this information to install an EDSFF drive.

About this task

Attention:

- Read “Installation guidelines” on page 83 to ensure that you work safely.
- 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.

A video for this task is available at:

- YouTube: <https://www.youtube.com/playlist?list=PLYV5R7hVcs-Cmxb8e4L4PvMQ7J5PxvuOK>
- Youku: https://list.youku.com/albumlist/show/id_59643656

Procedure

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

Note: Ensure that drive installation meets “Technical rules for drives” on page 87.

Step 2. Install the EDSFF drive.

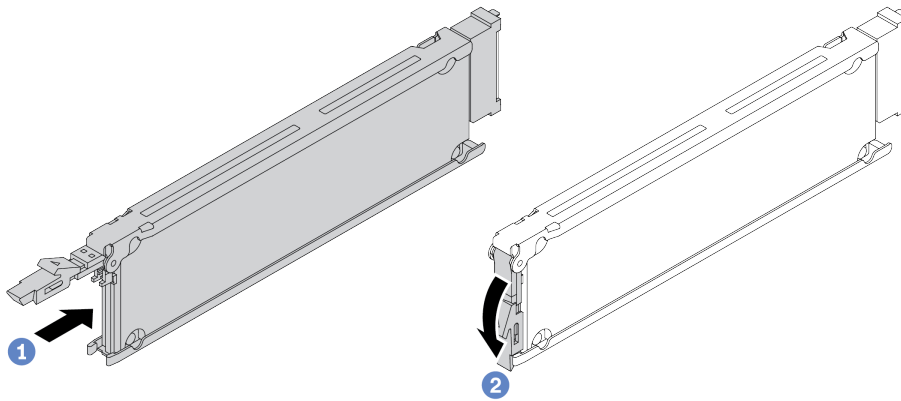


Figure 70. EDSFF drive installation

- a. Ensure that the drive tray handle is in the open position. Slide the drive into the drive bay until it snaps into position.
- b. Close the drive tray handle to lock the drive in place.

Step 3. Continue to install additional EDSFF drives if necessary.

Step 4. Install the EDSFF drive cage cover.

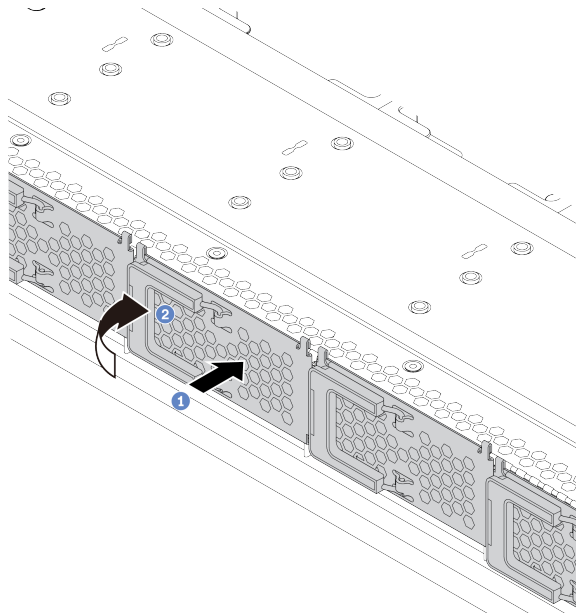


Figure 71. EDSFF drive cage cover installation

- a. Install the drive cage cover in place.
- b. Close the drive cage handle.

After you finish

1. Reinstall the security bezel if you have removed it. See “Install the security bezel” on page 204.
2. Use the Lenovo XClarity Provisioning Manager V3 to configure the RAID if necessary. For more information, see:
https://sysmgt.lenovofiles.com/help/topic/ixpm_frontend/ixpm_v3_about.html

Hot-swap power supply unit replacement

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

Remove a hot-swap power supply unit

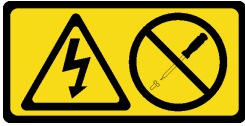
Use this information to remove a power supply unit.

About this task

Note: If the power supply unit to be removed is the only one installed, the power supply is non-hot-swap and before removing it, you must turn off the server first. To support redundancy mode or hot-swap, install an additional hot-swap power supply.

Safety information for AC power supplies

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.

Safety information for DC power supplies

CAUTION:

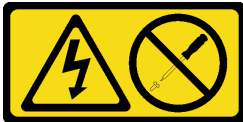
240 V dc input (input range: 180-300 V dc) is supported in Chinese Mainland ONLY. Power supply with 240 V dc input cannot support hot plugging power cord function. Before removing the power supply with dc input, please turn off server or disconnect dc power sources at the breaker panel or by turning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



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

NEVER CONNECT AND DISCONNECT THE POWER SUPPLY CABLE AND EQUIPMENT WHILE YOUR EQUIPMENT IS POWERED ON WITH DC SUPPLY (hot-plugging). Otherwise you may damage the equipment and result in data loss, the damages and losses result from incorrect operation of the equipment will not be covered by the manufacturers' warranty.

S035



CAUTION:

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

S019



CAUTION:

The power-control button on the device does not turn off the electrical current supplied to the device. The device also might have more than one connection to dc power. To remove all electrical current from the device, ensure that all connections to dc power are disconnected at the dc power input terminals.

S029



**For -48V dc power supply, electrical current from power cables is hazardous.
To avoid a shock hazard:**

- **To connect or disconnect -48V dc power cables when you need to remove/replace install redundancy power supply unit(s).**

To Connect:

1. Turn OFF subject dc power source(s) and equipment (s) that are attached to this product.
2. Install the power supply unit(s) into the system housing.
3. Attach dc power cord(s) to the product.
 - Ensure correct polarity of -48 V dc connections: RTN is + and -48 V dc is -. Earth ground should be connected very well.
4. Connect dc power cord(s) to subject power source (s).
5. Turn ON all the power source(s).

To Disconnect:

1. Disconnect or turn off the subject dc power source(s) (at the breaker panel) before removing the power supply unit(s).
2. Remove the subject dc cord(s) and make sure the wire terminal of power cord(s) is insulated.
3. Unplug the subject power supply unit(s) from the system housing.

Attention:

- Read “Installation guidelines” on page 83 to ensure that you work safely.
- 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.

A video for this task is available at:

- YouTube: <https://www.youtube.com/playlist?list=PLYV5R7hVcs-Cmxb8e4L4PvMQ7J5PxvuOK>
- Youku: https://list.youku.com/albumlist/show/id_59643656

Procedure

Step 1. If the server is in a rack, adjust the cable management arm (CMA) to gain access to the power supply bay.

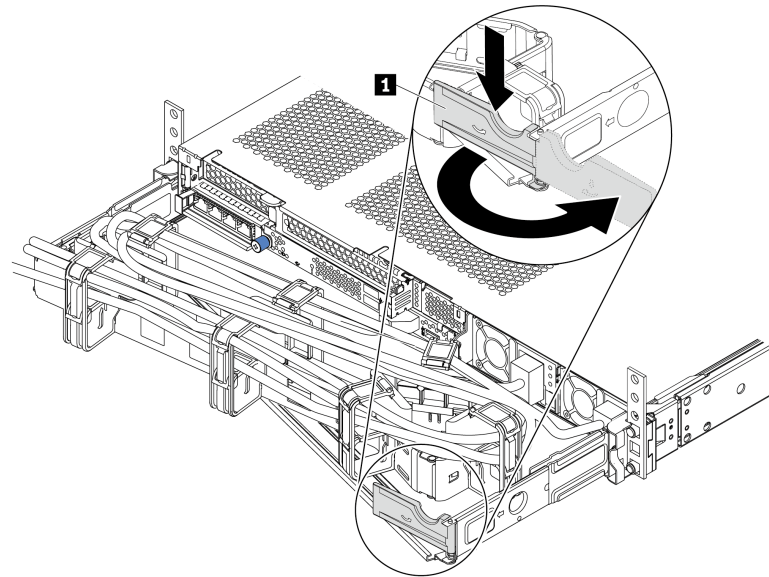


Figure 72. CMA adjustment

1. Press down the stop bracket **1** and rotate it to the open position.
 2. Rotate the CMA out of the way to gain access to the power supply.
- Step 2. Disconnect the power cord from the hot-swap power supply.
- For 240 V DC power supply units, turn off the server, then, disconnect both ends of the power cord and keep it in an ESD-safe place.
 - For AC power supply units, disconnect both ends of the power cord and keep it in an ESD-safe place.
 - For -48V DC power supply units:
 1. Disconnect the power cords from the electrical outlet.
 2. Use a slotted screwdriver to loosen the captive screws on the power supply terminal block.
 3. Disconnect the power cords from the power supply unit, make the wire terminal insulated, and keep them in an ESD-safe place.

Note: If you are replacing two power supplies, replace them 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 43.

- 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.

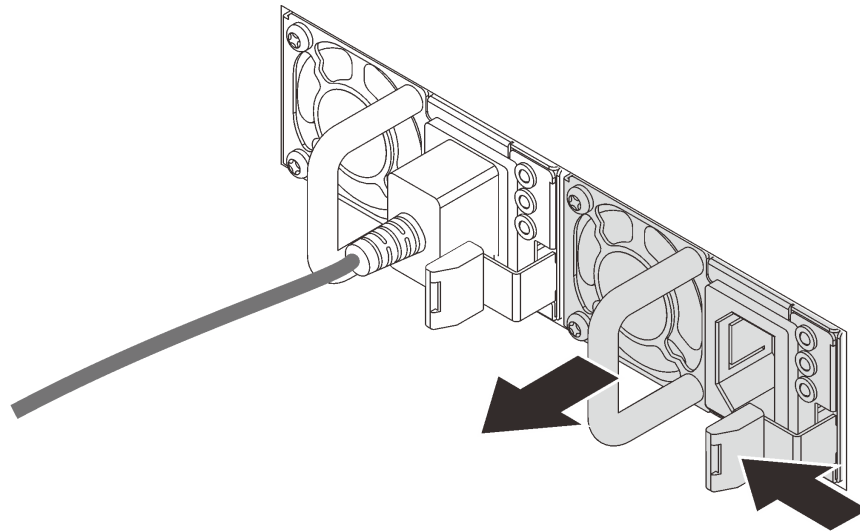


Figure 73. Hot-swap power supply removal

After you finish

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 135.

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.

About this task

The following describes the information that you must consider when installing a power supply:

- The server is shipped with only one power supply by default. In this case, the power supply is non-hot-swap and before removing it, you must turn off the server first. To support redundancy mode or hot-swap, install an additional hot-swap power supply.
- If you are replacing the existing power supply with a new power supply:
 - Use Lenovo Capacity Planner to calculate the required power capacity for what is configured for your server. More information about Lenovo Capacity Planner is available at: <https://datacentersupport.lenovo.com/solutions/Invo-lcp>
 - Ensure that the devices that you are installing are supported. For a list of supported optional devices for the server, go to: <https://static.lenovo.com/us/en/serverproven/index.shtml>

- Attach the power information label that comes with this option onto the existing label near the power supply.



Figure 74. Example power supply unit label on the top cover

Safety information for AC power supplies

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.

Safety information for DC power supplies

CAUTION:

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



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

NEVER CONNECT AND DISCONNECT THE POWER SUPPLY CABLE AND EQUIPMENT WHILE YOUR EQUIPMENT IS POWERED ON WITH DC SUPPLY (hot-plugging). Otherwise you may damage the equipment and result in data loss, the damages and losses result from incorrect operation of the equipment will not be covered by the manufacturers' warranty.

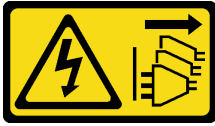
S035



CAUTION:

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

S019



CAUTION:

The power-control button on the device does not turn off the electrical current supplied to the device. The device also might have more than one connection to dc power. To remove all electrical current from the device, ensure that all connections to dc power are disconnected at the dc power input terminals.

S029



**For -48V dc power supply, electrical current from power cables is hazardous.
To avoid a shock hazard:**

- **To connect or disconnect -48V dc power cables when you need to remove/replace install redundancy power supply unit(s).**

To Connect:

1. Turn OFF subject dc power source(s) and equipment (s) that are attached to this product.
2. Install the power supply unit(s) into the system housing.
3. Attach dc power cord(s) to the product.
 - Ensure correct polarity of -48 V dc connections: RTN is + and -48 V dc is -. Earth ground should be connected very well.
4. Connect dc power cord(s) to subject power source (s).
5. Turn ON all the power source(s).

To Disconnect:

1. Disconnect or turn off the subject dc power source(s) (at the breaker panel) before removing the power supply unit(s).
2. Remove the subject dc cord(s) and make sure the wire terminal of power cord(s) is insulated.
3. Unplug the subject power supply unit(s) from the system housing.

Attention:

- Read “Installation guidelines” on page 83 to ensure that you work safely.
- 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.

A video for this task is available at:

- YouTube: <https://www.youtube.com/playlist?list=PLYV5R7hVcs-Cmxb8e4L4PvMQ7J5PxvuOK>
- Youku: https://list.youku.com/albumlist/show/id_59643656

Procedure

- Step 1. Touch the static-protective package that contains the hot-swap power supply to any unpainted surface on the outside of the server. Then, take the hot-swap power supply out of the package and place it on a static-protective surface.
- Step 2. If there is a power-supply filler installed, remove it.

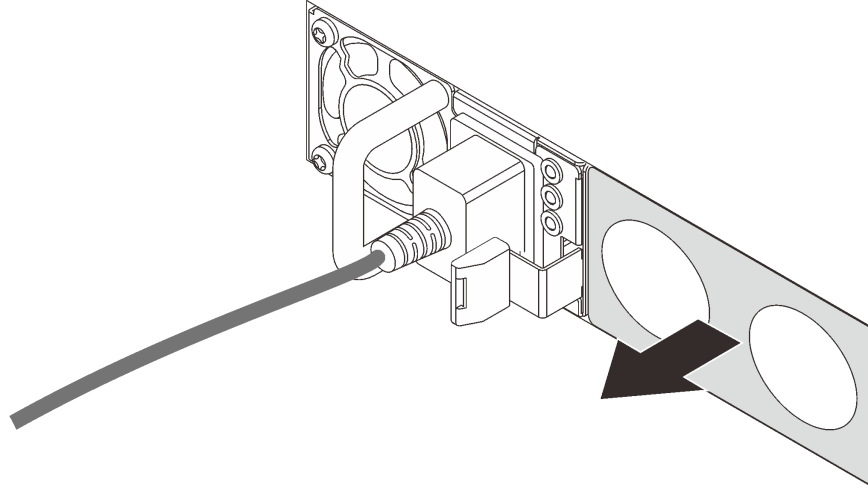


Figure 75. Hot-swap power supply filler removal

- Step 3. Slide the new hot-swap power supply into the bay until it snaps into position.

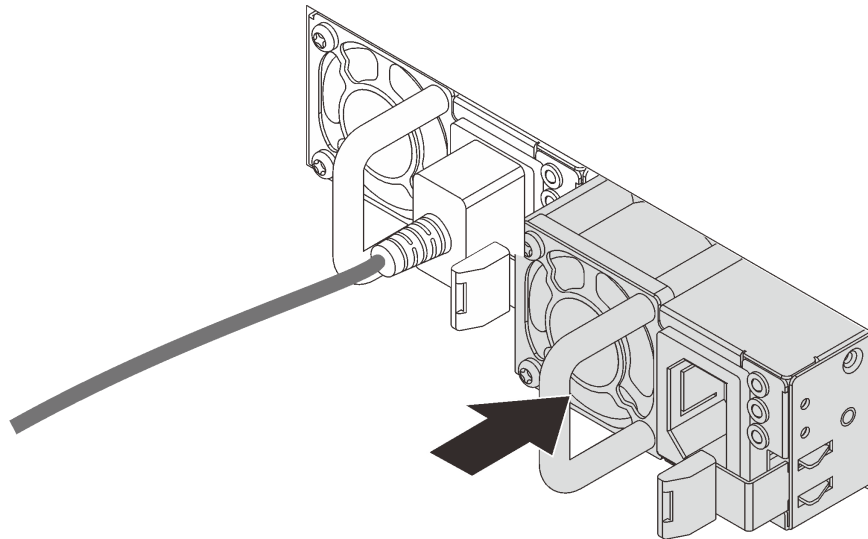



Figure 76. Hot-swap power supply installation

- Step 4. Connect the power supply unit to a properly grounded electrical outlet.
 - For 240 V DC power supply units:
 1. Turn off the server.
 2. Connect one end of the power cord to the power connector on the power supply unit.
 3. Connect the other end of the power cord to a properly grounded electrical outlet.

- For AC power supply units:
 1. Connect one end of the power cord to the power connector on the power supply unit.
 2. Connect the other end of the power cord to a properly grounded electrical outlet.
- For –48V DC power supply units:
 1. Use a slotted screwdriver to loosen the 3 captive screws on the power supply terminal block.
 2. Check the polarity label on the power supply unit and each power cord.

Polarity	PSU terminal block	Power cord
Input	-48V	-Vin
Ground		GND
Input	RTN	RTN

3. Face the groove side of each power cord connector towards the corresponding screw hole on the terminal block. Then, insert them to the connector beneath the screw hole.
4. Tighten the captive screws on the terminal block. Ensure the screws and power cords are secured in place.
5. Connect the other end of the cables to a properly grounded electrical outlet.

After you finish

1. If you have adjusted the CMA to gain access to the power supply bay, properly readjust the CMA back in place.
2. If the server is turned off, turn on the server. Ensure that both the power input LED and the power output LED on the power supply are lit, indicating that the power supply is operating properly.

Hot-swap rear drive assembly replacement

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

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

About this task

The following illustrates how to remove the 2.5-inch rear drive assembly. You can remove the 7mm rear drive assembly in the same way.

Attention:

- Read “Installation guidelines” on page 83 to ensure that you work safely.
- Power off the server and disconnect all power cords for this task.

- 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.

A video for this task is available at:

- YouTube: <https://www.youtube.com/playlist?list=PLYV5R7hVcs-Cmxb8e4L4PvMQ7J5PxvuOK>
- Youku: https://list.youku.com/albumlist/show/id_59643656

Procedure

- Step 1. Remove the top cover. See “Remove the top cover” on page 220.
- Step 2. Remove the drives or drive fillers installed in the hot-swap rear drive cage. See “Remove a 2.5/3.5-inch hot-swap drive” on page 124.
- Step 3. Disconnect the hot-swap rear drive cage cables from the system board or the PCIe adapter.
- Step 4. Hold the two blue touch points and directly lift the hot-swap rear drive cage out of the chassis.

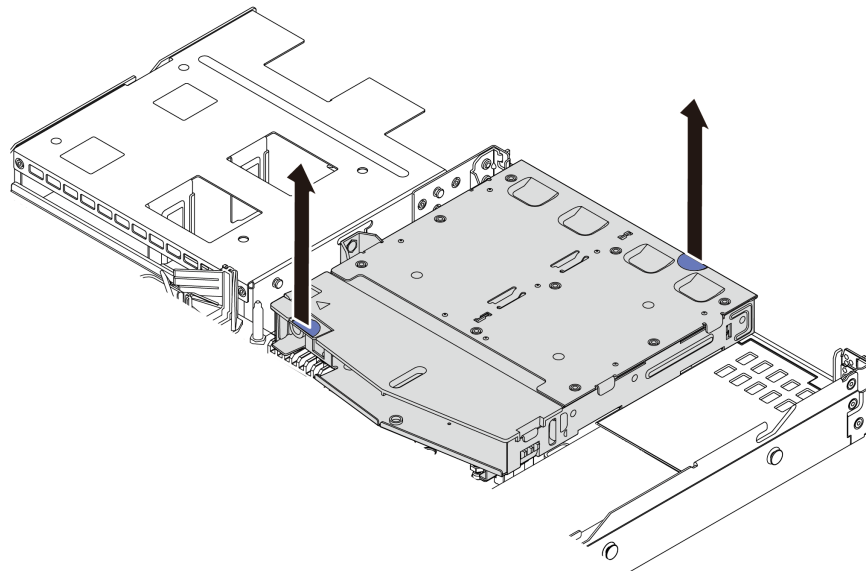


Figure 77. Hot-swap rear drive cage removal

- Step 5. If the rear backplane is reused, remove the rear backplane. See “Remove the 2.5-inch rear drive backplane” on page 101.

After you finish

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

Install the hot-swap rear drive assembly

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

About this task

The following illustrates how to install the 2.5-inch rear drive assembly. You can install the 7mm rear drive assembly in the same way.

Attention:

- Read “Installation guidelines” on page 83 to ensure that you work safely.
- Power off the server and disconnect all power cords for this task.
- 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.

A video for this task is available at:

- YouTube: <https://www.youtube.com/playlist?list=PLYV5R7hVcs-Cmxb8e4L4PvMQ7J5PxvuOK>
- Youku: https://list.youku.com/albumlist/show/id_59643656

Procedure

- Step 1. Touch the static-protective package that contains the hot-swap rear drive cage to any unpainted surface on the outside of the server. Then, take the hot-swap rear drive cage out of the package and place it on a static-protective surface.
- Step 2. Gently press and hold the tab on the hot-swap rear drive cage as shown and remove the air baffle from the hot-swap rear drive cage.

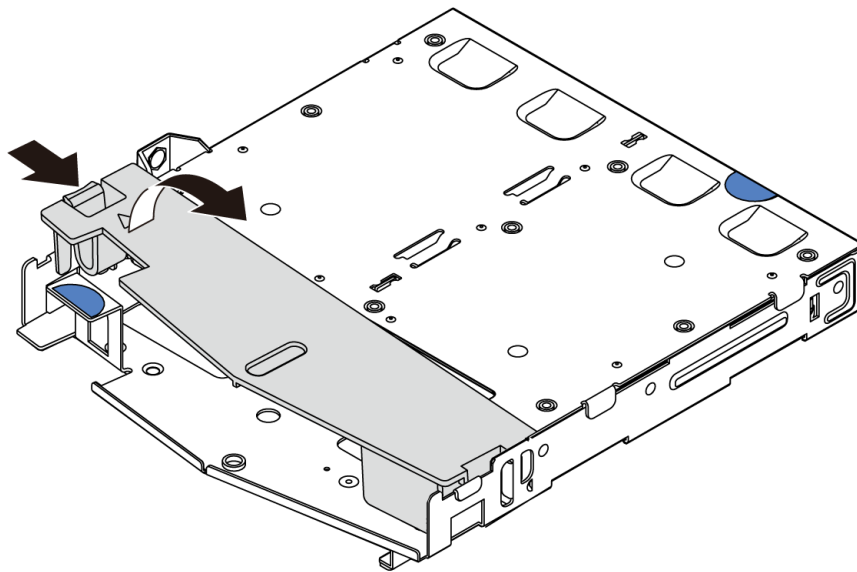


Figure 78. Air baffle removal

- Step 3. Align the rear backplane with the hot-swap rear drive cage and lower it into the hot-swap rear drive cage.

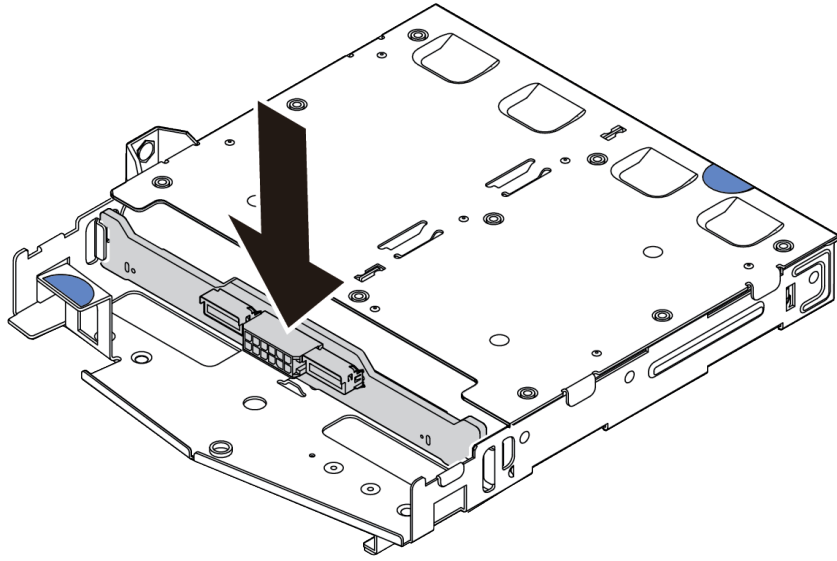


Figure 79. Rear backplane installation

- Step 4. Connect the cables to the backplane. See “2.5-inch/3.5-inch drive backplane (power)” on page 65 and “2.5-inch/3.5-inch drive backplane (signal)” on page 66.
- Step 5. Install the air baffle into the hot-swap rear drive cage as shown.

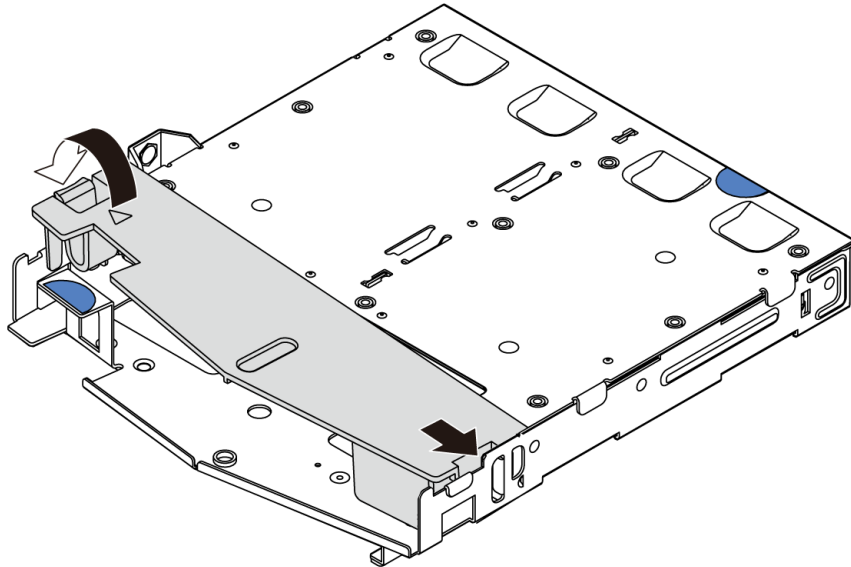


Figure 80. Air baffle installation

Step 6. Align the pins on the hot-swap rear drive cage with the corresponding hole and slot in the chassis. Then, lower the hot-swap rear drive cage into the chassis until it is fully seated.

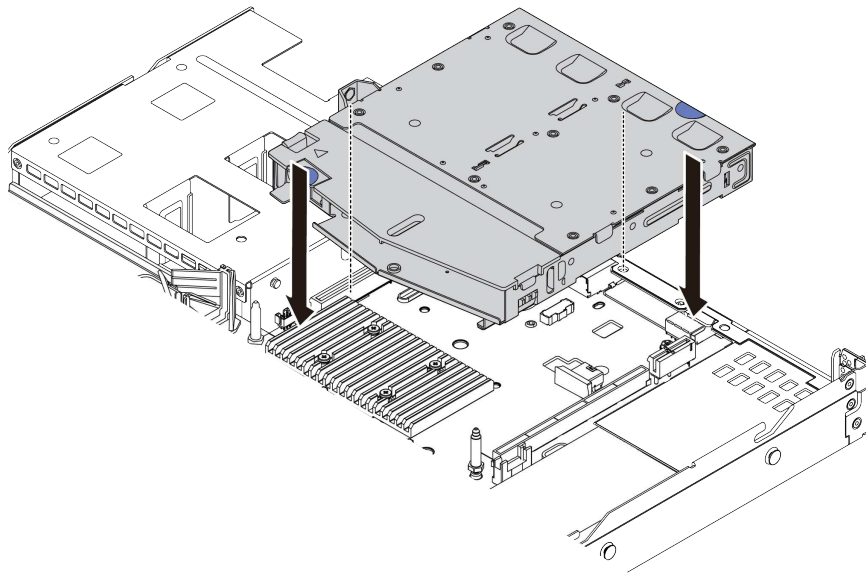


Figure 81. Hot-swap rear drive cage installation

Step 7. Connect the cables to the system board or expansion slots. See “2.5-inch/3.5-inch drive backplane (power)” on page 65 and “2.5-inch/3.5-inch drive backplane (signal)” on page 66.

After you finish

1. Reinstall the drives or drive fillers into the hot-swap rear drive cage. See “Install a 2.5/3.5-inch hot-swap drive” on page 125.
2. Complete the parts replacement. See “Complete the parts replacement” on page 224.

Internal CFF HBA/RAID adapter replacement

Use this information to remove and install the internal CFF HBA/RAID adapter.

Remove the internal CFF HBA/RAID adapter

Use this information to remove the internal CFF HBA/RAID adapter.

About this task

Attention:

- Read “Installation guidelines” on page 83 to ensure that you work safely.
- Power off the server and disconnect all power cords for this task.
- 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.

A video for this task is available at:

- YouTube: <https://www.youtube.com/playlist?list=PLYV5R7hVcs-Cmxb8e4L4PvMQ7J5PxxuOK>
- Youku: https://list.youku.com/albumlist/show/id_59643656

Procedure

- Step 1. Remove the top cover. See “Remove the top cover” on page 220.
- Step 2. Remove any components that may impede access to the internal CFF HBA/RAID adapter.
- Step 3. Disconnect all cables from the internal CFF HBA/RAID adapter.
- Step 4. Lift the release pin, slightly slide the internal CFF HBA/RAID adapter as shown, and carefully lift it out of the chassis.

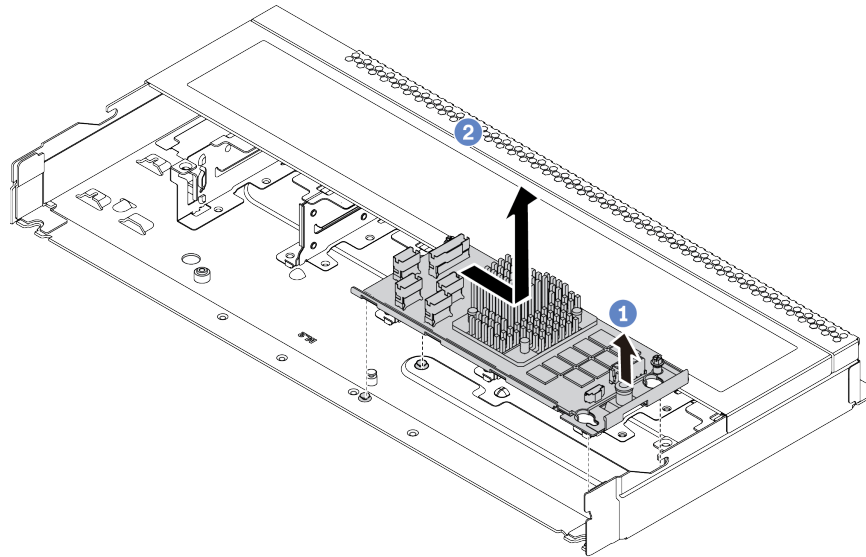


Figure 82. Internal CFF HBA/RAID adapter removal

After you finish

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

Install the internal CFF HBA/RAID adapter

Use this information to install the internal CFF HBA/RAID adapter.

About this task

Attention:

- Read “Installation guidelines” on page 83 to ensure that you work safely.
- Power off the server and disconnect all power cords for this task.
- 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.

A video for this task is available at:

- YouTube: <https://www.youtube.com/playlist?list=PLYV5R7hVcs-Cmxb8e4L4PvMQ7J5PxvuOK>
- Youku: https://list.youku.com/albumlist/show/id_59643656

Procedure

- Step 1. Touch the static-protective package that contains the internal CFF HBA/RAID adapter to any unpainted surface on the outside of the server. Then, take the internal CFF HBA/RAID adapter out of the package and place it on a static-protective surface.
- Step 2. Align the notches on the tray with the pins on the chassis, place down the internal CFF HBA/RAID adapter, and slightly slide it as shown to secure it on the chassis.

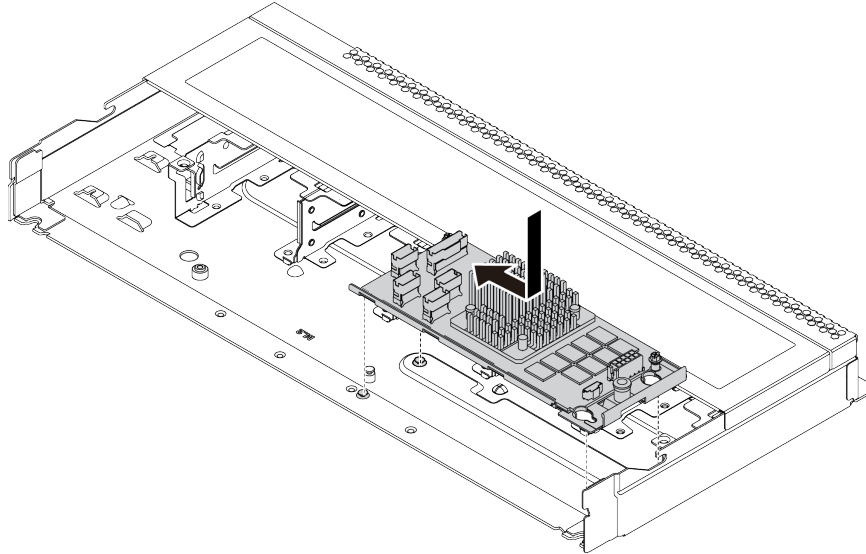


Figure 83. Internal CFF HBA/RAID adapter installation

- Step 3. Connect cables to the internal RAID adapter. See “CFF HBA/RAID adapter” on page 57.

After you finish

Complete the parts replacement. See “Complete the parts replacement” on page 224.

Intrusion switch replacement

Use this information to remove and install an intrusion switch.

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

Remove an intrusion switch

Use this information to remove an intrusion switch.

About this task

Attention:

- Read “Installation guidelines” on page 83 to ensure that you work safely.
- Power off the server and disconnect all power cords for this task.
- 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.

A video for this task is available at:

- YouTube: <https://www.youtube.com/playlist?list=PLYV5R7hVcs-Cmxb8e4L4PvMQ7J5PxvuOK>
- Youku: https://list.youku.com/albumlist/show/id_59643656

Procedure

- Step 1. Remove the top cover. See “Remove the top cover” on page 220.
- Step 2. Disconnect the cable of the intrusion switch from the system board. For the location of the intrusion switch connector and cable routing information, refer to “System board components” on page 44 and “Intrusion switch” on page 59.
- Step 3. Slide the intrusion switch as shown to remove it.

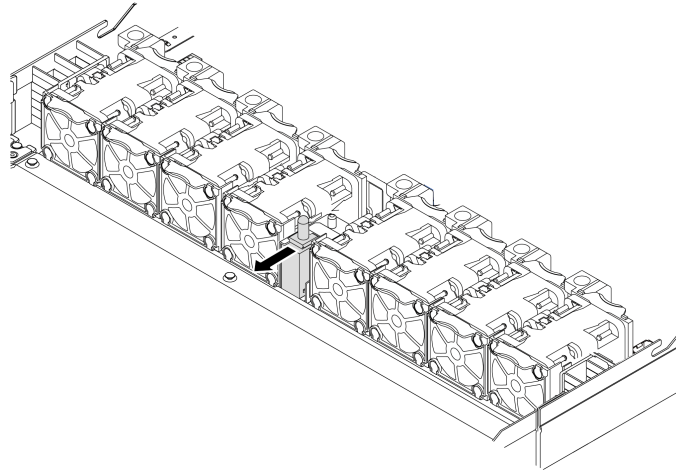


Figure 84. Intrusion switch removal

After you finish

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

Install an intrusion switch

Use this information to install an intrusion switch.

About this task

Attention:

- Read “Installation guidelines” on page 83 to ensure that you work safely.
- Power off the server and disconnect all power cords for this task.
- 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.

A video for this task is available at:

- YouTube: <https://www.youtube.com/playlist?list=PLYV5R7hVcs-Cmxb8e4L4PvMQ7J5PxvuOK>
- Youku: https://list.youku.com/albumlist/show/id_59643656

Procedure

- Step 1. Touch the static-protective package that contains the intrusion switch to any unpainted surface on the outside of the server. Then, take the intrusion switch out of the package and place them on a static-protective surface.
- Step 2. Insert the intrusion switch and push it in the direction as shown until it is fully seated.

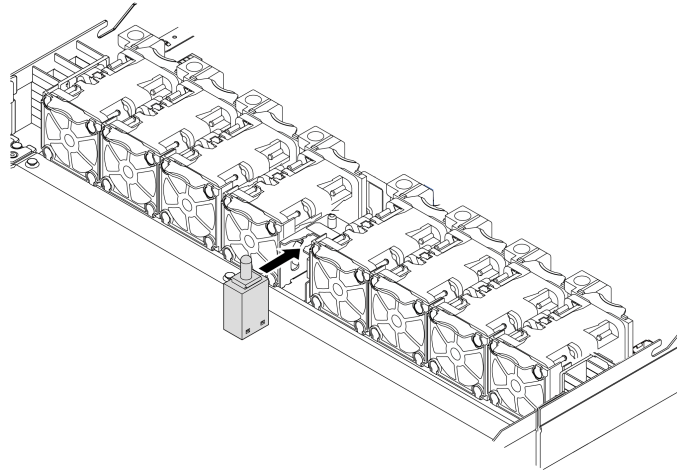


Figure 85. Intrusion switch installation

- Step 3. Connect the cable of the intrusion switch to the intrusion switch connector on the system board. See “Intrusion switch” on page 59.

After you finish

Complete the parts replacement. See “Complete the parts replacement” on page 224.

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.

About this task

Attention:

- Read “Installation guidelines” on page 83 to ensure that you work safely.
- Power off the server and disconnect all power cords for this task.
- Memory modules are sensitive to static discharge and require special handling. Refer to the standard guidelines for “Handling static-sensitive devices” on page 85.
 - 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.

A video for this task is available at:

- YouTube: <https://www.youtube.com/playlist?list=PLYV5R7hVcs-Cmxb8e4L4PvMQ7J5PxvuOK>
- Youku: https://list.youku.com/albumlist/show/id_59643656

Procedure

- Step 1. Remove the top cover. See “Remove the top cover” on page 220.
- Step 2. If your server comes with an air baffle, remove it. See “Remove the air baffle” on page 91.
- Step 3. Remove the memory module from the slot.

mm

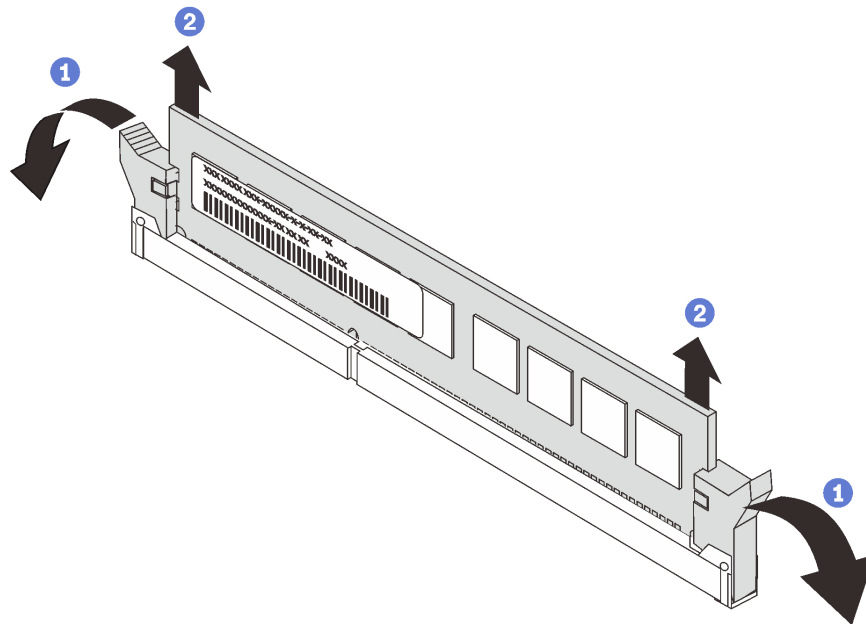


Figure 86. Memory module removal

- a. Open the retaining clip 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.

- b. Grasp the memory module at both ends and carefully lift it out of the slot.

After you finish

1. Install a memory module filler or a new memory module to cover the slot. See “Install a memory module” on page 164.
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 and order

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

Your server has 16 channels, 32 memory slots, and supports:

- Minimum memory:
 - 16 GB
- Maximum memory:
 - 2 TB using RDIMMs
 - 4 TB using 3DS RDIMMs
- Type (depending on the model):
 - TruDDR4 3200, dual-rank, 16 GB/32 GB/64 GB RDIMM
 - TruDDR4 3200, quad-rank, 128 GB 3DS RDIMM
 - TruDDR4 3200 128 GB/256 GB PMEM

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

Notes:

- The operating speed and total memory capacity depend on the processor model and UEFI settings.
- All Icelake Platinum and Gold CPUs support PMEM. For Icelake Silver CPUs, only processor 4314 supports PMEM.

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.

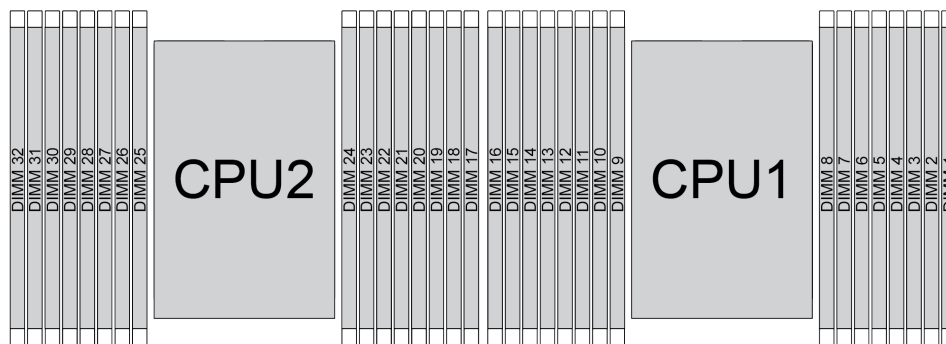


Figure 87. Memory module slots on the system board

Table 42. Memory slot and channel identification

Channel	F0	F1	E0	E1	H0	H1	G0	G1	C1	C0	D1	D0	A1	A0	B1	B0
Slot number	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1
	32	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17

Memory module installation guideline

- Two types of configurations are supported. Consider corresponding rules and population sequence accordingly:

- “DRAM DIMM installation order” on page 151 (RDIMMs or 3DS RDIMMs)
- “PMEM and DRAM DIMM installation order” on page 155
- A label on each DIMM identifies the DIMM type. This information is in the format **xxxxx nRxxx PC4-xxxx-xx-xx-xxx**. Where **n** indicates if the DIMM is single-rank (n=1) or dual-rank (n=2).
- At least one DIMM is required for each processor. Install at least eight DIMMs per processor for good performance.
- When you replace a DIMM, the server provides automatic DIMM enablement capability without requiring you to use the Setup utility to enable the new DIMM manually.

Attention:

- Mixing x4 and x8 DIMMs in the same channel is allowed.
- Always populate DIMMs with the maximum number of ranks in the farthest DIMM slot, followed by the nearest DIMM slot.
- Do not mix RDIMMs and 3DS RDIMMs in the same server.

DRAM DIMM installation order

For RDIMMs or 3DS RDIMMs, the following memory modes are available:

- “Independent mode” on page 151
- “Mirroring mode” on page 154

Independent mode

In independent memory mode, memory channels can be populated with DIMMs in any order and you can populate all channels for each processor in any order with no matching requirements. Independent memory mode provides the highest level of memory performance, but lacks failover protection. The DIMM installation order for independent memory mode varies based on the number of processors and memory modules installed in the server.

Follow the rules below when installing memory modules in independent mode:

- All memory modules to be installed must be of the same type.
- Memory modules from different vendors are supported.
- There must be at least one DDR4 DIMM per socket.
- In each memory channel, populate slot 0 first.
- If a memory channel has two DIMMs, populate the DIMM with a higher number of ranks in slot 0; if the two DIMMs have the same number of ranks, populate the DIMM with a higher capacity in slot 0.
- A maximum of 8 logical ranks (ranks seen by the host) per channel is allowed.
- A maximum of two different DIMM capacities are supported per system.
 - For channels A, C, E, and G, populated DIMMs must have the same total capacity for each channel.
 - For channels B, D, F, and H, populated DIMMs must have the same total capacity for each channel, which can be different from that of the other set (channels A, C, E, and G).
- If there are more than two DIMMs, populate them in a right-and-left symmetrical manner across a CPU socket.

The following table shows the sequence of populating memory modules (with the **same capacity**) for independent mode when only one processor (CPU 1) is installed.

Table 43. Independent mode with one processor (DIMMs with the same capacity)

Configuration	DIMM slots
---------------	------------

Table 43. Independent mode with one processor (DIMMs with the same capacity) (continued)

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
1 DIMM			3													
2 DIMMs			3				7									
4 DIMMs ¹			3				7			10				14		
6 DIMMs	1		3				7			10				14		16
8 DIMMs ^{1,2}	1		3		5		7			10		12		14		16
12 DIMMs	1	2	3	4			7	8	9	10			13	14	15	16
16 DIMMs ^{1,2}	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16

Notes:

1. DIMM configurations that support Sub NUMA Clustering (SNC), which can be enabled via UEFI. SNC is not supported if DIMM population does not follow the sequence indicated by the table above.
2. DIMM configurations that support Software Guard Extensions (SGX). See “Enable Software Guard Extensions (SGX)” in *Setup Guide* to enable this feature.

The following table shows the sequence of populating memory modules (with **different capacities**) for independent mode when only one processor (CPU 1) is installed.

Table 44. Independent mode with one processor (DIMMs with different capacities)

Configuration	DIMM slots															
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
2 DIMMs			3		5											
4 DIMMs			3		5							12		14		
8 DIMMs ^{1,2}	1		3		5		7			10		12		14		16
12 DIMMs ^{1,2}	1		3	4	5		7	8	9	10		12	13	14		16
16 DIMMs ^{1,2}	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16

Notes:

1. DIMM configurations that support Sub NUMA Clustering (SNC), which can be enabled via UEFI. SNC is not supported if DIMM population does not follow the sequence indicated by the table above.
2. DIMM configurations that support Software Guard Extensions (SGX). See “Enable Software Guard Extensions (SGX)” in *Setup Guide* to enable this feature.

The following table shows the sequence of populating memory modules (with the **same capacity**) for independent mode when two processors (CPU 1 and CPU 2) are installed.

Table 45. Independent mode with two processors (DIMMs with the same capacity)

Configura- tion	DIMM slots															
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
2 DIMMs			3													
4 DIMMs			3				7									
8 DIMMs ¹			3				7			10				14		
12 DIMMs	1		3				7			10				14		16
16 DIMMs ^{1,2}	1		3		5		7			10		12		14		16
24 DIMMs	1	2	3	4			7	8	9	10			13	14	15	16
32 DIMMs ^{1,2}	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Configura- tion	DIMM slots															
	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32
2 DIMMs			19													
4 DIMMs			19				23									
8 DIMMs ¹			19				23			26				30		
12 DIMMs	17		19				23			26				30		32
16 DIMMs ^{1,2}	17		19		21		23			26		28		30		32
24 DIMMs	17	18	19	20			23	24	25	26			29	30	31	32
32 DIMMs ^{1,2}	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32

Notes:

1. DIMM configurations that support Sub NUMA Clustering (SNC), which can be enabled via UEFI. SNC is not supported if DIMM population does not follow the sequence indicated by the table above.
2. DIMM configurations that support Software Guard Extensions (SGX). See “Enable Software Guard Extensions (SGX)” in *Setup Guide* to enable this feature.

The following table shows the sequence of populating memory modules (with **different capacities**) for independent mode when two processors (CPU 1 and CPU 2) are installed.

Table 46. Independent mode with two processors (DIMMs with different capacities)

Configura- tion	DIMM slots															
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
4 DIMMs			3		5											
8 DIMMs			3		5							12		14		
16 DIMMs ^{1,2}	1		3		5		7			10		12		14		16
24 DIMMs ^{1,2}	1		3	4	5		7	8	9	10		12	13	14		16
32 DIMMs ^{1,2}	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16

Table 46. Independent mode with two processors (DIMMs with different capacities) (continued)

Configura- tion	DIMM slots															
	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32
4 DIMMs			19		21											
8 DIMMs			19		21							28		30		
16 DIMMs ^{1,2}	17		19		21		23			26		28		30		32
24 DIMMs ^{1,2}	17		19	20	21		23	24	25	26		28	29	30		32
32 DIMMs ^{1,2}	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32

Notes:

1. DIMM configurations that support Sub NUMA Clustering (SNC), which can be enabled via UEFI. SNC is not supported if DIMM population does not follow the sequence indicated by the table above.
2. DIMM configurations that support Software Guard Extensions (SGX). See “Enable Software Guard Extensions (SGX)” in *Setup Guide* to enable this feature.

Mirroring mode

Memory-mirroring mode provides full memory redundancy while reducing the total system memory capacity in half. Memory channels are grouped in pairs with each channel receiving the same data. If a failure occurs, the memory controller switches from the DIMMs on the primary channel to the DIMMs on the backup channel. The DIMM installation order for memory mirroring varies based on the number of processors and DIMMs installed in the server.

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.

Follow the rules below when installing memory modules in mirroring mode:

- All memory modules to be installed must be of the same type with the same capacity, frequency, voltage, and ranks.
- Mirroring can be configured across channels, and the total DDR4 memory size of the primary and secondary channels must be the same.

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

Table 47. Mirroring mode with one processor (CPU 1)

Configura- tion	DIMM slots															
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
8 DIMMs	1		3		5		7			10		12		14		16
16 DIMMs	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16

Note: DIMM configurations listed in the table support the Sub NUMA Clustering (SNC) feature, which can be enabled via UEFI. SNC is not supported if DIMM population does not follow the sequence indicated by the table above.

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

Table 48. Mirroring mode with two processors (CPU 1 and CPU 2)

Configura- tion	DIMM slots															
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
16 DIMMs	1		3		5		7			10		12		14		16
32 DIMMs	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Configura- tion	DIMM slots															
	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32
16 DIMMs	17		19		21		23			26		28		30		32
32 DIMMs	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32

Note: DIMM configurations listed in the table support the Sub NUMA Clustering (SNC) feature, which can be enabled via UEFI. SNC is not supported if DIMM population does not follow the sequence indicated by the table above.

PMEM and DRAM DIMM installation order

This section contains information of how to install PMEMs and DRAM DIMMs properly.

PMEM rules

Make sure to meet the following requirements when applying PMEMs in the system.

- All the PMEMs that are installed must be of the same part number.
- All the DRAM DIMMs that are installed must be of the same type, rank, and capacity with minimum capacity of 16 GB. It is recommended to use Lenovo DRAM DIMMs with the same part number.

Setting up the system for PMEM for the first time

Complete the following steps when installing PMEMs to the system for the first time.

1. Determine the mode and combination (see “App Direct Mode” on page 160 or “Memory Mode” on page 162).
2. Consider “PMEM rules” on page 155 and acquire the PMEMs and DRAM DIMMs that meet the requirements.
3. Remove all the memory modules that are presently installed (see “Remove a memory module” on page 148).
4. Follow the adopted combination to install all the PMEMs and DRAM DIMMs (see “Install a memory module” on page 164).
5. Disable security on all the installed PMEMs (see “PMEM Management options” on page 155).
6. Make sure the PMEM firmware 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).
7. Configure the PMEMs so that the capacity is available for use (see “PMEM Management options” on page 155).

PMEM Management options

PMEMs can be managed with the following tools:

- **Lenovo XClarity Provisioning Manager (LXPM)**

To open LXPM, power on the system and press **F1** as soon as the logo screen appears. If a password has been set, enter the password to unlock LXPM.

Go to **UEFI Setup → System Settings → Intel Optane PMEMs** to configure and manage PMEMs.

For more details, see https://sysmgt.lenovofiles.com/help/topic/LXPMv3/UEFI_setup.html.

Note: If the text-based interface of Setup Utility opens instead of LXPM, go to **System Settings → <F1> Start Control** and select **Tool Suite**. Then, reboot the system and press **F1** as soon as the logo screen appears to open LXPM.

- **Setup Utility**

To enter Setup Utility:

1. Power on the system and press **F1** to open LXPM.
2. Go to **UEFI Settings → System Settings**, click on the pull-down menu on the upper right corner of the screen, and select **Text Setup**.
3. Reboot the system, and press **F1** as soon as the logo screen appears.

Go to **System Configuration and Boot Management → System Settings → Intel Optane PMEMs** to configure and manage PMEMs.

- **Lenovo XClarity Essentials OneCLI**

Some management options are available in commands that are executed in the path of Lenovo XClarity Essentials OneCLI in the operating system. See https://sysmgt.lenovofiles.com/help/topic/toolstr_cli_lenovo/onecli_t_download_use_tcsccli.html to learn how to download and use Lenovo XClarity Essentials OneCLI.

Following are the available management options:

- **Intel Optane PMEMs details**

Select this option to view the following details concerning each of the installed PMEMs:

- Number of Intel Optane PMEMs detected
- Total raw capacity
- Total memory capacity
- Total App Direct capacity
- Total unconfigured capacity
- Total inaccessible capacity
- Total reserved capacity

Alternatively, view PMEM details with the following command in OneCLI:

```
OneCli.exe config show IntelOptanePMEM  
--bmc USERID:PASSWORD@10.104.195.86
```

Notes:

- *USERID* stands for XCC user ID.
- *PASSWORD* stands for XCC user password.
- *10.104.195.86* stands for IP address.

- **Goals**

- **Memory Mode [%]**

Select this option to define the percentage of PMEM capacity that is invested in system memory, and hence decide the PMEM mode:

- **0%:** App Direct Mode

- **100%: Memory Mode**

Go to **Goals → Memory Mode [%]**, input the memory percentage, and reboot the system.

Notes:

- Before changing from one mode to another:
 1. Back up all the data and delete all the created namespaces. Go to **Namespaces → View/Modify/Delete Namespaces** to delete the created namespaces.
 2. Perform secure erase on all the installed PMEMs. Go to **Security → Press to Secure Erase** to perform secure erase.
- Make sure the capacity of installed PMEM and DRAM DIMMs meets system requirements for the new mode (see “PMEM rules” on page 155).
- After the system is rebooted and the input goal value is applied, the displayed value in **System Configuration and Boot Management → Intel Optane PMEMs → Goals** will go back to the following default selectable options:
 - **Scope:** [Platform]
 - **Memory Mode [%]:** 0
 - **Persistent Memory Type:** [App Direct]These values are selectable options for PMEM settings, and do not represent the current PMEM status.

In addition, you can take advantage of a memory configurator, which is available at the following site: http://1config.lenovo.com/#/memory_configuration

Alternatively, set PMEM Goals with the following commands in OneCLI:

- For Memory Mode:

1. Set create goal status.

```
OneCli.exe config set IntelOptanePMEM.CreateGoal Yes  
--bmc USERID:PASSWORD@10.104.195.86
```

2. Define the PMEM capacity that is invested in system volatile memory.

```
OneCli.exe config set IntelOptanePMEM.MemoryModePercentage 100  
--bmc USERID:PASSWORD@10.104.195.86
```

Where *100* stands for the percentage of capacity that is invested in system volatile memory.

- For App Direct Mode:

1. Set create goal status.

```
OneCli.exe config set IntelOptanePMEM.CreateGoal Yes  
--bmc USERID:PASSWORD@10.104.195.86
```

2. Define the PMEM capacity that is invested in system volatile memory.

```
OneCli.exe config set IntelOptanePMEM.MemoryModePercentage 0  
--bmc USERID:PASSWORD@10.104.195.86
```

Where *0* stands for the percentage of capacity that is invested in system volatile memory.

3. Set the PMEM mode.

```
OneCli.exe config set IntelOptanePMEM.PersistentMemoryType "App Direct"  
--bmc USERID:PASSWORD@10.104.195.86
```

Where *App Direct* stands for the PMEM mode. You can input *App Direct* for App Direct interleaved or *App Direct Not Interleaved* for App Direct not interleaved.

- **Persistent Memory Type**

In App Direct Mode, the PMEMs that are connected to the same processor are by default interleaved (displayed as **App Direct**), while memory banks are used in turns. To set them as not interleaved in the Setup Utility, go to **Intel Optane PMEMs → Goals → Persistent Memory Type [(PMEM mode)]**, select **App Direct Not Interleaved** and reboot the system.

Note: Setting PMEM App Direct capacity to not interleaved will turn the displayed App Direct regions from one region per processor to one region per PMEM.

- **Regions**

After the memory percentage is set and the system is rebooted, regions for the App Direct capacity will be generated automatically. Select this option to view the App Direct regions per processor.

- **Namespaces**

App Direct capacity of PMEMs requires the following steps before it is truly available for applications.

1. Namespaces must be created for region capacity allocation.
2. Filesystem must be created and formatted for the namespaces in the operating system.

Each App Direct region can be allocated into one namespace. Create namespaces in the following operating systems:

- Windows: Use *powershell* command. To create a namespace, use Windows Server 2019 or later versions.
- Linux: Use *ndctl* command.
- VMware: Reboot the system, and VMware will create namespaces automatically.

After creating namespaces for App Direct capacity allocation, make sure to create and format filesystem in the operating system so that the App Direct capacity is accessible for applications.

- **Security**

- Enable Security

Attention: By default, PMEM security is disabled. Before enabling security, make sure all the country or local legal requirements regarding data encryption and trade compliance are met. Violation could cause legal issues.

PMEMs can be secured with passphrases. Two types of passphrase protection scope are available for PMEM:

- **Platform:** Choose this option to run security operation on all the installed PMEM units at once. A platform passphrase is stored and automatically applied to unlock PMEMs before operating system starts running, but the passphrase still has to be disabled manually for secure erase.

Alternatively, enable/disable platform level security with the following commands in OneCLI:

- Enable security:

1. Enable security.

```
OneCli.exe config set IntelOptanePMEM.SecurityOperation "Enable Security"  
--bmc USERID:PASSWORD@10.104.195.86
```

2. Set the security passphrase.

```
OneCli.exe config set IntelOptanePMEM.SecurityPassphrase "123456"  
--bmc USERID:PASSWORD@10.104.195.86
```

Where *123456* stands for the passphrase.

3. Reboot the system.

- Disable security:

1. Disable security.

```
OneCli.exe config set IntelOptanePMEM.SecurityOperation "Disable Security"  
--bmc USERID:PASSWORD@10.104.195.86
```

2. Enter passphrase.

```
OneCli.exe config set IntelOptanePMEM.SecurityPassphrase "123456"  
--bmc USERID:PASSWORD@10.104.195.86
```

3. Reboot the system.

- **Single PMEM:** Choose this option to run security operation on one or more selected PMEM units.

Notes:

- Single PMEM passphrases are not stored in the system, and security of the locked units needs to be disabled before the units are available for access or secure erase.
- Always make sure to keep records of the slot number of locked PMEMs and corresponding passphrases. In the case the passphrases are lost or forgotten, the stored data cannot be backed up or restored, but you can contact Lenovo service for administrative secure erase.
- After three failed unlocking attempts, the corresponding PMEMs enter “exceeded” state with a system warning message, and the PMEM unit can only be unlocked after the system is rebooted.

To enable passphrase, go to **Security → Press to Enable Security**.

- Secure Erase

Notes:

- Password is required to perform Secure Erase when security enabled.
- Before executing secure erase, make sure ARS (Address Range Scrub) is done on all PMEMs or on the specific PMEMs selected. Otherwise, secure erase cannot be started on all PMEMs or the specific PMEM selected, and the following text message will pop out:

```
The passphrase is incorrect for single or multiple or all  
Intel Optane PMEMs selected, or maybe there is namespace on  
the selected PMEMs. Secure erase operation is not done  
on all Intel Optane PMEMs selected.
```

Secure erase cleanses all the data that is stored in the PMEM unit, including encrypted data. This data deletion method is recommended before returning or disposing a malfunctioning unit, or changing PMEM mode. To perform secure erase, go to **Security → Press to Secure Erase**.

Alternatively, perform platform level secure erase with the following command in OneCLI:

```
OneCli.exe config set IntelOptanePMEM.SecurityOperation "Secure Erase Without Passphrase"  
--bmc USERID:PASSWORD@10.104.195.86
```

- **PMEM Configuration**

PMEM contains spared internal cells to stand in for the failed ones. When the spared cells are exhausted to 0%, there will be an error message, and it is advised to back up data, collect service log, and contact Lenovo support.

There will also be a warning message when the percentage reaches 1% and a selectable percentage (10% by default). When this message appears, it is advised to back up data and run PMEM diagnostics (see <https://sysmgt.lenovofiles.com/help/topic/LXPMv3/diagnostics.html>). To adjust the selectable percentage that the warning message requires, go to **Intel Optane PMEMs → PMEM Configuration**, and input the percentage.

Alternatively, change the selectable percentage with the following command in OneCLI:

```
OneCli.exe config set IntelOptanePMEM.PercentageRemainingThresholds 20
```

--bmc USERID:PASSWORD@10.104.195.86

Where 20 is the selectable percentage.

Adding or replacing PMEMs in App Direct Mode

Complete the following steps before adding or replacing PMEMs in App Direct Mode.

1. Back up stored data in PMEM namespaces.
2. Disable PMEM security with one of the following options:
 - **LXPM**
Go to **UEFI Setup → System Settings → Intel Optane PMEMs → Security → Press to Disable Security**, and input passphrase to disable security.
 - **Setup Utility**
Go to **System Configuration and Boot Management → System Settings → Intel Optane PMEMs → Security → Press to Disable Security**, and input passphrase to disable security.
3. Delete namespaces with command corresponding to the operating system that is installed:
 - **Linux** command:
`ndctl destroy-namespace all -f`
 - **Windows** Powershell command
`Get-PmemDisk | Remove-PmemDisk`
4. Clear Platform Configuration Data (PCD) and Namespace Label Storage Area (LSA) with the following `ipmctl` command (for both Linux and Windows).
`ipmctl delete -pcd`

Notes: See the following links to learn how to download and use `ipmctl` in different operating systems:

 - Windows: <https://datacentersupport.lenovo.com/us/en/videos/YTV101407>
 - Linux: <https://datacentersupport.lenovo.com/us/en/solutions/HT508642>
5. Reboot the system.

App Direct Mode

In this mode, PMEMs act as independent and persistent memory resources directly accessible by specific applications, and DRAM DIMMs act as system memory. Ensure that the ratio of total DRAM DIMM capacity to total PMEM capacity within a processor is between 1:1 and 1:8.

With one processor

Table 49. Memory population in App Direct Mode with one processor (CPU 1)

Configuration	DIMM slots															
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
1 PMEM and 6 DIMMs*	D		D		P		D			D				D		D
1 PMEM and 8 DIMMs*	D		D	P	D		D			D		D		D		D
2 PMEMs and 12 DIMMs	D	D	D	D	P		D	D	D	D		P	D	D	D	D

Table 49. Memory population in App Direct Mode with one processor (CPU 1) (continued)

4 PMEMs and 4 DIMMs	P		D		P		D			D		P		D		P
4 PMEMs and 8 DIMMs	D		D	P	D		D	P	P	D		D	P	D		D
8 PMEMs and 8 DIMMs	D	P	D	P	D	P	D	P	P	D	P	D	P	D	P	D

Note: Configurations with an asterisk (*) support the not-interleaved mode only. 100% interleaved mode is not supported.

Two processors

Table 50. Memory population in App Direct Mode with two processors (CPU 1 and CPU 2)

<ul style="list-style-type: none"> • D: DRAM DIMM • P: Persistent Memory Module (PMEM) 																
Configura-tion	DIMM slots															
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
2 PMEM and 12 DIMMs*	D		D		P		D			D				D		D
2 PMEM and 16 DIMMs*	D		D	P	D		D			D		D		D		D
4 PMEMs and 24 DIMMs	D	D	D	D	P		D	D	D	D		P	D	D	D	D
8 PMEMs and 8 DIMMs	P		D		P		D			D		P		D		P
8 PMEMs and 16 DIMMs	D		D	P	D		D	P	P	D		D	P	D		D
16 PMEMs and 16 DIMMs	D	P	D	P	D	P	D	P	P	D	P	D	P	D	P	D
Configura-tion	DIMM slots															
	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32
2 PMEM and 12 DIMMs*	D		D		P		D			D				D		D
2 PMEM and 16 DIMMs*	D		D	P	D		D			D		D		D		D
4 PMEMs and 24 DIMMs	D	D	D	D	P		D	D	D	D		P	D	D	D	D
8 PMEMs and 8 DIMMs	P		D		P		D			D		P		D		P

Table 50. Memory population in App Direct Mode with two processors (CPU 1 and CPU 2) (continued)

8 PMEMs and 16 DIMMs	D		D	P	D		D	P	P	D		D	P	D		D
16 PMEMs and 16 DIMMs	D	P	D	P	D	P	D	P	P	D	P	D	P	D	P	D

Note: Configurations with an asterisk (*) support the not-interleaved mode only. 100% interleaved mode is not supported.

Memory Mode

In this mode, PMEMs act as volatile system memory, while DRAM DIMMs act as cache. Ensure that the ratio of total DRAM DIMM capacity to total PMEM capacity within a processor is between 1:4 and 1:16.

With one processor

Table 51. Memory Mode with one processor (CPU 1)

<ul style="list-style-type: none"> D: DRAM DIMM P: Persistent Memory Module (PMEM) 																
Configuration	DIMM slots															
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
4 PMEMs and 4 DIMMs	P		D		P		D			D		P		D		P
4 PMEMs and 8 DIMMs	D		D	P	D		D	P	P	D		D	P	D		D
8 PMEMs and 8 DIMMs	D	P	D	P	D	P	D	P	P	D	P	D	P	D	P	D

With two processors

Table 52. Memory Mode with two processors (CPU 1 and CPU 2)

<ul style="list-style-type: none"> D: DRAM DIMM P: Persistent Memory Module (PMEM) 																
Configura-tion	DIMM slots															
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
8 PMEMs and 8 DIMMs	P		D		P		D			D		P		D		P
8 PMEMs and 16 DIMMs	D		D	P	D		D	P	P	D		D	P	D		D
16 PMEMs and 16 DIMMs	D	P	D	P	D	P	D	P	P	D	P	D	P	D	P	D
Configura-tion	DIMM slots															
	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32

Table 52. Memory Mode with two processors (CPU 1 and CPU 2) (continued)

8 PMEMs and 8 DIMMs	P		D		P		D			D		P		D		P
8 PMEMs and 16 DIMMs	D		D	P	D		D	P	P	D		D	P	D		D
16 PMEMs and 16 DIMMs	D	P	D	P	D	P	D	P	P	D	P	D	P	D	P	D

App Direct + Mirroring mode

PMEMs, in App Direct mode, act as independent and persistent memory resources directly accessible by specific applications; and DRAM DIMMs, in mirroring mode, act as system memory.

Note: PMEMs do not support mirroring.

With one processor

Table 53. App Direct + Mirroring mode with one processor (CPU 1)

<ul style="list-style-type: none"> • D: DRAM DIMM • P: Persistent Memory Module (PMEM) 																
Configuration	DIMM slots															
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
1 PMEM and 8 DIMMs*	D		D	P	D		D			D		D		D		D
4 PMEMs and 8 DIMMs	D		D	P	D		D	P	P	D		D	P	D		D
8 PMEMs and 8 DIMMs	D	P	D	P	D	P	D	P	P	D	P	D	P	D	P	D

Note: Configurations with an asterisk (*) support the not-interleaved mode only. 100% interleaved mode is not supported.

With two processors

Table 54. App Direct + Mirroring mode with two processors (CPU 1 and CPU 2)

<ul style="list-style-type: none"> • D: DRAM DIMM • P: Persistent Memory Module (PMEM) 																
Configura-tion	DIMM slots															
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
2 PMEMs and 16 DIMMs*	D		D	P	D		D			D		D		D		D
8 PMEMs and 16 DIMMs	D		D	P	D		D	P	P	D		D	P	D		D

Table 54. App Direct + Mirroring mode with two processors (CPU 1 and CPU 2) (continued)

16 PMEMs and 16 DIMMs	D	P	D	P	D	P	D	P	P	D	P	D	P	D	P	D
Configura-tion	DIMM slots															
	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32
2 PMEMs and 16 DIMMs*	D		D	P	D		D			D		D		D		D
8 PMEMs and 16 DIMMs	D		D	P	D		D	P	P	D		D	P	D		D
16 PMEMs and 16 DIMMs	D	P	D	P	D	P	D	P	P	D	P	D	P	D	P	D

Note: Configurations with an asterisk (*) support the not-interleaved mode only. 100% interleaved mode is not supported.

Install a memory module

Use this information to install a memory module.

About this task

Attention:

- Read “Installation guidelines” on page 83 to ensure that you work safely.
- Power off the server and disconnect all power cords for this task.
- Memory modules are sensitive to static discharge and require special handling. Refer to the standard guidelines for “Handling static-sensitive devices” on page 85:
 - Always wear an electrostatic-discharge strap when removing or installing memory modules. Electrostatic-discharge gloves can also be used.
 - Never hold two or more memory modules together so that they do not touch each other. Do not stack memory modules directly on top of each other during storage.
 - Never touch the gold memory module connector contacts or allow these contacts to touch the outside of the memory module connector housing.
 - Handle memory modules with care: never bend, twist, or drop a memory module.
 - Do not use any metal tools (such as jigs or clamps) to handle the memory modules, because the rigid metals may damage the memory modules.
 - Do not insert memory modules while holding packages or passive components, which can cause package cracks or detachment of passive components by the high insertion force.

A video for this task is available at:

- YouTube: <https://www.youtube.com/playlist?list=PLYV5R7hVcs-Cmxb8e4L4PvMQ7J5PxvuOK>
- Youku: https://list.youku.com/albumlist/show/id_59643656

Procedure

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

Step 2. Locate the required memory module slot on the system board.

Note: Ensure that you observe the installation rules and sequence in “Memory module installation rules and order” on page 150.

Step 3. Install the memory module into the slot.

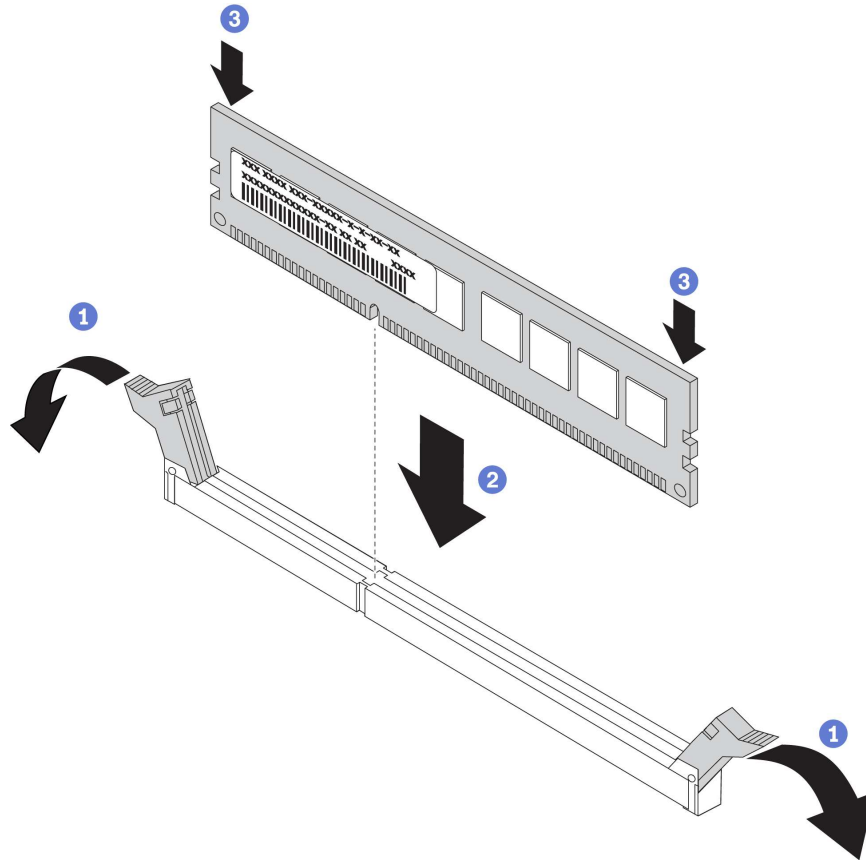


Figure 88. Memory module installation

a. Open the retaining clip 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.

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

c. 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. In this case, open the retaining clips, remove the memory module, and then reinsert it.

After you finish

Complete the parts replacement. See “Complete the parts replacement” on page 224.

M.2 adapter and M.2 drive replacement

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

Remove the M.2 adapter and M.2 drive

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

About this task

Attention:

- Read “Installation guidelines” on page 83 to ensure that you work safely.
- Power off the server and disconnect all power cords for this task.
- 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.

A video for this task is available at:

- YouTube: <https://www.youtube.com/playlist?list=PLYV5R7hVcs-Cmxb8e4L4PvMQ7J5PxvuOK>
- Youku: https://list.youku.com/albumlist/show/id_59643656

Procedure

Step 1. Remove the top cover. See “Remove the top cover” on page 220.

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

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

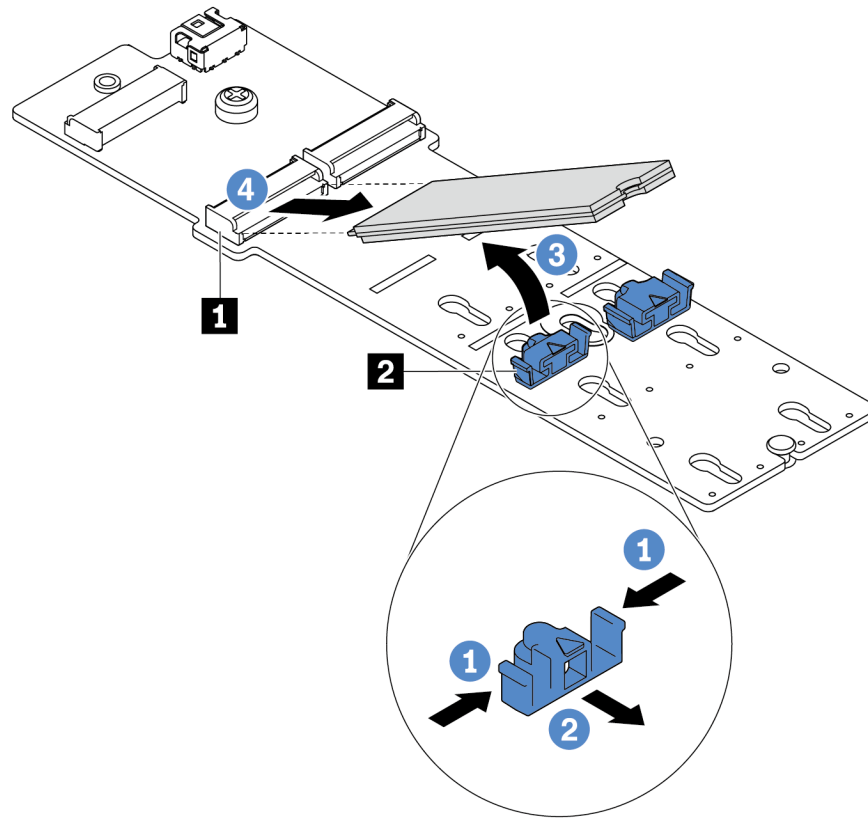


Figure 89. M.2 drive removal

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

Step 3. Remove the M.2 module from the chassis.

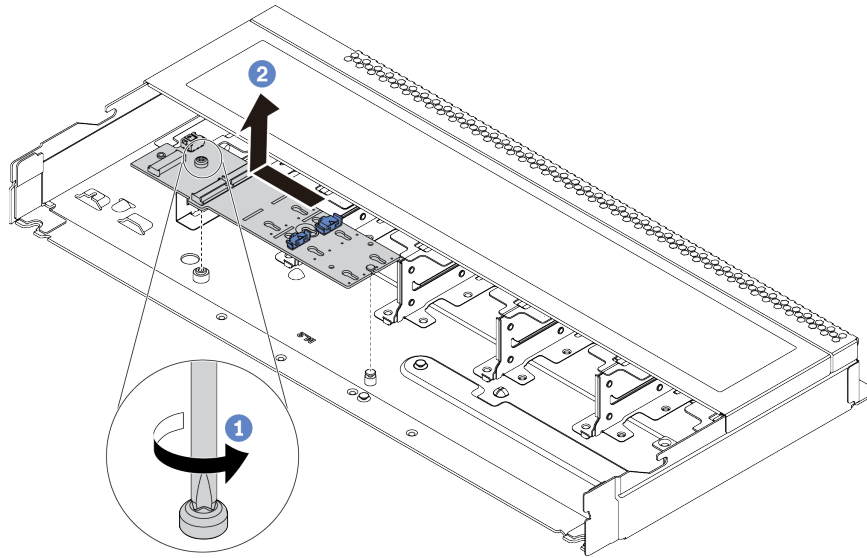


Figure 90. M.2 module removal

- a. Loosen the screw.
- b. Release the M.2 adapter from the pin and carefully lift the M.2 adapter out from the chassis.

Step 4. Disconnect all M.2 cables from the system board.

After you finish

If you are instructed to return the old M.2 adapter or M.2 drive, follow all packaging instructions and use any packaging materials that are provided.

Adjust the retainer on the M.2 adapter

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

About this task

Attention:

- Read “Installation guidelines” on page 83 to ensure that you work safely.
- Power off the server and disconnect all power cords for this task.
- 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.

A video for this task is available at:

- YouTube: <https://www.youtube.com/playlist?list=PLYV5R7hVcs-Cmxb8e4L4PvMQ7J5PxvuOK>
- Youku: https://list.youku.com/albumlist/show/id_59643656

Procedure

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

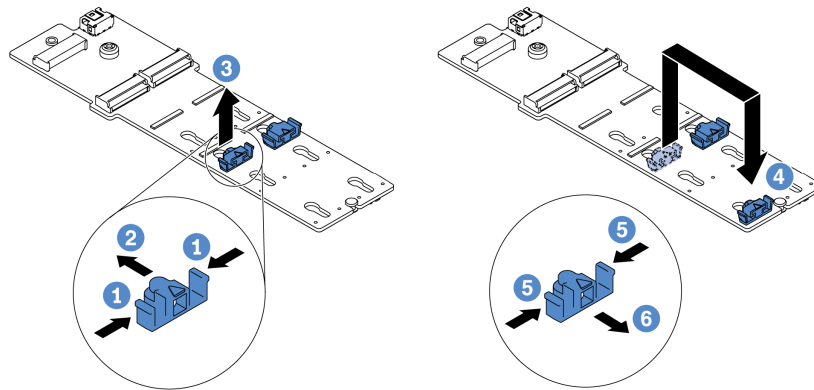


Figure 91. M.2 retainer adjustment

- Step 1. Press both sides of the retainers.
- Step 2. Move the retainer forward until it is in the large opening of the keyhole.
- Step 3. Take the retainer out of the keyhole.
- Step 4. Insert the retainer into the correct keyhole into which the retainer should be installed to accommodate the particular size of the M.2 drive you wish to install.
- Step 5. Press both sides of the retainer.
- Step 6. Slide the retainer backwards until it is seated in place.

Install the M.2 adapter and M.2 drive

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

About this task

Attention:

- Read “Installation guidelines” on page 83 to ensure that you work safely.
- Power off the server and disconnect all power cords for this task.
- 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.

A video for this task is available at:

- YouTube: <https://www.youtube.com/playlist?list=PLYV5R7hVcs-Cmxb8e4L4PvMQ7J5PxxvOK>
- Youku: https://list.youku.com/albumlist/show/id_59643656

Procedure

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

Notes:

- The M.2 adapter module is shipped with a loose screw, but the screw is not necessarily used for the installation.
- The M.2 adapter you want to install might be different from the following illustrations, but the installation method is the same.

Step 2. Adjust the retainer on the M.2 adapter to accommodate the particular size of the M.2 drive you wish to install. See “Adjust the retainer on the M.2 adapter” on page 168.

Step 3. Locate the M.2 drive slot on the M.2 adapter.

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

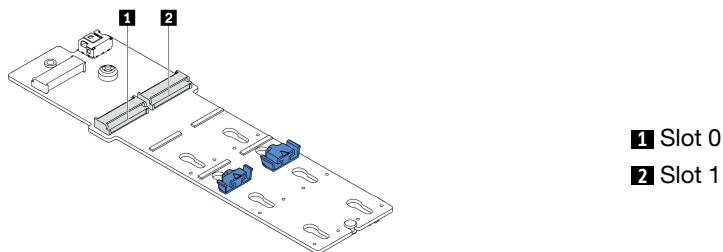


Figure 92. M.2 drive slot

Step 4. Install the M.2 adapter onto the chassis.

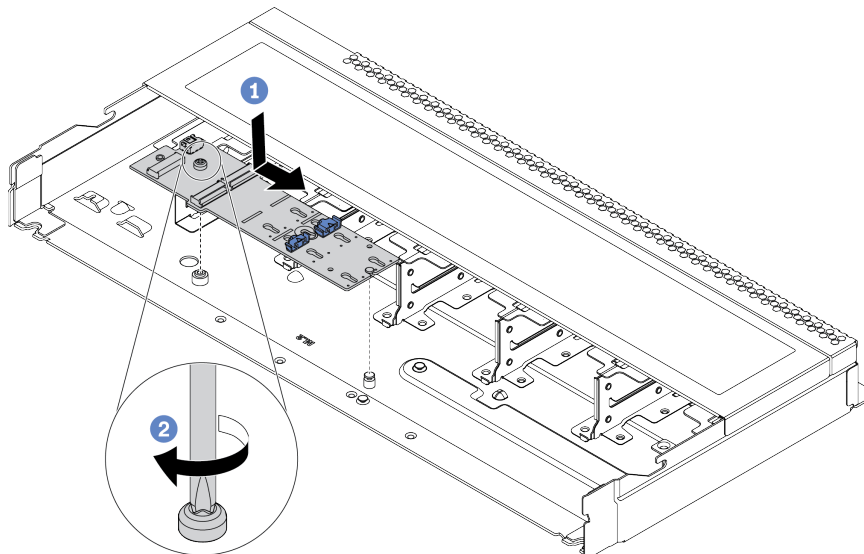


Figure 93. M.2 adapter installation

- Align the notch of the M.2 adapter with the pin on the chassis, and then place down the M.2 adapter.
- Tighten the screw to secure the M.2 adapter.

Step 5. Install the M.2 drive on the M.2 adapter.

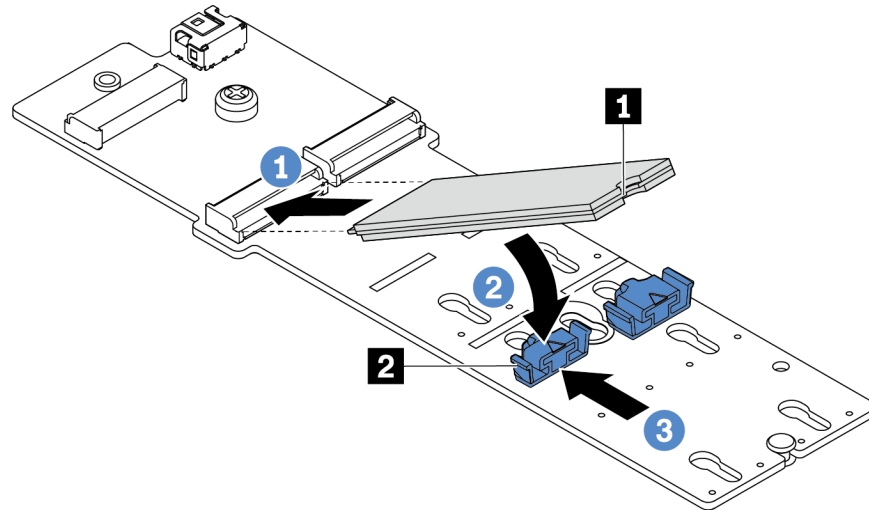


Figure 94. M.2 drive installation

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

Step 6. Connect the cables to the M.2 adapter and system board. See “M.2 drive backplane” on page 62.

After you finish

- Complete the parts replacement. See “Complete the parts replacement” on page 224.
- Use the Lenovo XClarity Provisioning Manager V3 to configure the RAID. For more information, see: https://sysmgmt.lenovofiles.com/help/topic/ixpm_frontend/ixpm_v3_about.html

OCP 3.0 Ethernet adapter replacement

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

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

Remove the OCP 3.0 Ethernet adapter

Use this information to remove the OCP 3.0 Ethernet adapter.

About this task

Attention:

- Read “Installation guidelines” on page 83 to ensure that you work safely.
- Power off the server and disconnect all power cords for this task.
- 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.

A video for this task is available at:

- YouTube: <https://www.youtube.com/playlist?list=PLYV5R7hVcs-Cmxb8e4L4PvMQ7J5PxvuOK>
- Youku: https://list.youku.com/albumlist/show/id_59643656

Procedure

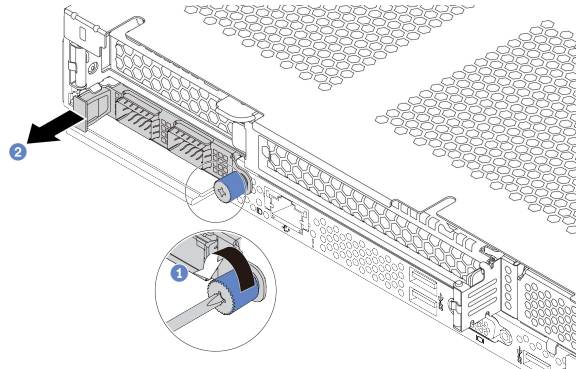


Figure 95. OCP 3.0 Ethernet adapter removal

- Step 1. Loosen the thumbscrew that secures the adapter.
- Step 2. Pull out the OCP 3.0 Ethernet adapter by its handle on the left as shown.

After you finish

Install a new OCP 3.0 Ethernet adapter or a card filler. See “Install the OCP 3.0 Ethernet adapter” on page 172.

Install the OCP 3.0 Ethernet adapter

Use this information to install the OCP 3.0 Ethernet adapter.

About this task

Attention:

- Read “Installation guidelines” on page 83 to ensure that you work safely.
- Power off the server and disconnect all power cords for this task.
- 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.

A video for this task is available at:

- YouTube: <https://www.youtube.com/playlist?list=PLYV5R7hVcs-Cmxb8e4L4PvMQ7J5PxvuOK>
- Youku: https://list.youku.com/albumlist/show/id_59643656

Procedure

- Step 1. Touch the static-protective package that contains the OCP 3.0 Ethernet adapter to any unpainted surface on the outside of the server. Then, take the OCP 3.0 Ethernet adapter out of the package and place it on a static-protective surface.

Step 2. Attach the OCP 3.0 Ethernet adapter label that comes with this option on the rear of the server.

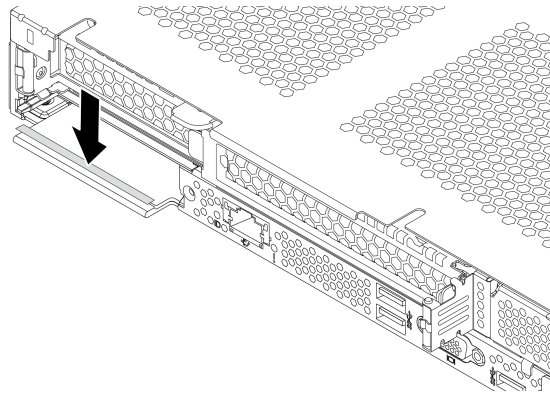


Figure 96. OCP 3.0 Ethernet adapter label installation

Step 3. Install the OCP 3.0 Ethernet adapter.

Notes:

- Ensure that the Ethernet adapter is fully seated and the thumbscrew is securely tightened. Otherwise, the OCP 3.0 Ethernet adapter will not get full connection and may not function.
- If there is an OCP 3.0 Ethernet adapter installed, when the system is powered off but still plugged in to AC power, system fans will continue to spin at a much lower speed. This is the system design to provide proper cooling for the OCP 3.0 Ethernet adapter.

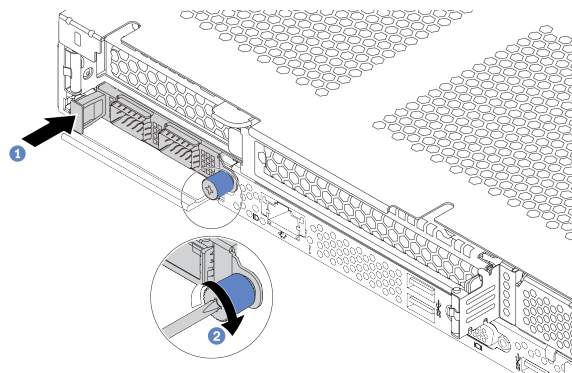


Figure 97. OCP 3.0 Ethernet adapter installation

- a. Push the OCP 3.0 Ethernet adapter by its handle on the left until it is fully inserted into the connector on the system board.
- b. Fully tighten the thumbscrew to secure the adapter.

After you finish

Complete the parts replacement. See “Complete the parts replacement” on page 224.

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 adapter.

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.

About this task

Attention:

- Read “Installation guidelines” on page 83 to ensure that you work safely.
- Power off the server and disconnect all power cords for this task.
- 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.

A video for this task is available at:

- YouTube: <https://www.youtube.com/playlist?list=PLYV5R7hVcs-Cmxb8e4L4PvMQ7J5PxvuOK>
- Youku: https://list.youku.com/albumlist/show/id_59643656

Procedure

- Step 1. Remove the top cover. See “Remove the top cover” on page 220.
- Step 2. Remove the riser assembly. See “Remove a riser card” on page 198.
- Step 3. Remove the PCIe adapter from the riser assembly.

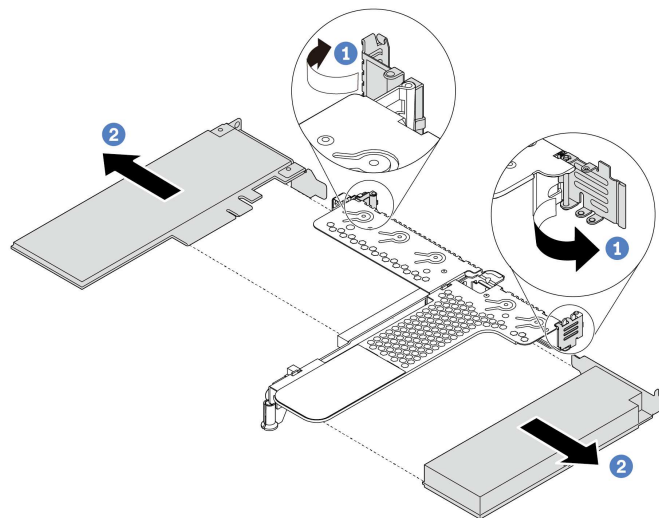


Figure 98. PCIe adapter removal from the LP-FH riser assembly

- a. Rotate the latch on the riser bracket to the open position.

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

Note: The procedure for removing a PCIe adapter is similar for different types of riser assembly. In this topic, the LP-FH riser assembly is used as an example.

After you finish

1. Install a PCIe adapter or PCIe adapter filler. See “Install a PCIe adapter” on page 175.
2. 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.

About this task

Attention:

- Read “Installation guidelines” on page 83 to ensure that you work safely.
- Power off the server and disconnect all power cords for this task.
- 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.

A video for this task is available at:

- YouTube: <https://www.youtube.com/playlist?list=PLYV5R7hVcs-Cmxb8e4L4PvMQ7J5PxvuOK>
- Youku: https://list.youku.com/albumlist/show/id_59643656

Procedure

- Step 1. Touch the static-protective package that contains the PCIe adapter to any unpainted surface on the outside of the server. Then, take the PCIe adapter out of the package and place it on a static-protective surface.
- Step 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 39.

Step 3. Install the PCIe adapter and secure it to the riser assembly.

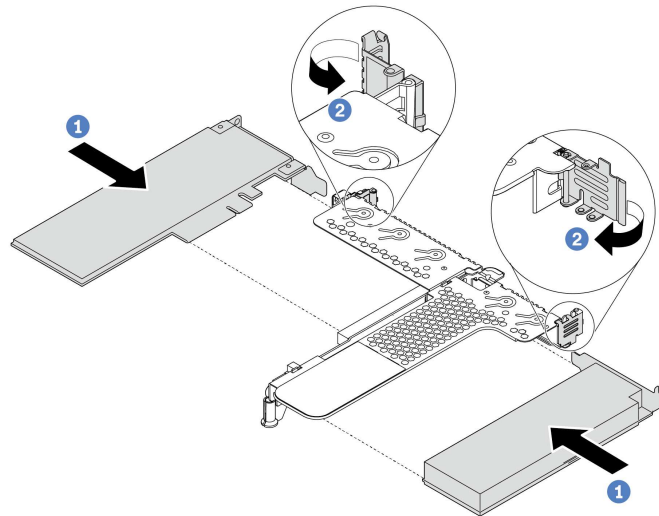


Figure 99. PCIe adapter installation into the LP-FH riser assembly

- a. 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.
- b. Rotate the latch on the riser bracket to the closed position.

Notes:

1. Ensure that PCIe adapter installation meets “Technical rules for PCIe adapters” on page 88.
2. The procedure for installing a PCIe adapter is similar for different types of riser assembly. In this topic, the LP-FH riser assembly is used as an example.

Step 4. Connect cables to the PCIe adapter in the riser assembly. See Chapter 3 “Internal cable routing” on page 55.

After you finish

1. Reinstall the riser assembly. See “Install a riser card” on page 201.
2. Complete the parts replacement. See “Complete the parts replacement” on page 224.

Processor and heat sink replacement

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

Attention: Before you begin replacing a processor, make sure that you have an alcohol cleaning pad (part number 00MP352) and thermal grease.

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). This task requires a Torx T30 driver. This procedure must be executed by a trained technician.

About this task

S002



CAUTION:

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

Attention:

- Read “Installation guidelines” on page 83 to ensure that you work safely.
- Power off the server and disconnect all power cords for this task.
- 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.
- If the server is in a rack, remove it from the rack.
- 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.
- 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 the electrical connectors in the processor socket.
- 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.

Note: The heat sink, processor, and processor carrier for your system might be different from those shown in the illustrations.

The following illustration shows the components of the PHM.

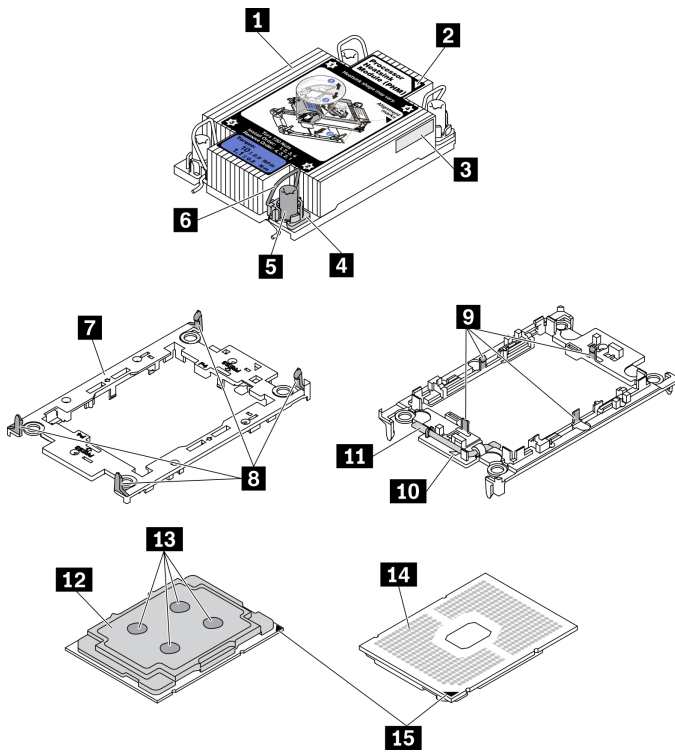


Figure 100. PHM components

1 Heat sink	9 Clips to secure processor in carrier
2 Heat sink triangular mark	10 Carrier triangular mark
3 Processor identification label	11 Processor ejector handle
4 Nut and wire bail retainer	12 Processor heat spreader
5 Torx T30 nut	13 Thermal grease
6 Anti-tilt wire bail	14 Processor contacts
7 Processor carrier	15 Processor triangular mark
8 Clips to secure carrier to heat sink	

A video for this task is available at:

- YouTube: <https://www.youtube.com/playlist?list=PLYV5R7hVcs-Cmxb8e4L4PvMQ7J5PxvuOK>
- Youku: https://list.youku.com/albumlist/show/id_59643656

Procedure

Step 1. Remove the top cover. See “Remove the top cover” on page 220.

Step 2. Remove the PHM from the system board.

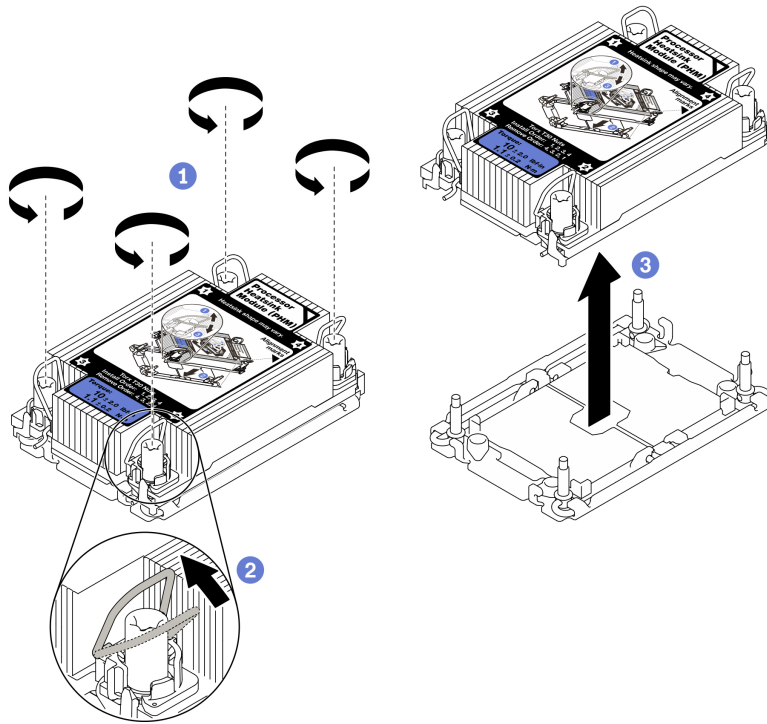


Figure 101. Removing a PHM

- a. Fully loosen the Torx T30 nuts on the PHM *in the removal sequence shown* on the heat-sink label.
- b. Rotate the anti-tilt wire bails inward.
- c. Carefully lift the PHM from the processor socket. If the PHM cannot be fully lifted out of the socket, further loosen the Torx T30 nuts and try lifting the PHM again.

Notes:

- Do not touch the contacts on the bottom of the processor.
- Keep the processor socket clean from any object to prevent possible damages.

After you finish

- Each processor socket must always contain a cover or a PHM. Protect empty processor sockets with a cover or install a new PHM.
- If you are removing the PHM as part of a system board replacement, set the PHM aside.
- If you are reusing the processor or heat sink, separate the processor from its retainer. See “Separate the processor from carrier and heat sink” on page 179
- If you are instructed to return the defective component, please package the part to prevent any shipping damage. Reuse the packaging the new part arrived in and follow all packaging instructions.

Separate the processor from carrier and heat sink

This task has instructions for separating a processor and its carrier from an assembled processor and heat sink, known as a processor-heat-sink module (PHM). This procedure must be executed by a trained technician.

About this task

Attention:

- Read “Installation guidelines” on page 83 to ensure that you work safely.
- Power off the server and disconnect all power cords for this task.
- 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.
- Do not touch the processor contacts. Contaminants on the processor contacts, such as oil from your skin, can cause connection failures.
- Do not allow the thermal grease on the processor or heat sink to come in contact with anything. Contact with any surface can compromise the thermal grease, rendering it ineffective. Thermal grease can damage components, such as the electrical connectors in the processor socket.

Note: The heat sink, processor, and processor carrier for your system might be different than those shown in the illustrations.

Procedure

Step 1. Separate the processor from the heat sink and carrier.

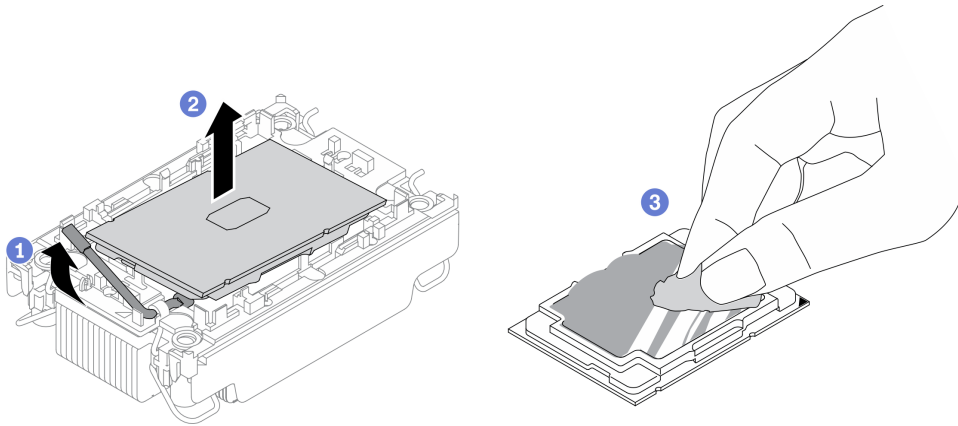


Figure 102. Separating a processor from the heat sink and carrier

Note: Do not touch the contacts on the processor.

- a. Lift the handle to release the processor from the carrier.
- b. Hold the processor by its edges; then, lift the processor from the heat sink and carrier.
- c. Without putting the processor down, wipe the thermal grease from the top of the processor with an alcohol cleaning pad; then, place the processor on a static protective surface with the processor-contact side up.

Step 2. Separate the processor carrier from the heat sink.

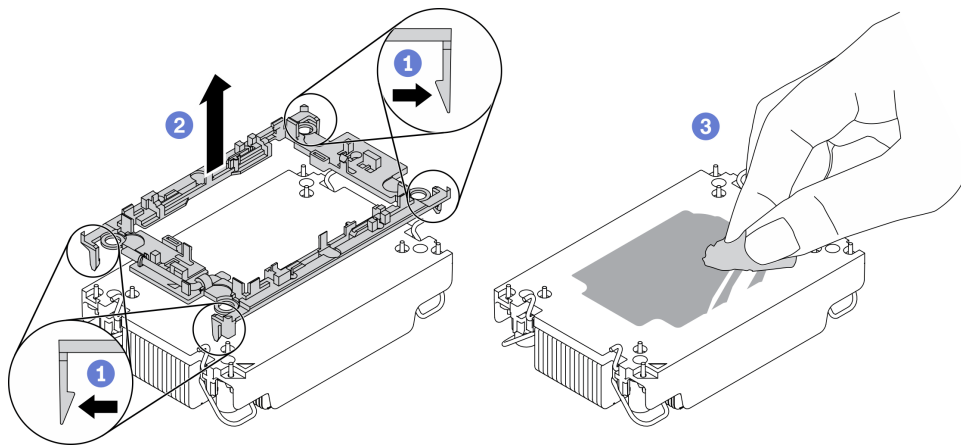


Figure 103. Separating a processor carrier the from heat sink

Note: The processor carrier will be discarded and replaced with a new one.

- a. Release the retaining clips from the heat sink.
- b. Lift the carrier from the heat sink.
- c. Wipe the thermal grease from the bottom of the heat sink with an alcohol cleaning pad.

After you finish

If you are instructed to return the defective component, please package the part to prevent any shipping damage. Reuse the packaging the new part arrived in and follow all packaging instructions.

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). This task requires a Torx T30 driver. This procedure must be executed by a trained technician.

About this task

Attention:

- Read “Installation guidelines” on page 83 to ensure that you work safely.
- Power off the server and disconnect all power cords for this task.
- 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.
- 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.
- 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 the electrical connectors in the processor socket.
- 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.

- 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:

- The heat sink, processor, and processor carrier for the system might be different from those shown in the illustrations.
- 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 “Update the firmware” in the *ThinkSystem SR630 V2 Setup Guide*.

The following illustration shows the components of the PHM.

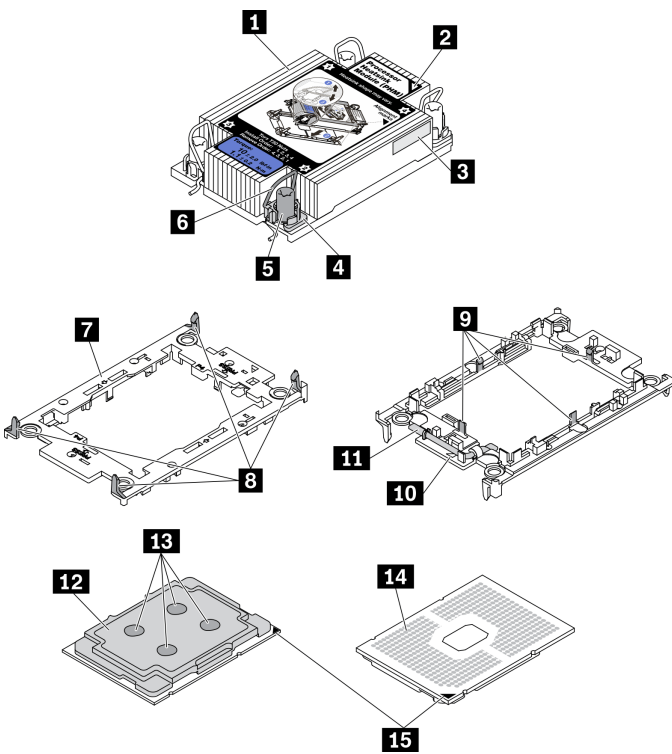


Figure 104. PHM components

1 Heat sink	9 Clips to secure processor in carrier
2 Heat sink triangular mark	10 Carrier triangular mark
3 Processor identification label	11 Processor ejector handle
4 Nut and wire bail retainer	12 Processor heat spreader
5 Torx T30 nut	13 Thermal grease
6 Anti-tilt wire bail	14 Processor contacts
7 Processor carrier	15 Processor triangular mark
8 Clips to secure carrier to heat sink	

A video for this task is available at:

- YouTube: <https://www.youtube.com/playlist?list=PLYV5R7hVcs-Cmxb8e4L4PvMQ7J5PxvuOK>
- Youku: https://list.youku.com/albumlist/show/id_59643656

Procedure

Step 1. If you are replacing a processor and reusing the heat sink.

- a. Remove the processor identification label from the heat sink and replace it with the new label that comes with the replacement processor.
- b. If there is any old thermal grease on the heat sink, wipe the thermal grease from the bottom of the heat sink with an alcohol cleaning pad.

Step 2. If you are replacing a heat sink and reusing the processor.

- a. 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.

Note: 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.

- b. Install processor in new carrier.

Note: Replacement heat sinks come with both gray and black processor carriers. Make sure to use the carrier with the same color as the one you discarded earlier.

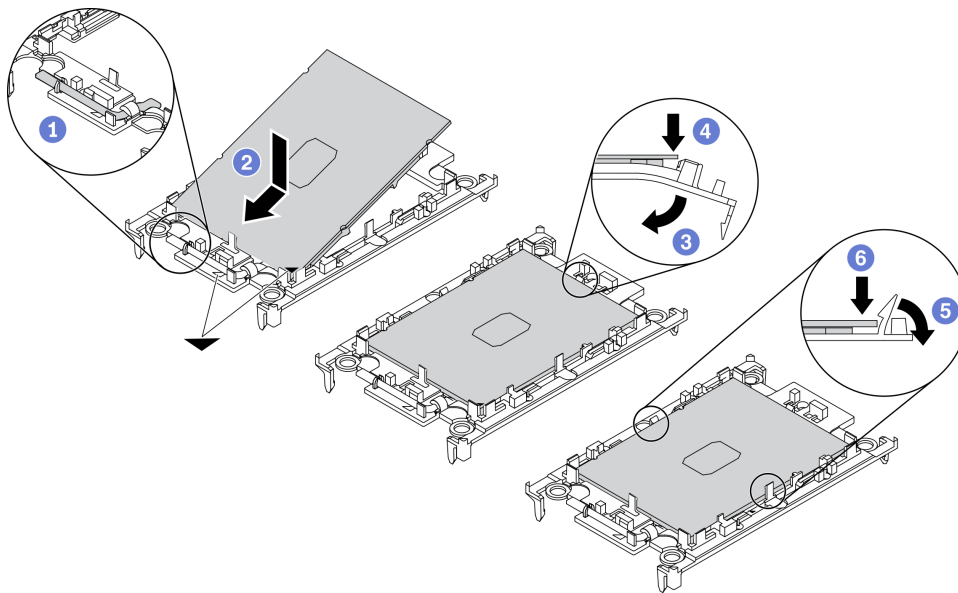


Figure 105. Installing a processor carrier

1. Make sure the handle on the carrier is in the closed position.
2. Align the processor on the new carrier so that the triangular marks align; then, insert the marked end of the processor into the carrier.
3. Hold the inserted end of the processor in place; then, pivot the unmarked end of the carrier down and away from the processor.

4. Press the processor and secure the unmarked end under the clip on the carrier.
5. Carefully pivot the sides of the carrier down and away from the processor.
6. Press the processor and secure the sides under the clips on the carrier.

Note: To prevent the processor from falling out of the carrier, keep the processor-contact side up and hold the processor-carrier assembly by the sides of the carrier.

Step 3. Apply thermal grease.

- a. Carefully place the processor and carrier in the shipping tray with the processor-contact side down. Make sure the triangular mark on the carrier is aligned with the triangular mark in the shipping tray.
- b. If there is any old thermal grease on the processor, gently wipe the top of the processor with an alcohol cleaning pad.

Note: Make sure the alcohol has fully evaporated before applying new thermal grease.

- 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.

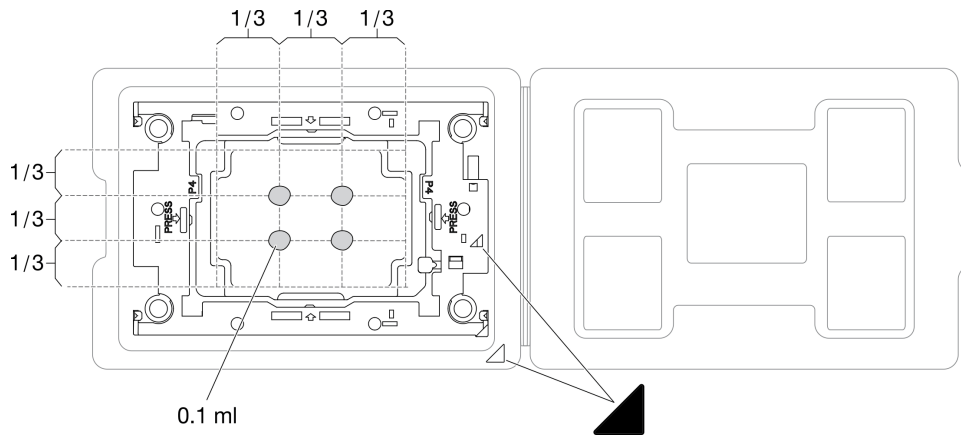


Figure 106. Thermal grease application with processor in shipping tray

Step 4. Assemble the processor and heat sink.

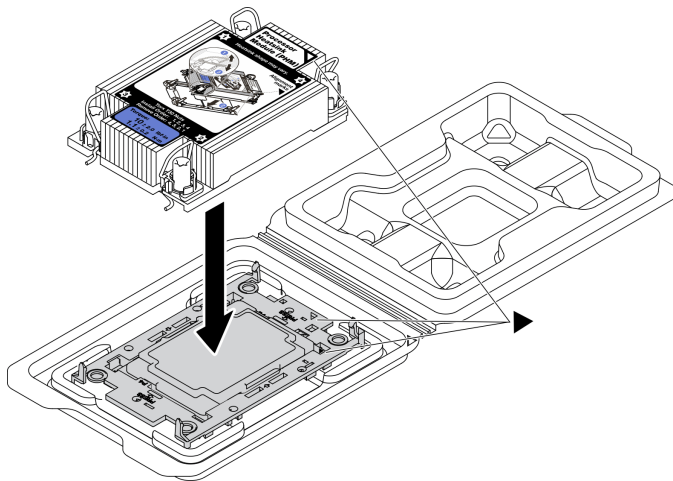


Figure 107. Assembling the PHM with processor in shipping tray

- a. Align the triangular mark on the heat sink label with the triangular mark on the processor carrier and processor.
- b. Install the heat sink onto the processor-carrier.
- c. Press the carrier into place until the clips at all four corners engage.

Step 5. Install the processor-heat-sink module into the system board socket.

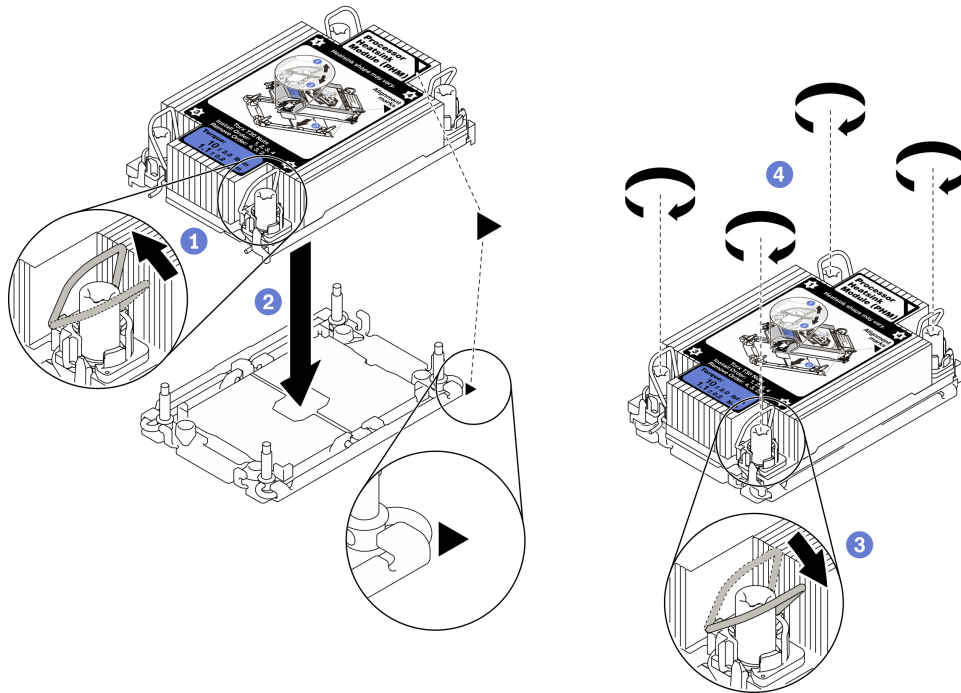


Figure 108. Installing a PHM

- a. Rotate the anti-tilt wire bails inward.
- b. Align the triangular mark and four Torx T30 nuts on the PHM with the triangular mark and threaded posts of the processor socket; then, insert the PHM into the processor socket.
- c. Rotate the anti-tilt wire bails outward until they engage with the hooks in the socket.
- d. Fully tighten the Torx T30 nuts *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 fasteners to fully tighten is 1.1 newton-meters, 10 inch-pounds).

After you finish

Complete the parts replacement. See “Complete the parts replacement” on page 224.

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.

About this task

Attention: Read “Installation guidelines” on page 83 to ensure that you work safely.

A video for this task is available at:

- YouTube: <https://www.youtube.com/playlist?list=PLYV5R7hVcs-Cmxb8e4L4PvMQ7J5PxvuOK>
- Youku: https://list.youku.com/albumlist/show/id_59643656

Procedure

- Step 1. If the server is installed with the security bezel, remove it first. See “Remove the security bezel” on page 203.
- Step 2. Use a flat-blade screwdriver to remove the ID label plate on the right rack latch and place it in a safe place.

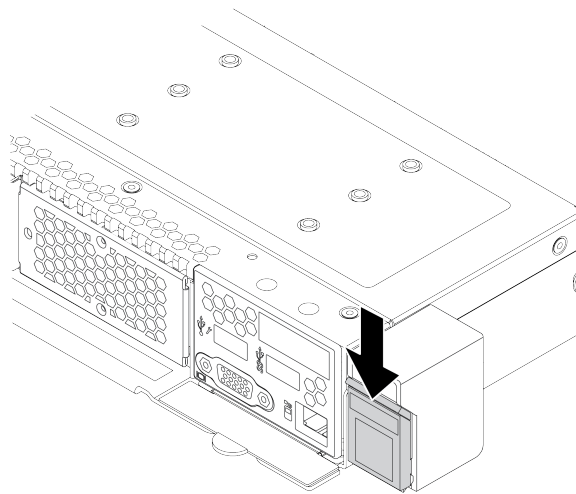


Figure 109. ID label plate removal

- Step 3. On each side of the server, remove the two screws that secure the rack latch.

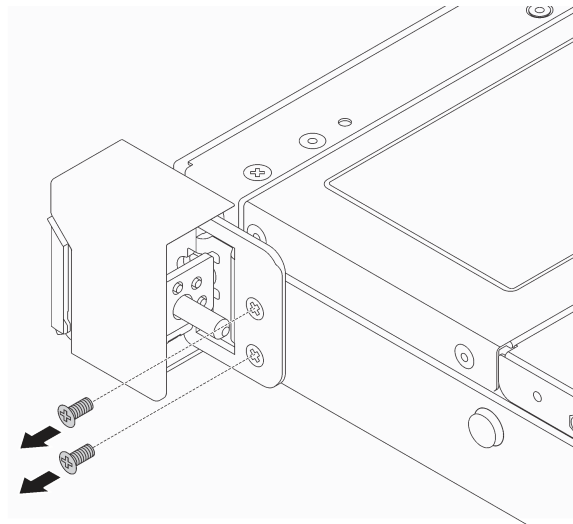


Figure 110. Rack latch screws removal

Step 4. On each side of the server, remove the rack latch from the chassis as shown.

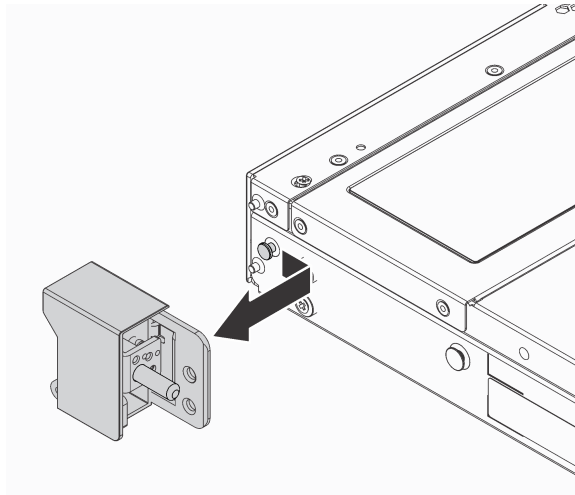


Figure 111. Rack latch removal

After you finish

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.

About this task

Attention: Read “Installation guidelines” on page 83 to ensure that you work safely.

A video for this task is available at:

- YouTube: <https://www.youtube.com/playlist?list=PLYV5R7hVcs-Cmxb8e4L4PvMQ7J5PxvuOK>
- Youku: https://list.youku.com/albumlist/show/id_59643656

Procedure

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

Step 2. On each side of the server, align the rack latch with the pin on the chassis. Then, press the rack latch onto the chassis and slightly slide it forward as shown.

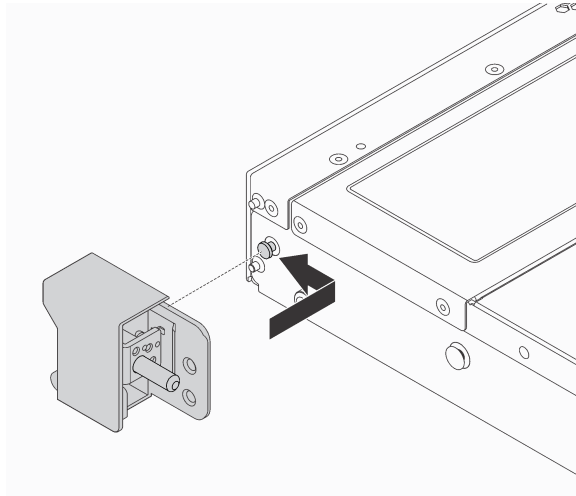


Figure 112. Rack latch installation

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

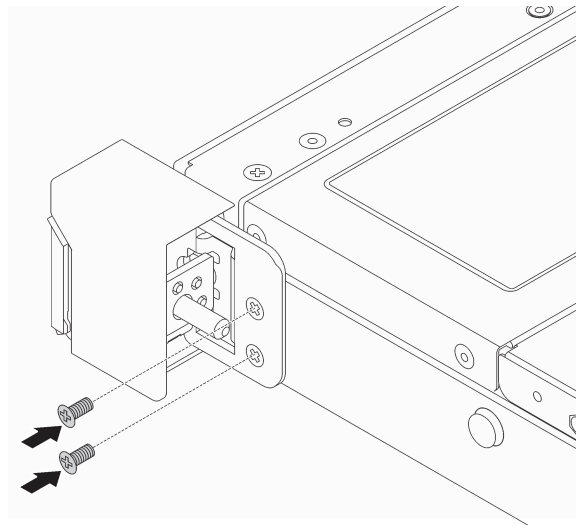


Figure 113. Rack latch screws installation

After you finish

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

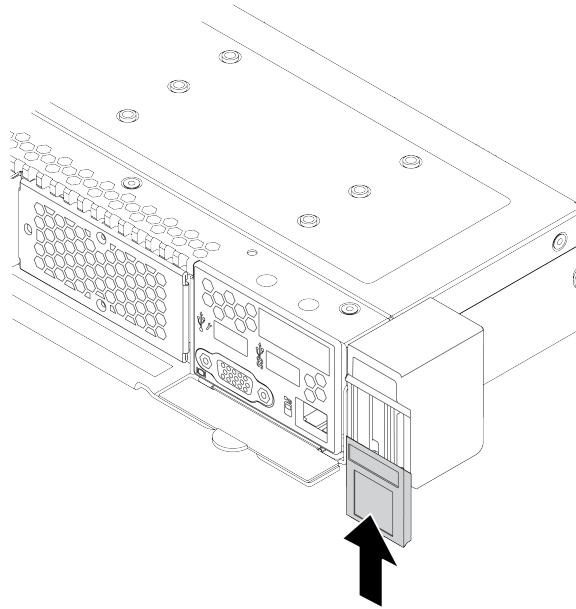


Figure 114. ID label plate installation

2. Complete the parts replacement. See “Complete the parts replacement” on page 224.

RAID super capacitor module replacement

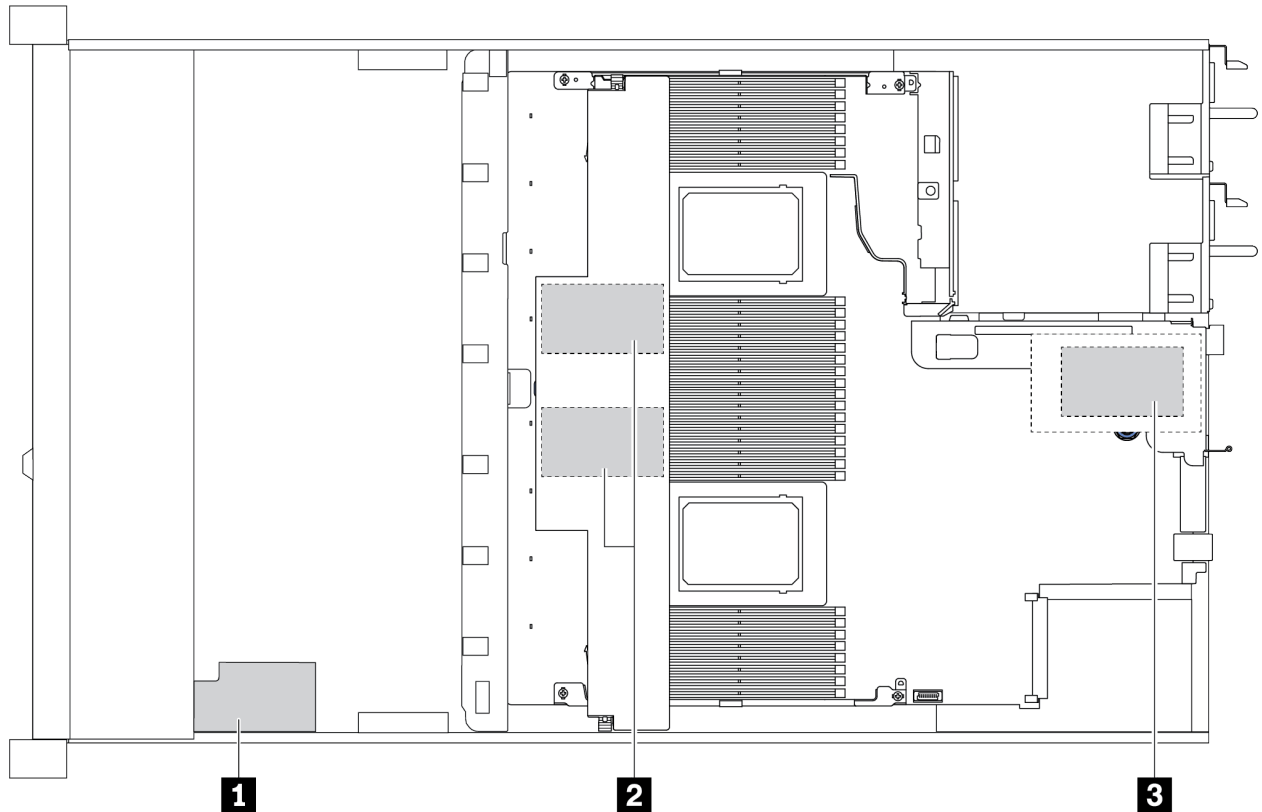
The RAID super capacitor module protects the cache memory on the installed RAID adapter. You can purchase a RAID super capacitor module from Lenovo. Use this information to remove and install a RAID super capacitor module.

For a list of supported options, see:

<https://static.lenovo.com/us/en/serverproven/index.shtml>

RAID super capacitors can be installed on the chassis, in the air baffle, or to one riser slot.

RAID super capacitor module locations



No.	Location	Scenario
1	Super capacitor on the chassis	2.5" chassis installed with a standard or performance heat sink
2	Super capacitors in the air baffle	2.5" or 3.5" chassis installed with a standard heat sink
3	Super capacitors in the riser 1 slot	3.5" chassis installed with a performance heat sink

Remove the RAID super capacitor module on the chassis

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

About this task

Attention:

- Read “Installation guidelines” on page 83 to ensure that you work safely.
- Power off the server and disconnect all power cords for this task.
- 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.

A video for this task is available at:

- YouTube: <https://www.youtube.com/playlist?list=PLYV5R7hVcs-Cmxb8e4L4PvMQ7J5PxvuOK>
- Youku: https://list.youku.com/albumlist/show/id_59643656

Procedure

- Step 1. Remove the top cover. See “Remove the top cover” on page 220.
- Step 2. Disconnect the cable of the RAID super capacitor module.
- Step 3. Remove the RAID super capacitor module on the chassis.

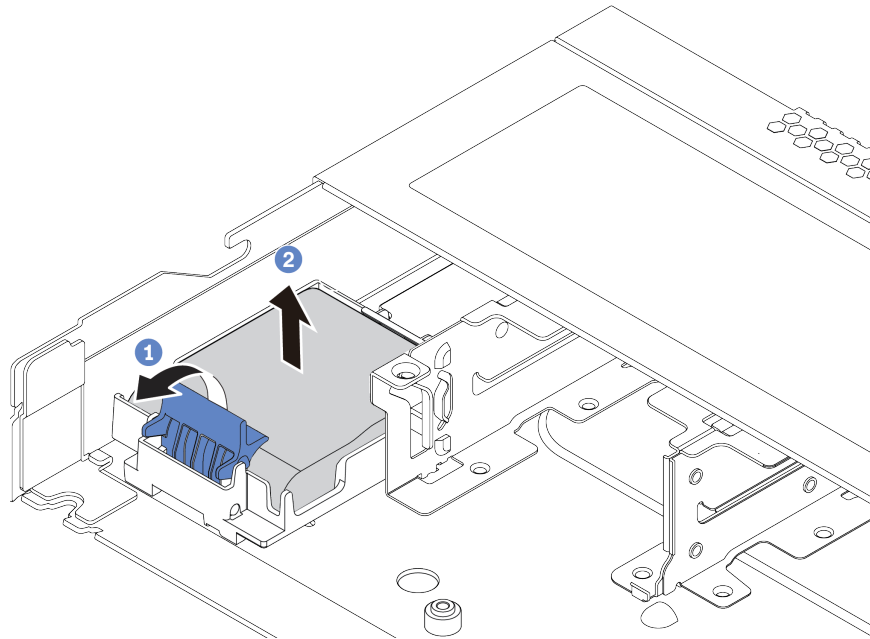


Figure 115. Removal of the RAID super capacitor module on the chassis

- a. Open the retention clip on the holder of the RAID super capacitor module.
- b. Take the RAID super capacitor module out of the holder.

Step 4. Remove the RAID super capacitor module holder as shown if necessary.

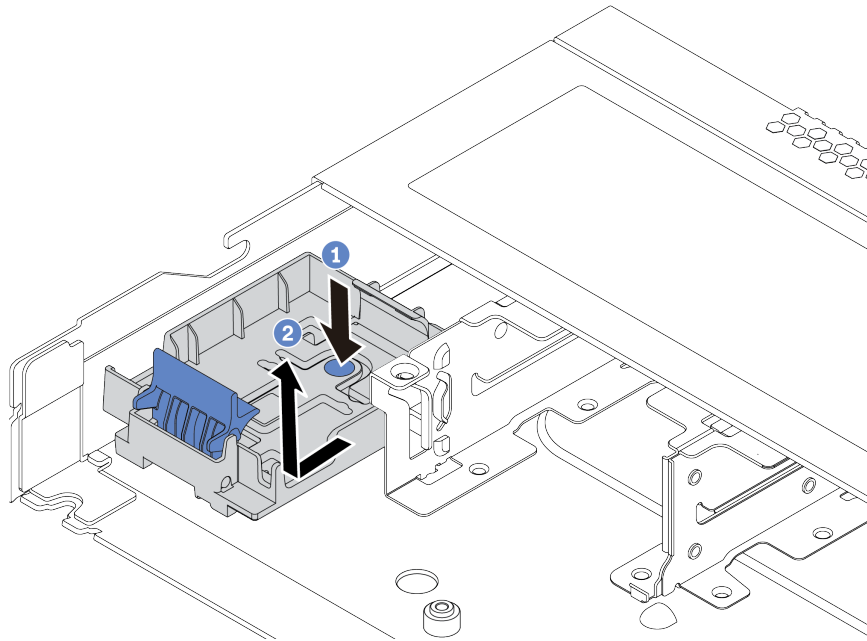


Figure 116. RAID super capacitor module holder removal

After you finish

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.

About this task

Attention:

- Read “Installation guidelines” on page 83 to ensure that you work safely.
- Power off the server and disconnect all power cords for this task.
- 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.

A video for this task is available at:

- YouTube: <https://www.youtube.com/playlist?list=PLYV5R7hVcs-Cmxb8e4L4PvMQ7J5PxvuOK>
- Youku: https://list.youku.com/albumlist/show/id_59643656

Procedure

- Step 1. Touch the static-protective package that contains the RAID super capacitor module to any unpainted surface on the outside of the server. Then, take the RAID super capacitor module out of the package and place it on a static-protective surface.

Step 2. If the server comes with a tray that covers the place of the RAID super capacitor module on the chassis, remove it first.

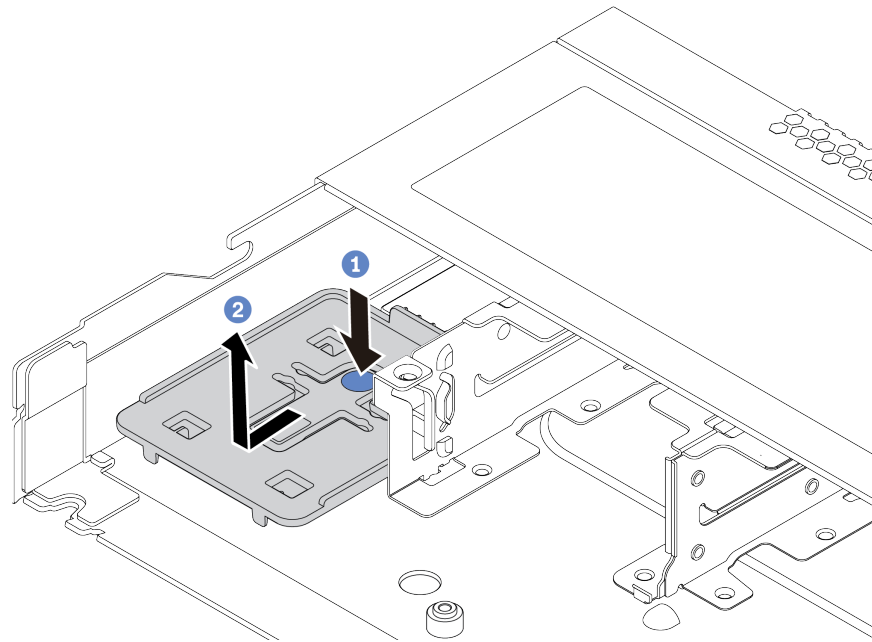


Figure 117. Tray removal

Step 3. If the server does not have a RAID super capacitor module holder on the chassis, install one first.

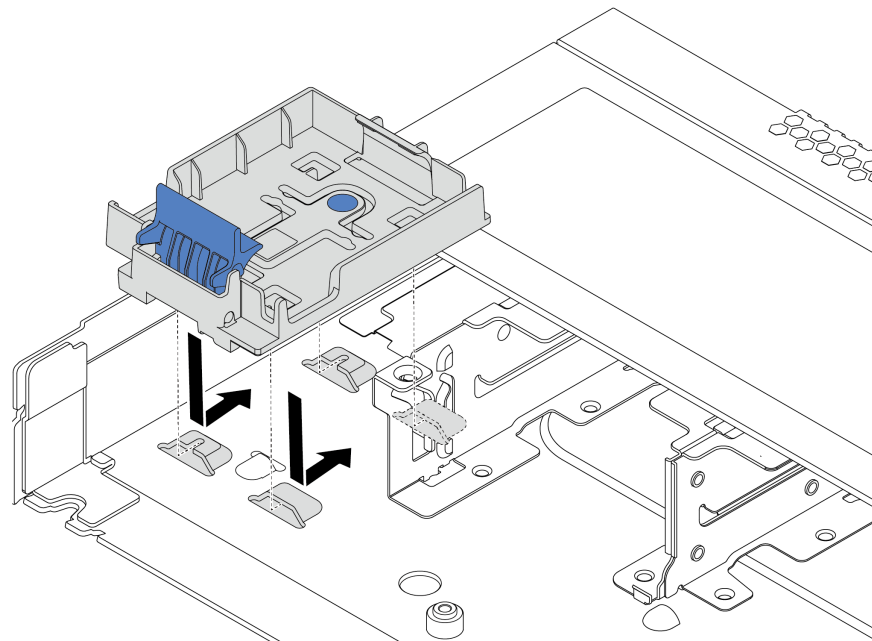


Figure 118. RAID super capacitor module holder installation

Step 4. Install the RAID super capacitor module on the chassis.

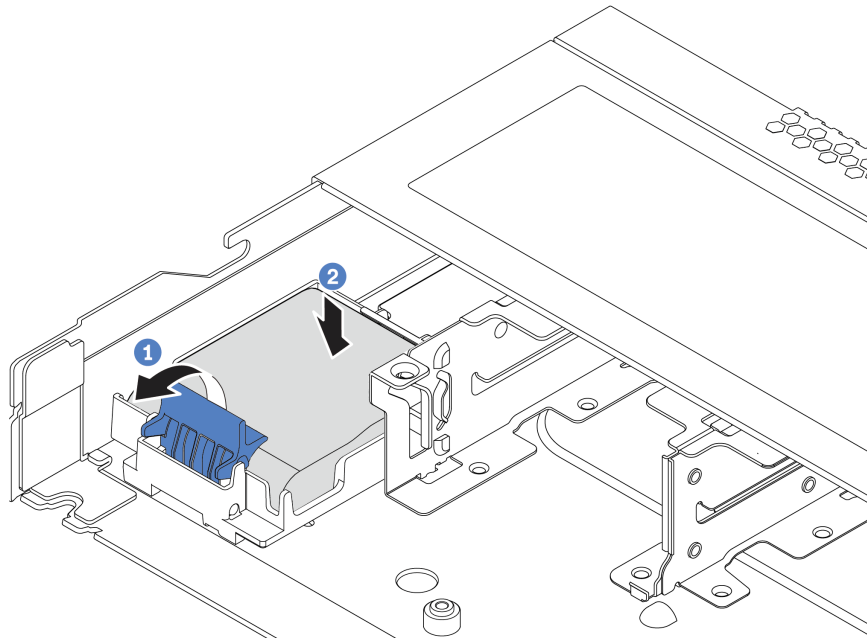


Figure 119. Installation of the RAID super capacitor module on the chassis

- a. Open the retention clip on the holder.
- b. Put the RAID super capacitor module into the holder and press it down to secure it into the holder.

After you finish

1. Connect the super capacitor module to an adapter with the extension cable that comes with the super capacitor module. See “RAID super capacitor modules” on page 60.
2. Complete the parts replacement. See “Complete the parts replacement” on page 224.

Remove the RAID super capacitor module on the air baffle

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

About this task

Attention:

- Read “Installation guidelines” on page 83 to ensure that you work safely.
- Power off the server and disconnect all power cords for this task.
- 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.

A video for this task is available at:

- YouTube: <https://www.youtube.com/playlist?list=PLYV5R7hVcs-Cmxb8e4L4PvMQ7J5PxvuOK>
- Youku: https://list.youku.com/albumlist/show/id_59643656

Procedure

- Step 1. Remove the top cover. See “Remove the top cover” on page 220.
- Step 2. Disconnect the cable of the RAID super capacitor module.
- Step 3. Remove the air baffle from the chassis. See “Remove the air baffle” on page 91.
- Step 4. Remove the RAID super capacitor module on the air baffle.

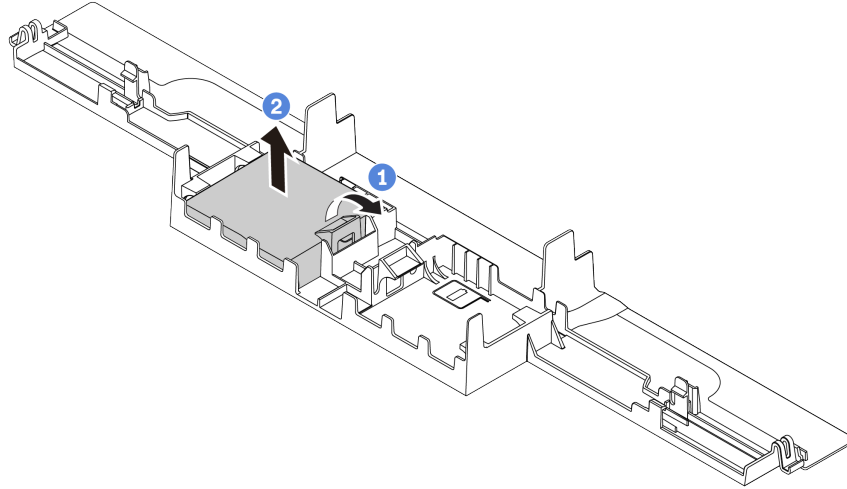


Figure 120. Removal of the RAID super capacitor module on the air baffle

- a. Open the retention clip on the holder of the RAID super capacitor module.
- b. Take the RAID super capacitor module out of the holder.

After you finish

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 air baffle

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

About this task

Attention:

- Read “Installation guidelines” on page 83 to ensure that you work safely.
- Power off the server and disconnect all power cords for this task.
- 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.

A video for this task is available at:

- YouTube: <https://www.youtube.com/playlist?list=PLYV5R7hVcs-Cmxb8e4L4PvMQ7J5PxvuOK>
- Youku: https://list.youku.com/albumlist/show/id_59643656

Procedure

- Step 1. Touch the static-protective package that contains the RAID super capacitor module to any unpainted surface on the outside of the server. Then, take the RAID super capacitor module out of the package and place it on a static-protective surface.
- Step 2. Install the RAID super capacitor module on the air baffle.

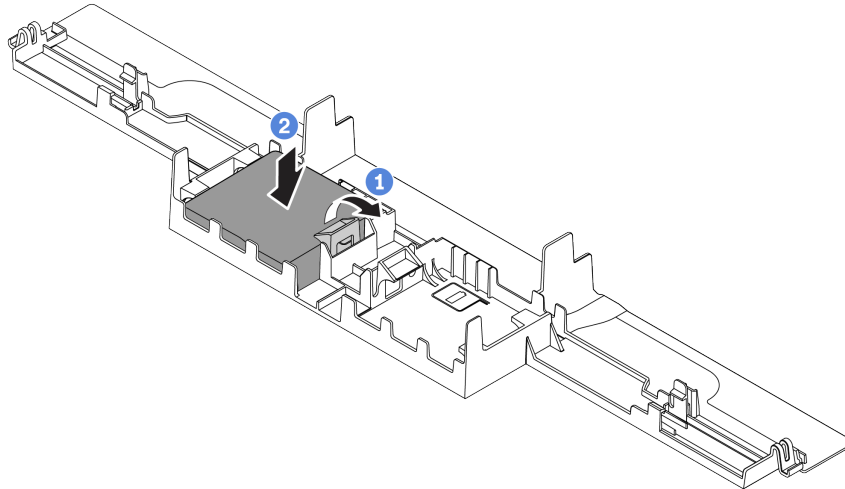


Figure 121. Installation of the RAID super capacitor module on the air baffle

- a. Open the retention clip on the holder.
- b. Put the RAID super capacitor module into the air baffle and press it down to secure it into the air baffle.

After you finish

1. Install the air baffle on the chassis. See “Install the air baffle” on page 92.
2. Connect the super capacitor module to an adapter with the extension cable that comes with the super capacitor module. See “RAID super capacitor modules” on page 60.
3. Complete the parts replacement. See “Complete the parts replacement” on page 224.

Remove the RAID super capacitor module on the riser

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

About this task

Attention:

- Read “Installation guidelines” on page 83 to ensure that you work safely.
- Power off the server and disconnect all power cords for this task.
- 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.

A video for this task is available at:

- YouTube: <https://www.youtube.com/playlist?list=PLYV5R7hVcs-Cmxb8e4L4PvMQ7J5PxvuOK>
- Youku: https://list.youku.com/albumlist/show/id_59643656

Procedure

- Step 1. Remove the top cover. See “Remove the top cover” on page 220.
- Step 2. Disconnect the cable of the RAID super capacitor module.
- Step 3. Remove the riser assembly. See “Remove a riser card” on page 198.
- Step 4. Remove the RAID super capacitor module from the riser.

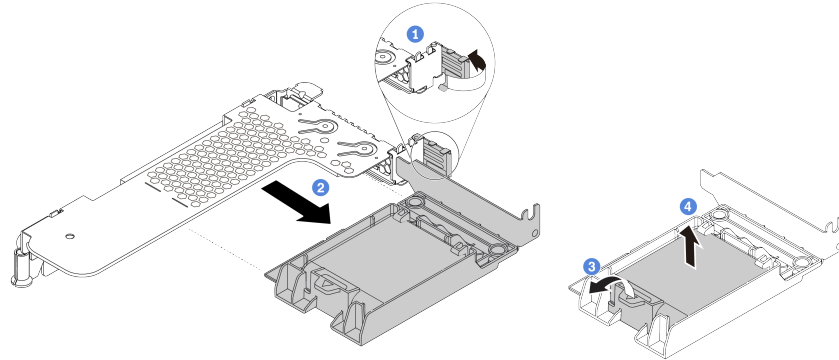


Figure 122. Removal of the RAID super capacitor assembly from the riser

- a. Rotate the latch on the riser bracket to the open position.
- b. Remove the RAID super capacitor assembly from the riser.
- c. Open the retention clip on the holder of the RAID super capacitor module.
- d. Take the RAID super capacitor module out of the holder.

After you finish

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 riser

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

About this task

Attention:

- Read “Installation guidelines” on page 83 to ensure that you work safely.
- Power off the server and disconnect all power cords for this task.
- 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.

A video for this task is available at:

- YouTube: <https://www.youtube.com/playlist?list=PLYV5R7hVcs-Cmxb8e4L4PvMQ7J5PxvuOK>
- Youku: https://list.youku.com/albumlist/show/id_59643656

Procedure

- Step 1. Touch the static-protective package that contains the RAID super capacitor module to any unpainted surface on the outside of the server. Then, take the RAID super capacitor module out of the package and place it on a static-protective surface.
- Step 2. Install the RAID super capacitor module on the riser.

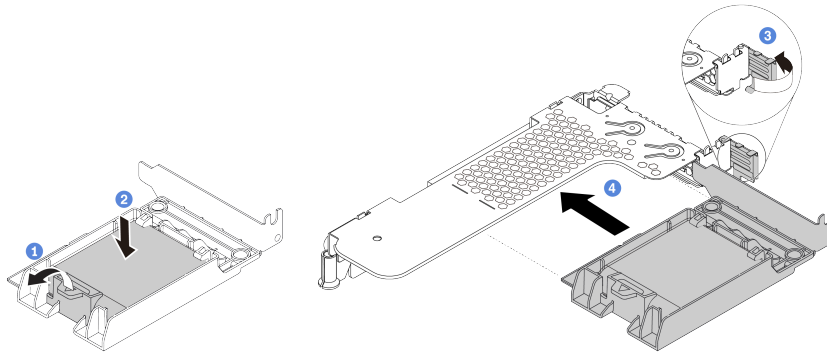


Figure 123. Installation of the RAID super capacitor module on the riser

- 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.
- Rotate the latch on the riser bracket to the open position.
- Align the RAID super capacitor assembly with the slot on the riser card. Then, carefully press the RAID super capacitor assembly straight into the slot until it is securely seated and its bracket also is secured.

After you finish

- Install the riser assembly on the chassis. See “Install a riser card” on page 201.
- Connect the super capacitor module to an adapter with the extension cable that comes with the super capacitor module. See “RAID super capacitor modules” on page 60.
- Complete the parts replacement. See “Complete the parts replacement” on page 224.

Riser card replacement

Use this information to remove and install a riser card.

There are different types of riser assembly configurations. The removal or installation procedure of the riser card is similar for all types of riser assembly. The following takes the LP-FH riser assembly as an example.

Remove a riser card

Use this information to remove a riser card.

About this task

The riser assembly you want to remove might be different from the following illustrations, but the removal method is the same. The following takes the LP-FH riser assembly as an example.

Attention:

- Read “Installation guidelines” on page 83 to ensure that you work safely.
- Power off the server and disconnect all power cords for this task.
- 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.

A video for this task is available at:

- YouTube: <https://www.youtube.com/playlist?list=PLYV5R7hVcs-Cmxb8e4L4PvMQ7J5PxvuOK>
- Youku: https://list.youku.com/albumlist/show/id_59643656

Procedure

- Step 1. Remove the top cover. See “Remove the top cover” on page 220.
- 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.
- Step 3. Grasp the riser assembly by its edges and carefully lift it out of the chassis.

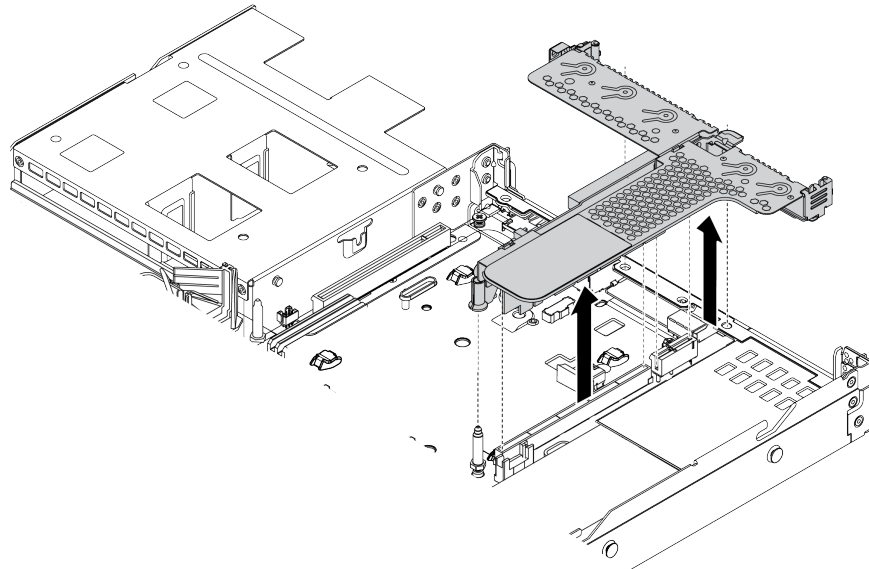


Figure 124. Riser assembly removal

- Step 4. If necessary, remove the PCIe adapters that are installed on the riser card. See “Remove a PCIe adapter” on page 174.

Step 5. Remove the riser card from the bracket.

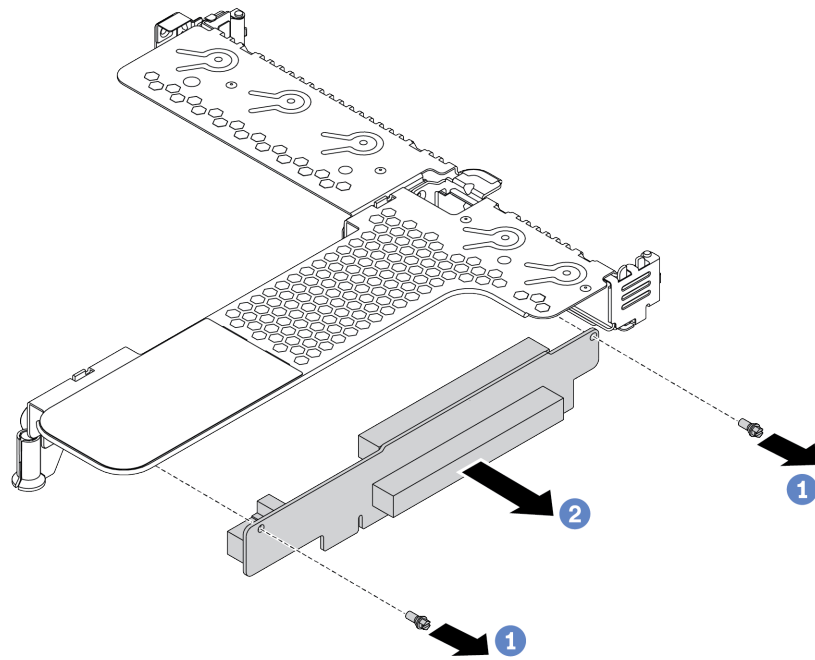


Figure 125. Riser card removal

- a. Remove the two screws that secure the riser card to the bracket.
- b. Remove the riser card.

After you finish

1. If you are instructed to return the old riser card, follow all packaging instructions and use any packaging materials that are provided.
2. Remove the rear wall bracket if you would like to install a non-LP-FH riser assembly.

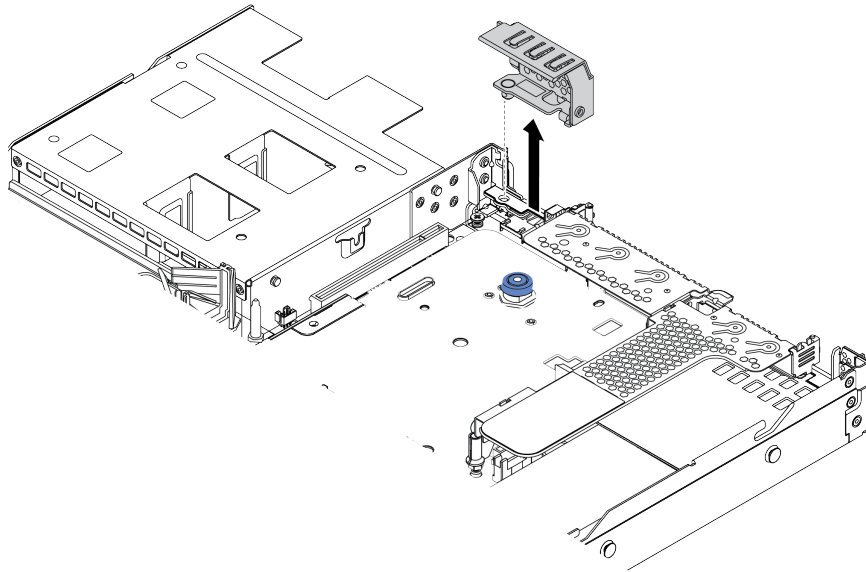


Figure 126. Rear wall bracket removal

Install a riser card

Use this information to install a riser card.

About this task

The riser assembly you want to install might be different from the following illustrations, but the installation method is the same. The following takes the LPFH riser assembly as an example.

Attention:

- Read “Installation guidelines” on page 83 to ensure that you work safely.
- Power off the server and disconnect all power cords for this task.
- 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.

A video for this task is available at:

- YouTube: <https://www.youtube.com/playlist?list=PLYV5R7hVcs-Cmxb8e4L4PvMQ7J5PxvuOK>
- Youku: https://list.youku.com/albumlist/show/id_59643656

Procedure

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

Step 2. Install the riser card and secure it to the bracket.

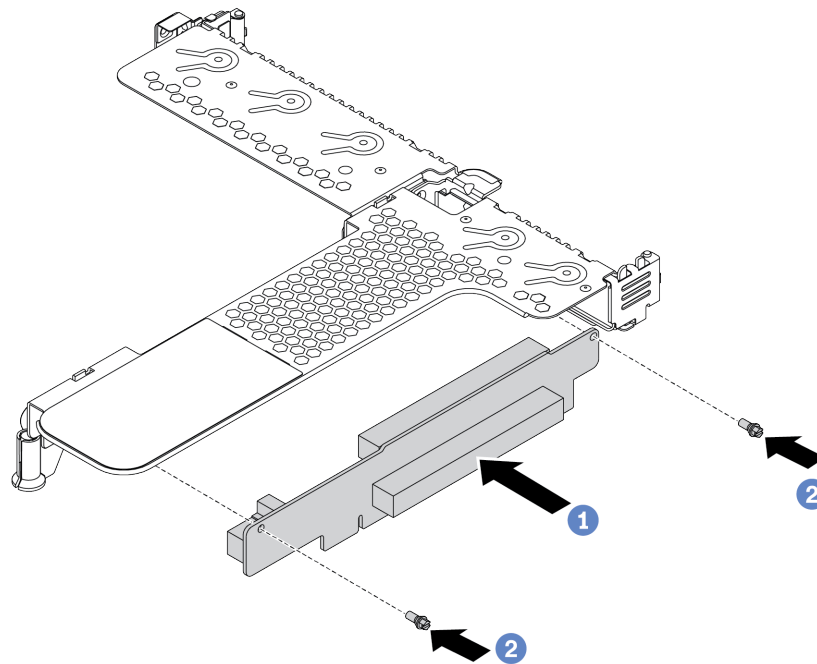


Figure 127. Riser card installation

1. Align the screw holes in the riser card with the corresponding ones in the bracket.
2. Install the two screws to secure the riser card to the bracket

Step 3. If necessary, reinstall the PCIe adapters on the riser card. See “Install a PCIe adapter” on page 175. Then, refer to your note to reconnect any cables of the PCIe adapters on the riser card. Or you can refer to the Chapter 3 “Internal cable routing” on page 55 and locate the cable routing information for your configuration options.

Step 4. Position the riser assembly on the chassis. Align the plastic clip and two pins on the bracket with the guide pin and two holes on 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.

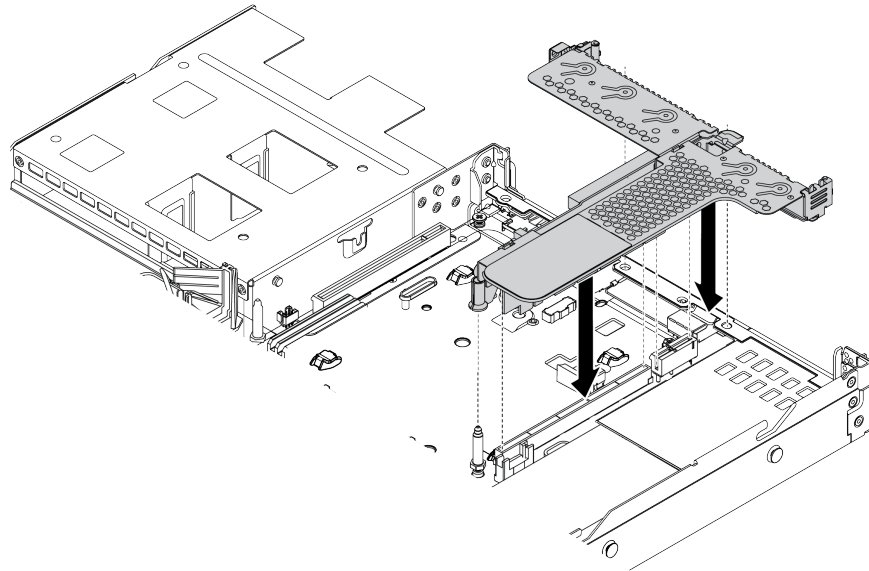


Figure 128. Riser assembly installation

After you finish

Complete the parts replacement. See “Complete the parts replacement” on page 224.

Security bezel replacement

Use this information to remove and install the security bezel.

Note: The security bezel is available on some models.

Remove the security bezel

Use this information to remove the security bezel.

About this task

Attention: Read “Installation guidelines” on page 83 to ensure that you work safely.

A video for this task is available at:

- YouTube: <https://www.youtube.com/playlist?list=PLYV5R7hVcs-Cmxb8e4L4PvMQ7J5PxvuOK>
- Youku: https://list.youku.com/albumlist/show/id_59643656

Procedure

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

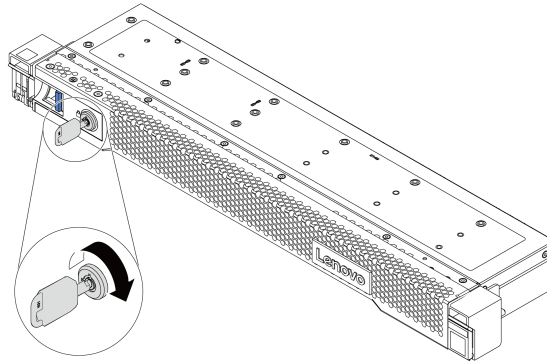


Figure 129. Unlocking the security bezel

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

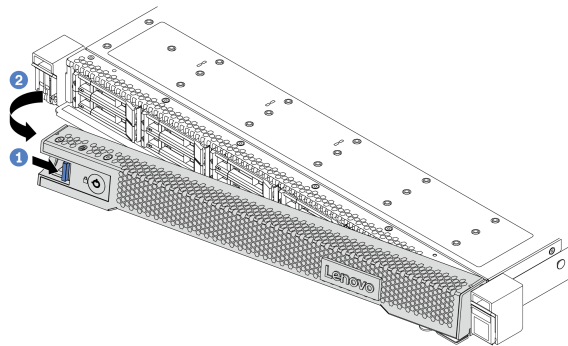


Figure 130. Security bezel removal

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.

About this task

Attention: Read “Installation guidelines” on page 83 to ensure that you work safely.

A video for this task is available at:

- YouTube: <https://www.youtube.com/playlist?list=PLYV5R7hVcs-Cmxb8e4L4PvMQ7J5PxvuOK>
- Youku: https://list.youku.com/albumlist/show/id_59643656

Procedure

Step 1. If you have removed the rack latches, reinstall them. See “Install the rack latches” on page 187.

Step 2. If the key is held inside the security bezel, remove it out of the security bezel.

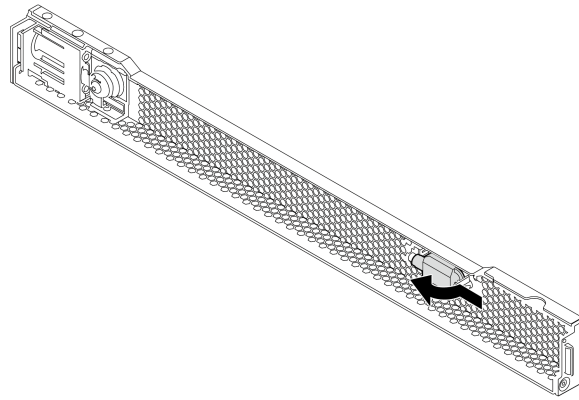


Figure 131. Key removal

Step 3. Carefully insert the tab on the security bezel into the slot on the right rack latch. Then, press and hold the blue release latch and rotate the security bezel inward until the other side clicks into place.

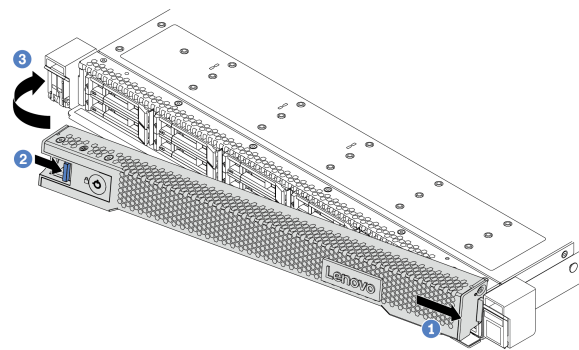


Figure 132. Security bezel installation

Step 4. Use the key to lock the security bezel to the closed position.

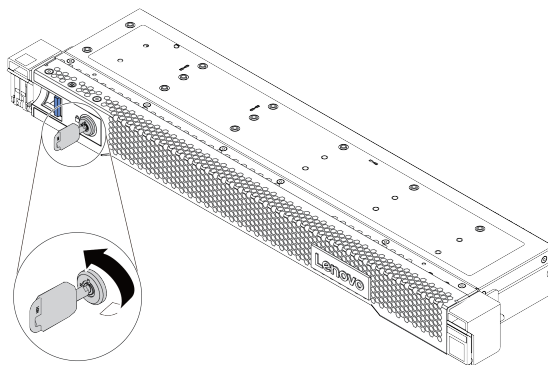


Figure 133. Locking the security bezel

Serial port module replacement

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

Remove a serial port module

Use this information to remove a serial port module.

About this task

Attention:

- Read “Installation guidelines” on page 83 to ensure that you work safely.
- Power off the server and disconnect all power cords for this task.
- 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.

A video for this task is available at:

- YouTube: <https://www.youtube.com/playlist?list=PLYV5R7hVcs-Cmxb8e4L4PvMQ7J5PxvuOK>
- Youku: https://list.youku.com/albumlist/show/id_59643656

Procedure

- Step 1. Remove the top cover. See “Remove the top cover” on page 220.
- Step 2. Disconnect the cable of the serial port module from the system board.
- Step 3. Remove the riser bracket from the server.

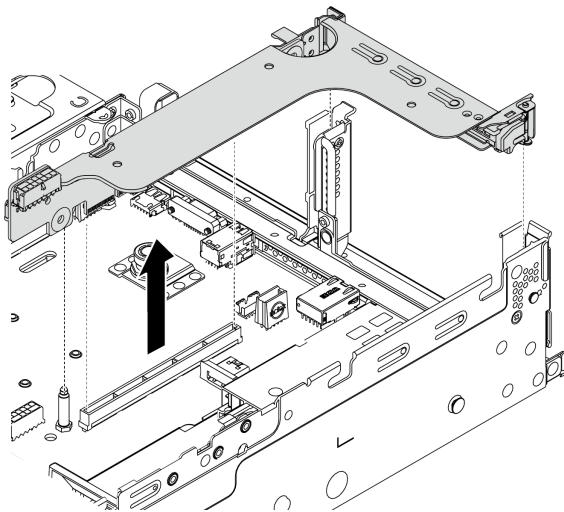


Figure 134. Removing the riser bracket

- Step 4. Open the retention latch and remove the serial port module from the riser bracket.

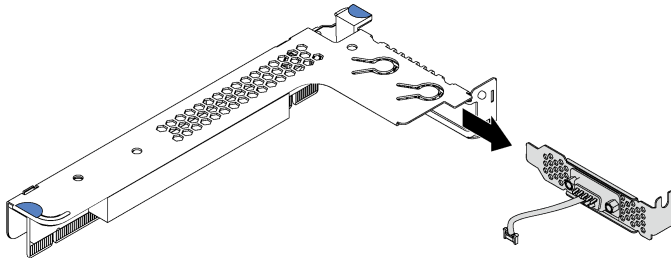


Figure 135. Removing the riser bracket

- Step 5. (Optional) If you need to replace the serial port bracket, use a 5 mm wrench to disassemble the serial port cable from the bracket.

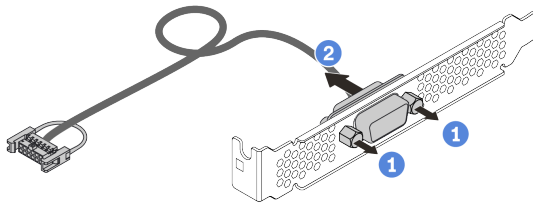


Figure 136. Disassembling the serial port module

After you finish

1. Install a new serial port module, a PCIe adapter, or a PCIe slot bracket to cover the place. See “Install a serial port module” on page 207 and “Install a PCIe adapter” on page 175.
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 a serial port module

Use this information to install a serial port module.

About this task

Attention:

- Read “Installation guidelines” on page 83 to ensure that you work safely.
- Power off the server and disconnect all power cords for this task.
- 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 “Technical rules for PCIe adapters” on page 88 to ensure that you install the serial port module to a correct PCIe slot.

A video for this task is available at:

- YouTube: <https://www.youtube.com/playlist?list=PLYV5R7hVcs-Cmxb8e4L4PvMQ7J5PxvuOK>
- Youku: https://list.youku.com/albumlist/show/id_59643656

Procedure

- Step 1. Touch the static-protective package that contains the component to any unpainted surface on the outside of the server. Then, take the component out of the package and place it on a static-protective surface.
- Step 2. Use a 5 mm wrench to install the serial port cable into the bracket.

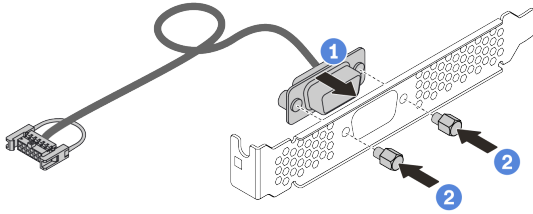


Figure 137. Assembling the serial port module

- Step 3. Install the serial port module to the riser bracket.

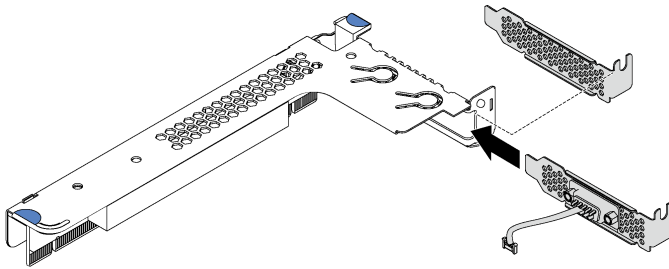


Figure 138. Installing the serial port module

- Step 4. Install the riser assembly to the server.

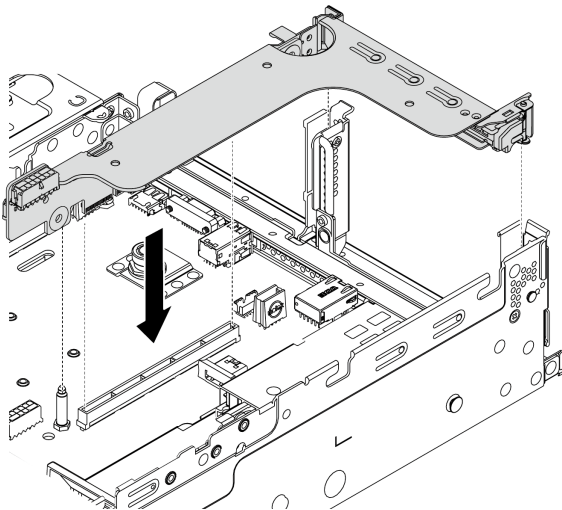


Figure 139. Installing the riser assembly

- Step 5. 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 44.

After you finish

1. Complete the parts replacement. See “Complete the parts replacement” on page 224.
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.

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.

About this task

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.

Attention:

- Read “Installation guidelines” on page 83 to ensure that you work safely.

- 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.

A video for this task is available at:

- YouTube: <https://www.youtube.com/playlist?list=PLYV5R7hVcs-Cmxb8e4L4PvMQ7J5PxvuOK>
- Youku: https://list.youku.com/albumlist/show/id_59643656

Procedure

Step 1. Remove the top cover. See “Remove the top cover” on page 220.

Step 2. Grasp the fan tabs on both ends of the system fan and carefully lift the system fan out of the server.

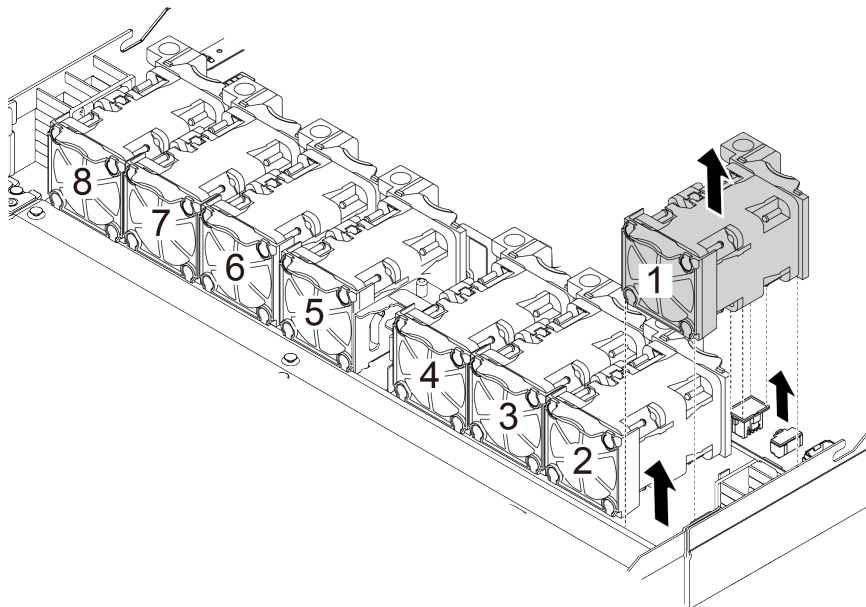


Figure 140. System fan removal

After you finish

1. Install a new system fan or install a fan filler to cover the place. See “Install a system fan” on page 210.
2. If you are instructed to return the old system fan, follow all packaging instructions and use any packaging materials that are provided.

Install a system fan

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

About this task

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.

Attention:

- Read “Installation guidelines” on page 83 to ensure that you work safely.
- 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.

A video for this task is available at:

- YouTube: <https://www.youtube.com/playlist?list=PLYV5R7hVcs-Cmxb8e4L4PvMQ7J5PxvuOK>
- Youku: https://list.youku.com/albumlist/show/id_59643656

Procedure

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

Note: Ensure that fan installation meets “Technical rules for system fans” on page 90.

Step 2. Place the system fan down in the slot and then press the point on its edge to secure it in place. Ensure that the fan connector is installed correctly to the connector on the system board.

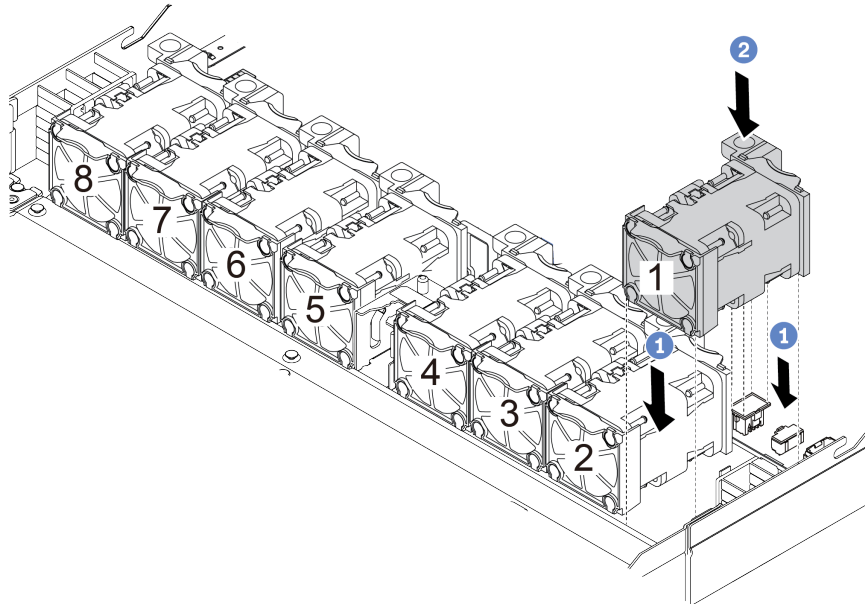


Figure 141. System fan installation

After you finish

Complete the parts replacement. See “Complete the parts replacement” on page 224.

System board replacement

Use this information to remove and install the system board.

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.

About this task

A system board, also known as the motherboard, provides different connectors or slots to connect different components or peripherals of the system for communication. If the system board fails, it must be replaced.

Attention:

- Read “Installation guidelines” on page 83 to ensure that you work safely.
- Power off the server and disconnect all power cords for this task.
- 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.

A video for this task is available at:

- YouTube: <https://www.youtube.com/playlist?list=PLYV5R7hVcs-Cmxb8e4L4PvMQ7J5PxvuOK>
- Youku: https://list.youku.com/albumlist/show/id_59643656

Procedure

Step 1. Prepare your server.

- a. Remove the top cover. See “Remove the top cover” on page 220.
- b. If your server comes with an air baffle, remove it first. See “Remove the air baffle” on page 91.
- c. If your server comes with a rear drive assembly, remove it first. See “Remove the hot-swap rear drive assembly” on page 140.
- d. 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.

- e. Remove any of the following components that are installed on the system board and put them in a safe, static-protective place.
 - “Processor and heat sink” on page 176
 - “Memory modules” on page 148
 - “System fans” on page 209
 - “RAID super capacitor modules” on page 189
 - “Riser assemblies” on page 198
 - “CMOS battery” on page 108
 - “OCP 3.0 Ethernet adapter” on page 171
- f. Pull out the power supplies slightly. Ensure that they are disconnected from the system board.

Step 2. Remove the system board.

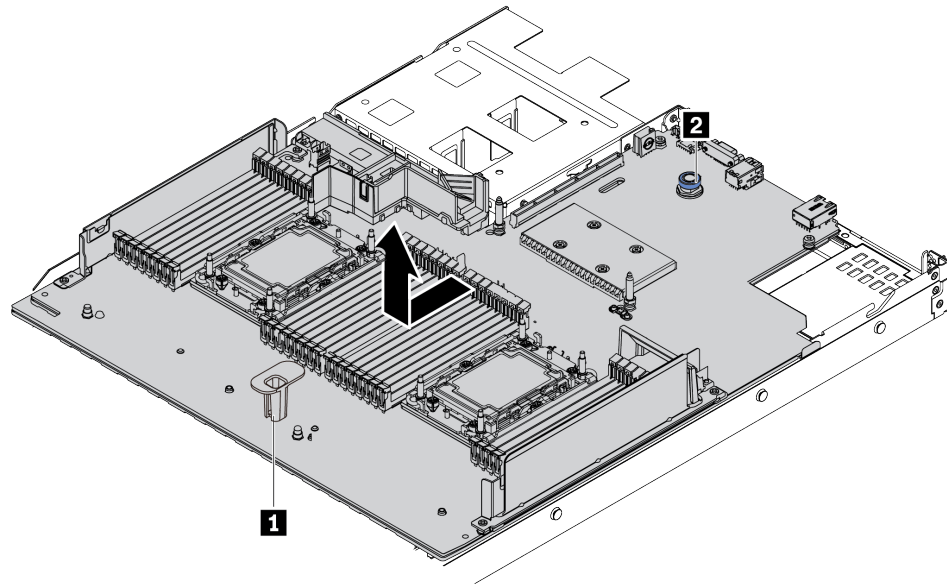


Figure 142. System board removal

- a. Hold the lift handle **1** and lift the release pin **2** at the same time and slide the system board toward the front of the server.
- b. Lift the system board out of the chassis.

After you finish

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

Important: Before you return the system board, make sure that the CPU socket is covered. There is a CPU external cap covering the CPU socket on the new system board. Slide the CPU external cap out from the CPU socket on the new system board, and install the external cap on the CPU socket on the removed system board.

If you are planning to recycle the system board, follow the instructions in Appendix A “Hardware disassembling for recycle” on page 251 for compliance with local regulations.

Install the system board

Use this information to install the system board.

About this task

Attention:

- Read “Installation guidelines” on page 83 to ensure that you work safely.
- Power off the server and disconnect all power cords for this task.
- 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.

A video for this task is available at:

- YouTube: <https://www.youtube.com/playlist?list=PLYV5R7hVcs-Cmxb8e4L4PvMQ7J5PxvuOK>
- Youku: https://list.youku.com/albumlist/show/id_59643656

Procedure

- Step 1. Touch the static-protective package that contains the system board to any unpainted surface on the outside of the server. Then, take the system board out of the package and place it on a static-protective surface.
- Step 2. Install the system board to the server.

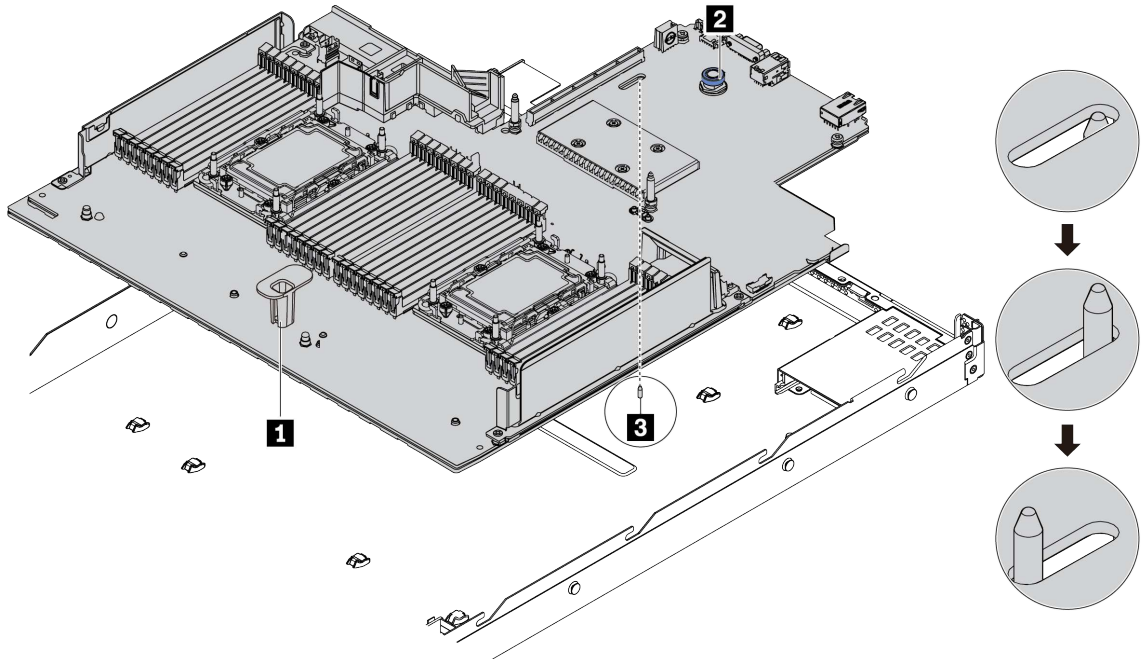


Figure 143. System board installation

- a. Hold the lift handle **1** and the release pin **2** at the same time to lower the system board into the chassis.
- b. 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 locating pin **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 **2** secures the system board in place.

After you finish

1. Install any components that you have removed from the failing system board.
 - “Processor and heat sink” on page 176
 - “Memory modules” on page 148
 - “System fans” on page 209

- “RAID super capacitor modules” on page 189
 - “Riser assemblies” on page 198
 - “CMOS battery” on page 108
 - “OCP 3.0 Ethernet adapter” on page 171
2. Properly route and secure the cables in the server. Refer to detailed cable routing information for each component in Chapter 3 “Internal cable routing” on page 55.
 3. Install the rear drive cage if you have removed it. See “Install the hot-swap rear drive assembly” on page 141.
 4. Install the air baffle if you have removed it. See “Install the air baffle” on page 92.
 5. Install the top cover. See “Install the top cover” on page 222.
 6. Push the power supplies into the bays until they click into place.
 7. Connect power cords to the server and turn on the server.
 8. Update the machine type and serial number of the system board. See “Update the machine type and serial number” on page 216.
 9. Enable TPM. See “Enable TPM” on page 218.
 10. Optionally, enable Secure Boot. See “Enable UEFI Secure Boot” on page 219.

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 V3

To update the machine type and serial number from Lenovo XClarity Provisioning Manager V3:

1. Start the server and press F1 to display the Lenovo XClarity Provisioning Manager V3 interface.
2. If the power-on Administrator password is required, enter the password.
3. From the System Summary page, click **Update VPD**.
4. Update the machine type and serial number.

- From Lenovo XClarity Essentials OneCLI

Lenovo XClarity Essentials OneCLI sets the machine type and serial number in the Lenovo XClarity Controller. Select one of the following methods to access the Lenovo XClarity Controller and set the machine type and serial number:

- Operate from the target system, such as LAN or keyboard console style (KCS) access
- Remote access to the target system (TCP/IP based)

To update the machine type and serial number from Lenovo XClarity Essentials OneCLI:

1. Download and install Lenovo XClarity Essentials OneCLI.

To download Lenovo XClarity Essentials OneCLI, go to the following site:

<https://datacentersupport.lenovo.com/solutions/HT116433>

2. Copy and unpack the OneCLI package, which also includes other required files, to the server. Make sure that you unpack the OneCLI and the required files to the same directory.
3. After you have Lenovo XClarity Essentials OneCLI in place, type the following commands to set the machine type and serial number:

```
onecli config set SYSTEM_PROD_DATA.SysInfoProdName <m/t_model> [access_method]
onecli config set SYSTEM_PROD_DATA.SysInfoSerialNum <s/n> [access_method]
```

Where:

<m/t_model>

The server machine type and model number. Type *m t m xxxxyyy*, where *xxxx* is the machine type and *yyy* is the server model number.

<s/n>

The serial number on the server. Type *sn zzzzzzz*, where *zzzzzz* is the serial number.

[access_method]

The access method that you select to use from the following methods:

- Online authenticated LAN access, type the command:

```
[--bmc-username xcc_user_id --bmc-password xcc_password]
```

Where:

xcc_user_id

The BMC/IMM/XCC account name (1 of 12 accounts). The default value is USERID.

xcc_password

The BMC/IMM/XCC account password (1 of 12 accounts).

Example commands are as follows:

```
onecli config set SYSTEM_PROD_DATA.SysInfoProdName <m/t_model> --bmc-username xcc_user_id
--bmc-password xcc_password
onecli config set SYSTEM_PROD_DATA.SysInfoSerialNum <s/n> --bmc-username xcc_user_id
--bmc-password xcc_password
```

- Online KCS access (unauthenticated and user restricted):

You do not need to specify a value for *access_method* when you use this access method.

Example commands are as follows:

```
onecli config set SYSTEM_PROD_DATA.SysInfoProdName <m/t_model>
onecli config set SYSTEM_PROD_DATA.SysInfoSerialNum <s/n>
```

Note: The KCS access method uses the IPMI/KCS interface, which requires that the IPMI driver be installed.

- Remote LAN access, type the command:

```
[--bmc xcc_user_id:xcc_password@xcc_external_ip]
```

Where:

xcc_external_ip

The BMC/IMM/XCC IP address. There is no default value. This parameter is required.

xcc_user_id

The BMC/IMM/XCC account (1 of 12 accounts). The default value is USERID.

xcc_password

The BMC/IMM/XCC account password (1 of 12 accounts).

Note: BMC, IMM, or XCC internal LAN/USB IP address, account name, and password are all valid for this command.

Example commands are as follows:

```
onecli config set SYSTEM_PROD_DATA.SysInfoProdName <m/t_model>
```

```
--bmc xcc_user_id:xcc_password@xcc_external_ip
onecli config set SYSTEM_PROD_DATA.SysInfoSerialNum <s/n>
--bmc xcc_user_id:xcc_password@xcc_external_ip
```

4. Reset the Lenovo XClarity Controller to the factory defaults. Go to https://sysmgt.lenovofiles.com/help/topic/com.lenovo.systems.management.xcc.doc/NN1ia_c_resettingthexcc.html for more information.

Enable TPM

The server supports Trusted Platform Module (TPM) of version 2.0.

Note: For customers in the Chinese Mainland, integrated TPM is not supported. However, customers in the Chinese Mainland can install a TPM adapter (sometimes called a daughter card), only version 2.0 is available.

When a system board is replaced, you must make sure that the TPM policy is set correctly.

CAUTION:

Take special care when setting the TPM policy. If it is not set correctly, the system board can become unusable.

Set the TPM policy

By default, a replacement system board is shipped with the TPM policy set to **undefined**. You must modify this setting to match the setting that was in place for the system board that is being replaced.

There are two methods available to set the TPM policy:

- From Lenovo XClarity Provisioning Manager V3

To set the TPM policy from Lenovo XClarity Provisioning Manager V3:

1. Start the server and press F1 to display the Lenovo XClarity Provisioning Manager V3 interface.
2. If the power-on Administrator password is required, enter the password.
3. From the System Summary page, click **Update VPD**.
4. Set the policy to one of the following settings.
 - **NationZ TPM 2.0 enabled - China only.** Customers in the Chinese Mainland should choose this setting if a NationZ TPM 2.0 adapter is installed.
 - **TPM enabled - ROW.** Customers outside of the Chinese Mainland should choose this setting.
 - **Permanently disabled.** Customers in the Chinese Mainland should use this setting if no TPM adapter is installed.

Note: Although the setting **undefined** is available as a policy setting, it should not be used.

- From Lenovo XClarity Essentials OneCLI

Note: Please note that a Local IPMI user and password must be setup in Lenovo XClarity Controller for remote accessing to the target system.

To set the TPM policy from Lenovo XClarity Essentials OneCLI:

1. Read TpmTcmPolicyLock to check whether the TPM_TCM_POLICY has been locked:
`OneCli.exe config show imm.TpmTcmPolicyLock --override --bmc <userid>:<password>@<ip_address>`

Note: The imm.TpmTcmPolicyLock value must be 'Disabled', which means TPM_TCM_POLICY is NOT locked and changes to the TPM_TCM_POLICY are permitted. If the return code is 'Enabled' then no changes to the policy are permitted. The planar may still be used if the desired setting is correct for the system being replaced.

2. Configure the TPM_TCM_POLICY into XCC:

- For customers in Chinese Mainland with no TPM, or customers that require to disable TPM:
OneCli.exe config set imm.TpmTcmPolicy "NeitherTpmNorTcm" **--override --bmc** <userid>:<password>@<ip_address>
 - For customers in Chinese Mainland that require to enable TPM:
OneCli.exe config set imm.TpmTcmPolicy "NationZTPM20Only" **--override --bmc** <userid>:<password>@<ip_address>
 - For customers outside Chinese Mainland that require to enable TPM:
OneCli.exe config set imm.TpmTcmPolicy "TpmOnly" **--override --bmc** <userid>:<password>@<ip_address>
3. Issue reset command to reset system:
OneCli.exe misc ospower reboot **--bmc** <userid>:<password>@<ip_address>
 4. Read back the value to check whether the change has been accepted:
OneCli.exe config show imm.TpmTcmPolicy **--override --bmc** <userid>:<password>@<ip_address>

Notes:

- If the read back value is matched it means the TPM_TCM_POLICY has been set correctly.
imm.TpmTcmPolicy is defined as below:
 - Value 0 use string "Undefined", which means UNDEFINED policy.
 - Value 1 use string "NeitherTpmNorTcm", which means TPM_PERM_DISABLED.
 - Value 2 use string "TpmOnly", which means TPM_ALLOWED.
 - Value 4 use string "NationZTPM20Only", which means NationZ_TPM20_ALLOWED.
 - Below 4 steps must also be used to 'lock' the TPM_TCM_POLICY when using OneCli/ASU commands:
5. Read TpmTcmPolicyLock to check whether the TPM_TCM_POLICY has been locked , command as below:
OneCli.exe config show imm.TpmTcmPolicyLock **--override --bmc** <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 --bmc** <userid>:<password>@<ip_address>
 7. Issue reset command to reset system, command as below:
OneCli.exe misc ospower reboot **--bmc** <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 values for imm.TpmTcmPolicy include 'NeitherTpmNorTcm', 'TpmOnly', and 'NationZTPM20Only'.
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 --bmc** <userid>:<password>@<ip_address>

Note: If the read back value is changed from 'Disabled' to 'Enabled' that means the TPM_TCM_POLICY has been locked successfully. There is no method to unlock a policy once it has been set other than replacing system board.

imm.TpmTcmPolicyLock is defined as below:

Value 1 uses string "Enabled" , which means lock the policy. Other values are not accepted.

Enable UEFI Secure Boot

Optionally, you can enable UEFI Secure Boot.

There are two methods available to enable UEFI Secure Boot:

- From Lenovo XClarity Provisioning Manager V3

To enable UEFI Secure Boot from Lenovo XClarity Provisioning Manager V3:

1. Start the server and press F1 to display the Lenovo XClarity Provisioning Manager V3 interface.
2. If the power-on Administrator password is required, enter the password.
3. From the UEFI Setup page, click **System Settings** → **Security** → **Secure Boot**.
4. Enable Secure Boot and save the settings.

- From Lenovo XClarity Essentials OneCLI

To enable UEFI Secure Boot from Lenovo XClarity Essentials OneCLI:

1. Download and install Lenovo XClarity Essentials OneCLI.

To download Lenovo XClarity Essentials OneCLI, go to the following site:

<https://datacentersupport.lenovo.com/solutions/HT116433>

2. Run the following command to enable Secure Boot:

```
OneCli.exe config set SecureBootConfiguration.SecureBootSetting Enabled  
--bmc <userid>:<password>@<ip_address>
```

where:

- *<userid>:<password>* are the credentials used to access the BMC (Lenovo XClarity Controller interface) of your server. The default user ID is USERID, and the default password is PASSWORD (zero, not an uppercase o)
- *<ip_address>* is the IP address of the BMC.

For more information about the Lenovo XClarity Essentials OneCLI **set** command, see:

http://sysmgmt.lenovofiles.com/help/topic/toolsctr_cli_lenovo/onecli_r_set_command.html

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.

About this task

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.

Attention:

- Read “Installation guidelines” on page 83 to ensure that you work safely.
- Power off the server and disconnect all power cords for this task.
- 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.

A video for this task is available at:

- YouTube: <https://www.youtube.com/playlist?list=PLYV5R7hVcs-Cmxb8e4L4PvMQ7J5PxvuOK>
- Youku: https://list.youku.com/albumlist/show/id_59643656

Procedure

- Step 1. If the server is installed in a rack, remove the server from the rack. See the Rack Installation Guide that comes with the rail kit for your server.

Step 2. Remove the top cover.

Attention: Handle the top cover carefully. Dropping the top cover with the cover latch open might damage the cover latch.

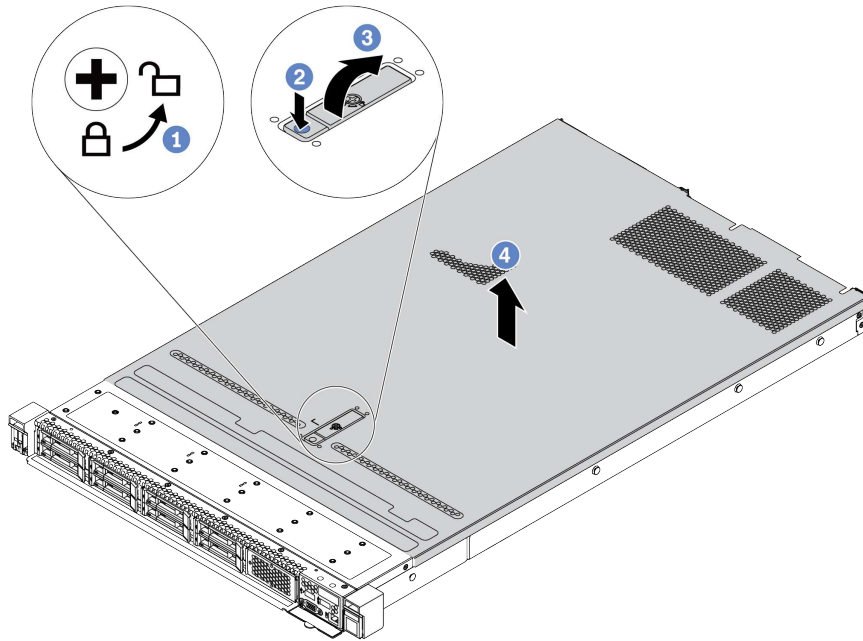


Figure 144. Top cover removal

- Use a screwdriver to turn the cover lock to the unlocked position as shown.
- Press the release button on the cover latch. The cover latch then gets released to some extent.
- Fully open the cover latch as shown.
- Slide the top cover to the rear until it is disengaged from the chassis. Then, lift the top cover off the chassis and place the top cover on a flat clean surface.

After you finish

Replace any options as required or install a new top cover. See “Install the top cover” on page 222.

Install the top cover

Use this information to install the top cover.

About this task

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.

Attention:

- Read “Installation guidelines” on page 83 to ensure that you work safely.
- Power off the server and disconnect all power cords for this task.
- 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.

Operating the server with the top cover removed might damage server components. For proper cooling and airflow, install the top cover before you turn on the server.

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 and attach the service label to the new top cover first.

A video for this task is available at:

- YouTube: <https://www.youtube.com/playlist?list=PLYV5R7hVcs-Cmxb8e4L4PvMQ7J5PxvuOK>
- Youku: https://list.youku.com/albumlist/show/id_59643656

Procedure

Step 1. Check your server and 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.
- All internal cables are connected and routed correctly. See Chapter 3 “Internal cable routing” on page 55.

Step 2. Install the top cover to your server.

Attention: Handle the top cover carefully. Dropping the top cover with the cover latch open might damage the cover latch.

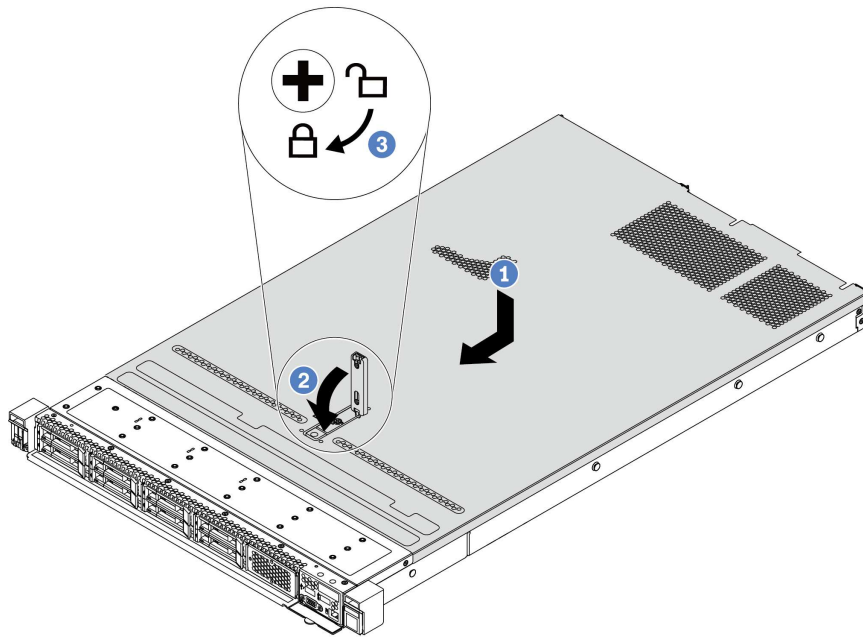


Figure 145. Top cover installation

- a. Ensure that the cover latch is in the open position. Lower the top cover onto the chassis until both sides of the top cover engage the guides on both sides of the chassis. Then, slide the top cover to the front of the chassis.

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

- b. Press down the cover latch and ensure that the cover latch is completely closed.
- c. Use a screwdriver to turn the cover lock to the locked position.

After you finish

After installing the top cover, complete the parts replacement. See “Complete the parts replacement” on page 224.

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 detailed cable routing information for each component in Chapter 3 “Internal cable routing” on page 55.
3. If you have removed the top cover, reinstall it. See “Install the top cover” on page 222.

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 11.
- Use the Lenovo XClarity Provisioning Manager V3 to configure the RAID if you have installed or removed a hot-swap drive, a RAID adapter, or the M.2 adapter and M.2 drive. For more information, see:
https://sysmgt.lenovofiles.com/help/topic/ixpm_frontend/ixpm_v3_about.html

Chapter 5. Problem determination

Use the information in this section to isolate and resolve issues that you might encounter while using your server.

Lenovo servers can be configured to automatically notify Lenovo Support if certain events are generated. You can configure automatic notification, also known as Call Home, from management applications, such as the Lenovo XClarity Administrator. You may also configure Call Home from Lenovo XClarity Controller. Using the Call Home function, you can create a service forwarder that automatically sends service data for any managed device to Lenovo Support.

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.

Note: For a listing of events, including user actions that might need to be performed to recover from an event, see the *Messages and Codes Reference*, which is available at:
https://thinksystem.lenovofiles.com/help/topic/SR630V2/pdf_files.html

Lenovo XClarity Administrator event log

If you are using Lenovo XClarity Administrator to manage server, network, and storage hardware, you can view the events from all managed devices through the XClarity Administrator.

Logs

The Event log provides a history of hardware and management conditions that have been detected.

Show: [Warning] [Error] [Info]

All Event Sources [Filter]

All Dates

Severity	Serviceability	Date and Time	System	Event	System Type	Source ID
Warning	Support	Jan 30, 2017, 7:48:07 AM	Chassis114:...	Node Node 08 device	Chassis	Jan 30, 20
Warning	Support	Jan 30, 2017, 7:48:07 AM	Chassis114:...	Node Node 02 device	Chassis	Jan 30, 20
Warning	User	Jan 30, 2017, 7:48:07 AM	Chassis114:...	I/O module IO Module	Chassis	Jan 30, 20
Warning	User	Jan 30, 2017, 7:48:07 AM	Chassis114:...	Node Node 08 incom	Chassis	Jan 30, 20

Figure 146. 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.

ThinkSystem System name: XCC0023579PK

Event Log Audit Log Maintenance History

Customize Table Clear Logs Refresh

Type: [Warning] [Error] [Info]

All Source All Date

Severity	Source	Event ID	Message	Date
Warning	System	0X4000000E00000000	Remote login successful. Login ID: userid from webguis at IP address: 10.104.194.180.	27 Jul 2015, 08:11:04 AM
Warning	System	0X4000000E00000000	Remote login successful. Login ID: userid from webguis at IP address: 10.104.194.180.	27 Jul 2015, 08:11:04 AM
Warning	System	0X4000000E00000000	Remote login successful. Login ID: userid from webguis at IP address: 10.104.194.180.	27 Jul 2015, 08:11:04 AM
Warning	System	0X4000000E00000000	Remote login successful. Login ID: userid from webguis at IP address: 10.104.194.180.	27 Jul 2015, 08:11:04 AM

Figure 147. 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

Light path diagnostics

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

- “Front view” on page 19
- “Diagnostics panel” on page 26
- “Diagnostics panel” on page 26
- “Rear view LEDs” on page 43
- “System board LEDs” on page 46

General problem determination procedures

Use the information in this section to resolve problems if the event log does not contain specific errors or the server is inoperative.

If you are not sure about the cause of a problem and the power supplies are working correctly, complete the following steps to attempt to resolve the problem:

1. Power off the server.
2. Make sure that the server is cabled correctly.
3. Remove or disconnect the following devices, one at a time, until you find the failure. Power on and configure the server each time you remove or disconnect a device.
 - Any external devices.
 - Surge-suppressor device (on the server).
 - Printer, mouse, and non-Lenovo devices.
 - Each adapter.
 - Hard disk drives.
 - Memory modules until you reach the minimum configuration that is supported for the server.

Note: The minimum configuration required for the server to start is one processor and one 2 GB DIMM.

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 227.

- Step 2. Check for short circuits, for example, if a loose screw is causing a short circuit on a circuit board.
- Step 3. Remove the adapters and disconnect the cables and power cords to all internal and external devices until the server is at the minimum configuration that is required for the server to start. See “Specifications” on page 2 to determine the minimum configuration for your server.
- Step 4. Reconnect all ac power cords and turn on the server. If the server starts successfully, reseal the adapters and devices one at a time until the problem is isolated.

If the server does not start from the minimum configuration, replace the components in the minimum configuration one at a time until the problem is isolated.

Resolving suspected Ethernet controller problems

The method that you use to test the Ethernet controller depends on which operating system you are using. See the operating-system documentation for information about Ethernet controllers, and see the Ethernet controller device-driver readme file.

Complete the following steps to attempt to resolve suspected problems with the Ethernet controller.

- Step 1. Make sure that the correct device drivers, which come with the server are installed and that they are at the latest level.
- Step 2. Make sure that the Ethernet cable is installed correctly.
 - The cable must be securely attached at all connections. If the cable is attached but the problem remains, try a different cable.
 - If you set the Ethernet controller to operate at 100 Mbps or 1000 Mbps, you must use Category 5 cabling.
- Step 3. Determine whether a hub is installed in the network environment. If yes, use direct connection from a server adapter port to a laptop to clarify the network issue. If the network environment is for unique fiber channel connectors (such as SFP+ and QSFP), use another known good server for direct connection to clarify the issue first.
- Step 4. Check the Ethernet controller LEDs on the rear panel of the server. These LEDs indicate whether there is a problem with the connector, cable, or hub.
 - The Ethernet link status LED is lit when the Ethernet controller receives a link pulse from the hub. If the LED is off, there might be a defective connector or cable or a problem with the hub.
 - The Ethernet transmit/receive activity LED is lit when the Ethernet controller sends or receives data over the Ethernet network. If the Ethernet transmit/receive activity is off, make sure that the hub and network are operating and that the correct device drivers are installed.
- Step 5. Check the LAN activity LED on the rear of the server. The LAN activity LED is lit when data is active on the Ethernet network. If the LAN activity LED is off, make sure that the hub and network are operating and that the correct device drivers are installed.
- Step 6. Check for operating-system-specific causes of the problem, and also make sure that the operating system drivers are installed correctly.
- Step 7. Make sure that the device drivers on the client and server are using the same protocol.

If the Ethernet controller still cannot connect to the network but the hardware appears to be working, the network administrator must investigate other possible causes of the error.

Troubleshooting by symptom

Use this information to find solutions to problems that have identifiable symptoms.

To use the symptom-based troubleshooting information in this section, complete the following steps:

1. Check the event log of Lenovo XClarity Controller and follow the suggested actions to resolve any event codes.

For more information about event logs, see “Event logs” on page 227)

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 255).

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 232
- “Server does not power on (no indication that input power is connected to the server)” on page 232
- “The power button does not work (server does not start)” on page 233
- “Server does not power off” on page 233

Embedded hypervisor is not in the boot list

Complete the following steps until the problem is solved.

1. Check <https://static.lenovo.com/us/en/serverproven/index.shtml> to validate that the embedded hypervisor device is supported for the server.
2. 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.
3. 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

4. See the documentation that comes with the optional embedded hypervisor flash device to validate that the device is configured correctly.
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.

Server does not power on (no indication that input power is connected to the server)

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 front operator panel.
4. Check the front operator panel LCD display for error indications.
5. Check the power supply LEDs and ensure that the power supplies are functioning:
 - a. Make sure that both power supplies installed in the server are of the same type. Mixing different power supplies in the server will cause a system error.
 - b. Make sure that the power cords are correctly connected to a working electrical outlet. The power source meets the input power requirements for the installed power supplies (see the power supply labels).
 - c. Disconnect and reconnect the input power cords.
 - d. Reseat the power supplies.
 - e. Replace the power supplies one by one, and check the power button function after installing each one.
6. If the problem still cannot be resolved, please collect the failure information with system logs captured to Lenovo support.

The power button does not work (server does not start)

Note: The power button will not function until approximately 1 to 3 minutes after the server has been connected to ac power to allow time for BMC to initialize.

Complete the following steps until the problem is resolved:

1. Verify that input power is applied to the server and that the power supplies are functioning. See “Server does not power on (no indication that input power is connected to the server)” on page 232.
2. 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.
3. Make sure that:
 - The type of memory that is installed is correct.
 - The processors are installed in the correct sequence.
 - The minimum number of DIMMs are installed and functional for your processor configuration.
4. Make sure that the power button on the server is working correctly:

Reseat the operator information panel cable. If the problem remains, replace the operator information panel.
5. If the problem still cannot be resolved, please collect the failure information with system logs captured to Lenovo support.

Server does not power off

Complete the following steps until the problem is resolved:

1. Determine whether you are using an Advanced Configuration and Power Interface (ACPI) or a non-ACPI operating system. If you are using a non-ACPI operating system, complete the following steps:
 - a. Press Ctrl+Alt+Delete.
 - b. Turn off the server by pressing the power button and holding it down for 5 seconds.
 - c. Restart the server.
 - d. If the server fails POST and the power button does not work, disconnect the power cord for 20 seconds; then, reconnect the power cord and restart the server.
2. If the problem remains or if you are using an ACPI-aware operating system, suspect the system board.

Memory problems

See this section to resolve issues related to memory.

- “Displayed system memory is less than installed physical memory” on page 234
- “Multiple memory modules in a channel identified as failing” on page 235
- “Attempt to change to another PMEM mode fails” on page 235
- “Extra namespace appears in an interleaved region” on page 235
- “Migrated PMEMs are not supported” on page 235
- “Invalid memory population detected” on page 236
- “PMEMs installed in wrong slots after system board replacement” on page 236
- “After PMEMs are reconfigured, error messages and LEDs persist to indicate PMEMs are installed in wrong slots” on page 237
- “Cannot create goal successfully when installing PMEMs to the system for the first time” on page 237

Displayed system memory is less than installed physical memory

Complete the following procedure to solve the problem.

Note: Each time you install or remove a memory module, you must disconnect the server from the power source; then, wait 10 seconds before restarting the server.

1. Make sure that:

- No error LEDs are lit on the operator information panel.
- No memory module error LEDs are lit on the system board.
- Memory mirrored channel does not account for the discrepancy.
- The memory modules are seated correctly.
- You have installed the correct type of memory module (see “PMEM rules” in *Setup Guide* for requirements).
- After changing or replacing a memory module, memory configuration is updated accordingly in the Setup Utility.
- All banks of memory are enabled. The server might have automatically disabled a memory bank when it detected a problem, or a memory bank might have been manually disabled.
- There is no memory mismatch when the server is at the minimum memory configuration.
- When PMEMs are installed:
 - a. Refer to “PMEM rules” in *Setup Guide* and see if the displayed memory fits the mode description.
 - b. If the memory is set in App Direct Mode, all the saved data have been backed up, and created namespaces are deleted before any PMEM is replaced or added.
 - c. If PMEMs are recently set in Memory Mode, turn it back to App Direct Mode and examine if there is namespace that has not been deleted.
 - d. Go to the Setup Utility, select **System Configuration and Boot Management → Intel Optane PMEMs → Security**, and make sure security of all the PMEM units is disabled.

2. Reseat the memory modules, and then restart the server.

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. When you start a solution and press F1, the LXPM interface is displayed by default. You can perform memory diagnostics with this interface. From the Diagnostic page, go to **Run Diagnostic → Memory test** or **PMEM test**.

Notes: When PMEMs are installed, run diagnostics based on the mode that is set presently:

- App Direct Mode:
 - Run Memory Test for DRAM memory modules.
 - Run PMEM Test for PMEMs.
- Memory Mode:

Run both Memory Test and PMEM Test for PMEMs.

5. Reverse the modules between the channels (of the same processor), and then restart the server. If the problem is related to a memory module, replace the failing memory module.

Note: When PMEMs are installed, only adopt this method in Memory Mode.

6. Re-enable all memory modules using the Setup utility, and then restart the server.
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 system board.

Multiple memory modules in a channel identified as failing

Note: Each time you install or remove a memory module, you must disconnect the server from the power source; then, wait 10 seconds before restarting the server.

Complete the following procedure to solve the problem.

1. Reseat the memory modules; then, restart the server.
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 server. 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 server after each memory module, until a memory module fails. Replace each failing memory module with an identical known good memory module, restarting the server 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 server. Repeat as necessary.
5. Reverse the memory modules between the channels (of the same processor), and then restart the server. 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 PMEM mode fails

After the PMEM mode is changed and the system is successfully restarted, if the PMEM mode stays the same instead of being changed, check the DRAM DIMMs and PMEM capacity to see if it meets the requirement of the new mode (see “PMEM rules” 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. Delete the created namespaces in either the Setup Utility or the operating system before the first booting with ESXi.

Migrated PMEMs are not supported

Intel Optane PMEM interleave set (DIMM X) is migrated from another system (Platform ID: 0x00), these migrated PMEMs are not supported nor warranted in this system.

If this warning message appears, complete the following steps:

1. Move the modules back to the original system with the exact same configuration as the previous one.
2. Back up stored data in PMEM namespaces.
3. Disable PMEM security with one of the following options:
 - **LXPM**

Go to **UEFI Setup → System Settings → Intel Optane PMEMs → Security → Press to Disable Security**, and input passphrase to disable security.

- **Setup Utility**

Go to **System Configuration and Boot Management** → **System Settings** → **Intel Optane PMEMs** → **Security** → **Press to Disable Security**, and input passphrase to disable security.

4. Delete namespaces with command corresponding to the operating system that is installed:

- **Linux** command:

```
ndctl destroy-namespace all -f
```

- **Windows** Powershell command

```
Get-PmemDisk | Remove-PmemDisk
```

5. Clear Platform Configuration Data (PCD) and Namespace Label Storage Area (LSA) with the following ipmctl command (for both Linux and Windows).

```
ipmctl delete -pcd
```

Notes: See the following links to learn how to download and use ipmctl in different operating systems:

- Windows: <https://datacentersupport.lenovo.com/us/en/videos/YTV101407>
- Linux: <https://datacentersupport.lenovo.com/us/en/solutions/HT508642>

6. Reboot the system, and press F1 to enter Setup Utility.

7. Power off the system.

8. Remove the modules to be reused for a new system or configuration.

Invalid memory population detected

Invalid memory population (unsupported DIMM population) detected. Please verify memory configuration is valid.

If this warning message appears, complete the following steps:

1. See “Memory module installation rules and order” in *Setup Guide* to make sure the present memory module population sequence is supported.
2. If the present sequence is indeed supported, see if any of the modules is displayed as “disabled” in Setup Utility.
3. Reseat the module that is displayed as “disabled,” and reboot the system.
4. If the problem persists, replace the memory module.

PMEMs installed in wrong slots after system board replacement

DIMM X of Intel Optane PMEM persistent interleave set should be moved to DIMM Y.

If this warning message appears, complete the following steps:

1. Record each of the instructions of changing PMEM slot from XCC events.
2. Power off the system, and remove the PMEMs that are mentioned in the warning messages. It is suggested to label these PMEMs to avoid confusion.
3. Install the PMEMs in the correct slot number indicated in the warning messages. Remove the labels to avoid blocking airflow and cooling.
4. Complete replacement and power on the system. Make sure there is no similar warning messages in XCC.

Note: Do not perform any provisioning on PMEM to avoid data lost when the messages are still present in XCC events.

After PMEMs are reconfigured, error messages and LEDs persist to indicate PMEMs are installed in wrong slots

AC the system or restart XCC to solve this problem.

Cannot create goal successfully when installing PMEMs to the system for the first time

When seeing ones of the following messages:

- ERROR: Cannot retrieve memory resources info
- ERROR: One or more PMEM modules do not have PCD data. A platform reboot is recommended to restore valid PCD data.

Complete the following steps to solve the problem.

1. If the PMEMs have been installed in another system with stored data, perform the following steps to erase the data.
 - a. Based on the original population order, install the PMEMs to the original system where they were installed previously, and back up the data from the PMEMs to other storage devices.
 - b. Disable PMEM security with one of the following options:
 - **LXPM**
Go to **UEFI Setup → System Settings → Intel Optane PMEMs → Security → Press to Disable Security**, and input passphrase to disable security.
 - **Setup Utility**
Go to **System Configuration and Boot Management → System Settings → Intel Optane PMEMs → Security → Press to Disable Security**, and input passphrase to disable security.
 - c. Delete namespaces with command corresponding to the operating system that is installed:
 - **Linux** command:
`ndctl destroy-namespace all -f`
 - **Windows** Powershell command
`Get-PmemDisk | Remove-PmemDisk`
 - d. Clear Platform Configuration Data (PCD) and Namespace Label Storage Area (LSA) with the following `ipmctl` command (for both Linux and Windows).
`ipmctl delete -pcd`

Notes: See the following links to learn how to download and use `ipmctl` in different operating systems:
 - Windows: <https://datacentersupport.lenovo.com/us/en/videos/YTV101407>
 - Linux: <https://datacentersupport.lenovo.com/us/en/solutions/HT508642>
2. Install the PMEMs back to the target system, and upgrade system firmware to the latest version without entering Setup Utility.
3. If the problem persists, overwrite PMEMs with the following `ndctl` command.
`ndctl sanitize-dimm --overwrite all`
4. Monitor the overwrite status with the following command.
`watch -n 1 "ipmctl show -d OverwriteStatus -dimm"`
5. When seeing all PMEM `OverwriteStatus=Completed`, reboot the system and see if the problem persists.

Hard disk drive problems

Use this information to resolve issues related to the hard disk drives.

- “Server cannot recognize a hard drive” on page 238
- “Multiple hard drives fail” on page 239
- “Multiple hard drives are offline” on page 239
- “A replacement hard disk drive does not rebuild” on page 239
- “Green drive activity LED does not represent actual state of associated drive” on page 239
- “Yellow drive activity LED does not represent actual state of associated drive” on page 239

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 status 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 and perform corresponding operations in different situations:
 - 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 V3 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 whether the hard disk drive backplane is correctly seated. For details, go to step 4.
 - 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 V3 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 backplane 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.

One or two 7mm drives identified as failing

Complete the following steps until the problem is solved:

1. Remove and reinstall the reported drive(s) in the same drive bay or another drive bay.
2. If the problem persists, consider replacing the current drives with new ones.
3. If the problem still persists, consider replacing the bottom backplane.
4. If the problem still persists, consider replacing the top backplane.

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 drive activity LED does not represent actual state of associated drive

Complete the following steps until the problem is solved:

1. If the green 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 V3 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 drive activity 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 SATA/SAS adapter.
3. Reseat the backplane signal cable and backplane power cable.
4. Reseat the drive.
5. Power on the server and observe the activity of the drive LEDs.

Monitor and video problems

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

- “Incorrect characters are displayed” on page 241
- “Screen is blank” on page 241
- “Management controller remote presence cannot work” on page 241
- “Screen goes blank when you start some application programs” on page 241
- “The monitor has screen jitter, or the screen image is wavy, unreadable, rolling, or distorted” on page 241
- “The wrong characters appear on the screen” on page 242

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 11.

Screen is blank

Note: Make sure that the expected boot mode has not been changed from the UEFI to Legacy or vice versa.

1. If the server is attached to a KVM switch, bypass the KVM switch to eliminate it as a possible cause of the problem: connect the monitor cable directly to the correct connector on the rear of the server.
2. If the server is installed with the graphical adapters while turning on the server, the Lenovo logo is displayed on the screen after approximately 3 minutes. This is normal operation while the system loads.
3. Make sure that:
 - The server is turned on and there is power supplied to the server.
 - The monitor cables are connected correctly.
 - The monitor is turned on and the brightness and contrast controls are adjusted correctly.
4. Make sure that the correct server is controlling the monitor, if applicable.
5. Make sure that the video output is not affected by corrupted server firmware; see “Firmware updates” on page 11.
6. If the problem remains, contact Lenovo Support.

Management controller remote presence cannot work

The management controller remote presence function is unable to display the system screen when an optional video adapter is present. To use the management controller remote presence function, remove the optional video adapter or use the onboard VGA as the display device. The management controller remote presence function is disabled if you install an optional video adapter.

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 11.

Keyboard, mouse, KVM switch or USB-device problems

Use this information to solve problems related to a keyboard, mouse, KVM switch or USB-device problems.

- “All or some keys on the keyboard do not work” on page 242
- “Mouse does not work” on page 242
- “KVM switch problems” on page 243
- “USB-device does not work” on page 243

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.

KVM switch problems

1. Make sure that the KVM switch is supported by your server.
2. Make sure that the KVM switch is powered on correctly.
3. If the keyboard, mouse or monitor can be operated normally with direct connection to the server, then replace the KVM switch.

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 V3 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 is not recognized” on page 243
- “PCIe adapter is not recognized or is not functioning” on page 243
- “Insufficient PCIe resources are detected.” on page 244
- “A Lenovo optional device that was just installed does not work.” on page 244
- “A Lenovo optional device that worked previously does not work now” on page 244

External USB device is not recognized

Complete the following steps until the problem is resolved:

1. Update the UEFI firmware to the latest version.
2. 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.
3. Use the Setup utility to make sure that the device is configured correctly.
4. 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. Update the UEFI firmware to the latest version.
2. Check the event log and resolve any issues related to the device.
3. Validate that the device is supported for the server (see <https://static.lenovo.com/us/en/serverproven/index.shtml>). Make sure that the firmware level on the device is at the latest supported level and update the firmware if applicable.
4. Make sure that the adapter is installed in a correct slot.

5. Make sure that the proper device drivers are installed for the device.
6. Resolve any resource conflicts if running legacy mode (UEFI). Check legacy ROM boot orders and modify the UEFI setting for MM config base.

Note: Ensure that you modify the ROM boot order associated with the PCIe adapter to the first execution order.

7. Check <http://datacentersupport.lenovo.com> for any tech tips (also known as retain tips or service bulletins) that might be related to the adapter.
8. Ensure any adapter external connections are correct and that the connectors are not physically damaged.
9. Make sure that the PCIe adapter is installed with the supported operating system.

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. Press Enter to access System Setup Utility.
2. Select **System Settings → Devices and I/O Ports → MM Config Base**; then, modify the setting to increase the device resources. For example, modify 3 GB to 2 GB or modify 2 GB to 1 GB.
3. Save the settings and restart the system.
4. If the error recurs with the highest device resource setting (1 GB), shutdown the system and remove some PCIe devices; then, power on the system.
5. If the reboot failed, repeat step 1 to step 4.
6. If the error recurs, press Enter to access System Setup Utility.
7. Select **System Settings → Devices and I/O Ports → PCI 64-Bit Resource Allocation**, then; modify the setting from **Auto** to **Enable**.
8. If the Boot Device does not support MMIO above 4GB for Legacy Boot, use UEFI Boot Mode or remove/disable some PCIe devices.
9. DC cycle the system and ensure the system is enter UEFI boot menu or the operating system; then, capture the FFDC log.
10. Contact Lenovo technical support.

A Lenovo optional device that was just installed does not work.

1. Check the XCC event log for any events associated with the device.
2. 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 Setup Utility. Whenever memory or any other device is changed, you must update the configuration.
3. Reseat the cable connection and ensure that there is no physical damage to the cable.
4. Reseat the device that you have just installed.
5. Replace the device that you have just installed.

A Lenovo optional device that worked previously does not work now

1. Check the XCC event log for any events associated with the device.

2. Make sure that all of the cable connections for the device are secure.
3. If the device comes with test instructions, use those instructions to test the device.
4. Reseat the cable connection and check if any physical parts have been damaged, .
5. Replace the cable.
6. Reseat the failing device.
7. 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 245
- “Serial device does not work” on page 245

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 245
- “Intermittent KVM problems” on page 246
- “Intermittent unexpected reboots” on page 246

Intermittent external device problems

Complete the following steps until the problem is solved.

1. Update the UEFI and XCC firmware to the latest versions.
2. Make sure that the correct device drivers are installed. See the manufacturer's website for documentation.
3. 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 V3 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 uncorrectable errors require that the server reboot so that it can disable a device, such as a memory DIMM or a processor to allow the machine to boot up properly.

1. If the reset occurs during POST and the POST watchdog timer is enabled, make sure that sufficient time is allowed in the watchdog timeout value (POST Watchdog Timer).

To check the POST watchdog time, restart the server and press F1 to display the Lenovo XClarity Provisioning Manager V3 system setup interface. Then, click **BMC Settings → POST Watchdog Timer**.
2. See the management controller event log to check for an event code that indicates a reboot. See “Event logs” on page 227 for information about viewing the event log. If you are using Linux base operating system, then capture all logs back to Lenovo support for further investigation.

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.
3. Make sure that the power supply AC source is stable within the supported range.
4. Swap the power supply to see if the issue follows the power supply, if it follows the power supply, then replace the failing one.
5. Review the event log and see how the problem it is to follow the event log actions to resolved the problems.

Network problems

Use this information to resolve issues related to networking.

- "Cannot wake server using Wake on LAN" on page 247
- "Could not log in using LDAP account with SSL enabled" on page 247

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 227), 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 248
- "The server immediately displays the POST Event Viewer when it is turned on" on page 248
- "Server is unresponsive (POST is complete and operating system is running)" on page 248
- "Server is unresponsive (cannot press F1 to start System Setup)" on page 249

- “Voltage planar fault is displayed in the event log” on page 249
- “Unusual smell” on page 249
- “Server seems to be running hot” on page 250
- “Cannot enter legacy mode after installing a new adapter” on page 250
- “Cracked parts or cracked chassis” on page 250

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 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 V3 system setup interface. Then, click **System Settings → Recovery and RAS → POST Attempts → POST Attempts Limit**. Available options are 3, 6, 9, and disable.

If the issue cannot be resolved by the actions mentioned above, call the service team to review the issue symptom and confirm whether the system board replacement is necessary.

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 DIMMs.
2. Restart the system.
 - If the system restarts, add each of the removed items one at a time and restart 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. Make sure that the fans are installed correctly.
3. Update the UEFI and XCC to the latest versions.
4. Make sure that the fillers in the server are installed correctly (see *Maintenance Manual* for detailed installation procedures).
5. Use the IPMI command to ramp up the fan speed to the full fan speed to see whether the issue can be resolved.

Note: The IPMI raw command should only be used by trained technician and the each system has its own specific PMI raw command.

6. Check the management processor event log for rising temperature events. If there are no events, the compute node is running within normal operating temperatures. Note that you can expect some variation in temperature.

Cannot enter legacy mode after installing a new adapter

Complete the following steps until the problem is solved.

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

Cracked parts or cracked chassis

Contact Lenovo Support.

Software problems

Use this information to solve software problems.

1. To determine whether the problem is caused by the software, make sure that:
 - The server has the minimum memory that is needed to use the software. For memory requirements, see the information that comes with the software.

Note: If you have just installed an adapter or memory, the server might have a memory-address conflict.

- The software is designed to operate on the server.
 - Other software works on the server.
 - The software works on another server.
2. If you receive any error messages while you use the software, see the information that comes with the software for a description of the messages and suggested solutions to the problem.
 3. Contact your place of purchase of the software.

Appendix A. Hardware disassembling for recycle

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

Disassembling the system board for recycle

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

Before disassembling the system board:

1. Remove the system board from the server (see “Remove the system board” on page 213).
2. Refer to local environmental, waste or disposal regulations to ensure compliance.

Complete the following steps to disassemble the system board:

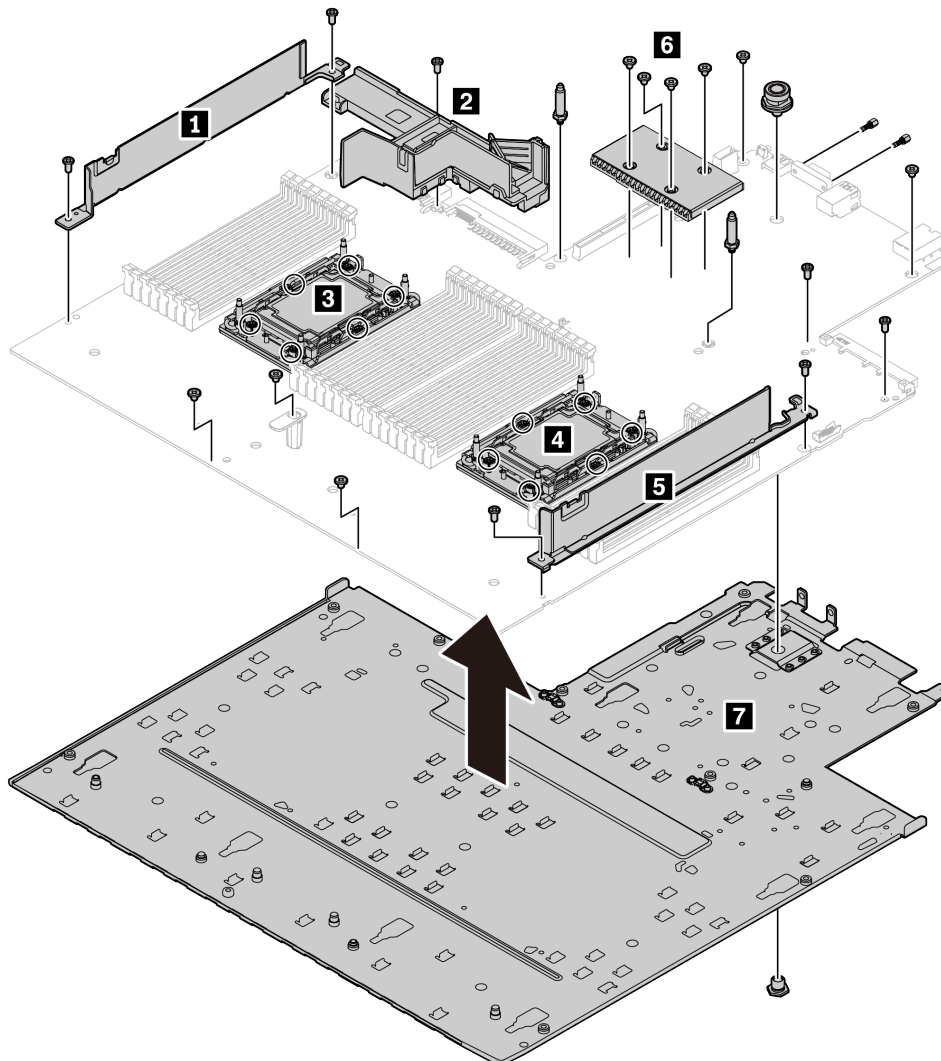


Figure 148. Disassembling the system board

Step 1. Remove the following screws as illustrated:

- 11 slotted screws (with PH2 screwdriver)
- Five slotted screws (with PH1 screwdriver)
- 12 T20 screws on the CPU sockets **3** **4** (with T20 screwdriver)
- Two guiding pin standoffs (with 7 mm wrench)
- One plunger (with 11 mm and 16 mm wrench)
- Two hexagon bolts on the VGA connector (with 5 mm wrench)

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

Note: Component **2** (PSU airduct) is available only when the CPU TDP is greater than 125 W.

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: This section includes references to IBM Web sites and information about obtaining service. IBM is Lenovo's preferred service provider for ThinkSystem.

Before you call

Before you call, there are several steps that you can take to try and solve the problem yourself. If you decide that you do need to call for assistance, gather the information that will be needed by the service technician to more quickly resolve your problem.

Attempt to resolve the problem yourself

You can solve many problems without outside assistance by following the troubleshooting procedures that Lenovo provides in the online help or in the Lenovo product documentation. The Lenovo product documentation also describes the diagnostic tests that you can perform. The documentation for most systems, operating systems, and programs contains troubleshooting procedures and explanations of error messages and error codes. If you suspect a software problem, see the documentation for the operating system or program.

You can find the product documentation for your ThinkSystem products at the following location:

<http://thinksystem.lenovofiles.com/help/index.jsp>

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

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

Gathering information needed to call Support

If you require warranty service for your Lenovo product, the service technicians will be able to assist you more efficiently if you prepare the appropriate information before you call. You can also go to <http://datacentersupport.lenovo.com/warrantylookup> for more information about your product warranty.

Gather the following information to provide to the service technician. This data will help the service technician quickly provide a solution to your problem and ensure that you receive the level of service for which you might have contracted.

- Hardware and Software Maintenance agreement contract numbers, if applicable
- Machine type number (Lenovo 4-digit machine identifier)
- Model number
- Serial number
- Current system UEFI and firmware levels
- Other pertinent information such as error messages and logs

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

Collecting service data

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

Service data can be collected through the following tools:

- **Lenovo XClarity Provisioning Manager V3**

Use the Collect Service Data function of Lenovo XClarity Provisioning Manager V3 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/toolstr_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/supportphonenumberlist> for your region support details.

Appendix C. Notices

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*Lenovo (United States), Inc.
8001 Development Drive
Morrisville, NC 27560
U.S.A.
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Important notes

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

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

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

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

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

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

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

Lenovo makes no representations or warranties with respect to non-Lenovo products. Support (if any) for the non-Lenovo products is provided by the third party, not Lenovo.

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

Telecommunication regulatory statement

This product may not be certified in your country for connection by any means whatsoever to interfaces of public telecommunications networks. Further certification may be required by law prior to making any such connection. Contact a Lenovo representative or reseller for any questions.

Electronic emission notices

When you attach a monitor to the equipment, you must use the designated monitor cable and any interference suppression devices that are supplied with the monitor.

Additional electronic emissions notices are available at:

<http://thinksystem.lenovofiles.com/help/index.jsp>

Taiwan BSMI RoHS declaration

單元 Unit	限用物質及其化學符號 Restricted substances and its chemical symbols					
	鉛Lead (PB)	汞Mercury (Hg)	鎘Cadmium (Cd)	六價鉻 Hexavalent chromium (Cr ⁶⁺)	多溴聯苯 Polybrominated biphenyls (PBB)	多溴二苯醚 Polybrominated diphenyl ethers (PBDE)
機架	○	○	○	○	○	○
外部蓋板	○	○	○	○	○	○
機械組零件	-	○	○	○	○	○
空氣傳動設備	-	○	○	○	○	○
冷卻組零件	-	○	○	○	○	○
內存模組	-	○	○	○	○	○
處理器模組	-	○	○	○	○	○
電纜組零件	-	○	○	○	○	○
電源供應器	-	○	○	○	○	○
儲備設備	-	○	○	○	○	○
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 import and export contact information

Contacts are available for Taiwan import and export information.

委製商/進口商名稱: 台灣聯想環球科技股份有限公司
 進口商地址: 台北市南港區三重路 66 號 8 樓
 進口商電話: 0800-000-702

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