ThinkSystem D2 Enclosure, Modular Enclosure, Modular Enclosure for 6U Configuration and ThinkSystem SD530 Compute Node
Maintenance Manual

Machine Type: 7X20, 7X21, 7X22 and 7X85

Note

Before using this information and the product it supports, be sure to read and understand the safety information and the safety instructions, which are available at:
https://pubs.lenovo.com/safety_documentation/

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

Contents

Safety

Before installing this product, read the Safety Information.

قبل تركيب هذا المنتج، يجب قراءة الملاحظات الآمنية

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

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

安裝本產品之前，請先閱讀「安全資訊」。

Prije instalacije ovog produkta obavezno pročitajte Sigurnosne Upute.

Před instalací tohoto produktu si přečtěte příručku bezpečnostních instrukcí.

Læs sikkerhedsforskrifterne, før du installerer dette produkt.

Lees voordat u dit product installeert eerst de veiligheidsvoorschriften.

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

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

Vor der Installation dieses Produkts die Sicherheitshinweise lesen.

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

לפני שתתקינו מוצר זה, קראו את הוראות הבטיחות.
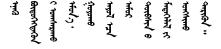
A termék telepítése előtt olvassa el a Biztonsági előírásokat!

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

製品の設置の前に、安全情報をお読みください。

본 제품을 설치하기 전에 안전 정보를 읽으십시오.

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

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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 pečítaje Bezpečnostné predpisy.

Pred namestitvijo tega proizvoda preberite Varnostne informacije.

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

Läs säkerhetsinformationen innan du installerar den här produkten.

ཐོན་རྫས་འདི་བདེ་སྐྱིད་མ་བྱས་གོང་། སྐྱར་གྱི་ཡིད་གཟབ་
བྱ་འདུ་མིན་ཡོད་པའི་འོད་སྦྱེར་བསླད་གོས།

Bu ürünü kurmadan önce güvenlik bilgilerini okuyun.

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

Safety inspection checklist

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

Note: The product is not suitable for use at visual display workplaces according to §2 of the Workplace Regulations.

Note: The set-up of the server is made in the server room only.

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

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

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

1. Make sure that the power is off and the power cord is disconnected.
2. Check the power cord.

   - Make sure that the third-wire ground connector is in good condition. Use a meter to measure third-wire ground continuity for 0.1 ohm or less between the external ground pin and the frame ground.

   - Make sure that the power cord is the correct type.

     To view the power cords that are available for the server:
     a. Go to:

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

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

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

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

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

3. Check for any obvious non-Lenovo alterations. Use good judgment as to the safety of any non-Lenovo alterations.

4. Check inside the server for any obvious unsafe conditions, such as metal filings, contamination, water or other liquid, or signs of fire or smoke damage.

5. Check for worn, frayed, or pinched cables.

6. Make sure that the power-supply cover fasteners (screws or rivets) have not been removed or tampered with.

Chapter 1. Introduction

The Product_name is a 2U/6U solution designed for high-volume network transaction processing. This solution includes a single enclosure that can contain up to four SD530 compute nodes, which are designed to deliver a dense, scalable platform for distributed enterprise and hyperconverged solutions.
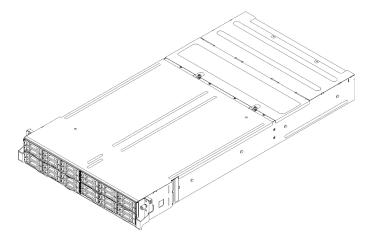

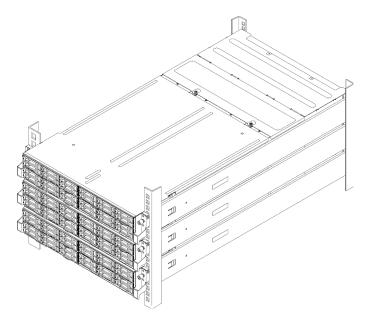*Figure 1.* D2 Enclosure 7X20 and Modular Enclosure 7X22

Figure 2. Modular 6U Configuration 7X85

The solution 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

Specifications

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

Enclosure specifications

Features and specifications of the enclosure.

Table 1. Enclosure specifications

Specification	Description

PCI expansion slots (depending on the enclosure model)	• PCIe 3.0 x8 shuttle:
	  – Supports up to eight low-profile PCIe 3.0 x8 adapters
	
	    One node supports up to two low-profile PCIe 3.0 x8 adapters from processor 1
	• PCIe 3.0 x16 shuttle:
	  – Supports up to four low-profile PCIe 3.0 x16 adapters
	
	    One node supports one low-profile PCIe 3.0 x16 adapters from processor 1
	
	Notes:
	
	  1. PCIe 3.0 x16 shuttle supports PCIe cassettes that can be installed and removed without removing the shuttle from the enclosure.
	
	  2. Ensure to power off the node before unseating the PCIe cassette from the shuttle.

Hot-swap fans	• Three 60x60x56mm fans • Two 80x80x80mm fans **Note:** Access these fans from the top of the enclosure (see "Remove the fan cover" on page 91).
Power supply (depending on the model)	Supports up to two hot-swap power supplies for redundancy support. (Except for the application of 240V DC applied through C14 input connect) • 1100-watt ac power supply • 1600-watt ac power supply • 2000-watt ac power supply **Important:** Power supplies and redundant power supplies in the enclosure must be with the same power rating, wattage or level.
System Management Module (SMM)	• Hot-swappable • Equipped with ASPEED controller • Offers RJ45 port for management of nodes and SMM over 1G Ethernet

Ethernet I/O ports	Access to a pair of on-board 10Gb connections through two types of optional enclosure level EIOM cards.
	• Two optional EIOM cards:
	  – 10Gb 8-port EIOM SFP+
	  – 10Gb 8-port EIOM Base-T (RJ45)
	• Minimum networking speed requirement for the EIOM card: 1Gbps
	Notes:
	
	  1. The EIOM card is installed in the enclosure and it provides direct access to LAN functions provided by each node.
	
	  2. iSCSI external storage devices are not supported when shared PCIe dual adapters are installed.

Table 1. Enclosure specifications (continued)

Specification	Description

Size	2U enclosure
	• Height: 87.0 mm (3.5 inches)
	• Depth: 891.5 mm (35.1 inches)
	• Width: 488.0 mm (19.3 inches)
	• Weight:
	  – Minimum configuration (with one minimal configuration node): 22.4 kg (49.4 lbs)
	  – Maximum configuration (with four maximal configuration nodes): 55.0 kg (121.2 lbs)

Acoustical noise emissions	With the maximum configuration of four nodes with two processors installed, full memory installed, full drives installed, and two 2000-watt power supplies installed: • Operation: 6.8 bels • Idle: 6.2 bels
Heat output (based on two 2000-watt power supplies)	Approximate heat output: • Minimum configuration (with one minimal configuration node): 604.1 BTU per hour (177 watts) • Maximum configuration (with four maximal configuration nodes): 7564.4 BTU per hour (2610 watts)

Electrical input	• Sine-wave input (50-60 Hz) required
	• Input voltage low range: 1100W is limited to 1050W
	  – Minimum: 100 V AC
	  – Maximum: 127 V AC
	• Input voltage high range: 1100W/1600W/2000W
	  – Minimum: 200 V AC
	  – Maximum: 240 V AC
	• Input kilovolt-amperes (kVA), approximately:
	  – Minimum: 0.153 kVA
	  – Maximum: 2.61 kVA
	CAUTION:
	
	1. **240 V dc input (input range: 180-300 V dc) is ONLY supported in Chinese Mainland.**
	
	2. **Power supplies with 240 V dc are not hot-swappable. To remove the power cord, ensure you have turned off the server or disconnected the dc power sources at the breaker panel.**
	
	3. **In order for the ThinkSystem products to operate error free in both a DC or AC electrical environment, a TN-S earthing system which complies to 60364-1 IEC 2005 standard has to be present or installed.**

Minimal configuration for debugging	• One D2 enclosure • One SD530 compute node • One processor in processor socket 1 • One DIMM in slot 6 in the compute node • One CFF v3 power supply • One drive with hardware/software RAID and backplane (if OS is needed for debugging)

Modular 6U configuration specifications

Table 2. Modular enclosure for 6U configuration specifications

Specification	Description
Size	Each modular enclosure for 6U configuration is of the following dimension: • Height: 87.0 mm (3.5 inches) • Depth: 891.5 mm (35.1 inches) • Width: 488.0 mm (19.3 inches) Weight: • Minimum configuration (with one minimal configuration node): 67.2 kg (148.2 lbs) • Maximum configuration (with four maximal configuration nodes): 165.0 kg (363.6 lbs)
Acoustical noise emissions	With the maximum configuration of twelve nodes with two processors installed, full memory installed, full drives installed, and two 2000W power supplies installed: • Operation: 6.8 bels • Idle: 6.2 bels
Heat output (based on two 2000-Watt power supplies)	Approximate heat output: • Minimum configuration (with one minimal configuration node): 604.1 BTU per hour (177 watts) • Maximum configuration (with four maximal configuration nodes): 7564.4 BTU per hour (2610 watts)

Compute node specifications

Features and specifications of the compute node.

Table 3. Compute node specifications

Specification	Description

Size	Node
	• Height: 41.0 mm (1.7 inches)
	• Depth: 562.0 mm (22.2 inches)
	• Width: 222.0 mm (8.8 inches)
	• Weight:
	  – Minimum weight: 3.5 kg (7.7 lb)
	  – Maximum weight: 7.5 kg (16.6 lb)

Processor (depending on the model)	• Supports up to two Intel Xeon series multi-core processors (one installed)
	• Level-3 cache
	
	Notes:
	
	1. Use the Setup utility to determine the type and speed of the processors in the node.
	
	2. For a list of supported processors, see https://serverproven.lenovo.com/.
	
	3. Due to lower operational processor temperature requirements, full performance cannot be guaranteed and processor throttling may occur when the ambient temperature is above 27°C or when a fan failure event occurs for the following processor SKUs:
	
	  • 6248R
	
	  • 6258R
	
	4. Processor 6248R comes with the following limitations:
	
	  • Supported quantity of drives goes up to two.
	
	  • PCIe expansion nodes are not supported when 6248R processors are installed in the compute node.
	
	  • Only the following PCIe adapters are supported:
	
	    – ThinkSystem M.2 Enablement Kit
	
	    – ThinkSystem M.2 with Mirroring Enablement Kit
	
	    – Intel OPA 100 Series Single-port PCIe 3.0 x16 HFA
	
	    – Intel OPA 100 Series Single-port PCIe 3.0 x8 HFA
	
	    – ThinkSystem Mellanox ConnectX-6 HDR100 QSFP56 1-port PCIe InfiniBand Adapter

Table 3. Compute node specifications (continued)

Specification	Description

Memory	See "Memory module installation rules and order" in *Setup Guide* for detailed information about memory configuration and setup.
	• Minimum: 8 GB (single TruDDR4 DRAM DIMM with one processor)
	• Maximum:
	  – 512 GB with 16 x 32 GB RDIMM
	  – 1,024 GB with 16 x 64 GB LRDIMM
	  – 2 TB with DC Persistent Memory Module (DCPMM) and RDIMMs in Memory Mode
	• Memory module types:
	  – Double-data-rate 4 (TruDDR4) error correcting code (ECC) 2666 MT/s registered DIMM (RDIMM) or load reduced DIMM (LRDIMM)
	  – DC Persistent Memory Module (DCPMM)
	• Capacity (depending on the model):
	  – 8 GB, 16 GB, and 32 GB RDIMM
	  – 64 GB LRDIMM
	  – 128 GB, 256 GB, and 512 GB DCPMM
	
	    Note: DCPMM can be mixed with DRAM DIMMs with capacity of more than 16 GB. See "DC Persistent Memory Module (DCPMM) setup" in *Setup Guide* for more information.
	• Slots: 16 DIMM slots that support up to
	  – 16 DRAM DIMMs
	  – Four DCPMMs and 12 DRAM DIMMs
	
	For a list of supported memory modules, see https://serverproven.lenovo.com/.
	
	Note: List of supported memory module is different for 1st generation (Skylake) and 2nd generation (Cascade Lake) Intel Xeon processors. Make sure to install compatible memory modules to avoid system error.

Drive bays	Supports up to six 2.5-inch hot-swap SAS/SATA/NVMe drive bays. **Attention:** As a general consideration, do not mix standard 512-byte and advanced 4-KB format drives in the same RAID array because it might lead to potential performance issues. Supports the following 2.5-inch hot-swap drive backplanes: • Four 2.5-inch hot-swap SAS/SATA backplane • Four 2.5-inch NVMe backplane • Six 2.5-inch hot-swap SAS/SATA backplane • Six 2.5-inch hot-swap SAS/SATA/NVMe backplane **Important:** Do not mix nodes with the four-drive backplane and six-drive backplanes in the same enclosure, as it may cause unbalanced cooling.
RAID adapters (depending on the model)	• Software RAID supports for RAID levels 0, 1, 5, and 10 • Hardware RAID supports for RAID levels 0, 1, 5, and 10
Video controller (integrated into Lenovo XClarity Controller)	• ASPEED • SVGA compatible video controller • Avocent Digital Video Compression • Video memory is not expandable **Note:** Maximum video resolution is 1920 x 1200 at 60 Hz.

Table 3. Compute node specifications (continued)

Specification	Description

Ethernet I/O port	Access to a pair of on-board 10Gb connections through two types of optional enclosure level EIOM cards.
	• Two optional EIOM cards:
	  – 10Gb 8-port EIOM SFP+
	  – 10Gb 8-port EIOM Base-T (RJ45)
	• Minimum networking speed requirement for the EIOM card: 1Gbps
	Note:
	The EIOM card is installed in the enclosure and it provides direct access to LAN functions provided by each node.

Operating System	Supported and certified operating systems include: • Microsoft Windows Server • VMware ESXi • Red Hat Enterprise Linux • SUSE Linux Enterprise Server References: • Complete list of available operating systems: https://lenovopress.lenovo.com/osig. • OS deployment instructions: See "Deploy the operating system" in *Setup Guide*.

Table 3. Compute node specifications (continued)

Specification	Description

Environment	The ThinkSystem SD530 complies with ASHRAE class A2 specifications. Depending on the hardware configuration, some solution models comply with ASHRAE Class A3 or Class A4 specifications. System performance may be impacted when operating temperature is outside ASHRAE A2 specification or fan failed condition. To comply with ASHRAE Class A3 and Class A4 specifications, the ThinkSystem SD530 needs to meet the following hardware configuration requirements:
	
	• Lenovo supported processors.
	
	  For unsupported processors, see the following attention for details[1].
	• Lenovo supported PCIe adapters.
	
	  For unsupported PCIe adapters, see the following attention for details[2].
	• Two power supplies installed for redundancy.
	
	  1100-watt power supplies are not supported.
	
	The ThinkSystem SD530 is supported in the following environment:
	• Air temperature:
	
	  Power on[3]:
	  – ASHRAE Class A2: 10°C - 35°C (50°F - 95°F); Above 900 m (2,953 ft), de-rated maximum air temperature 1°C / 300m (984 ft)
	  – ASHRAE Class A3: 5°C - 40°C (41°F - 104°F); Above 900 m (2,953 ft), de-rated maximum air temperature 1°C / 175m (574 ft)
	  – ASHRAE Class A4: 5°C - 45°C (41°F - 113°F); Above 900 m (2,953 ft), de-rated maximum air temperature 1°C / 125m (410 ft)
	
	  Power off[4]: 5°C to 45°C (41°F to 113°F)
	• Maximum altitude: 3,050 m (10,000 ft)
	• Relative Humidity (non-condensing):Power on[3]:
	  – 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/storage: 8% - 90%
	• Particulate contamination:
	
	  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 solution. For information about the limits for particulates and gases, see "Particulate contamination" on page 10.

Power rating	12 V DC, 60 A

Attention:

1. The following processors are not supported with ASHRAE Class A3 and Class A4 specifications:

   • 165W processor, 28-core, 26-core or 18-core (Intel Xeon 8176, 8176M, 8170, 8170M, and 6150)

   • 150W processor, 26-core, 24-core, 20-core, 16-core or 12-core (Intel Xeon 8164, 8160, 8160M, 8158, 6148, 6142, 6142M, and 6136)

   • 140W processor, 22-core or 18-core (Intel Xeon 6152, 6140, and 6140M)

   • 140W processor, 14-core (Intel Xeon 6132)

   • 130W processor, 8-core (Intel Xeon 6134 and 6134M)

   • 125W processor, 20-core, 16-core or 12-core (Intel Xeon 6138, 6138T, 6130T, 6126)

- 115W processor, 6-core (Intel Xeon 6128)
- 105W processor, 14-core or 4-core (Intel Xeon 8156, 5122, and 5120T)
- 70W processor, 8-core (Intel Xeon 4109T)

Note: The listed processors are included but not limited to the above list only.

2. The following processors are not supported with ASHRAE Class A2, Class A3 and Class A4 specifications. The following processors are provided for special bid configuration only and need customer's acceptance on the limitation consequence. The limitation includes experiencing power capping and a slight drop in performance when ambient is above 27°C.

- 205W processor, 28-core or 24-core (Intel Xeon 8180, 8180M and 8168)
- 200W processor, 18-core (Intel Xeon 6154)
- 165W processor, 12-core (Intel Xeon 6146)
- 150W processor, 24-core (Intel Xeon 8160T)
- 150W processor, 8-core (Intel Xeon 6144)
- 125W processor, 12-core (Intel Xeon 6126T)

Note: The listed processors are included but not limited to the above list only.

3. The following PCIe adapters are not supported with ASHRAE Class A3 and Class A4 specifications:

- Mellanox NIC with active optical cable
- PCIe SSD
- GPGPU card

Note: The listed PCIe adapters are included but not limited to the above list only.

PCIe expansion node specifications

Features and specifications of the PCIe expansion node.

PCIe expansion node specifications

Table 4. PCIe expansion node specifications

Specification	Description
Size	PCIe expansion node • Height: 41.0 mm (1.7 inches) • Depth: 562.0 mm (22.2 inches) • Width: 222.0 mm (8.8 inches) • Weight: – Minimum weight: 2.1 kg (4.6 lb)

PCI expansion slots	Supports up to two PCIe adapters with the following requirements:
	
	1. When a compute-expansion node assembly is installed in an enclosure:
	  • Two 2000-watt ac power supplies are required.
	  • The other two node bays in the same enclosure must be installed with either of the following:
	    – Another compute-expansion node assembly with one four-drive backplane installed in the compute node
	    – Two node fillers
	2. In the compute node that comes with the PCIe expansion node assembly:
	  • No RAID adapter should be installed in the compute node.
	  • Only four-drive backplanes are supported.
	  • No more than 12 DIMMs should be installed in the compute node.
	  • When two GPU adapters are installed:
	    a. Two processors are required in the compute node.
	    b. Four-drive NVMe backplane is not supported.
	3. Concerning the GPU adapters installed in the node assembly:
	  • Up to two 300 W passive GPU adapters (without fans) are supported.
	  • The two GPU adapters must be of the same type.
	  • When only one GPU adapter is installed, it has to be installed in the rear riser slot.

Power rating	12 V DC, 60 A

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 5. Limits for particulates and gases

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

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

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

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

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

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

Firmware updates

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

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

- Best practices related to updating firmware is available at the following site:
  - http://lenovopress.com/LP0656
- The latest firmware can be found at the following site:
  - http://datacentersupport.lenovo.com/products/servers/thinksystem/sd530/7X21/downloads
- You can subscribe to product notification to stay up to date on firmware updates:
  - https://datacentersupport.lenovo.com/tw/en/solutions/ht509500

Update method terminology

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

Firmware updating tools

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

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

Tool	Update Methods Supported	Core System Firmware Updates	I/O Devices Firmware Updates	Graphical user interface	Command line interface	Supports UXSPs
Lenovo XClarity Essentials OneCLI (OneCLI)	In-band Out-of-band On-Target Off-Target	√	All I/O devices		√	√
Lenovo XClarity Essentials UpdateXpress (LXCE)	In-band Out-of-band On-Target Off-Target	√	All I/O devices	√		√
Lenovo XClarity Essentials Bootable Media Creator (BoMC)	In-band Out-of-band Off-Target	√	All I/O devices	√ (BoMC application)	√ (BoMC application)	√
Lenovo XClarity Administrator (LXCA)	In-band[1] Out-of-band[2] Off-Target	√	All I/O devices	√		√
Lenovo XClarity Integrator (LXCI) for VMware vCenter	Out-of-band Off-Target	√	Selected I/O devices	√		
Lenovo XClarity Integrator (LXCI) for Microsoft Windows Admin Center	In-band Out-of-band On-Target Off-Target	√	All I/O devices	√		√
Lenovo XClarity Integrator (LXCI) for Microsoft System Center Configuration Manager	In-band On-Target	√	All I/O devices	√		√

Notes:

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

- **Lenovo XClarity Provisioning Manager**

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

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

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

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

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

- **Lenovo XClarity Controller**

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

  Notes:

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

    For additional information about configuring Ethernet over USB, see:

    "Configuring Ethernet over USB" section in the XCC documentation compatible with your server at https://pubs.lenovo.com/lxcc-overview/

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

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

  "Updating Server Firmware" section in the XCC documentation compatible with your server at https://pubs.lenovo.com/lxcc-overview/

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

- **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, see:

  https://pubs.lenovo.com/lxce-onecli/onecli_c_update

- **Lenovo XClarity Essentials UpdateXpress**

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

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

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

- **Lenovo XClarity Essentials Bootable Media Creator**

You can use Lenovo XClarity Essentials Bootable Media Creator to create bootable media that is suitable for 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/lnvo-bomc

- **Lenovo XClarity Administrator**

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

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

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

- **Lenovo XClarity Integrator offerings**

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

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

  https://pubs.lenovo.com/lxci-overview/

Tech Tips

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

To find the Tech Tips available for your server:

1. Go to http://datacentersupport.lenovo.com and navigate to the support page for your server.
2. Click on **How To's** from the navigation pane.
3. Click **Article Type** ➙ **Solution** from the drop-down menu.

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

Security advisories

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

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

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

Power on the compute node

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

A compute node can be turned on (power LED on) in any of the following ways:

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

For information about powering off the compute node, see .

Power off the compute node

The compute node remains in the standby state when connected to a power source, while Lenovo XClarity Controller is allowed to respond to remote power-on requests. To completely power off the compute node (power status LED off), you must disconnect all power cables.

To power off the compute node that is in a standby state (power status LED flashes once per second):

Note: The Lenovo XClarity Controller can place the compute node 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.

In the standby state, the compute node can respond to remote power-on requests sent to the Lenovo XClarity Controller. For information about powering on the compute node, see .

Chapter 2. Solution components

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

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

Each SD530 supports up to six 2.5-inch hot-swap Serial Attached SCSI (SAS), Serial ATA (SATA) or Non-Volatile Memory express (NVMe) drives.

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

The enclosure machine type, model number and serial number are on the ID label that can be found on the front of the enclosure, as shown in the following illustration.
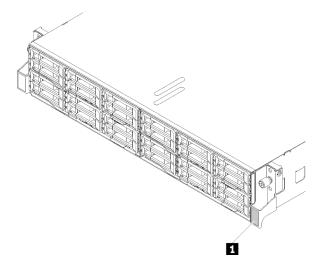
Figure 3. ID label on the front of the enclosure

Table 6. ID label on the front of the enclosure

1 ID label

The network access tag can be found on the front of the node. You can pull way the network access tag to paste your own label for recording some information such as the hostname, the system name and the inventory bar code. Keep the network access tag for future reference.
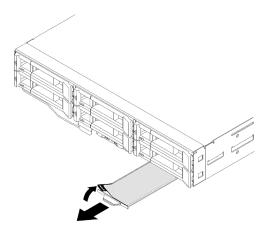
Figure 4. Network access tag on the front of the node

The node model number and serial number are on the ID label that can be found on the front of the node (on the underside of the network access tag), as shown in the following illustration.
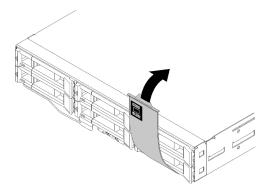
Figure 5. ID label on the front of the node

The system service label, which is on the top of the enclosure, provides a QR code for mobile access to service information. You can scan the QR code using a QR code reader and scanner with a mobile device and get quick access to the Lenovo Service Information website. The Lenovo Service Information website provides additional information for parts installation and replacement videos, and error codes for solution support.

The following illustration shows QR codes for the enclosure and the node.

- **Enclosure:**

  http://datacentersupport.lenovo.com/products/servers/thinksystem/d2-enclosure/7X20

Figure 6. D2 enclosure 7X20 QR code

  http://datacentersupport.lenovo.com/products/servers/thinksystem/modular-enclosure/7X22

Figure 7. Modular enclosure 7X22 QR code

- **Node:** http://datacentersupport.lenovo.com/products/servers/thinksystem/sd530/7X21

Figure 8. Compute node QR code

Front view

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

Enclosure

The following illustration shows the controls, LEDs, and connectors on the front of the enclosure.

Notes:

1. The illustrations in this document might differ slightly from your hardware.
2. For proper cooling, every empty node bay has to be installed with either a node or a node filler before the solution is powered on.

The enclosure supports the following configurations:

Up to **four compute nodes**.

The following illustration shows the node bays in the enclosure.
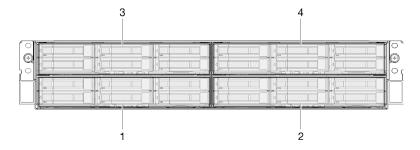
Figure 9. Enclosure front view with compute nodes and node bay numbering

Up to **two PCIe expansion node assemblies**.
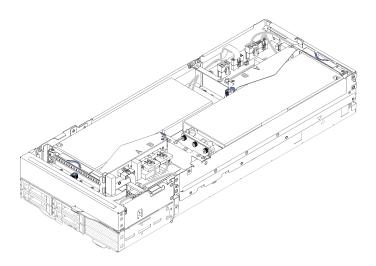
Figure 10. Compute-expansion node assembly

A compute-expansion node assembly consists of a PCIe expansion node and a compute node, to which the expansion node is installed. The node assembly takes two vertically adjacent node bays in an enclosure. See "PCIe expansion node specifications" on page 10 for detailed PCIe expansion node requirements.

Note: Do not mix a compute-expansion node assembly with compute nodes in the same enclosure. When a a compute-expansion node assembly is installed in an enclosure, fill the other two node bays with either two node fillers or another unit of compute-expansion node assembly.
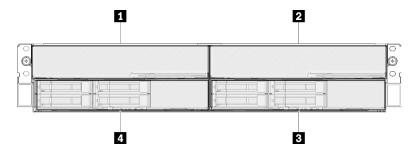
Figure 11. Enclosure front view with PCIe expansion node assemblies

Table 7. Enclosure front view with PCIe expansion node assemblies

1 PCIe expansion node	**3** Compute node
2 PCIe expansion node	**4** Compute node

Compute node

The following illustration shows the controls, LEDs, and connectors on the front of the compute node.

Six 2.5-inch drive configuration

See the following illustration for components, connectors and drive bay numbering in six 2.5-inch drive configuration.
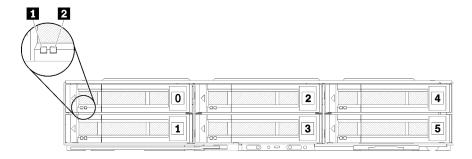
Figure 12. Six 2.5-inch drive configuration and drive bay numbering

Table 8. Components in six 2.5-inch drive configuration

1 Activity LED (green)	**2** Status LED (yellow)

Drive LEDs:

1 **Activity LED (green):** Green LEDs are on all hot swap drives. When this green LED is lit, it indicates that there is activity on the associated hard disk drive or solid-state drive.

- When this LED is flashing, it indicates that the drive is actively reading or writing data.
- For SAS and SATA drives, this LED is off when the drive is powered but not active.
- For NVMe (PCIe) SSDs, this LED is on solid when the drive is powered but not active.

Note: The drive activity LED might be in a different location on the front of the drive, depending on the drive type that is installed.

2 **Status LED (yellow):** The state of this yellow LED indicates an error condition or the RAID status of the associated hard disk drive or solid-state drive:

- When the yellow LED is lit continuously, it indicates that an error has occurred with the associated drive. The LED turns off only after the error is corrected. You can check event logs to determine the source of the condition.
- When the yellow LED flashes slowly, it indicates that the associated drive is being rebuilt.
- When the yellow LED flashes rapidly, it indicates that the associated drive is being located.

Note: The hard disk drive status LED might be in a different location on the front of the hard disk drive, depending on the drive type that is installed.

Five 2.5-inch drive configuration with KVM breakout module

See the following illustration for components, connectors and drive bay numbering in five 2.5-inch drive configuration with KVM breakout module.
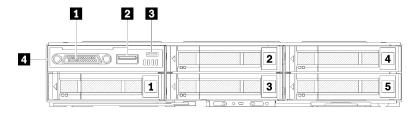
Figure 13. Five 2.5-inch drive configuration with KVM breakout module and drive bay numbering

Table 9. Components in five 2.5-inch drive configuration with the KVM breakout module

1 KVM connector	**3** Micro USB connector for Lenovo XClarity Controller management
2 USB 3.0 connector	**4** KVM breakout module

KVM breakout module comes with the following connectors:

1 **KVM connector:** Connect the console breakout cable to this connector (see "KVM breakout cable" on page 31 more information).

2 **USB 3.0 connector:** Connect a USB device to this USB 3.0 connector.

3 **Micro USB connector for Lenovo XClarity Controller management:** The connector provides direct access to Lenovo XClarity Controller by allowing you to connect a mobile device to the system and manage it with Lenovo XClarity Controller. For more details, see https://pubs.lenovo.com/lxcc-overview/ and http://sysmgt.lenovofiles.com/help/topic/com.lenovo.lxca.doc/aug_product_page.html for more information.

Notes:

1. Ensure that you use a high-quality OTG cable or a high-quality converter when connecting a mobile device. Be aware that some cables that are supplied with mobile devices are only for charging purposes.
2. Once a mobile device is connected, it indicates it is ready to use and no further action is required.

Four 2.5-inch drive configuration with KVM breakout module

See the following illustration for components, connectors and drive bay numbering in four 2.5-inch drive configuration with KVM breakout module.
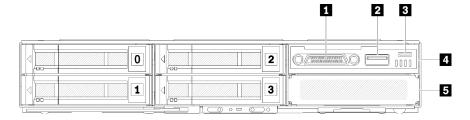
Figure 14. Four 2.5-inch drive configuration with KVM breakout module and drive bay numbering

Table 10. Components in four 2.5-inch drive configuration with the KVM breakout module

1 KVM connector	**4** KVM breakout module
2 USB 3.0 connector	**5** Drive bay filler
3 Micro USB connector for Lenovo XClarity Controller management	

Node operator panel

The following illustration shows the controls and LEDs on the node operator panel.
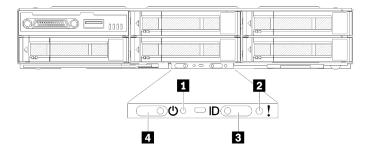
Figure 15. Node operator panel

Table 11. Node operator panel

1 NMI pinhole	**3** Identification button/LED
2 System error LED	**4** Power button/LED

1 **NMI pinhole:** Insert the tip of a straightened paper clip into this pinhole to force a non-maskable interrupt (NMI) upon the node, and consequent memory dump would take place. Only use this function while advised by Lenovo support representative.

2 **System error LED:** When this LED (yellow) is lit, it indicates that at least one system error has occurred. Check the event log for additional information.

3 **Identification button/LED:** This LED (blue) serves to visually locate the compute node, and can be turned on with pressing on the identification button or the following commands.

- Command to turn Identification LED on:

  ```
  ipmitool.exe -I lanplus -H <XCC's IP> -U USERID -P PASSWORD raw 0x3a 0x08 0x01 0x01
  ```

- Command to turn Identification LED off:

  ```
  ipmitool.exe -I lanplus -H <XCC's IP> -U USERID -P PASSWORD raw 0x3a 0x08 0x01 0x00
  ```

Notes:

1. Default XCC's IP address is 192.168.70.125

2. The behavior of this LED is determined by the SMM ID LED when SMM ID LED is turned on or blinking. For the exact location of SMM ID LED, see "System Management Module (SMM)" on page 25.

Table 12. Different SMM ID LED modes and Node ID LED behavior

SMM identification LED	Node identification LEDs
Off	All node ID LEDs are turned off when this mode is activated. Afterwards, SMM ID LED enters accept mode, while node ID LEDs determine the behavior of SMM ID LEDs (see "Enclosure rear overview" in *System Management Module User's Guide* for more information).
On	All the node ID LEDs are on except the blinking ones, which remain blinking.
Blink	All the node ID LEDs are blinking regardless of previous status.

4 **Power button/LED:** When this LED is lit (green), it indicates that the node has power. This green LED indicates the power status of the compute node:

- Flashing rapidly: The LED flashes rapidly for the following reasons:

- The node has been installed in an enclosure. When you install the compute node, the LED flashes rapidly for up to 90 seconds while the Lenovo XClarity Controller in the node is initializing.
    - The power source is not sufficient to turn on the node.
    - The Lenovo XClarity Controller in the node is not communicating with the System Management Module.
- Flashing slowly: The node is connected to the power through the enclosure and ready to turn on.
- Lit continuously: The node is connected to the power through the enclosure.
- Not lit continuously: No power on node.

Rear view

The following illustration shows the connectors and LEDs on the rear of the enclosure.

The following illustration shows the rear view of the entire system.

- Shuttle with eight low profile PCIe x8 slots
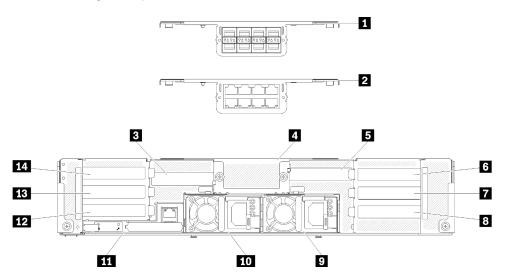
Figure 16. Rear view - The enclosure with x8 shuttle installed

Table 13. Components on x8 shuttle

1 10Gb 8-port EIOM cage (SFP+)	**8** PCIe slot 1-B
2 10Gb 8-port EIOM cage (RJ45)	**9** Power supply 2
3 PCIe slot 4-B	**10** Power supply 1
4 10Gb 8-port EIOM cage filler	**11** System Management Module
5 PCIe slot 3-B	**12** PCIe slot 2-B
6 PCIe slot 3-A	**13** PCIe slot 2-A
7 PCIe slot 1-A	**14** PCIe slot 4-A

Note: Make sure the power cord is properly connected to every power supply unit installed.

- Shuttle with four low profile PCIe x16 cassette bays
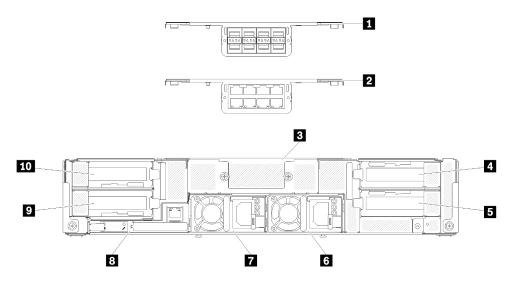
Figure 17. Rear view - The enclosure with x16 shuttle installed

Table 14. Components on x16 shuttle

1 10Gb 8-port EIOM cage (SFP+)	**6** Power supply 2
2 10Gb 8-port EIOM cage (RJ45)	**7** Power supply 1
3 10Gb 8-port EIOM cage filler	**8** System Management Module
4 PCIe slot 3	**9** PCIe slot 2
5 PCIe slot 1	**10** PCIe slot 4

Note: Make sure the power cord is properly connected to every power supply unit installed.

System Management Module (SMM)

The following section includes information about the connectors and LEDs on the rear of the System Management Module (SMM).

Two types of SMM are supported in this solution. See the following illustrations to discern the type of SMM that you have.

Single Ethernet port SMM
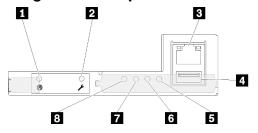
Figure 18. Rear view - Single Ethernet port SMM

Table 15. Single Ethernet port SMM

1 Reset pinhole	**5** System error LED (yellow)
2 USB port service mode button	**6** Identification LED (blue)

Table 15. Single Ethernet port SMM (continued)

3 Ethernet connector	**7** Status LED (green)
4 USB connector	**8** System power LED (green)

You can access the dedicated XCC network port of the four nodes via the Ethernet connector on the Single Ethernet port SMM. Go to website and use IP to access XCC. For more details, see *System Management Module User's Guide*.

The following four LEDs on the single Ethernet port SMM provide information about SMM operating status.

5 **System error LED (yellow):**

When this LED is lit, it indicates that a system error has occurred. Check the event log for additional information.

6 **Identification LED (blue):**

This LED could be lit to determine the physical location the specific enclosure in which the SMM is installed. Use the following commands to control the identification LED and locate the enclosure.

- Command to turn Identification LED on:

  `ipmitool.exe -I lanplus -H <SMM's IP> -U USERID -P PASSWORD raw 0x32 0x97 0x01 0x01`

- Command to turn Identification LED off:

  `ipmitool.exe -I lanplus -H <SMM's IP> -U USERID -P PASSWORD raw 0x32 0x97 0x01 0x00`

  Note: The default SMM IP address is 192.168.70.100

To identify the solution from the front side, see for more information.

7 **Status LED (green):**

This LED indicates the operating status of the SMM.

- Continuously on: the SMM has encountered one or more problems.
- Off: when the enclosure power is on, it indicates the SMM has encountered one or more problems.
- Flashing: the SMM is working.
  - During pre-boot process, the LED flashes rapidly (about four times per second).
  - When the pre-boot process is completed and the SMM is working correctly, the LED flashes at a slower speed (about once per second).

8 **System power LED (green):**

When this LED is lit, it indicates that the SMM power is on.

Dual Ethernet port SMM
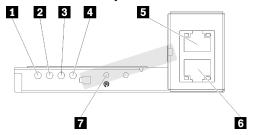
Figure 19. Rear view - Dual Ethernet port SMM

Table 16. Dual Ethernet port SMM

1 System power LED (green)	**5** Ethernet connector
2 Status LED (green)	**6** Ethernet connector
3 Identification LED (blue)	**7** Reset pinhole
4 System error LED (yellow)	

You can access the dedicated XCC network port of the four nodes via either of the SMM Ethernet connector. Go to SMM website and use IP to access XCC. For more details, see *System Management Module User's Guide*.

The following four LEDs on the dual Ethernet port SMM provide information about SMM operating status.

1 System power LED (green):

When this LED is lit, it indicates that the SMM power is on.

2 Status LED (green):

This LED indicates the operating status of the SMM.

- Continuously on: the SMM has encountered one or more problems.
- Off: when the enclosure power is on, it indicates the SMM has encountered one or more problems.
- Flashing: the SMM is working.
  - During pre-boot process, the LED flashes rapidly (about four times per second).
  - When the pre-boot process is completed and the SMM is working correctly, the LED flashes at a slower speed (about once per second).

3 Identification LED (blue):

This LED could be lit to determine the physical location the specific enclosure in which the SMM is installed. Use the following commands to control the identification LED and locate the enclosure.

- Command to turn Identification LED on:

  `ipmitool.exe -I lanplus -H <SMM's IP> -U USERID -P PASSWORD raw 0x32 0x97 0x01 0x01`
- Command to turn Identification LED off:

  `ipmitool.exe -I lanplus -H <SMM's IP> -U USERID -P PASSWORD raw 0x32 0x97 0x01 0x00`

  Note: The default SMM IP address is 192.168.70.100

To identify the solution from the front side, see for more information.

⁴ System error LED (yellow):

When this LED is lit, it indicates that a system error has occurred. Check the event log for additional information.

For web interface and error messages, see https://thinksystem.lenovofiles.com/help/topic/mgt_tools_smm/r_smm_users_guide.html.

PCIe slot LEDs

The following illustration shows the LEDs on the rear of PCIe 3.0 x16 shuttle.
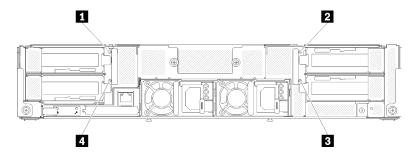
Figure 20. Rear view - PCIe 3.0 x16 LEDs

Table 17. PCIe slot LEDs

1 PCIe slot 4 LED	**3** PCIe slot 1 LED
2 PCIe slot 3 LED	**4** PCIe slot 2 LED

These four LEDs provide the operating status of PCIe 3.0 x16 adapters.

There are two colors of LEDs you might see:

- **Green:** It indicates the PCIe adapter is working normally.
- **Yellow (orange):** It indicates the PCIe adapter has encountered one or more problems.

Modular 6U configuration

The following illustration shows modular 6U configuration.

A modular 6U configuration 7X85 consists of three units of modular Enclosure 7X22, which are connected with Ethernet cables through SMM. For installation and replacement procedures of components in modular 6U configuration 7X85, see "Replace components in the enclosure" on page 63. For data backup and restore of dual Ethernet port SMM in modular 6U configuration 7X85, see "MicroSD card removal and installation for dual Ethernet port SMM" on page 130.
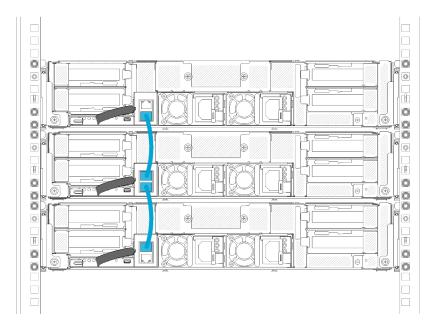
Figure 21. Rear view - Modular 6U configuration

System board layout

The illustrations in this section provide information about the connectors and switches that are available on the compute node system board.

System-board internal connectors

The following illustration shows the internal connectors on the system board.
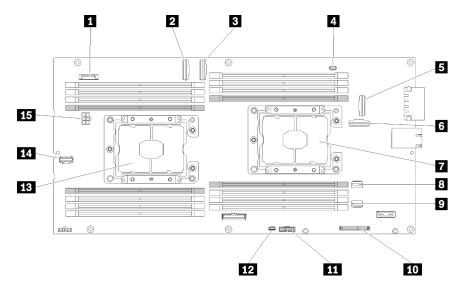
Figure 22. Internal connectors on the system board

Table 18. Internal connectors on the system board

1 CMOS battery (CR2032)	**9** SATA 2 connector
2 PCIe slot 3 connector	**10** M.2 connector

Table 18. Internal connectors on the system board (continued)

3	PCIe slot 4 connector	**11**	Trusted cryptographic module (TCM) connector
4	KVM breakout cable connector	**12**	KVM breakout module USB connector
5	PCIe slot 1 connector (for RAID adapter)	**13**	Processor 2
6	PCIe slot 2 connector	**14**	Backplane miscellaneous signal connector
7	Processor 1	**15**	Backplane power connector
8	SATA 1 connector		

The following illustration shows the location of the DIMM connectors on the system board.
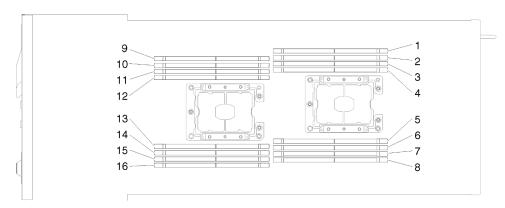
Figure 23. The location of the DIMM connectors on the system board

System-board switches

The following illustration shows the location and description of the switches.

Important:

1. If there is a clear protective sticker on the switch blocks, you must remove and discard it to access the switches.

2. Any system-board switch or jumper block that is not shown in the illustrations in this document are reserved.
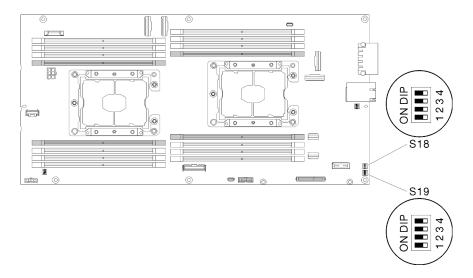
Figure 24. Location of the switches, jumpers, and buttons on the system board

The following table describes the jumpers on the system board.

Table 19. Jumper definition

Switch block	Switch	Switch name	Usage description	
			Open	Close
S18	2	XClarity Controller boot backup	Normal (default)	The compute node will boot by using a backup of the XClarity Controller firmware.
	3	XClarity Controller force update	Normal (default)	Enables XClarity Controller force update
	4	TPM physical presence	Normal (default)	Indicates a physical presence to the system TPM
S19	1	System UEFI backup	Normal (default)	Enables system BIOS backup
	2	Password override jumper	Normal (default)	Overrides the power-on password
	3	CMOS clear jumper	Normal (default)	Clears the real-time clock (RTC) registry

Important:

1. Before you change any switch settings or move any jumpers, turn off the solution; then, disconnect all power cords and external cables. Review the information in https://pubs.lenovo.com/safety_documentation/, "Installation Guidelines" on page 61, "Handling static-sensitive devices" on page 63, and "Power off the compute node" on page 16.

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

KVM breakout cable

Use this information for details about the KVM breakout cable.

Use the KVM breakout cable to connect external I/O devices to the compute node. The KVM breakout cable connects through the KVM connector (see "System-board internal connectors" on page 29). The KVM breakout cable has connectors for a display device (video), two USB 2.0 connectors for a USB keyboard and mouse, and a serial interface connector.

The following illustration identifies the connectors and components on the KVM breakout cable.
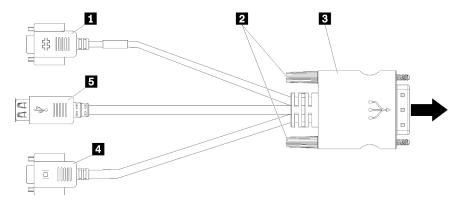
Figure 25. Connectors and components on the KVM breakout cable

Table 20.   Connectors and components on the console breakout cable

1 Serial connector	**4** Video connector (blue)
2 Captive screws	**5** USB 2.0 connectors (2)
3 to KVM connector	

2.5-inch drive backplanes

The following illustration shows the respective 2.5-inch drive backplanes.

Important: Do not mix nodes with the four-drive backplane and six-drive backplanes in the same enclosure. Mixing the four-drive backplane and six-drive backplanes may cause unbalanced cooling.

• Four 2.5-inch SAS/SATA backplane
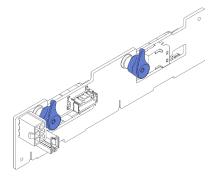
Figure 26. Four 2.5-inch SAS/SATA backplane

• Four 2.5-inch NVMe backplane
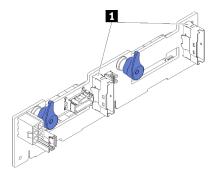
Figure 27. Four 2.5-inch NVMe backplane

1 NVMe connectors

Note: This backplane requires that two processors be installed in the compute node.

• Six 2.5-inch SAS/SATA backplane
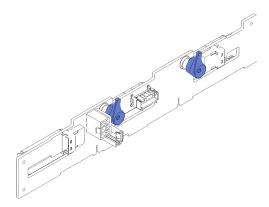
Figure 28. Six 2.5-inch SAS/SATA backplane

• Six 2.5-inch hot-swap SAS/SATA/NVMe backplane
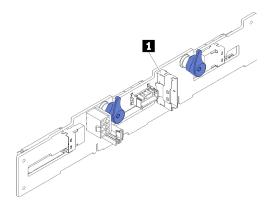
Figure 29. Six 2.5-inch hot-swap SAS/SATA/NVMe backplane

1 NVMe connector

Parts list

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

Note: Depending on the model, your solution might look slightly different from in the following illustrations.

Enclosure components

This section includes the components that come with the enclosure.
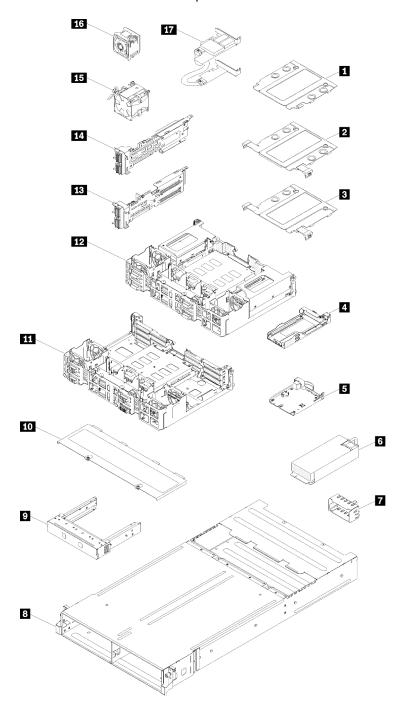
Figure 30. Enclosure components

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

- **Tier 1 customer replaceable unit (CRU):** Replacement of Tier 1 CRUs is your responsibility. If Lenovo installs a Tier 1 CRU at your request with no service agreement, you will be charged for the installation.

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

- **Field replaceable unit (FRU):** FRUs must be installed only by trained service technicians.

- **Consumable and Structural parts:** Purchase and replacement of consumable and structural parts (components, such as a cover or bezel) is your responsibility. If Lenovo acquires or installs a structural component at your request, you will be charged for the service.

Table 21. Parts list, enclosure

Index	Description	Tier 1 CRU	Tier 2 CRU	FRU	Consumable and Structural part
For more information about ordering the parts shown in Figure 30 "enclosure components" on page 35: https://datacentersupport.lenovo.com/products/servers/thinksystem/d2-enclosure/7X20/parts It is highly recommended that you check the power summary data for your server using Lenovo Capacity Planner before purchasing any new parts.					
1	10Gb 8-port EIOM cage filler				√
2	10Gb 8-port EIOM cage (SFP+)		√		
3	10Gb 8-port EIOM Base-T cage (RJ45)		√		
4	Cassette (for PCIe x16 shuttle)				√
5	System Management Module	√			
6	Power supply	√			
7	Power supply filler panel	√			
8	Enclosure				√
9	Node filler panel				√
10	Fan cover				√
11	PCIe x8 shuttle			√	
12	PCIe x16 shuttle			√	
13	PCIe I/O riser (PIOR) right (viewed from the front)			√	
14	PCIe I/O riser (PIOR) left (viewed from the front)			√	
15	80x80x80mm fan			√	
16	60x60x56mm fan		√		
17	Shared PCIe dual adapters			√	

Compute node components

This section includes the components that come with the compute node.
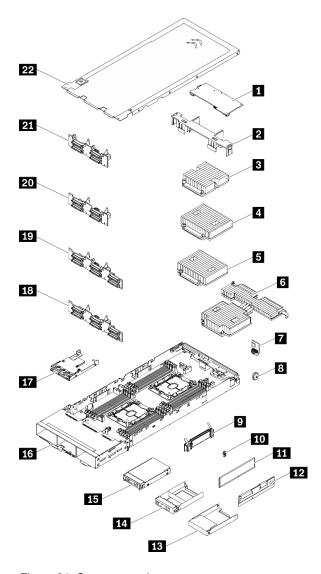
Figure 31. Compute node components

Table 22. Parts list, compute node

Index	Description	Tier 1 CRU	Tier 2 CRU	FRU	Consuma-ble and Structural part
For more information about ordering the parts shown in Figure 31 "compute node components" on page 37:					
https://datacentersupport.lenovo.com/products/servers/thinksystem/sd530/7x21/parts					
It is highly recommended that you check the power summary data for your server using Lenovo Capacity Planner before purchasing any new parts.					
1	PCIe adapter	√			
2	Air baffle				√
3	Processor and heat sink assembly (85mm heat sink)			√	
4	Processor and heat sink assembly (108mm heat sink)			√	

Table 22. Parts list, compute node (continued)

Index	Description	Tier 1 CRU	Tier 2 CRU	FRU	Consuma-ble and Structural part
5	Processor and heat sink assembly (108mm heat sink)			√	
6	Processor and heat sink assembly (T-shaped heat sink)			√	
7	Trusted Cryptographic Module			√	
8	CMOS battery (CR2032)				√
9	M.2 backplane	√			
10	M.2 retainer clip	√			
11	DRAM DIMM	√			
12	DC Persistent Memory Module (DCPMM)	√			
13	2.5-inch drive bay blank (for empty bays next to the backplane)				√
14	2.5-inch drive bay blank panel (for drive bays on the backplane)	√			
15	2.5-inch hot-swap drive	√			
16	Compute node tray			√	
17	KVM breakout module	√			
18	2.5-inch 6-drive hot-swap SAS/SATA backplane			√	
19	2.5-inch 6-drive hot-swap SAS/SATA/NVMe backplane			√	
20	2.5-inch 4-drive hot-swap SAS/SATA backplane			√	
21	2.5-inch 4-drive hot-swap NVMe backplane			√	
22	Compute node cover	√			

PCIe expansion node components

This section includes the components that come with the PCIe expansion node.

Note: PCIe expansion node has to be installed to a compute node before being installed into the enclosure. See "Compute-expansion node assembly replacement" on page 79 for detailed installation procedure and requirements.
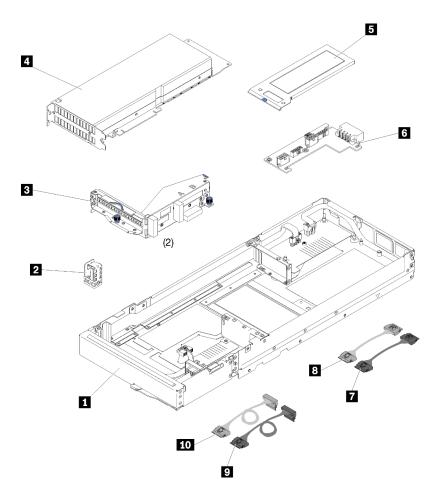
Figure 32. PCIe expansion node components

Table 23. Parts list, PCIe expansion node

Index	Description	Tier 1 CRU	Tier 2 CRU	FRU	Structural
For more information about ordering the parts shown in Figure 32 "PCIe expansion node components" on page 39: https://datacentersupport.lenovo.com/products/servers/thinksystem/sd530/7x21/parts It is highly recommended that you check the power summary data for your server using Lenovo Capacity Planner before purchasing any new parts.					
1	PCIe expansion node				√
2	Cable bracket		√		
3	Risers, front and rear	√			
4	PCIe adapter **Notes:** 　1. This component is not included in the PCIe expansion node option kit. 　2. The illustration might differ slightly from your hardware.	√			
5	Rear cable cover	√			
6	PCIe expansion node power board	√			

Table 23. Parts list, PCIe expansion node (continued)

Index	Description	Tier 1 CRU	Tier 2 CRU	FRU	Structural
7	PCIe#1-A cable	√			
8	PCIe#2-B cable	√			
9	PCIe#3-A cable	√			
10	PCIe#4-B cable	√			

Power cords

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

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

1. Go to:

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

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

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

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

Notes:

- For your safety, a power cord with a grounded attachment plug is provided to use with this product. To avoid electrical shock, always use the power cord and plug with a properly grounded outlet.

- Power cords for this product that are used in the United States and Canada are listed by Underwriter's Laboratories (UL) and certified by the Canadian Standards Association (CSA).

- For units intended to be operated at 115 volts: Use a UL-listed and CSA-certified cord set consisting of a minimum 18 AWG, Type SVT or SJT, three-conductor cord, a maximum of 15 feet in length and a parallel blade, grounding-type attachment plug rated 15 amperes, 125 volts.

- For units intended to be operated at 230 volts (U.S. use): Use a UL-listed and CSA-certified cord set consisting of a minimum 18 AWG, Type SVT or SJT, three-conductor cord, a maximum of 15 feet in length and a tandem blade, grounding-type attachment plug rated 15 amperes, 250 volts.

- For units intended to be operated at 230 volts (outside the U.S.): Use a cord set with a grounding-type attachment plug. The cord set should have the appropriate safety approvals for the country in which the equipment will be installed.

- Power cords for a specific country or region are usually available only in that country or region.
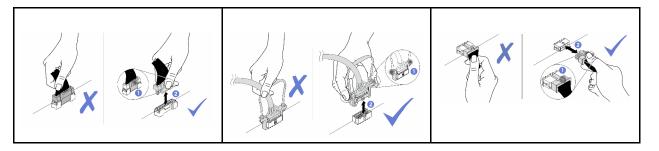
Internal cable routing

Some of the components in the node have internal cable connectors.

Attention: Strictly observe the following instructions to avoid damaging cable sockets on the system board. Any damage to the cable sockets might require replacing the system board.

- Connect cable connectors vertically or horizontally in alignment with the orientations of the corresponding cable sockets, avoiding any tilt.

- To disconnect cables from the system board, do as follows:

  1. Press and hold all latches, release tabs, or locks on cable connectors to release the cable connectors.

  2. Remove the cable connectors vertically or horizontally in alignment with the orientations of the corresponding cable sockets, avoiding any tilt.

     Note: The cable connectors might look different from those in the illustration, but the removal procedure is the same.

Notes:

- 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.

- If you are installing KVM module in a compute node, make sure to route the cables in the following order.

    1. NVMe signal cables (if there is any)

    2. KVM breakout module cable

    3. SATA/SAS signal cable (if there is any)

Some options, such as RAID adapter and backplanes, might require additional internal cabling. See the documentation that is provided for the option to determine any additional cabling requirements and instructions.

Four 2.5-inch-drive model

Use this section to understand how to route cables for four 2.5-inch-drive model.

Four 2.5-inch-drive model

- Four 2.5-inch hot-swap SAS/SATA backplane
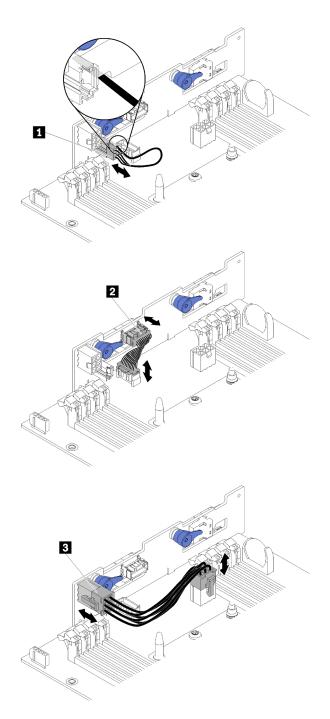
Figure 33. Four 2.5-inch hot-swap SAS/SATA backplane

Table 24. Components on the four 2.5-inch hot-swap SAS/SATA backplane

1 Ambient sensor cable	**3** Backplane power cable
2 miscellaneous signal cable	

• Four 2.5-inch drive cable routing
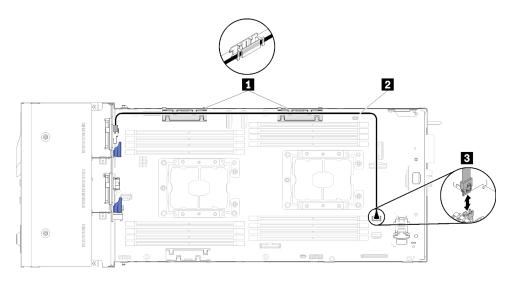
Figure 34. Four 2.5-inch drive cable routing

Table 25. Components on the four 2.5-inch drive cable routing

1 Internal cable management baskets	**3** SATA 1 connecotr
2 SAS/SATA cable	

- Four 2.5-inch drive with hardware RAID cable routing
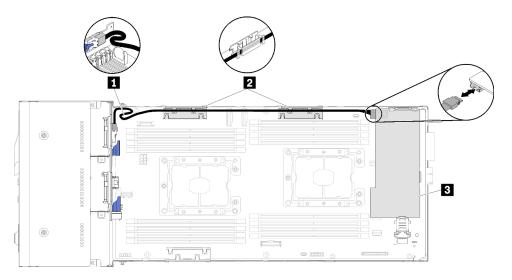
Figure 35. Four 2.5-inch drive with hardware RAID cable routing

Table 26. Components on the four 2.5-inch drive with hardware RAID cable routing

1 SAS/SATA cable	**3** RAID adapter
2 Internal cable management baskets	

Four 2.5-inch-drive NVMe model

Use this section to understand how to route cables for four 2.5-inch-drive NVMe model.

Four 2.5-inch-drive NVMe model

Note: If you are installing NVMe drives and KVM breakout module in the same compute node, make sure to route the KVM breakout module cable on top of the PCIe signal cable.
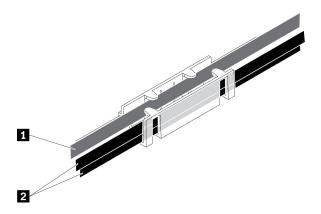
Figure 36. NVMe and KVM breakout module cable routing

Table 27. NVMe and KVM breakout module cable routing

1 KVM breakout module cable (routed to left side)	**2** NVMe signal cables

• Four 2.5-inch NVMe backplane
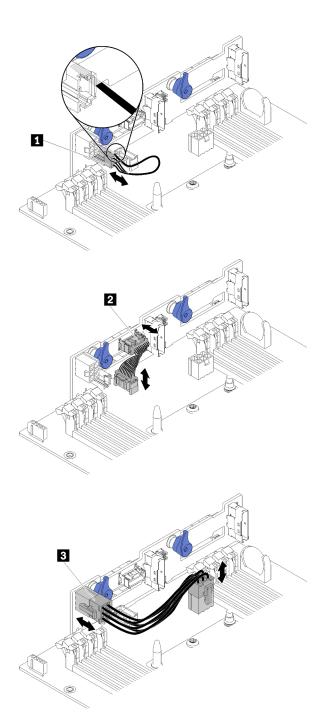
Figure 37. Four 2.5-inch NVMe backplane

Table 28. Components on the four 2.5-inch NVMe backplane

1 Ambient sensor cable	**3** Backplane power cable
2 miscellaneous signal cable	

- Four 2.5-inch drive cable routing
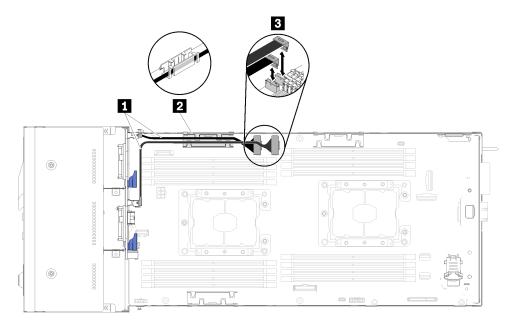
Figure 38. Four 2.5-inch drive cable routing (with NVMe)

Table 29. Components on the four 2.5-inch drive cable routing (with NVMe)

1 NVMe cable	**3** PCIe slot 3 and 4 connector
2 Internal cable management baskets	

Six 2.5-inch-drive model

Use this section to understand how to route cables for six 2.5-inch-drive model.

Six 2.5-inch-drive model

- Six 2.5-inch hot-swap SAS/SATA backplane
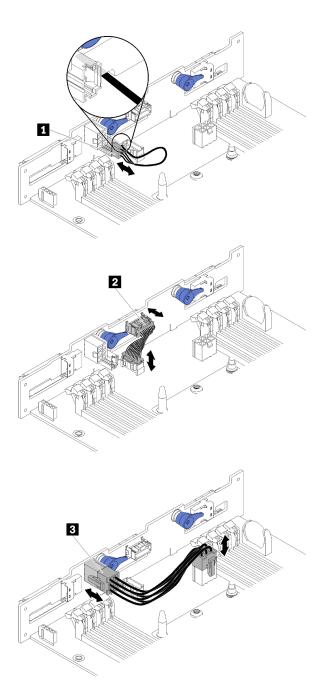
Figure 39. Six 2.5-inch hot-swap SAS/SATA backplane

Table 30. Components on the six 2.5-inch hot-swap SAS/SATA backplane

1 Ambient sensor cable	**3** Backplane power cable
2 miscellaneous signal cable	

• Six 2.5-inch drive cable routing
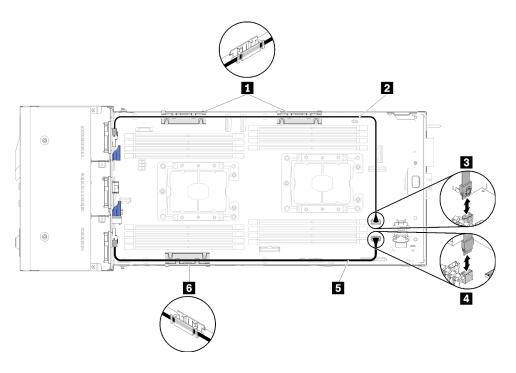
Figure 40. Six 2.5-inch drive cable routing

Table 31. Components on the six 2.5-inch drive cable routing

1 **6** Internal cable management basket	**3** SATA 1 connector
2 **5** SAS/SATA cable	**4** SATA 2 connector

- Six 2.5-inch drive with hardware RAID cable routing
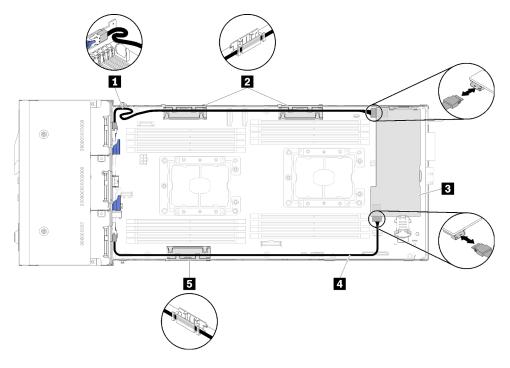
Figure 41. Six 2.5-inch drive with hardware RAID cable routing

Note: Route the **1** SAS/SATA cable as shown in the illustration to avoid cable slack.

Table 32. Components on the six 2.5-inch drive with hardware RAID cable routing

1 **4** SAS/SATA cable	**3** RAID adapter
2 **5** Internal cable management basket	

Six 2.5-inch-drive model (with NVMe)

Use this section to understand how to route cables for Six 2.5-inch-drive model (with NVMe).

Six 2.5-inch-drive model (with NVMe)

Note: If you are installing NVMe drives and KVM breakout module in the same compute node, make sure to route the KVM breakout module cable on top of the PCIe signal cable.
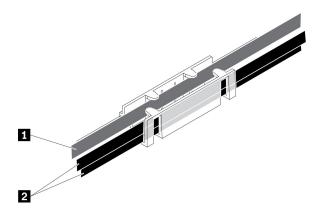
Figure 42. NVMe and KVM breakout module cable routing

Table 33. NVMe and KVM breakout module cable routing

1 KVM breakout module cable (routed to left side)	**2** NVMe signal cables

- Six 2.5-inch hot-swap SAS/SATA/NVMe backplane
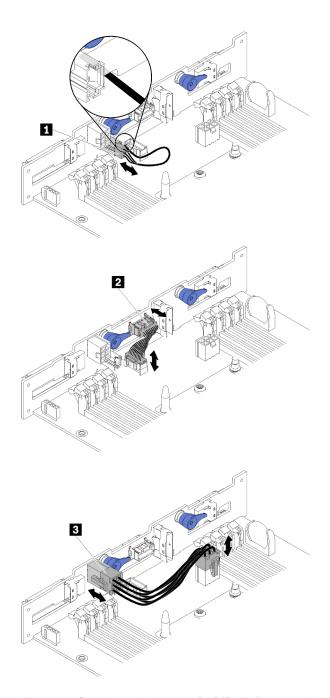
Figure 43. Six 2.5-inch hot-swap SAS/SATA/NVMe backplane

Table 34. Components on the six 2.5-inch hot-swap SAS/SATA/NVMe backplane

1 Ambient sensor cable	**3** Backplane power cable
2 miscellaneous signal cable	

- Six 2.5-inch drive cable routing (with NVMe)
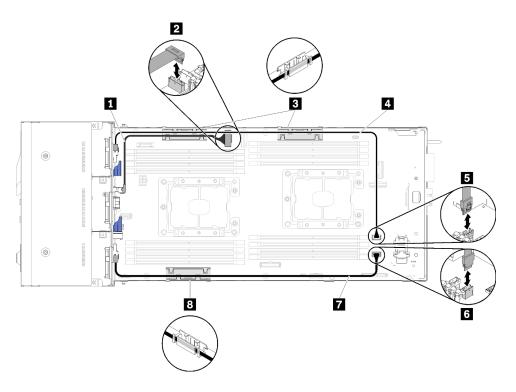
Figure 44. Six 2.5-inch drive cable routing (with NVMe)

Table 35. Components on the six 2.5-inch drive cable routing (with NVMe)

1 NVMe cable	**4** **7** SAS/SATA cable
2 PCIe slot 3 connector	**5** SATA 1 connector
3 **8** Internal cable management basket	**6** SATA 2 connector

- Six 2.5-inch drive (with NVMe) with hardware RAID cable routing
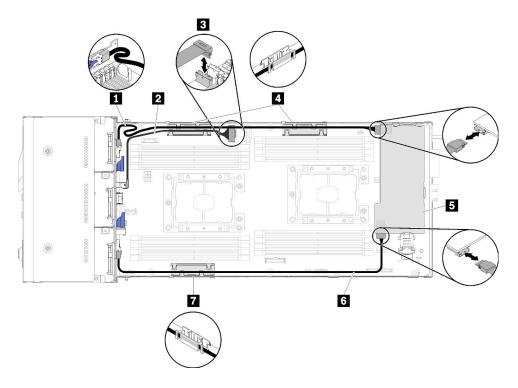
Figure 45. Six 2.5-inch drive (with NVMe) with hardware RAID cable routing

Note: Route the **1** SAS/SATA cable as shown in the illustration to avoid cable slack.

Table 36. Components on six 2.5-inch drive with hardware RAID cable routing

1 **6** SAS/SATA cable	**4** **7** Internal cable management basket
2 NVMe cable	**5** RAID adapter
3 PCIe slot 3 connector	

KVM breakout module

Use this section to understand how to route cables for your KVM breakout module.

Note: If you are installing NVMe drives and KVM breakout module in the same compute node, make sure to route the KVM breakout module cable on top of the PCIe signal cable.
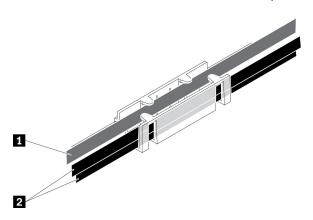
Figure 46. NVMe and KVM breakout module cable routing

Table 37. NVMe and KVM breakout module cable routing

1 KVM breakout module cable (routed to left side)	**2** NVMe signal cables

- The right KVM breakout module (for four 2.5-inch-drive model)
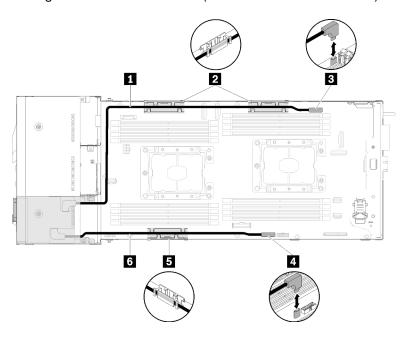
Figure 47. KVM breakout module installed in drive bay 4

Table 38. Components on the KVM breakout module installed in drive bay 4

1 Long signal cable	**3** KVM breakout cable connector
2 **5** Internal cable management basket	**4** USB connector
6 Short signal cable	

- The left KVM breakout module (for six 2.5-inch-drive model)
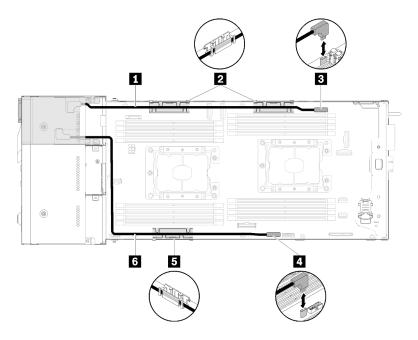
Figure 48. KVM breakout module installed in drive bay 0

Table 39. Components on the KVM breakout module installed in drive bay 0

1 Short signal cable	**3** KVM breakout cable connector
2 **5** Internal cable management basket	**4** USB connector
6 Long signal cable	

PCIe expansion node

Use this section to understand how to route cables for a PCIe expansion node.

Following are the cables that come with a PCIe expansion node:

- Front PCIe riser assembly
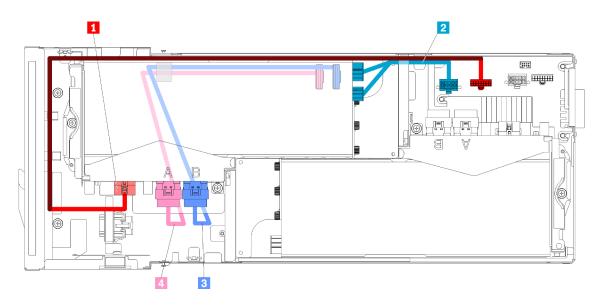
Figure 49. Front riser assembly cables

Table 40. Front riser assembly cables

1 Riser miscellaneous cable for the front riser assembly	**3** PCIe#4-B cable
2 Auxiliary power cable for the PCIe adapter in the front riser assembly	**4** PCIe#3-A cable

• Rear riser assembly
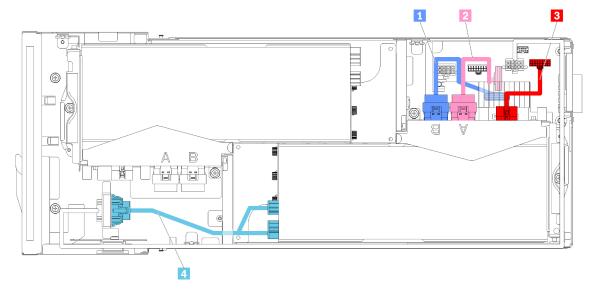
Figure 50. Rear riser assembly cables

Table 41. Rear riser assembly cables

1 PCIe#2-B cable	**3** Riser miscellaneous cable for the rear riser assembly
2 PCIe#1-A cable	**4** Auxiliary power cable for the PCIe adapter in the rear riser assembly

Notes: Make sure the following conditions are met before installing the rear riser cable cover.

1. If the PCIe#2-B cable is connected to the rear riser assembly, make sure it is routed under the PCIe#1-A cable through the gap between the two front riser power connectors.

2. If the PCIe#1-A cable is connected to the rear riser assembly, make sure it is routed above the PCIe#2-B cable through the gap between the two front riser power connectors.

3. When both riser assemblies are installed, make sure the front riser auxiliary power cable is looped back into the gap between the two front riser power connectors, and routed above the PCIe#2-B cable.
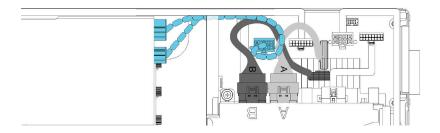
Figure 51. Routing PCIe#1-A, PCIe#2-B and the front riser auxiliary power cable

Modular enclosure for 6U configuration

See this section to learn how to route cables for modular enclosures for 6U configuration.

Modular enclosures for 6U configuration could be connected with Ethernet cables as illustrated.
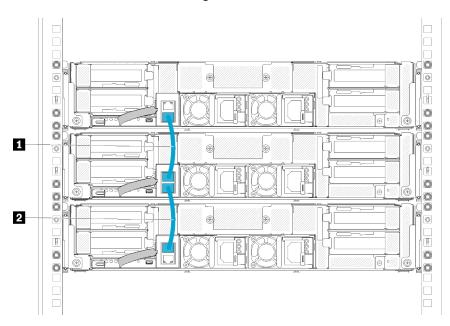
Figure 52. Cable routing for modular enclosures for 6U configuration

Table 42. Cable routing for modular enclosures for 6U configuration

1 Ethernet cable	**2** Ethernet cable

Note:

1. Despite 6U configuration consists of three 2U modular enclosures, it is technically feasible to connect more than three modular enclosures with Ethernet cables. However, according to spanning tree protocol (STP) defined by IEEE 802.1D standard, it is strongly suggested that no more than six modular

enclosures are connected in a rack if STP is implemented with default parameters. The chained enclosures do not necessarily have to be installed in the same rack, and could be connected cross-rack via rack switch. See the illustration for an example.
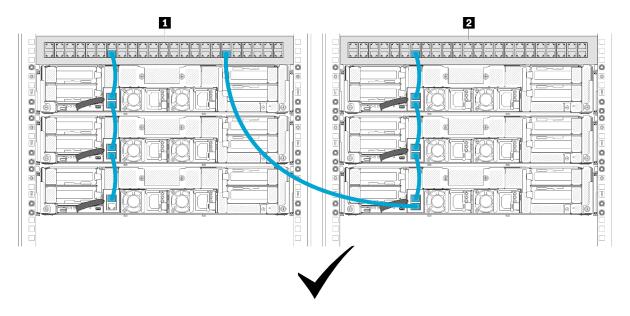
Figure 53. An example of cross-rack enclosure chain

Table 43. Devices in the cross-rack enclosure chain

1 Rack switch 1	**2** Rack switch 2

2. Do not create any switch loop by connecting the last port of a group of connected enclosures to the same switch or local area network (LAN) the first port of the group of connected enclosures is already connected to. See the illustration of an example of a switch loop that should be avoided.
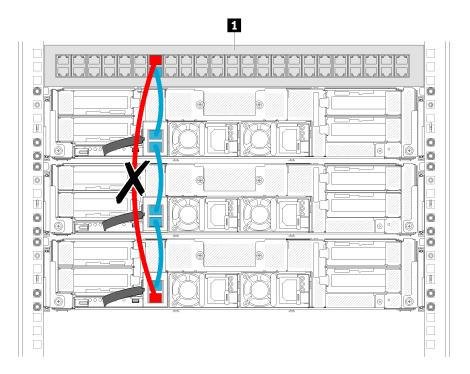
Figure 54. An example of enclosure chain switch loop that should be avoided

Table 44. Device in the enclosure chain switch loop

1 Rack switch

Chapter 3. Hardware replacement procedures

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

For more information about ordering parts:

1. Go to **http://datacentersupport.lenovo.com** and navigate to the support page for your server.

2. Click **Service Parts**.

3. Enter the serial number to view a listing of parts for your server.

Note: If you replace a part, such as an adapter, that contains firmware, you might also need to update the firmware for that part. For more information about updating firmware, see "Firmware updates" on page 12.

Installation Guidelines

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

Before installing optional devices, read the following notices carefully:

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

- Read the safety information and guidelines to ensure that you work safely.

  - A complete list of safety information for all products is available at:

    https://pubs.lenovo.com/safety_documentation/

  - The following guidelines are available as well: "Handling static-sensitive devices" on page 63 and "Working inside the solution with the power on" on page 63.

- Make sure the components you are installing are supported by the solution. For a list of supported optional components for the solution, see https://serverproven.lenovo.com/.

- When you install a new solution, download and apply the latest firmware. This will help ensure that any known issues are addressed, and that your solution is ready to work with optimal performance. Go to Product_name Drivers and Software to download firmware updates for your solution.

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

- It is good practice to make sure that the solution is working correctly before you install an optional component.

- Keep the working area clean, and place removed components on a flat and smooth surface that does not shake or tilt.

- Do not attempt to lift an object that might be too heavy for you. If you have to lift a heavy object, read the following precautions carefully:

  - Make sure that you can stand steadily without slipping.

  - Distribute the weight of the object equally between your feet.

  - Use a slow lifting force. Never move suddenly or twist when you lift a heavy object.

– To avoid straining the muscles in your back, lift by standing or by pushing up with your leg muscles.

- Make sure that you have an adequate number of properly grounded electrical outlets for the solution, monitor, and other devices.

- 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 solution to remove or install hot-swap power supplies, hot-swap fans, or hot-plug USB devices. However, you must turn off the solution before you perform any steps that involve removing or installing adapter cables, and you must disconnect the power source from the solution before you perform any steps that involve removing or installing a riser card.

- Blue on a component indicates touch points, where you can grip to remove a component from or install it in the solution, open or close a latch, and so on.

- Terra-cotta on a component or an Terra-cotta label on or near a component indicates that the component can be hot-swapped if the solution and operating system support hot-swap capability, which means that you can remove or install the component while the solution is still running. (Terra-cotta can also indicate touch points on hot-swap components.) See the instructions for removing or installing a specific hot-swap component for any additional procedures that you might have to perform before you remove or install the component.

- The Red strip on the drives, adjacent to the release latch, indicates that the drive can be hot-swapped if the solution and operating system support hot-swap capability. This means that you can remove or install the drive while the solution 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 solution, make sure you reinstall all safety shields, guards, labels, and ground wires.

System reliability guidelines

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

Make sure the following requirements are met:

- When the server comes with redundant power, a power supply must be installed in each power-supply bay.

- Adequate space around the server must be spared to allow server cooling system to work properly. Leave approximately 50 mm (2.0 in.) of open space around the front and rear of the server. Do not place any object in front of the fans.

- For proper cooling and airflow, refit the server cover before you turn the power on. Do not operate the server for more than 30 minutes with the server cover removed, for it might damage server components.

- Cabling instructions that come with optional components must be followed.

- A failed fan must be replaced within 48 hours since malfunction.

- A removed hot-swap fan must be replaced within 30 seconds after removal.

- A removed hot-swap drive must be replaced within two minutes after removal.

- A removed hot-swap power supply must be replaced within two minutes after removal.

- Every air baffle that comes with the server must be installed when the server starts (some servers might come with more than one air baffle). Operating the server with a missing air baffle might damage the processor.

- All processor sockets must contain either a socket cover or a processor with heat sink.

- When more than one processor is installed, fan population rules for each server must be strictly followed.

- Do not operate the enclosure without the SMM assembly installed. Operating the solution without the SMM assembly might cause the system to fail. Replace the System Management Module (SMM) assembly as soon as possible after removal to ensure proper operation of the system.

Working inside the solution with the power on

You might need to keep the power on with the solution 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 solution might stop and loss of data might occur when internal solution 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 solution with the power on.

- Avoid loose-fitting clothing, particularly around your forearms. Button or roll up long sleeves before working inside the solution.

- Prevent your necktie, scarf, badge rope, or long hair from dangling into the solution.

- 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 solution as you lean over it.

- Avoid dropping any metallic objects, such as paper clips, hairpins, and screws, into the solution.

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 solution 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 solution 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 solution 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 solution 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.

Replace components in the enclosure

Use the following information to remove and install the enclosure components.

Cable management arm replacement

Use the following procedures to remove and install the cable management arm.

Remove the cable management arm

Use this procedure to remove the cable management arm.

Before you remove the cable management arm:

1. Read the following section(s) to ensure that you work safely.

    - "Safety" on page iii
    - "Installation Guidelines" on page 61

Complete the following steps to remove the cable management arm.
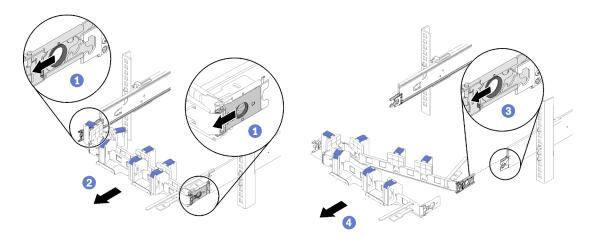
Figure 55. Cable management arm removal

Note: Your cable management arm might be different from the illustrations if you mounted the cable management arm to the opposite side.

Step 1. Pull the two outer mounting clip release latches backward to disengage the cable management arm.

Step 2. Pull the inner mounting clip release latch backward to disengage the cable management arm.

Step 3. Remove the cable management arm out of the slide rails.

Install the cable management arm

Use this procedure to install the cable management arm.

Before you install the cable management arm:

1. Read the following section(s) to ensure that you work safely.

    - "Safety" on page iii
    - "Installation Guidelines" on page 61

2. Make sure the enclosure is pushed fully into the rack and the thumbscrews are tightened.

Complete the following steps to install the cable management arm.
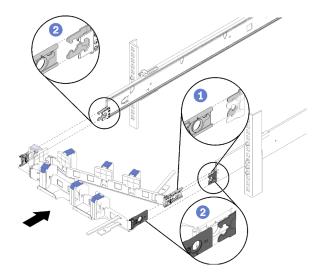
Figure 56. Cable management arm installation

Step 1.   Align the inner mounting clip with the inner tab on the slide, then, push it until it snaps into place.

Step 2.   Align two outer mounting clips with the outer tabs on the slides; then, push them until they snap into place.

Compute node replacement

Use the following procedures to remove and install the compute node from the D2 Enclosure.

Remove a compute node from the enclosure

Use this procedure to remove a compute node from the D2 Enclosure.

Attention: Unauthorized personnel should not remove or install the nodes. Only trained or service-related personnel are allowed to perform such actions.

1. Unauthorized personnel should not remove or install the nodes. Only trained or service-related personnel are allowed to perform such actions.

2. If one or more sets of shared PCIe dual adapters are installed in the enclosure, make sure to remove the nodes with auxiliary adapters first (node 2 and 3) and proceed to nodes with primary adapters (node 1 and 4). See the following table for location of primary and auxiliary adapters.

Table 45. Location of shared PCIe dual adapters from the rear

Primary adapter					Auxiliary adapter
- -	4-A	4-B	3-B	3-A	- -
Auxiliary adapter	2-A			1-A	**Primary adapter**
	2-B			1-B	

Before you remove a compute node:

1. Read the following section(s) to ensure that you work safely.

   - "Safety" on page iii
   - "Installation Guidelines" on page 61

2. Turn off the corresponding compute node that you are going to perform the task on.

3. When you remove the compute node, note the node bay number. Reinstalling a compute node into a different node bay from the one it was removed from can have unintended consequences. Some

configuration information and update options are established according to node bay number. If you reinstall the compute node into a different node bay, you might have to reconfigure the compute node. One way to track node is via the serial number.

Note: The serial number is located on the pull out tab for the each node.

Complete the following steps to remove the compute node from a enclosure.
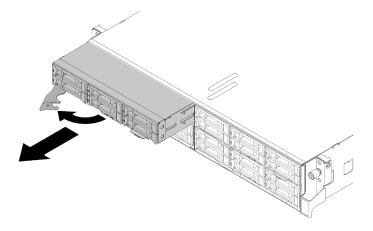
Figure 57. Node removal

Step 1.   Release and rotate the front handle as shown in the illustration.

> **Attention:** To maintain proper system cooling, do not operate the D2 Enclosure without a compute node or node bay filler installed in each node bay.

Step 2.   Slide the node out about 12 inches (300 mm); then, grip the node with both hands and remove it from the enclosure.

Step 3.   Install either a node bay filler or another compute node in the node bay within 1 minute.

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

Demo video

Watch the procedure on YouTube

Replace a compute node

Use this information to replace a defective compute node.

Attention:

- Only trained service technicians are allowed to perform this procedure. Unauthorized personnel should not attempt to replace this component.
- If possible, back up all compute node settings, including the settings of the optional components installed in the compute node.

Important: After a compute node is replaced, it is required to update the compute node with the latest firmware or restore the pre-existing firmware. Make sure that you have the latest firmware or a copy of the preexisting one before you proceed (see "Firmware updates" on page 12 for more information).

Before replacing a compute node:

1. Read the following section(s) to ensure that you work safely.
   - "Safety" on page iii
   - "Installation Guidelines" on page 61
2. Turn off the corresponding compute node that you are going to perform the task on.
3. Remove the compute node or compute-expansion node assembly from the enclosure (see "Remove a compute node from the enclosure" on page 65 or "Remove the compute-expansion node assembly from the enclosure" on page 79).

Complete the following steps to replace a compute node:

Step 1. Remove one of the following components from the compute node:
- Compute node cover: see "Remove the compute node cover" on page 141.
- PCIe expansion node: see "Remove the PCIe expansion node from a compute node" on page 203.

Step 2. Remove the air baffle from the compute node (see "Remove the air baffle" on page 136).

Step 3. Remove all the drives and drive bay fillers, and place them on a static-protective surface (see "Remove a hot-swap drive" on page 148).

Note: Record the drive bay number when removing the drives so that you can install them back into the same drive bays in the replacement compute node.

Step 4. If a KVM breakout module has been installed in the compute node, remove it (see "Remove the KVM breakout module" on page 156).

Step 5. If a RAID adapter has been installed in the compute node, remove it and place it on a static-protective surface (see "Remove a RAID adapter from the compute node" on page 175).

Step 6. Remove the drive backplane from the compute node (see "Remove the drive backplane" on page 150), and immediately install it in the replacement compute node (see "Install the drive backplane" on page 151).

Step 7. Install the drives that were removed earlier to the replacement compute node (see "Install a hot-swap drive" on page 149).

Step 8. Transfer processor and heat sink assembly 1 (the rear processor) from the compute node to the replacement unit:

a. Remove the socket cover from the processor socket in which you plan to install the processor in the replacement compute node.

b. Remove the processor and heat sink assembly from the defective compute node (see "Remove a processor and heat sink" on page 169).

c. Install the processor and heat sink assembly into the socket in the replacement compute node (see "Install a processor and heat sink" on page 172).

d. Orient the socket cover that was removed earlier above the empty processor socket in the defective compute node; then, gently press on the four corners of the socket cover that you placed on the empty processor socket in to secure the cover to the socket.

Attention: When transferring a processor and heat sink assembly to a replacement compute node:
- Install the removed processor and heat sink assembly to the replacement compute node immediately after removal.
- Always protect an empty processor socket in a compute node with a socket cover.

Step 9. Repeat the previous step for the second processor and heat sink assembly (the front processor) if necessary.

Step 10. Remove one memory module at a time from the defective compute node (see "Remove a memory module" on page 144), and immediately install it into the same memory module slot in the replacement compute node (see "Install a memory module" on page 145) until all the memory modules are transferred.

Step 11. If a M.2 backplane has been installed in the compute node, remove it (see "Remove the M.2 backplane" on page 162) and install it in the replacement compute node (see "Install the M.2 backplane" on page 163).

Step 12. If a TCM/TPM has been installed in the compute node, remove it from the compute node (see "Remove the Trusted Cryptographic Module (TCM)" on page 77), and install it in the replacement compute node (see "Install the Trusted Cryptographic Module (TCM)" on page 78).

Step 13. If a RAID adapter has been removed, install it in the replacement compute node (see "Install a RAID adapter into the compute node" on page 177).

Step 14. If a KVM breakout module has been removed, install it in the replacement compute node (see "Install the KVM breakout module" on page 158).

Step 15. Route and connect all cables transferred in previous steps (see "Internal cable routing" on page 41).

Step 16. Install the air baffle in the replacement compute node (see "Install the air baffle" on page 137).

Note: For proper cooling and airflow, make sure to install the air baffle. Operating the node with the air baffle removed might lead to component damage.

Step 17. Install the component removed in step 1:

Compute node cover:

a. Install the original node cover to the replacement unit.

b. Install the replacement unit cover to the defective unit and return it to Lenovo. Make sure to follow all packaging instructions, and use any packaging materials for shipping that are supplied to you.

See "Install the compute node cover" on page 142.

PCIe expansion node:

a. Install the PCIe expansion node that was removed earlier to the replacement compute node (see "Install the PCIe expansion node to a compute node" on page 205).

After replacing the compute node:

1. Install the compute node or compute-expansion node assembly into the enclosure (see "Install a compute node in the enclosure" on page 69 or "Install the compute-expansion node assembly into the enclosure" on page 80).

2. Update the machine type and serial number with new vital product data (VPD). Use the Lenovo XClarity Provisioning Manager to update the machine type and serial number. See "Update the machine type and serial number" on page 71.

3. Enable Trusted Platform Module/Transmission Control Module (TPM/TCM). See "Enable TPM/TCM" on page 73.

4. Optionally, enable Secure Boot.

5. Update the compute node configuration.

- Download and install the latest device drivers: http://datacentersupport.lenovo.com

- Update the system firmware (see "Firmware updates" on page 12).

- Update the UEFI configuration.

- Reconfigure the disk arrays if you have installed or removed a hot-swap drive or a RAID adapter. See the Lenovo XClarity Provisioning Manager User Guide, which is available for download at: http://datacentersupport.lenovo.com

6. If you are planning to recycle the compute node, follow the instruction in "Disassemble the compute node for recycle" on page 241 for compliance with local regulations.

Important: Before returning the defective compute node, make sure that a socket cover is securely attached to each empty processor socket and the cover was re-installed over the defective node.

Install a compute node in the enclosure

Use this procedure to install a compute node in the D2 Enclosure.

Note: If one or more sets of shared PCIe dual adapters are installed in the enclosure, it requires the completion of initialization of the nodes with the primary adapter to power on the nodes with the corresponding auxiliary adapter.

Before you install the compute node in a enclosure:

1. Read the following section(s) to ensure that you work safely.

   - "Safety" on page iii
   - "Installation Guidelines" on page 61

Attention: Be careful when you are removing or installing the node to avoid damaging the node connectors.
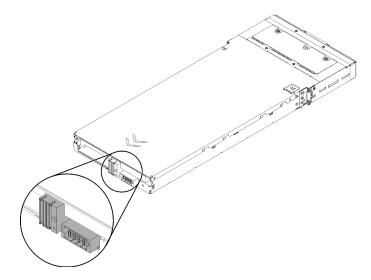
Figure 58. Node connectors

Complete the following steps to install the compute node in a enclosure.
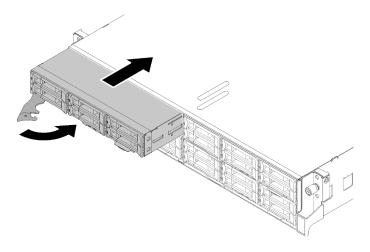
Figure 59. Node installation

Step 1. Select the node bay.

> **Note:** If you are reinstalling a compute node that you removed, you must install it in the same node bay from which you removed it. Some compute node configuration information and update options are established according to node bay number. Reinstalling a compute node into a different node bay can have unintended consequences. If you reinstall the compute node into a different node bay, you might have to reconfigure the compute node.

Step 2. Make sure that the front handle on the compute node is in the fully open position.

Step 3. Slide the compute node into the node bay until it stops.

Step 4. Rotate the compute node handle to the fully closed position until the handle latch clicks.

> **Note:** The time required for a compute node to initialize varies by system configuration. The power LED flashes rapidly; the power button on the compute node will not respond until the power LED flashes slowly, indicating that the initialization process is complete.

After you install a compute node, complete the following steps:

1. Check the power LED to make sure it transitions between fast blink and slow blink to indicate the node is ready to be powered on; then, power on the node.

2. Make sure that the power LED on the compute node control panel is lit continuously, indicating that the compute node is receiving power and is turned on.

3. If you have other compute nodes to install, do so now.

4. If this is the initial installation of the node in the enclosure, you must configure the node through the Lenovo XClarity Provisioning Manager and install the node operating system. See https://sysmgt.lenovofiles.com/help/topic/LXPM/os_installation.html for more details.

5. If compute node access over local console is not available:

   a. Access Lenovo XClarity Controller web interface (see https://sysmgt.lenovofiles.com/help/topic/com.lenovo.systems.management.xcc.doc/dw1lm_c_accessingtheimmwebinterface.html).

   b. Set up Lenovo XClarity Controller network connection through Lenovo XClarity Provisioning Manager (see https://sysmgt.lenovofiles.com/help/topic/com.lenovo.systems.management.xcc.doc/dw1lm_t_settinguptheimmnetworkconnection.html).

   c. Log in to Lenovo XClarity Controller (see https://sysmgt.lenovofiles.com/help/topic/com.lenovo.systems.management.xcc.doc/dw1lm_t_loggingintotheimm.html).

6. If you have changed the configuration of the compute node or if you are installing a different compute node from the one that you removed, you must configure the compute node through the Setup utility,

and you might have to install the compute node operating system, see "System Configuration" in *Setup Guide* for more details.

7. If you are installing a different compute node from the one that you removed, update the machine type and serial number with new vital product data (VPD). Use the Lenovo XClarity Provisioning Manager to update the machine type and serial number. See .

8. You can place identifying information on the pull out label tab that are accessible from the front of the node.

Demo video

[Watch the procedure on YouTube](#)

Update the machine type and serial number

After the system board is replaced by trained service technicians, the machine type and serial number must be updated.

There are two methods available to update the machine type and serial number:

- From Lenovo XClarity Provisioning Manager

  To update the machine type and serial number from Lenovo XClarity Provisioning Manager:

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

  2. If the power-on Administrator password is required, enter the password.

  3. From the System Summary page, click **Update VPD**.

  4. Update the machine type and serial number.

- From Lenovo XClarity Essentials OneCLI

  Lenovo XClarity Essentials OneCLI sets the machine type and serial number in the Lenovo XClarity Controller. Select one of the following methods to access the Lenovo XClarity Controller and set the machine type and serial number:

  – Operate from the target system, such as LAN or keyboard console style (KCS) access

  – Remote access to the target system (TCP/IP based)

  To update the machine type and serial number from Lenovo XClarity Essentials OneCLI:

  1. Download and install Lenovo XClarity Essentials OneCLI.

     To download Lenovo XClarity Essentials OneCLI, go to the following site:

     https://datacentersupport.lenovo.com/solutions/HT116433

  2. Copy and unpack the OneCLI package, which also includes other required files, to the server. Make sure that you unpack the OneCLI and the required files to the same directory.

  3. After you have Lenovo XClarity Essentials OneCLI in place, type the following commands to set the machine type and serial number:
     ```
     onecli config set SYSTEM_PROD_DATA.SysInfoProdName <m/t_model> [access_method]
     onecli config set SYSTEM_PROD_DATA.SysInfoSerialNum <s/n> [access_method]
     onecli config set SYSTEM_PROD_DATA.SysInfoProdIdentifier <system model> [access_method]
     onecli config set SYSTEM_PROD_DATA.SysInfoProdIdentifierEx <system model> --override [access_method]
     ```

     Where:

     <m/t_model>

The server machine type and model number. Type `xxxxyyyyyy`, where *xxxx* is the machine type and *yyyyyy* is the server model number.

<s/n>
The serial number on the server. Type `zzzzzzzz` (length 8-10 characters), where *zzzzzzzz* is the serial number.

<system model>
The system model. Type `system yyyyyyyy`, where *yyyyyyyy* is the product identifier.

[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>
  onecli config set SYSTEM_PROD_DATA.SysInfoProdIdentifier <system model> --bmc-username xcc_user_
  id --bmc-password xcc_password
  onecli config set SYSTEM_PROD_DATA.SysInfoProdIdentifierEx <system model> --override --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>
  onecli config set SYSTEM_PROD_DATA.SysInfoProdIdentifier <system model>
  onecli config set SYSTEM_PROD_DATA.SysInfoProdIdentifierEx <system model> --override
  ```

  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>
```

```
onecli config set SYSTEM_PROD_DATA.SysInfoProdIdentifier <system model> --bmc xcc_user_id:xcc_
password@xcc_external_ip
onecli config set SYSTEM_PROD_DATA.SysInfoProdIdentifierEx <system model> --override --bmc xcc_
user_id:xcc_password@xcc_external_ip
```

4. Reset the Lenovo XClarity Controller to the factory defaults. See "Resetting the BMC to Factory Default" section in the XCC documentation compatible with your server at https://pubs.lenovo.com/lxcc-overview/.

Enable TPM/TCM

The solution supports Trusted Platform Module (TPM), Version 1.2 or Version 2.0

Note: For customers in the People's Republic of China, TPM is not supported. However, customers in the People's Republic of China can install a Trusted Cryptographic Module (TCM) adapter (sometimes called a daughter card).

When a system board is replaced, you must make sure that the TPM/TCM policy is set correctly.

CAUTION:
Take special care when setting the TPM/TCM policy. If it is not set correctly, the system board can become unusable.

Set the TPM policy

By default, a replacement system board is shipped with the TPM policy set to **undefined**. You must modify this setting to match the setting that was in place for the system board that is being replaced.

There are two methods available to set the TPM policy:

• From Lenovo XClarity Provisioning Manager

 To set the TPM policy from Lenovo XClarity Provisioning Manager:

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

 2. If the power-on Administrator password is required, enter the password.

 3. From the System Summary page, click **Update VPD**.

 4. Set the policy to one of the following settings.

 – **NationZ TPM 2.0 enabled - China only**. Customers in the Chinese Mainland should choose this setting if a NationZ TPM 2.0 adapter is installed.

 – **TPM enabled - ROW**. Customers outside of the Chinese Mainland should choose this setting.

 – **Permanently disabled**. Customers in the Chinese Mainland should use this setting if no TPM adapter is installed.

 Note: Although the setting **undefined** is available as a policy setting, it should not be used.

• From Lenovo XClarity Essentials OneCLI

 Note: Please note that a Local IPMI user and password must be setup in Lenovo XClarity Controller for remote accessing to the target system.

 To set the TPM policy from Lenovo XClarity Essentials OneCLI:

1. Read TpmTcmPolicyLock to check whether the TPM_TCM_POLICY has been locked:
   `OneCli.exe config show imm.TpmTcmPolicyLock --override --imm <userid>:<password>@<ip_address>`

   Note: The imm.TpmTcmPolicyLock value must be 'Disabled', which means TPM_TCM_POLICY is NOT locked and changes to the TPM_TCM_POLICY are permitted. If the return code is 'Enabled' then no changes to the policy are permitted. The planar may still be used if the desired setting is correct for the system being replaced.

2. Configure the TPM_TCM_POLICY into XCC:

   – For customers in Chinese Mainland with no TPM, or customers that require to disable TPM:
     `OneCli.exe config set imm.TpmTcmPolicy "NeitherTpmNorTcm" --override --imm <userid>:<password>@<ip_address>`

   – For customers in Chinese Mainland that require to enable TPM:
     `OneCli.exe config set imm.TpmTcmPolicy "NationZTPM20Only" --override --imm <userid>:<password>@<ip_address>`

   – For customers outside Chinese Mainland that require to enable TPM:
     `OneCli.exe config set imm.TpmTcmPolicy "TpmOnly" --override --imm <userid>:<password>@<ip_address>`

3. Issue reset command to reset system:
   `OneCli.exe misc ospower reboot --imm <userid>:<password>@<ip_address>`

4. Read back the value to check whether the change has been accepted:
   `OneCli.exe config show imm.TpmTcmPolicy --override --imm <userid>:<password>@<ip_address>`

   Notes:

   – If the read back value is matched it means the TPM_TCM_POLICY has been set correctly.

     imm.TpmTcmPolicy is defined as below:

     – Value 0 use string "Undefined" , which means UNDEFINED policy.

     – Value 1 use string "NeitherTpmNorTcm", which means TPM_PERM_DISABLED.

     – Value 2 use string "TpmOnly", which means TPM_ALLOWED.

     – Value 4 use string "NationZTPM20Only", which means NationZ_TPM20_ALLOWED.

   – Below 4 steps must also be used to 'lock' the TPM_TCM_POLICY when using OneCli/ASU commands:

5. Read TpmTcmPolicyLock to check whether the TPM_TCM_POLICY has been locked , command as below:
   `OneCli.exe config show imm.TpmTcmPolicyLock --override --imm <userid>:<password>@<ip_address>`

   The value must be 'Disabled', it means TPM_TCM_POLICY is NOT locked and must be set.

6. Lock the TPM_TCM_POLICY:
   `OneCli.exe config set imm.TpmTcmPolicyLock "Enabled"--override --imm <userid>:<password>@<ip_address>`

7. Issue reset command to reset system, command as below:
   `OneCli.exe misc ospower reboot --imm <userid>:<password>@<ip_address>`

   During the reset, UEFI will read the value from imm.TpmTcmPolicyLock, if the value is 'Enabled' and the imm.TpmTcmPolicy value is valid, UEFI will lock the TPM_TCM_POLICY setting.

   Note: The valid values for imm.TpmTcmPolicy include 'NeitherTpmNorTcm', 'TpmOnly', and 'NationZTPM20Only'.

   If the imm.TpmTcmPolicyLock is set as 'Enabled' but imm.TpmTcmPolicy value is invalid, UEFI will reject the 'lock' request and change imm.TpmTcmPolicyLock back to 'Disabled'.

8. Read back the value to check whether the 'Lock' is accepted or rejected. Command as below:
   `OneCli.exe config show imm.TpmTcmPolicy --override --imm <userid>:<password>@<ip_address>`

Note: If the read back value is changed from 'Disabled' to 'Enabled' that means the TPM_TCM_POLICY has been locked successfully. There is no method to unlock a policy once it has been set other than replacing system board.

imm.TpmTcmPolicyLock is defined as below:

Value 1 uses string "Enabled" , which means lock the policy. Other values are not accepted.

Assert Physical Presence

Before you can assert Physical Presence, the Physical Presence Policy must be enabled. By default, the Physical Presence Policy is enabled with a timeout of 30 minutes.

There are two ways to assert the Physical Presence:

1. If the Physical Presence Policy is enabled, you can assert Physical Presence through the Lenovo XClarity Provisioning Manager or through the Lenovo XClarity Controller.

2. Switch the hardware jumpers on the system board.

Notes: If the Physical Presence Policy has been disabled:

1. Set the hardware Physical Presence jumper on the system board to assert Physical Presence.

2. Enable the Physical Presence Policy using either F1 (UEFI Settings) or Lenovo XClarity Essentials OneCLI.

Assert Physical Presence through the Lenovo XClarity Controller

Complete the following steps to assert Physical Presence through the Lenovo XClarity Controller:

1. Log in to the Lenovo XClarity Controller interface.

   For information about logging in to the Lenovo XClarity Controller, see the "Opening and Using the XClarity Controller Web Interface" section in the XCC documentation version compatible with your server at https://pubs.lenovo.com/lxcc-overview/.

2. Click **BMC Configuration ➙ Security** and verify that Physical Presence is set to **assert**.

Assert Physical Presence through the hardware

You can also assert hardware Physical Presence through the use of a jumper on the system board. For more information about asserting hardware Physical Presence through the use of a jumper, see "System-board switches" on page 30.

Set the TPM version

To be able to set the TPM version, Physical Presence must be asserted.

The Lenovo XClarity Provisioning Manager or the Lenovo XClarity Essentials OneCLI can be used to set the TPM version.

To set the TPM version:

1. Download and install Lenovo XClarity Essentials OneCLI.

   a. Go to http://datacentersupport.lenovo.com and navigate to the support page for your server.

   b. Click **Drivers & Software**.

   c. Navigate to the version of Lenovo XClarity Essentials OneCLI for your operating system and download the package.

2. Run the following command to set the TPM version:

   Note: You can change the TPM version from 1.2 to 2.0 and back again. However, you can toggle between versions a maximum of 128 times.

To set the TPM version to version 2.0:
```
OneCli.exe config set TrustedComputingGroup.DeviceOperation "Update to TPM2.0 compliant"
         --bmc userid:password@ip_address
```

To set the TPM version to version 1.2:
```
OneCli.exe config set TrustedComputingGroup.DeviceOperation "Update to TPM1.2 compliant"
         --bmc userid:password@ip_address
```

where:

- *<userid>:<password>* are the credentials used to access the BMC (Lenovo XClarity Controller interface) of your server. The default user ID is USERID, and the default password is PASSW0RD (zero, not an uppercase o)

- *<ip_address>* is the IP address of the BMC.

For more information about the Lenovo XClarity Essentials OneCLI `set` command, see:

https://pubs.lenovo.com/lxce-onecli/onecli_r_set_command

3. Alternatively, you can use the following Advanced Settings Utility (ASU) commands:

To set the TPM version to version 2.0:
```
asu64 set TPMVersion.TPMVersion "Update to TPM2.0 compliant" --host <ip_address>
         --user <userid> --password <password>  --override
```

To set the TPM version to version 1.2:
```
asu64 set TPMVersion.TPMVersion "Update to TPM1.2 compliant" --host <ip_address>
         --user <userid> --password <password>  --override
```

where:

- *<userid>* and *<password>* are the credentials used to the BMC (Lenovo XClarity Controller interface) of your server. The default user ID is USERID, and the default password is PASSW0RD (zero, not an uppercase o)

- *<ip_address>* is the IP address of the BMC.

Enable UEFI Secure Boot
Optionally, you can enable UEFI Secure Boot.

There are two methods available to enable UEFI Secure Boot:

- From Lenovo XClarity Provisioning Manager

  To enable UEFI Secure Boot from Lenovo XClarity Provisioning Manager:

  1. Start the server and press the key specified in the on-screen instructions to display the Lenovo XClarity Provisioning Manager interface. (For more information, see the "Startup" section in the LXPM documentation compatible with your server at https://pubs.lenovo.com/lxpm-overview/.)

  2. If the power-on Administrator password is required, enter the password.

  3. From the UEFI Setup page, click **System Settings ➙ Security ➙ Secure Boot**.

  4. Enable Secure Boot and save the settings.

- From Lenovo XClarity Essentials OneCLI

  To enable UEFI Secure Boot from Lenovo XClarity Essentials OneCLI:

  1. Download and install Lenovo XClarity Essentials OneCLI.

     To download Lenovo XClarity Essentials OneCLI, go to the following site:

     https://datacentersupport.lenovo.com/solutions/HT116433

  2. Run the following command to enable Secure Boot:

```
OneCli.exe config set SecureBootConfiguration.SecureBootSetting Enabled --bmc <userid>:<password>@<ip_
```
address>

where:

- – *<userid>:<password>* are the credentials used to access the BMC (Lenovo XClarity Controller interface) of your server. The default user ID is USERID, and the default password is PASSW0RD (zero, not an uppercase o)
- – *<ip_address>* is the IP address of the BMC.

For more information about the Lenovo XClarity Essentials OneCLI `set` command, see:

https://pubs.lenovo.com/lxce-onecli/onecli_r_set_command

Note: If disabling UEFI secure boot is needed, run the following command:
```
OneCli.exe config set SecureBootConfiguration.SecureBootSetting Disabled --bmc <userid>:<password>@<ip_
```
address>

Trusted Cryptographic Module (TCM) replacement

Use the following procedures to remove and install the Trusted Cryptographic Module (TCM) .

Remove the Trusted Cryptographic Module (TCM)

Use this information to remove the Trusted Cryptographic Module (TCM).

Before you remove the Trusted Cryptographic Module (TCM):

1. Read the following section(s) to ensure that you work safely.

   - "Safety" on page iii
   - "Installation Guidelines" on page 61

2. Turn off the corresponding compute node that you are going to perform the task on.

3. Remove the compute node (see "Remove a compute node from the enclosure" on page 65).

4. Remove the compute node cover (see "Remove the compute node cover" on page 141).

Attention:

- TCM is the unique component for the nodes that are sold in China.
- When the TCM is removed, all TCM functions will be disabled.

Complete the following steps to remove TCM.
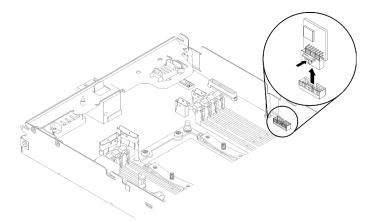
Figure 60. TCM removal

Step 1. Locate the TCM connector on the system board (see).

Step 2. Carefully hold the TCM by its edges; then, gently press on the latch, and lift it from the system board.

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

Demo video

Watch the procedure on YouTube

Install the Trusted Cryptographic Module (TCM)
Use this information to install the Trusted Cryptographic Module (TCM).

Before you install the Trusted Cryptographic Module (TCM):
  1. Read the following section(s) to ensure that you work safely.
      • "Safety" on page iii
      • "Installation Guidelines" on page 61
  2. Turn off the corresponding compute node that you are going to perform the task on.
  3. Remove the compute node (see).
  4. Remove the compute node cover (see).

Attention:

• TCM is the unique component for the nodes that are sold in China.

• When the TCM is removed, all TCM functions will be disabled.

Complete the following steps to install the TCM.

Figure 61. TCM installation

Step 1. Touch the static-protective package that contains the TCM to any *unpainted* metal surface on the chassis or any *unpainted* metal surface on any other grounded rack component; then, remove the TCM from the package.

Step 2. Carefully hold the TCM by its edges and insert it into the TCM connector on the system board.

After you install the TCM, complete the following steps:

1. If the air baffle is removed, reinstall it (see "Install the air baffle" on page 137).
2. Reinstall the compute node cover (see "Install the compute node cover" on page 142).
3. Reinstall the compute node (see "Install a compute node in the enclosure" on page 69).
4. Check the power LED to make sure it transitions between fast blink and slow blink to indicate the node is ready to be powered on.

Demo video

Watch the procedure on YouTube

Compute-expansion node assembly replacement

Use the following procedures to remove or install the PCIe expansion node assembly from or to the enclosure.

Remove the compute-expansion node assembly from the enclosure

Use this procedure to remove the compute-expansion node assembly from the enclosure.

Attention: Unauthorized personnel should not remove or install the nodes. Only trained or service-related personnel are admitted to perform such actions.

Before you remove the PCIe expansion node assembly from the enclosure:
1. Read the following section(s) to ensure that you work safely.

   - "Safety" on page iii
   - "Installation Guidelines" on page 61

2. When you remove the compute-expansion node assembly, note the node bay numbers and make sure to reinstall it back to the original bays. Installing it into different node bays from the original can lead to unexpected consequences, as some configuration information and update options are established according to node bay number. If you reinstall the compute-expansion node assembly into different node bays, you might have to reconfigure the reinstalled compute node. One way to track the node assembly is via the serial number of the compute node.

   Note: The serial number is located on the pull-out tab of each compute node.

Complete the following steps to remove the PCIe expansion node assembly from the enclosure.

Step 1.   Release and rotate the two front handles as shown in the illustration.
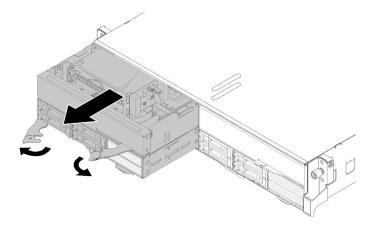
Figure 62. Compute-expansion node assembly removal

Attention: To maintain proper system cooling, do not operate the enclosure without a compute node or node bay filler installed in each node bay.

Step 2.   Slide the node assembly out about 12 inches (300 mm); then, grip the node assembly with both hands and remove it from the enclosure.

Step 3.   If the enclosure is powered on with nodes in the other two bays, it is critical for proper cooling that you install two nodes or node fillers in the empty bays within 1 minute.

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

Install the compute-expansion node assembly into the enclosure

Use this procedure to install a compute-expansion node assembly into the enclosure.

Before you install the compute-expansion node assembly into the enclosure:

1. Read the following section(s) to ensure that you work safely.

   - "Safety" on page iii
   - "Installation Guidelines" on page 61

2. Install the PCIe expansion node to the compute node (see "Install the PCIe expansion node to a compute node" on page 205).

Attention: When removing or installing the node assembly, be careful not to damage the node connectors.
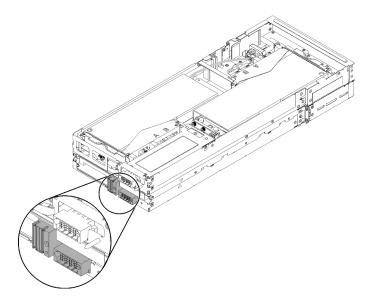
Figure 63. Connectors on the compute-expansion node assembly

Complete the following steps to install the PCIe expansion node assembly into the enclosure.

Step 1.   Select two empty bays vertically adjacent to each other for installation.
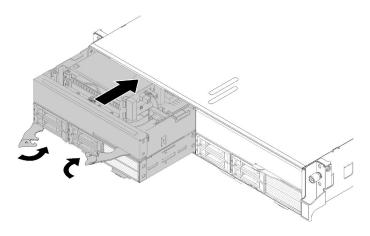
Figure 64. PCIe expansion node installation into the enclosure

Notes:

1. When reinstalling a compute-expansion node assembly removed previously, be sure to install it into the exact same node bays. Some compute node configuration information and update options are established according to node bay number, and reinstalling a compute node into a different node bay can lead to unexpected consequences. If you reinstall the compute-expansion node assembly into different node bays, you might have to reconfigure the installed compute node.

2. When a compute-expansion node assembly is installed in an enclosure, the other two node bays in the same enclosure must be installed with either one compute-expansion node assembly or two node fillers.

Step 2. Make sure that the front handles of the compute node are in the fully open position.

Step 3. Slide the compute-expansion node assembly into the node bays until it stops.

Step 4. Rotate the compute node handles to the fully closed position with two hands until both the handle latches click into place.

Note: The time required for a node to initialize varies by system configuration. The power LED flashes rapidly; the power button on the compute node will not respond until the power LED flashes slowly, indicating that the initialization process is complete.

After you install the compute-expansion node assembly to the enclosure, complete the following steps:

1. Check the power LED to make sure it transitions between fast blink and slow blink to indicate the node is ready to be powered on; then, power on the node.

2. Make sure that the power LED on the compute node control panel is lit continuously, indicating that the compute node is receiving power and is turned on.

3. If you have other compute nodes to install, do so now.

4. If this is the initial installation of the node in the enclosure, you must configure the node through the Lenovo XClarity Provisioning Manager and install the node operating system. See https://sysmgt.lenovofiles.com/help/topic/LXPM/os_installation.html for more details.

5. If compute node access over local console is not available:

   a. Access Lenovo XClarity Controller web interface (see https://sysmgt.lenovofiles.com/help/topic/com.lenovo.systems.management.xcc.doc/dw1lm_c_accessingtheimmwebinterface.html).

   b. Set up Lenovo XClarity Controller network connection through Lenovo XClarity Provisioning Manager (see https://sysmgt.lenovofiles.com/help/topic/com.lenovo.systems.management.xcc.doc/dw1lm_t_settinguptheimmnetworkconnection.html).

c. Log in to Lenovo XClarity Controller (see https://sysmgt.lenovofiles.com/help/topic/com.lenovo.systems.management.xcc.doc/dw1lm_t_loggingintotheimm.html).

6. If you have changed the configuration of the compute node or if you are installing a different compute node from the one that you removed, you must configure the compute node through the Setup utility, and you might have to install the compute node operating system, see "System Configuration" in *Setup Guide* for more details.

7. If you are installing a different compute node from the one that you removed, update the machine type and serial number with new vital product data (VPD). Use the Lenovo XClarity Provisioning Manager to update the machine type and serial number. See "Update the machine type and serial number" on page 71.

8. You can place identifying information on the pull out label tab that are accessible from the front of the node.

EIOM replacement

Use the following procedures to remove and install the EIOM.

Remove the EIOM

Use this information to remove the EIOM.

Before you remove the EIOM:

1. Read the following section(s) to ensure that you work safely.

   - "Safety" on page iii
   - "Installation Guidelines" on page 61

2. Power off all the compute nodes and peripheral devices (see "Power off the compute node" on page 16).

3. Disengage all the compute nodes from the enclosure.

4. Disconnect the power cords and all external cables from the rear of the enclosure.

5. If the cable management arm is installed, remove it (see "Remove the cable management arm" on page 64).

6. Remove the shuttle (see "Remove the shuttle" on page 120) and place it on the stable work surface.

Complete the following steps to remove the EIOM.

- For 10GbE cage (SFP+) model
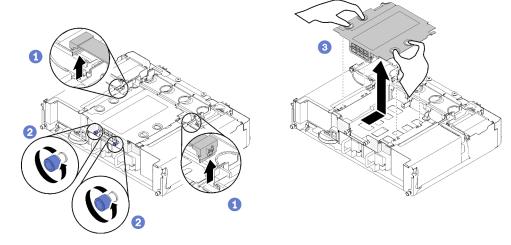
Figure 65. EIOM removal

- For 10GBASE-T cage (RJ-45) model
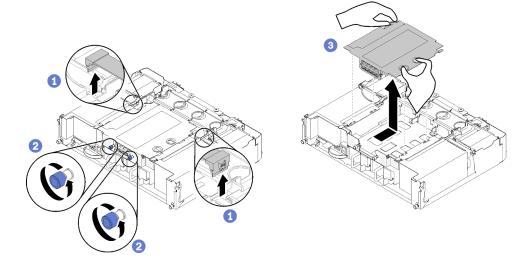
Figure 66. EIOM removal

- For EIOM filler
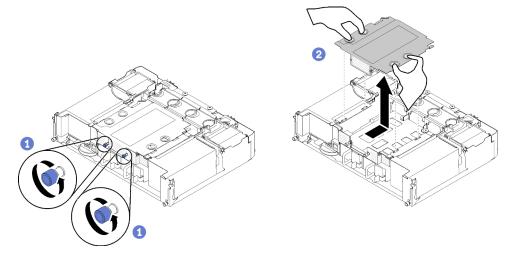
Figure 67. EIOM filler removal

Step 1. Disconnect two cables from the EIOM. (Skip this step for the EIOM filler)

> **Note:** Make sure you push the release latch only when disconnecting the signal cable.

Step 2. Turn the thumbscrews counterclockwise.

Step 3. Grasp and push the EIOM slightly towards the front side of the shuttle.

Step 4. Lift the EIOM up to remove the EIOM from the shuttle.

After removing the EIOM:

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

Demo video

Watch the procedure on YouTube

Install the EIOM

Use this information to install the EIOM.

Before you install the EIOM:

1. Read the following section(s) to ensure that you work safely.

   - "Safety" on page iii
   - "Installation Guidelines" on page 61

2. Turn off the server and peripheral devices and disconnect the power cords and all external cables (see "Power off the compute node" on page 16).

3. Disengage all the compute nodes from the enclosure.

4. If the cable management arm is installed, remove it (see "Remove the cable management arm" on page 64).

5. Remove the shuttle (see "Remove the shuttle" on page 120) and place it on the stable work surface.

Note: The minimum networking speed requirement for the EIOM is 1Gbps.

Complete the following steps to install the EIOM.

Step 1. Grasp the EIOM and align the four EIOM tabs with the slots in the shuttle; then, lower the EIOM into the slots.

- For 10GbE cage (SFP+) model
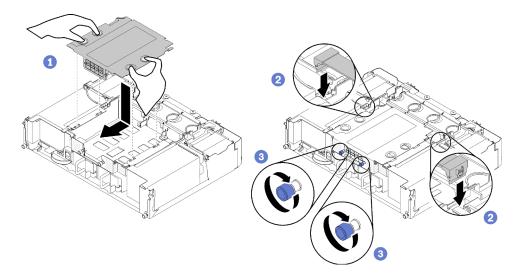
Figure 68. EIOM installation

- For 10GBASE-T cage (RJ-45) model
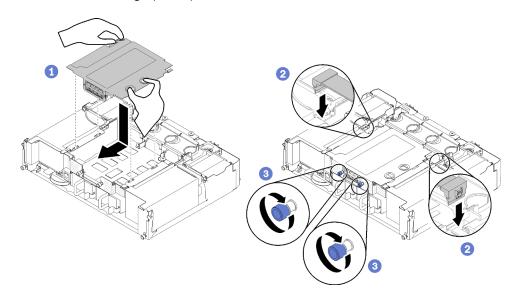
Figure 69. EIOM installation

- For EIOM filler
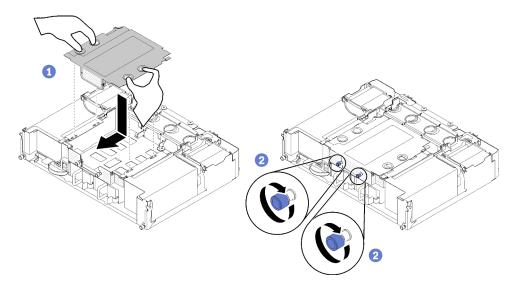
Figure 70. EIOM filler removal

Step 2.   Pull the EIOM slightly towards the rear side of the shuttle.

Step 3.   Connect required cables to the EIOM. (Skip this step for the EIOM filler)

Step 4.   Turn the thumbscrews clockwise.

After you install the EIOM, complete the following steps:

1. Reinstall the shuttle (see "Install the shuttle" on page 123).

2. If the cable management arm is removed, install it (see "Install the cable management arm" on page 64).

3. Reconnect the power cords and any cables that you removed.

4. Push all compute nodes back into the enclosure (see "Install a compute node in the enclosure" on page 69).

5. Turn on all compute nodes.

Demo video

Watch the procedure on YouTube

Fan replacement

Use the following procedures to remove and install a fan.

There are two types of fan in the solution:

- Three 60x60x56mm fans: Fan 2, 3 and 4
- Two 80x80x80mm fans: Fan 1 and 5
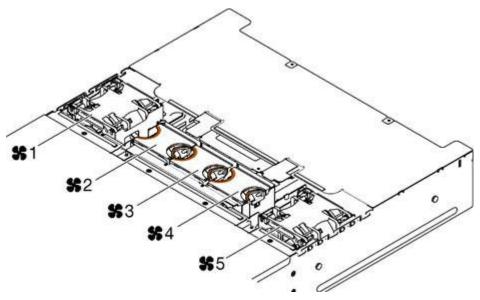
Figure 71. Numbering of fans

Remove a fan

Use this information to remove a fan in the enclosure.

To avoid possible danger, read and follow the following safety statement.

- **S017**

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

- **S033**

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

The following illustration shows locations of fan fault LEDs. When the LED is lit, it indicates the fan is having problems.
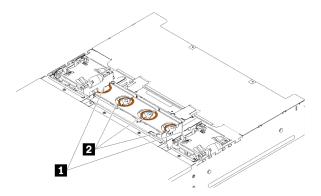
Figure 72. Fan fault LEDs

Table 46. Fan fault LEDs

1 80x80x80mm fan fault LEDs	**2** 60x60x56mm fan fault LEDs

Before removing a fan:

1. Read the following section(s) to ensure that you work safely.

   - "Safety" on page iii
   - "Installation Guidelines" on page 61

   Attention: Static electricity that is released to internal solution components when the solution is powered-on might cause the solution to halt, which might result in the loss of data. To avoid this potential problem, always use an electrostatic-discharge wrist strap or other grounding system when you work inside the solution with the power on.

2. Remove the fan cover (see "Remove the fan cover" on page 91).

   Note: Replace the failed fan and reinstall the fan cover in 3 minutes.

Complete the following steps to remove a fan.

Step 1. Remove the fan.

   - For a 60x60x56mm fan:

     Squeeze the fan release latches together, and then lift the fan out of the enclosure.
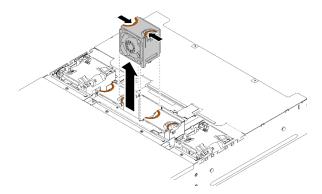
Figure 73. 60x60x56mm fan removal

   - For an 80x80x80mm fan:

     1. Carefully pull the cable out from underneath the sheet metal flange.

2. Disconnect the cable.

3. Grasp the fan and lift it out of the enclosure.
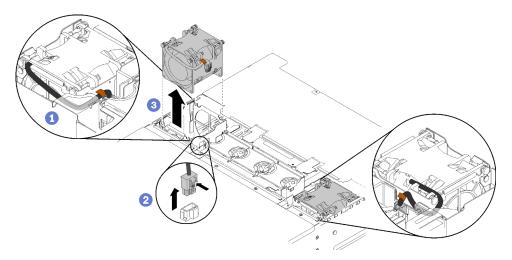
Figure 74. 80x80x80mm fan removal

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

Demo video

Watch the procedure on YouTube

Install a fan

Use this information to install a fan in the enclosure.

To avoid possible danger, read and follow the following safety statement.

- **S017**

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

- **S033**

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

Before you install a fan :

1. Read the following section(s) to ensure that you work safely.

- "Safety" on page iii
- "Installation Guidelines" on page 61

Attention: Static electricity that is released to internal solution components when the solution is powered-on might cause the solution to halt, which might result in the loss of data. To avoid this potential problem, always use an electrostatic-discharge wrist strap or other grounding system when you work inside the solution with the power on.

2. Remove the fan cover (see "Remove the fan cover" on page 91).

Note: Replace the failed fan and reinstall the fan cover in 3 minutes.

Complete the following steps to install a fan.

Step 1. Install the fan.

- For a 60x60x56mm fan:
  1. Lower the fan into the socket, and push it downward until it clicks into place.
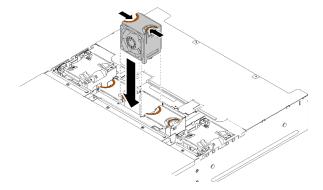
Figure 75. 60x60x56mm fan installation

- For an 80x80x80mm fan:
  1. Lower the fan into the socket, and push it downward until it clicks into place.
  2. Connect the power cable.
  3. Carefully route the cable underneath the flange and make sure the cable is routed through the notch.

  Note: Make sure the cable is routed in the proper location and no wire is stuck in the flange.
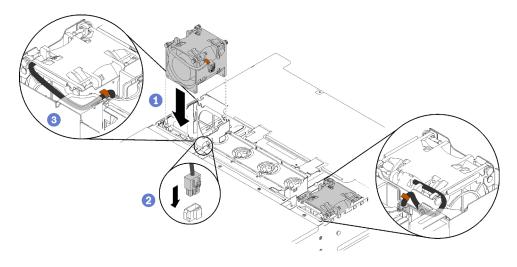
Figure 76. 80x80x80mm fan installation

After you install a fan, complete the following steps.

1. Reinstall the fan cover (see "Install the fan cover" on page 92).

Demo video

Watch the procedure on YouTube

Fan cover replacement

Use the following procedures to remove and install the fan cover.

Remove the fan cover

Use this information to remove the fan cover.

To avoid possible danger, read and follow the following safety statement.

- **S017**

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

- **S033**

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

Before you remove the fan cover:

1. Read the following section(s) to ensure that you work safely.

   - "Safety" on page iii
   - "Installation Guidelines" on page 61

2. Slide the enclosure out of the rack.

Complete the following steps to remove the fan cover.
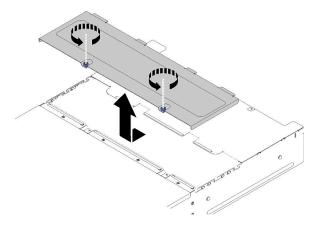
Figure 77. Fan cover removal

Step 1.   Turn the thumbscrews counterclockwise.

Step 2.   Push the fan cover slightly towards the front side of the enclosure; then, lift the cover up.

Step 3.   Lay the cover flat or store it for future use.

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

Demo video

Watch the procedure on YouTube

Install the fan cover

Use this information to install the fan cover.

To avoid possible danger, read and follow the following safety statement.

- **S017**

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

- **S033**

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

Before you install the fan cover:

1. Read the following section(s) to ensure that you work safely.

   - "Safety" on page iii
   - "Installation Guidelines" on page 61

2. Loosen the screws and slide the enclosure out of the rack.

Complete the following steps to install the fan cover.
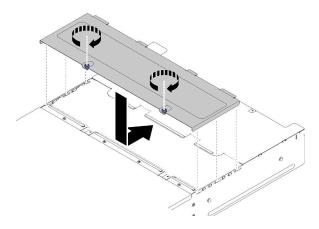
Figure 78. Fan cover installation

Step 1.   Orient the cover so that the posts on the inside of the cover slide into the slots on the enclosure.

Step 2.   Slide the fan cover forward to the closed position until it clicks into place.

Step 3.   Turn the thumbscrews clockwise.

Step 4.   To install a system service label (which needs to be ordered separately), align the label on the cover, remove the backing, and press the label on the cover.

After you install the fan cover, complete the following steps.

1. Push the enclosure into the rack and fasten the screws.

Demo video

Watch the procedure on YouTube

Hot-swap power supply replacement

Use the following procedures to remove and install the dongle a hot-swap power supply.

Remove a hot-swap power supply

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

To avoid possible danger, read and follow the following safety statement.

- **S001**

DANGER

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

- **S002**

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

- **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.

- **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.

Before you remove a hot-swap power supply:

1. Read the following section(s) to ensure that you work safely.

   - "Safety" on page iii
   - "Installation Guidelines" on page 61

2. Disconnect the power cords and all external cables (see "Power off the compute node" on page 16).

Complete the following steps to remove a hot-swap power supply.
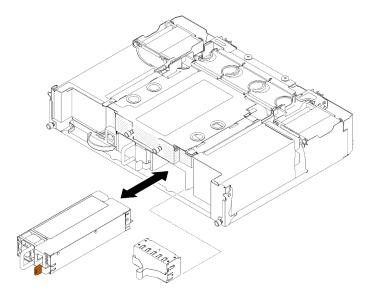
Figure 79. Hot-swap power supply removal

Step 1.   Disconnect the power cord from the connector on the back of the power supply.

Step 2.   Press and hold the orange release tab to the left.

Step 3.   Grasp the handle and pull the power supply out of the bay.

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

Demo video

Watch the procedure on YouTube

Install a hot-swap power supply

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

To avoid possible danger, read and follow the following safety statement.

- <u>**S001**</u>

$\triangle$**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.**

- 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.

Before you install a hot-swap power supply:

Notes:

1. Make sure the devices you are installing are supported. For a list of supported optional devices for the solution, see https://serverproven.lenovo.com/.

2. Do not install two power supply units with different wattages. Related information is available from the following:

- Read the label on top cover for maximum wattage output of installed power supply units. Only replace the existing units with those with the same wattage as marked on the label.

- Check the rear of the node to make sure there is no length difference between the two installed units. If there is visible difference in length, it means the two units come with different wattages, and one of them have to be replaced.

Complete the following steps to install a hot-swap power supply.
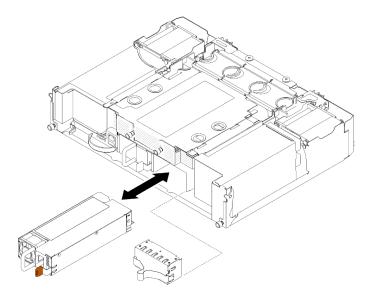
Figure 80. Hot-swap power supply installation

Step 1.   Slide the hot-swap power supply into the bay until the release latch clicks into place.

Important: During normal operation, each power-supply bay must contain either a power supply or power-supply filler panel for proper cooling.

Step 2.   Connect one end of the power cord for the new power supply into the AC connector on the back of the power supply; then, connect the other end of the power cord into a properly grounded electrical outlet.

Note: Connect the power cord to the power supply unit, and make sure it's properly connected to the power.

Step 3.   If the node is turned off, turn on the node.

Step 4.   Make sure that the ac power LED on the power supply is lit, indicating that the power supply is operating correctly. If the node is turned on, make sure that the dc power LED on the power supply is lit also.

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

1. Reconnect the power cords and any cables that you removed.
2. Turn on all compute nodes.

Demo video

Watch the procedure on YouTube

Low-profile PCIe x8 adapter replacement

Use the following procedures to remove and install a low-profile PCIe x8 adapter.

This solution supports up to eight PCIe x8 adapters. See the following tables for adapter location and slot number.

Table 47. Adapter location and corresponding slot number - Configuration 1

4-A (Node 4 Slot **6**)	4-B (Node 4 Slot **5**)	3-B (Node 3 slot 6)	3-A (Node 3 Slot 5)
2-A (Node 2 Slot 5)			1-A (Node 1 Slot 5)
2-B (Node 2 Slot 6)			1-B (Node 1 Slot 6)

Note: In this configuration, Node 4 comes with reverse slot order to Node 1 to 3.

Table 48. Adapter location and corresponding slot number - Configuration 2

4-B (Node 4 Slot **6**)	4-A (Node 4 Slot **5**)	3-B (Node 3 slot 6)	3-A (Node 3 Slot 5)
2-A (Node 2 Slot 5)			1-A (Node 1 Slot 5)
2-B (Node 2 Slot 6)			1-B (Node 1 Slot 6)

Note: In this configuration, Node 4 comes with the same slot order as Node 1 to 3.

Remove a low-profile PCIe x8 adapter

Use this information to remove a low-profile PCIe x8 adapter.

Before you remove a low-profile PCIe x8 adapter:

1. Read the following section(s) to ensure that you work safely.

   - "Safety" on page iii
   - "Installation Guidelines" on page 61

2. Power off all the compute nodes and peripheral devices (see "Power off the compute node" on page 16).

3. Disengage all the compute nodes from the enclosure.

4. Disconnect the power cords and all external cables from the rear of the enclosure.

5. If the cable management arm is installed, remove it (see "Remove the cable management arm" on page 64).

6. Remove the shuttle (see "Remove the shuttle" on page 120).

7. Locate the adapter.

4-A	4-B	3-B	3-A
2-A			1-A
2-B			1-B

Figure 81. Adapter location

Complete the following steps to remove a low-profile PCIe x8 adapter from the shuttle.
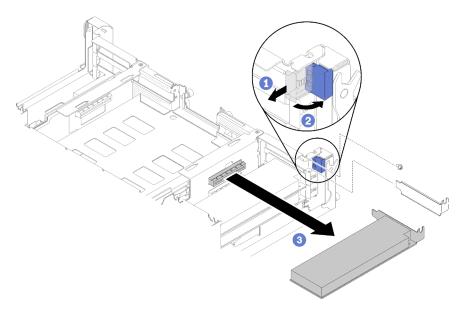
Figure 82. Adapter removal

Step 1.   Rotate the retention bracket to the open position.

Step 2.   Remove the screw if present.

Step 3.   Carefully grasp the adapter by its top edge or upper corners, and pull the adapter out of the shuttle.

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

Demo video

[Watch the procedure on YouTube](#)

Remove a low-profile PCIe x8 adapter in PCIe slot 3-B and 4-B
Use this information to remove a low-profile PCIe x8 adapter in PCIe slot 3-B and 4-B.

Before you remove a low-profile PCIe x8 adapter in PCIe slot 3-B and 4-B:

1. Read the following section(s) to ensure that you work safely.

   - "Safety" on page iii
   - "Installation Guidelines" on page 61

2. Power off all the compute nodes and peripheral devices (see "Power off the compute node" on page 16).

3. Disengage all the compute nodes from the enclosure.

4. Disconnect the power cords and all external cables from the rear of the enclosure.

5. If the cable management arm is installed, remove it (see "Remove the cable management arm" on page 64).

6. Remove the shuttle (see "Remove the shuttle" on page 120).

7. Remove the EIOM card (see "Remove the EIOM" on page 82).

8. Locate the adapter.

4-A	4-B	3-B	3-A
2-A			1-A
2-B			1-B

Figure 83. Adapter location

Complete the following steps to remove a low-profile PCIe x8 adapter in PCIe slot 3-B and 4-B.
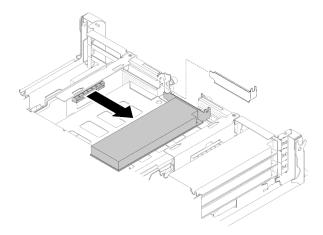
Figure 84. Adapter removal

Step 1.   Carefully grasp the adapter by its top edge or upper corners, and pull the adapter out of the shuttle.

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

Install a low-profile PCIe x8 adapter

Use this information to install a low-profile PCIe x8 adapter.

Before you install a low-profile PCIe x8 adapter:

1. Read the following section(s) to ensure that you work safely.

   - "Safety" on page iii
   - "Installation Guidelines" on page 61

2. Power off all the compute nodes and peripheral devices (see "Power off the compute node" on page 16).

3. Disengage all the compute nodes from the enclosure.

4. Disconnect the power cords and all external cables from the rear of the enclosure.

5. If the cable management arm is installed, remove it (see "Remove the cable management arm" on page 64).

6. Remove the shuttle from the enclosure (see "Remove the shuttle" on page 120).

7. Locate the adapter.

4-A	4-B	3-B	3-A
2-A			1-A
2-B			1-B

Figure 85. Adapter location

8. Touch the static-protective package that contains the adapter to any unpainted metal surface on the solution; then, remove the adapter from the package.

9. Place the adapter, component side up, on a flat, static-protective surface and set any jumpers or switches as described by the adapter manufacturer.

Complete the following steps to install a low-profile PCIe x8 adapter.
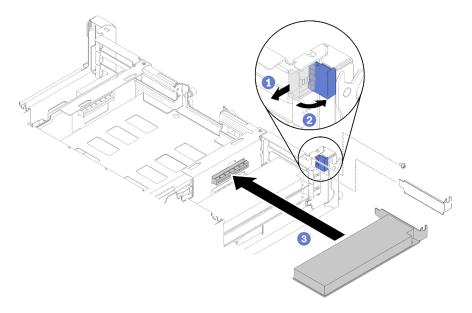
Figure 86. Adapter installation

Step 1. Slide the retention bracket forward and rotate it to the open position.

Step 2. Remove screw (if necessary).

Step 3. Slide the expansion-slot cover out of the shuttle.

Step 4. Align the adapter with the PCI connector on the shuttle and press the adapter firmly into the PCI connector on the shuttle.

Step 5. Rotate the retention bracket and slide toward the rear of the shuttle to the close position.

Step 6. Fasten the screw if necessary.

> **Note:** Fasten the screw if the solution is under vibration environment or you plan to transport the solution.

After you install a low-profile PCIe x8 adapter, complete the following steps.

1. Reinstall the shuttle (see "Install the compute node cover" on page 142).

2. If the cable management arm is removed, install it (see "Install the cable management arm" on page 64).

3. Reconnect the power cords and any cables that you removed.

4. Push all compute nodes back into the enclosure (see "Install a compute node in the enclosure" on page 69).

5. Turn on all compute nodes.

Demo video

Watch the procedure on YouTube

Install a low-profile PCIe x8 adapter in PCIe slot 3-B and 4-B

Use this information to install a low-profile PCIe x8 adapter in PCIe slot 3-B and 4-B.

Before you install a low-profile PCIe x8 adapter in PCIe slot 3-B and 4-B:

1. Read the following section(s) to ensure that you work safely.
   - "Safety" on page iii
   - "Installation Guidelines" on page 61
2. Power off all the compute nodes and peripheral devices (see "Power off the compute node" on page 16).
3. Disengage all the compute nodes from the enclosure.
4. Disconnect the power cords and all external cables from the rear of the enclosure.
5. If the cable management arm is installed, remove it (see "Remove the cable management arm" on page 64).
6. Remove the shuttle (see "Remove the shuttle" on page 120).
7. Remove the EIOM card (see "Remove the EIOM" on page 82).
8. Touch the static-protective package that contains the adapter to any unpainted metal surface on the solution; then, remove the adapter from the package.
9. Locate the adapter.

4-A	4-B	3-B	3-A
2-A			1-A
2-B			1-B

Figure 87. Adapter location

10. Place the adapter, component side up, on a flat, static-protective surface and set any jumpers or switches as described by the adapter manufacturer, if necessary.

Complete the following steps to install a low-profile PCIe x8 adapter in PCIe slot 3-B and 4-B.
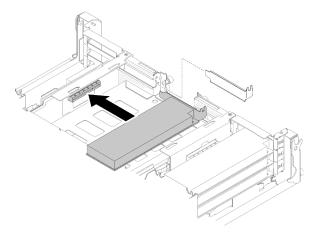
Figure 88. Adapter installation

Step 1.   Slide the expansion-slot cover out of the shuttle.

Step 2.   Align the adapter with the PCI connector on the shuttle and press the adapter firmly into the PCI connector on the shuttle.

After you install a low-profile PCIe x8 adapter in PCIe slot 3-B and 4-B, complete the following steps.

1. Reinstall the EIOM card (see "Install the EIOM" on page 84).

2. Reinstall the shuttle (see "Install the compute node cover" on page 142).

3. If the cable management arm is removed, install it (see "Install the cable management arm" on page 64).

4. Reconnect the power cords and any cables that you removed.

5. Push all compute nodes back into the enclosure (see "Install a compute node in the enclosure" on page 69).

6. Turn on all compute nodes.

Low-profile PCIe x16 adapter replacement

Use the following procedures to remove and install a low-profile PCIe x16 adapter.

This solution supports up to four PCIe x16 adapters. See the following table for adapter location and slot number.

Table 49. Adapter location and corresponding slot number

4 (Node 4 Slot 5)	-----------------------------	-----------------------------	3 (Node 3 Slot 5)
2 (Node 2 Slot 5)	-----------------------------	-----------------------------	1 (Node 1 Slot 5)

Remove a low-profile PCIe x16 adapter

Use this information to remove a low-profile PCIe x16 adapter.

Before you remove a low-profile PCIe x16 adapter:

1. Read the following section(s) to ensure that you work safely.

   - "Safety" on page iii
   - "Installation Guidelines" on page 61

2. Turn off the corresponding compute node that you are going to perform the task on.

3. Locate the adapter.

4	3
2	1

Figure 89. Adapter location

4. Disconnect the cables from the adapter if any.

Complete the following steps to remove a low-profile PCIe x16 adapter in the shuttle.

Step 1. Remove the adapter cassette.

   a. Slide the release latch to the open position.

   b. Slide the adapter cassette out of the shuttle.
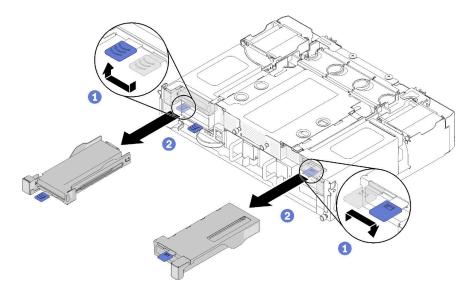
Figure 90. Adapter cassette removal

Step 2. Remove the adapter from the adapter cassette.

    a. Remove the screw.

    b. Loosen the rear bracket screws.

    c. Slide the rear bracket away from the adapter and carefully remove the adapter from the cassette.
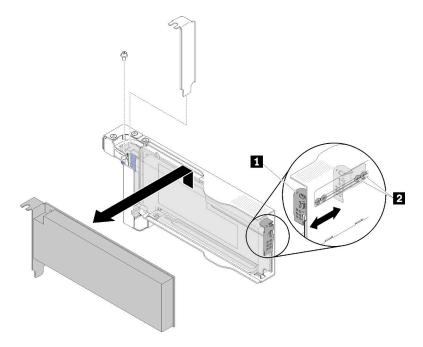
Figure 91. Adapter removal

Attention: Make sure no components contacts the cassette sheet metal edges when removing the adapter from the cassette.

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

Demo video

Install a low-profile PCIe x16 adapter

Use this information to install a low-profile PCIe x16 adapter.

Before you install a low-profile PCIe x16 adapter:

1. Read the following section(s) to ensure that you work safely.

   -
   -

2. Turn off the corresponding compute node that you are going to perform the task on.

3. Touch the static-protective package that contains the adapter to any unpainted metal surface on the solution; then, remove the adapter from the package.

4. Locate the adapter.

4	3
2	1

Figure 92. Adapter location

5. Place the adapter, component side up, on a flat, static-protective surface and set any jumpers or switches as described by the adapter manufacturer, if necessary.

Complete the following steps to install a low-profile PCIe x16 adapter.

Step 1. Remove the adapter cassette.

      a. Slide the release latch to the open position.

      b. Slide the adapter cassette out of the shuttle.
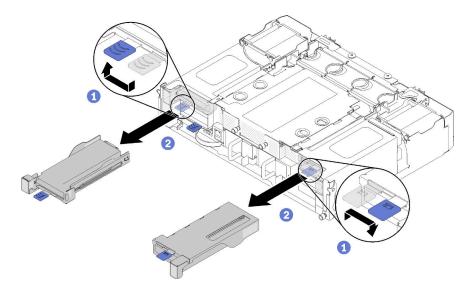
Figure 93. Adapter cassette removal

Step 2. Install the adapter to the adapter cassette.

a. Remove the screws.

b. Slide the expansion-slot cover out.

c. Align the gold finger on the adapter with the cassette, then, insert the adapter into the adapter cassette.

d. Loosen bracket screws for about 1/4 turn to adjust the adapter bracket to secure the adapter according to your adapter length; then, tighten bracket screws.

e. Fasten the screw to secure the adapter to the cassette.

f. Connect any required cables to the adapter.
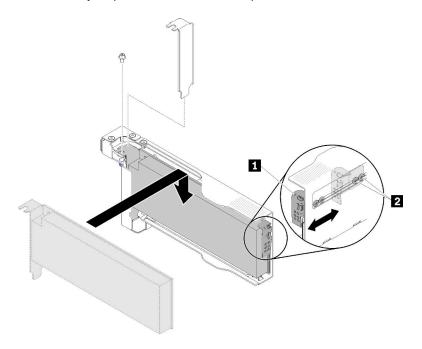
Figure 94. Adapter installation

Step 3. Reinstall the adapter cassette.

a. Slide the release latch to the open position.

Note: Pay attention to the adapter cassette position when you installing it and see the following illustration for the accurate position information.

b. Carefully align the adapter cassette with the guides on the shuttle ; then, slide the adapter cassette into the shuttle and make sure that the cassette is fully seated.

c. Slide the release latch to the close position.
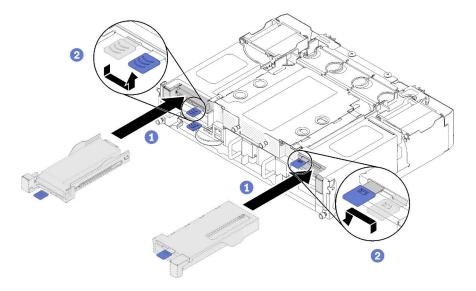
Figure 95. Adapter cassette installation

After you install a low-profile PCIe x16 adapter, complete the following steps.

1. Reseat the corresponding compute node after you remove/add/replace the adapter.

2. Reconnect the power cords and any cables that you removed.

3. Turn on all compute nodes.

Demo video

Watch the procedure on YouTube

PCIe I/O riser (PIOR) replacement

Use the following procedures to remove and install the PCIe I/O riser left and right from and into the shuttle.

Remove the PIOR left/right

Use this information to remove the PIOR left/right from the shuttle.

Before you remove a PIOR:

1. Read the following section(s) to ensure that you work safely.

   • "Safety" on page iii
   • "Installation Guidelines" on page 61

2. Power off all the compute nodes and peripheral devices (see "Power off the compute node" on page 16).

3. Disengage all the compute nodes from the enclosure.

4. Disconnect the power cords and all external cables from the rear of the enclosure.

5. If the cable management arm is installed, remove it (see "Remove the cable management arm" on page 64).

6. Remove the shuttle from the enclosure (see "Remove the shuttle" on page 120).

7. Remove the EIOM card from the shuttle (see "Remove the EIOM" on page 82e).

8. Remove all the adapters that are installed (see "Remove a low-profile PCIe x8 adapter" on page 98 or "Remove a low-profile PCIe x16 adapter" on page 103).

Complete the following steps to remove the PIOR.

Remove the PIOR right

Note: This PIOR is on the right when the shuttle is viewed from the front.

Step 1.   Disconnect the fan cable from the PIOR right.
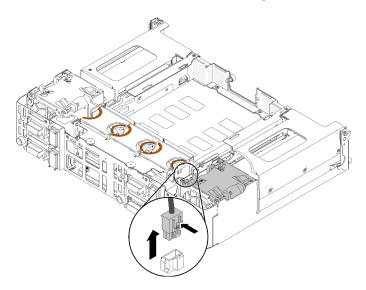
Figure 96. Fan cable disconnection from the PIOR right

Step 2.   Remove the three screws that secure the PIOR right to the shuttle.
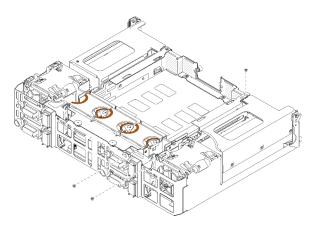
Figure 97. Screw removal

Step 3.   Lift the PIOR right and remove it from the shuttle.
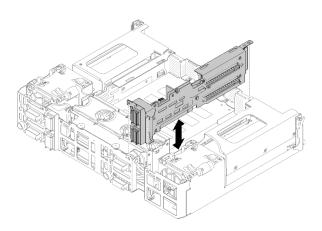
Figure 98. PIOR right removal

Remove the PIOR left

Note: This PIOR is on the left when the shuttle is viewed from the front.

Step 1. Disconnect the fan cable from the PIOR left.
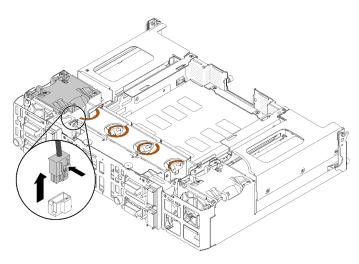
Figure 99. Fan cable disconnection from the PIOR left

Step 2. Remove the three screws that secure the PIOR left to the shuttle.
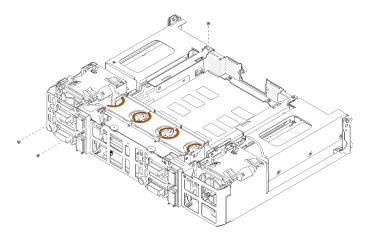
Figure 100. Screw removal

Step 3. Lift the PIOR left and remove it from the shuttle.
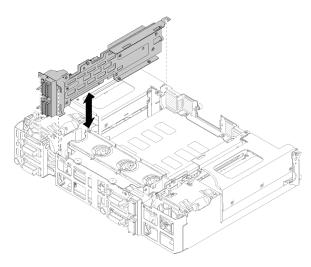
Figure 101. PIOR left removal

After removing the PIOR:

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

Install the PIOR left/right

Use this information to install the PIOR left/right into the shuttle.

Before you install a PIOR :

1. Read the following section(s) to ensure that you work safely.

   - "Safety" on page iii
   - "Installation Guidelines" on page 61

2. Remove the PIOR that is to be replaced (see "Remove the PIOR left/right" on page 107).

Install the PIOR right

Note: This PIOR is on the right when the shuttle is viewed from the front.

Step 1. Align the PIOR right to the slot on the shuttle as illustrated, and lower it until it is securely seated in the shuttle.
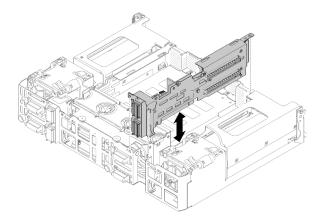
Figure 102. PIOR right installation

Step 2. Secure the PIOR right to the shuttle with three screws as illustrated.
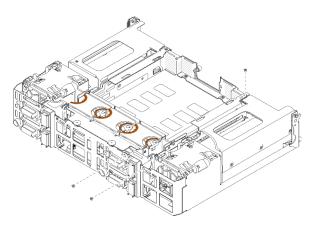
Figure 103. Securing the PIOR right with screws

Step 3. Reconnect the fan cable to the PIOR right.
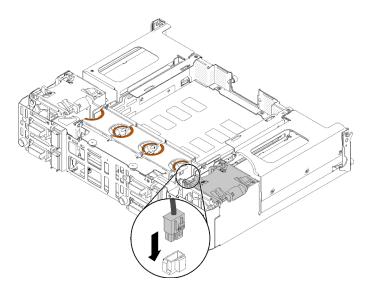
Figure 104. Fan cable connection to the PIOR right

Install the PIOR left

Note: This PIOR is on the left when the shuttle is viewed from the front.

Step 1.   Align the PIOR left to the slot on the shuttle as illustrated, and lower it until it is securely seated in the shuttle.
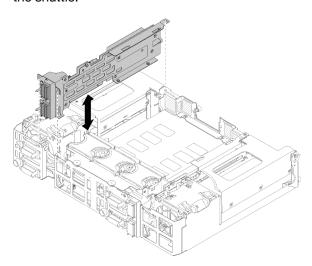
Figure 105. PIOR left installation

Step 2.   Secure the PIOR left to the shuttle with three screws as illustrated.
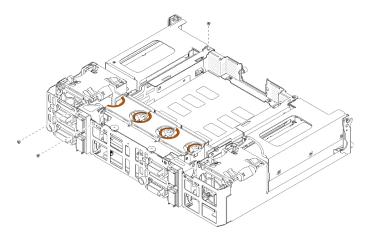
Figure 106. Securing the PIOR left with screws

Step 3. Reconnect the fan cable to the PIOR left.
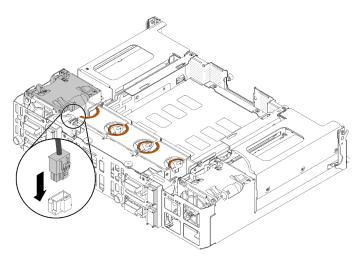
Figure 107. Fan cable connection to the PIOR left

After you install the PIOR, complete the following steps.

1. Reinstall all the PCIe adapters that were removed previously (see "Install a low-profile PCIe x16 adapter" on page 105 or "Install a low-profile PCIe x8 adapter" on page 100).

2. Reinstall the EIOM into the shuttle (see "Install the EIOM" on page 84).

3. Reinstall the shuttle into the enclosure (see "Install the shuttle" on page 123).

4. Reinstall the cable management arm if it was removed previously.

5. Reconnect the power cords and any cables that you removed previously.

6. Reinstall the compute nodes into the enclosure.

7. Power on all the compute nodes.

Shared PCIe dual adapters replacement

Use the following procedures to remove and install the shared PCIe dual adapters.

Remove the shared PCIe dual adapters

Use this information to remove the shared PCIe dual adapters.

Before you remove the shared PCIe dual adapters:

1. Read the following section(s) to ensure that you work safely.

   • "Safety" on page iii
   • "Installation Guidelines" on page 61

2. Power off all the compute nodes and peripheral devices (see "Power off the compute node" on page 16).

3. Disengage all the compute nodes from the enclosure.

4. Disconnect the power cords and all external cables from the rear of the enclosure.

5. If the cable management arm is installed, remove it (see "Remove the cable management arm" on page 64).

6. Remove the shuttle (see "Remove the shuttle" on page 120).

7. Locate the shared PCIe dual adapters.

Table 50. Location of shared PCIe dual adapters from the rear

Primary adapter					Auxiliary adapter
– –	4-A	4-B	3-B	3-A	– –
	2-A			1-A	
Auxiliary adapter	2-B			1-B	Primary adapter

Figure 108. Location of shared PCIe dual adapters

Note: When installing the adapters after removal, make sure to install the primary/auxiliary adapter back to the original slot.

Complete the following steps to remove the shared PCIe dual adapters from the enclosure.

Remove the shared PCIe dual adapters from PCIe slot 3-A and 1-B

Step 1. Rotate the retention bracket of the top PCIe slot (3-A) to the open position.
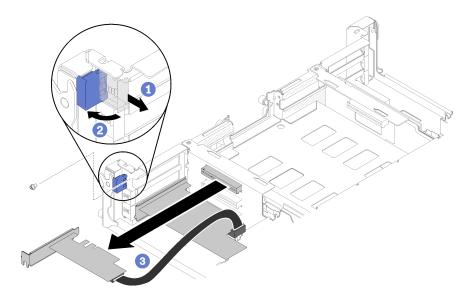
Figure 109. Removing the auxiliary adapter

Step 2. Remove the screw if one is present.

Step 3. Carefully grasp the auxiliary adapter by the top edge or upper corners, and pull it out from the shuttle.

Step 4. Rotate the retention bracket of the bottom PCIe slot (1-B) to the open position.
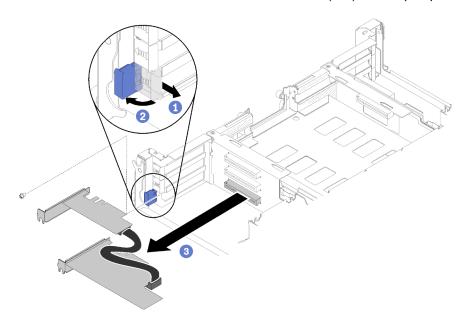
Figure 110. Removing the primary adapter

Step 5. Remove the screw if one is present.

Step 6. Carefully grasp the primary adapter by the top edge or upper corners, and pull it out from the shuttle.

Remove the shared PCIe dual adapters from PCIe slot 4-A and 2-B

Step 1. Rotate the retention bracket of the top PCIe slot (4-A) to the open position.
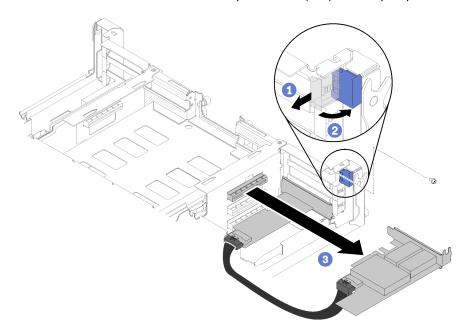
Figure 111. Removing the primary adapter

Step 2.   Remove the screw if one is present.

Step 3.   Carefully grasp the primary adapter by the top edge or upper corners, and pull it out from the shuttle.

Step 4.   Rotate the retention bracket of the bottom PCIe slot (2-B) to the open position.
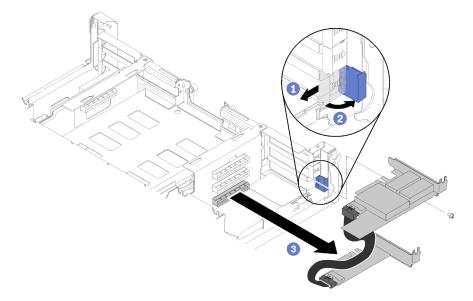
Figure 112. Removing the auxiliary adapter

Step 5.   Remove the screw if one is present.

Step 6.   Carefully grasp the auxiliary adapter by the top edge or upper corners, and pull it out from the shuttle.

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

Install the shared PCIe dual adapters
Use this information to install the shared PCIe dual adapters.

Before you install the shared PCIe dual adapters:

1. Read the following section(s) to ensure that you work safely.

    - "Safety" on page iii
    - "Installation Guidelines" on page 61

2. Power off all the compute nodes and peripheral devices (see "Power off the compute node" on page 16).

3. Disengage all the compute nodes from the enclosure.

4. Disconnect the power cords and all external cables from the rear of the enclosure.

5. If the cable management arm is installed, remove it (see "Remove the cable management arm" on page 64).

6. Remove the shuttle from the enclosure (see "Remove the shuttle" on page 120).

7. Locate the PCIe slots to install the adapters into.

Table 51. Location of shared PCIe dual adapters from the rear

Primary adapter					Auxiliary adapter
- -	**4-A**	**4-B**	**3-B**	**3-A**	- -
Auxiliary adapter	**2-A**			**1-A**	Primary adapter
	2-B			**1-B**	

Figure 113. Location of shared PCIe dual adapters

Notes:

a. To ensure sufficient space for the cable:

   1) Before installing the adapters into PCIe slot 3-A and 1-B, make sure slot 1-A is empty.

   2) Before installing the adapters into PCIe slot 4-A and 2-B, make sure slot 2-A is empty.

   If not, remove the adapter that is installed in the slot (see "Remove a low-profile PCIe x8 adapter" on page 98).

b. When one or more pairs of shared PCIe dual adapters are installed in the shuttle, make sure slot 3-B and 4-B are both empty.

8. Touch the static-protective package that contains the adapter to any unpainted metal surface on the solution; then, remove the adapter from the package.

Complete the following steps to install the shared PCIe dual adapters.

Install the shared PCIe dual adapters into PCIe slot 3-A and 1-B

Step 1. Rotate the retention bracket of the top and bottom PCIe slots (3-A and 1-B) to the open position.

Step 2. If expansion-slot covers and screws are installed in these slots, remove them.
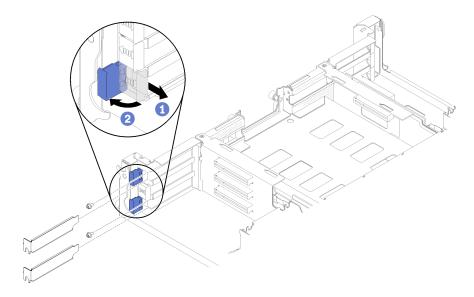
Figure 114. Removing expansion-slot covers and screws

Step 3. Align the primary adapter with the bottom slot connector , and firmly press it in.
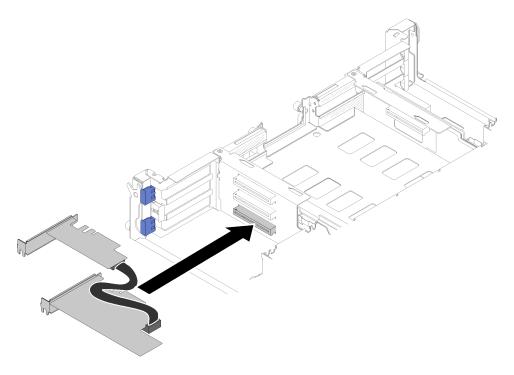
Figure 115. Installing the primary adapter

Step 4. Align the auxiliary adapter with the top slot connector, and firmly press it in.
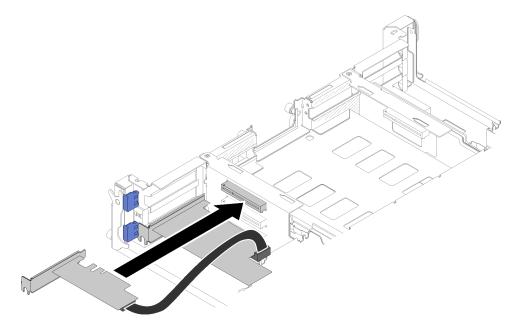
Figure 116. Installing the auxiliary adapter

Install the shared PCIe dual adapters into PCIe slot 4-A and 2-B

Step 1. Rotate the retention bracket of the top and bottom PCIe slots (4-A and 2-B) to the open position.

Step 2. If expansion-slot covers and screws are installed in these slots, remove them.
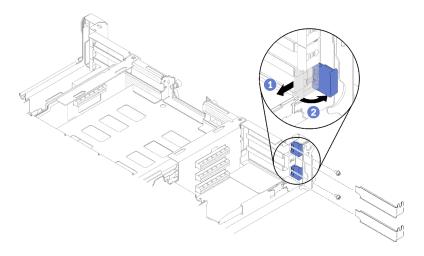
Figure 117. Removing expansion-slot covers and screws

Step 3. Align the auxiliary adapter with the bottom slot connector, and firmly press it in.
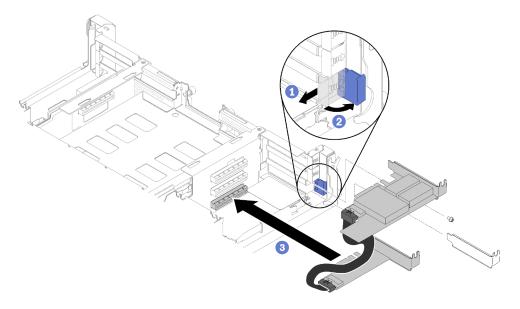
Figure 118. Installing the auxiliary adapter

Step 4. Align the primary adapter with the top slot connector, and firmly press it in.
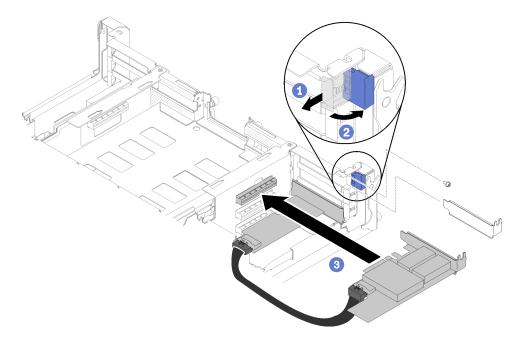
Figure 119. Installing the primary adapter

After you install the shared PCIe dual adapters, complete the following steps.

1. Fasten the two screws if necessary.

   Note: Make sure to fasten the screws if the solution will undergo vibration or transportation.

2. Rotate the two retention brackets to the locked position.

3. Reinstall the shuttle (see "Install the compute node cover" on page 142).

   Note: To prevent from jamming the shared PCIe dual adapters cable into the fan, make sure to route the cable between the two adapters before installing the shuttle.

4. If the cable management arm is removed, reinstall it (see "Install the cable management arm" on page 64).

5. Reconnect the power cords and any cables that you removed.

6. Push all compute nodes back into the enclosure (see "Install a compute node in the enclosure" on page 69).

7. Turn on all compute nodes.

Shuttle replacement

Use the following procedures to remove and install the shuttle.

Remove the shuttle

Use this information to remove the shuttle.

Before you remove the shuttle:

1. Read the following section(s) to ensure that you work safely.

   - "Safety" on page iii
   - "Installation Guidelines" on page 61

2. Power off all the compute nodes and peripheral devices (see "Power off the compute node" on page 16).

3. Disengage all the compute nodes from the enclosure.

4. Disconnect the power cords and all external cables from the rear of the enclosure.

5. If the cable management arm is installed, remove it (see "Remove the cable management arm" on page 64).

Attention: Be careful when you are removing or installing the shuttle to avoid damaging the shuttle connectors.
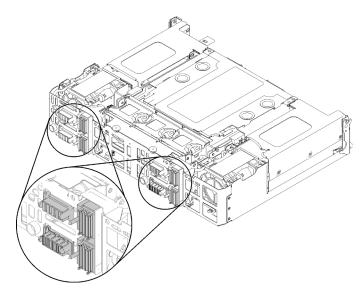
Figure 120. Shuttle connectors

Complete the following steps to remove the shuttle.

Step 1. Turn the two thumbscrews counterclockwise and lift the handles up.

Step 2. Pull the handles and slide the half of the shuttle out of the chassis.
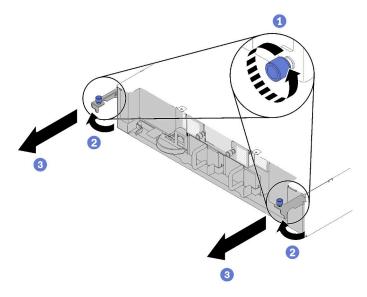
Figure 121. Shuttle removal

Step 3. Push two release latches and slide the whole shuttle out of the chassis.
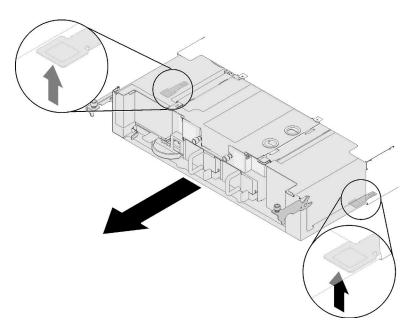
Figure 122. Shuttle removal

Attention: To prevent any damage to the shuttle connectors, make sure that you hold the shuttle properly to put it down as illustrated.
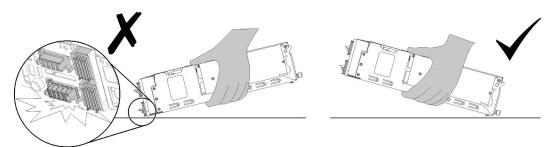
Figure 123. Shuttle connectors

After removing the shuttle from the enclosure:

•

• If you are instructed to return the shuttle, complete the following steps and follow all packaging instructions, and use any packaging materials for shipping that are supplied to you:

   1. Remove the EIOM (see "Remove the EIOM" on page 82).

   2. Remove the fans (see "Remove a fan" on page 87).

   3. Remove all the adapters that are installed (see "Remove a low-profile PCIe x8 adapter" on page 98, "Remove a low-profile PCIe x16 adapter" on page 103 or "Remove the shared PCIe dual adapters" on page 113).

   4. Remove both PIOR left and right (see "Remove the PIOR left/right" on page 107).

Note: When returning PCIe x16 shuttle, make sure to return it along with all four of the adapter cassettes (see "Enclosure components" on page 35 for the cassette).

Demo video

Install the shuttle

Use this information to install the shuttle.

Before you install the shuttle:

1. Read the following section(s) to ensure that you work safely.

   - "Safety" on page iii
   - "Installation Guidelines" on page 61

2. Power off all the compute nodes and peripheral devices (see "Power off the compute node" on page 16).

3. Disengage all the compute nodes from the enclosure.

4. Disconnect the power cords and all external cables from the rear of the enclosure.

5. If the cable management arm is installed, remove it (see "Remove the cable management arm" on page 64).

Attention: Be careful when you are removing or installing the shuttle to avoid damaging the shuttle connectors.
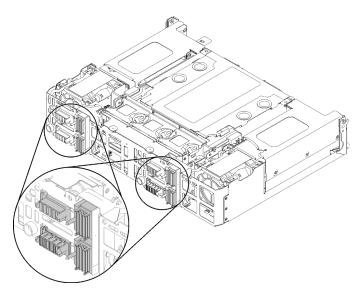
Figure 124. Shuttle connectors

Complete the following steps to install the shuttle.

Step 1.   Turn the two thumbscrews counterclockwise to release handles.

Step 2.   Align the shuttle with rails and pins; then, slide the shuttle into the enclosure.
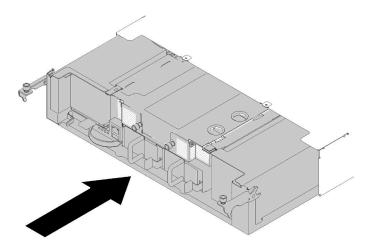
Figure 125. Shuttle installation

Step 3.   Make sure the pins on the shuttle are fully seated in the slots.

Step 4.   Push the handles down and turn the thumbscrews clockwise.
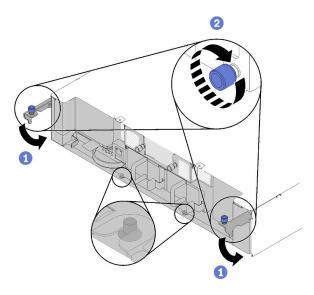
Figure 126. Shuttle installation

After you install the shuttle, complete the following steps:

1. If the cable management arm is removed, install it (see "Install the cable management arm" on page 64).
2. Reconnect the power cords and any cables that you removed.
3. Push all compute nodes back into the enclosure (see "Install a compute node in the enclosure" on page 69).
4. Turn on all compute nodes.

Demo video

Watch the procedure on YouTube

System Management Module (SMM) and related component replacement

Use the following procedures to remove and install the System Management Module (SMM) and related components.

Remove the System Management Module (SMM)

Use this information to remove the SMM from the shuttle.

Before you remove the SMM from the shuttle:

1. Read the following section(s) to ensure that you work safely.

   - "Safety" on page iii
   - "Installation Guidelines" on page 61

2. If you want to migrate current enclosure settings and the enclosure Power Distribution Module (PDM) Vital Product Data (VPD) onto the new SMM, make sure to do the following:

   a. Perform backup of SMM settings, enclosure VPD and PDM VPD (see https://thinksystem.lenovofiles.com/help/topic/mgt_tools_smm/smm_smm_recovery.html).

   b. See "System Management Module (SMM)" on page 25 to discern the type of SMM that you have, and back up stored data accordingly.

      - **Single Ethernet port SMM**

        Use a FAT32 formatted USB flash drive with at least 1GB available space to back up SMM settings, and install it to the new SMM for data restore. See "USB flash drive removal and installation for single Ethernet port SMM" on page 128 for USB flash drive installation and removal, and https://thinksystem.lenovofiles.com/help/topic/mgt_tools_smm/smm_smm_recovery.html for data backup and restore procedure.

      - **Dual Ethernet port SMM**

        Use the FAT32 microSD card installed in the SMM to back up SMM settings, remove it from the SMM, and install it to the new SMM for data restore. See "MicroSD card removal and installation for dual Ethernet port SMM" on page 130 for microSD card installation and removal, and https://thinksystem.lenovofiles.com/help/topic/mgt_tools_smm/smm_smm_recovery.html for data backup and restore procedure.

Complete the following steps to remove the SMM from the shuttle.
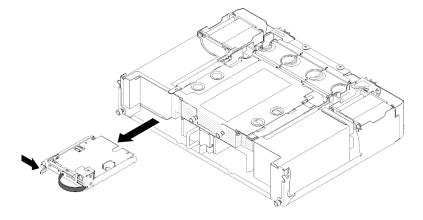
Figure 127. SMM removal

Step 1. Push the release latch rightward and hold it.

Step 2.   Grip and pull on the strap to slide the SMM out from the shuttle.

After you remove the SMM from the shuttle, complete the following steps based on the type of SMM that you have:

- **Single Ethernet port SMM**

  1. Install the new single Ethernet port SMM (see "Install the System Management Module (SMM)" on page 126).

  2. Install the USB flash drive to the single Ethernet port SMM to be installed (see "USB flash drive removal and installation for single Ethernet port SMM" on page 128).

  3. Perform data restore (see https://thinksystem.lenovofiles.com/help/topic/mgt_tools_smm/smm_smm_recovery.html).

- **Dual Ethernet port SMM**

  1. Remove the microSD card and install it to the new dual Ethernet port SMM (see "MicroSD card removal and installation for dual Ethernet port SMM" on page 130).

  2. Install the new dual Ethernet port SMM (see "Install the System Management Module (SMM)" on page 126).

  3. Perform data restore (see https://thinksystem.lenovofiles.com/help/topic/mgt_tools_smm/smm_smm_recovery.html).

Demo video

Watch the procedure on YouTube

Watch the procedure on YouTube

Install the System Management Module (SMM)

Use this information to install the SMM into the shuttle.

Before you install the SMM into the shuttle:

1. Read the following section(s) to ensure that you work safely.

   - "Safety" on page iii

   - "Installation Guidelines" on page 61

2. If you want to migrate current enclosure settings and the enclosure Power Distribution Module (PDM) Vital Product Data (VPD) onto the new SMM, make sure to do the following:

   a. Perform backup of SMM settings, enclosure VPD and PDM VPD (see https://thinksystem.lenovofiles.com/help/topic/mgt_tools_smm/smm_smm_recovery.html).

   b. See "System Management Module (SMM)" on page 25 to discern the type of SMM that you have, and back up stored data accordingly.

      - **Single Ethernet port SMM**

        Use a FAT32 formatted USB flash drive with at least 1GB available space to back up SMM settings, and install it to the new SMM for data restore. See "USB flash drive removal and installation for single Ethernet port SMM" on page 128 for USB flash drive installation and removal, and https://thinksystem.lenovofiles.com/help/topic/mgt_tools_smm/smm_smm_recovery.html for data backup and restore procedure.

      - **Dual Ethernet port SMM**

        Use the FAT32 microSD card installed in the SMM to back up SMM settings, remove it from the SMM, and install it to the new SMM for data restore. See "MicroSD card removal and installation

for dual Ethernet port SMM" on page 130 for microSD card installation and removal, and https://thinksystem.lenovofiles.com/help/topic/mgt_tools_smm/smm_smm_recovery.html for data backup and restore procedure.

Note: If you are installing a dual Ethernet port SMM, make sure to install the microSD card into the dual Ethernet port SMM before installing the SMM into the shuttle.

Complete the following steps to install the SMM into the shuttle.
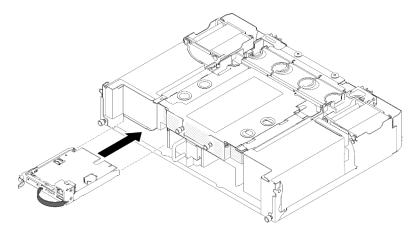
Figure 128. SMM installation

Step 1.   Push the SMM into the empty bay until the latch clicks into place.

Step 2.   If you are replacing a single Ethernet port SMM with a dual Ethernet port SMM, cover the sticker in front of the SMM with the one that comes in the option kit.

Step 3.   Connect the required cables.

After you install the SMM into the shuttle, complete the following steps based on the type of SMM that you have:

- **Single Ethernet port SMM**

    1. Install the USB flash drive with stored data to the single Ethernet port SMM that has been installed (see "USB flash drive removal and installation for single Ethernet port SMM" on page 128).
    2. Perform data restore (see https://thinksystem.lenovofiles.com/help/topic/mgt_tools_smm/smm_smm_recovery.html).

- **Dual Ethernet port SMM**

    Perform data restore (see https://thinksystem.lenovofiles.com/help/topic/mgt_tools_smm/smm_smm_recovery.html).

Demo video

Watch the procedure on YouTube

Watch the procedure on YouTube

Device installation and removal for SMM data backup and restore

Use the following procedures to remove and install device for SMM data backup and restore.

See "System Management Module (SMM)" on page 25 to discern the type of SMM that you have.

- **Single Ethernet port SMM:**

  Go to .

- **Dual Ethernet port SMM:**

  Go to .

USB flash drive removal and installation for single Ethernet port SMM

Use this information to remove and install the USB flash drive from and to the single Ethernet port SMM for data backup and restore.

Before you remove and install the USB flash drive for SMM data backup and restore:

1. Read the following section(s) to ensure that you work safely.

   -
   -

2. Make sure the SMM that you have is a single Ethernet port SMM. If it is a dual Ethernet port SMM, go to instead. See to discern the type of SMM that you have.

Complete the following steps to remove and install the USB flash drive for SMM data backup and restore:

Step 1. Align the USB flash drive with the connector on the single Ethernet port SMM, and push it in until it is firmly connected.
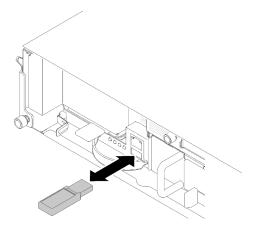
Figure 129. USB flash drive installation

Note: When the USB flash drive and a management Ethernet cable (to the RJ-45 port) are connected to the SMM at the same time, adjust the strap as in either of the following illustrations.
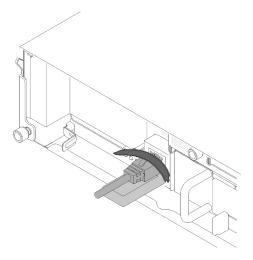
Figure 130. Strap adjustment with both the USB flash drive and the Ethernet cable connected
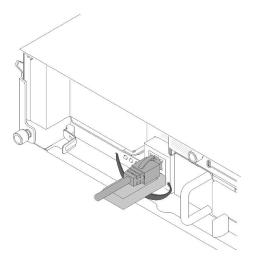
Figure 131. Strap adjustment with both the USB flash drive and the Ethernet cable connected

Step 2. Complete the following steps to perform backup of SMM settings, enclosure VPD and PDM VPD. For more information, see https://thinksystem.lenovofiles.com/help/topic/mgt_tools_smm/smm_smm_ recovery.html.

    a. Update the solution firmware to the latest level.

    b. Log in to SMM web interface.

    c. Go to **System Information** section, and select **enclosure VPD** or **PDM VPD** tab.

    d. Perform data backup.

Step 3. After data backup is completed, pull the USB flash drive out from the connector to remove it from the single Ethernet port SMM.
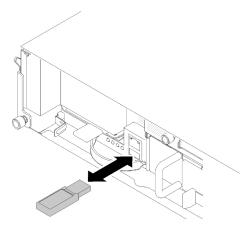
Figure 132. USB flash drive removal

Step 4. Remove the single Ethernet port SMM (see "Remove the System Management Module (SMM)" on page 125).

Step 5. Install the new single Ethernet port SMM (see "Install the System Management Module (SMM)" on page 126).

Note: For proper data restoration, make sure to replace the single Ethernet port SMM with another unit of the same type of SMM. Do not replace the single Ethernet port SMM with a dual Ethernet port SMM.

Step 6. Keep the USB flash drive, and install it to the new single Ethernet port SMM (See step 1).

After you install the USB flash drive to the new single Ethernet port SMM for data restore, complete the following steps.

1. Connect all cables to the single Ethernet port SMM.

2. Log in to SMM web interface, and perform data restore of SMM settings, enclosure VPD and PDM VPD. For more information, see https://thinksystem.lenovofiles.com/help/topic/mgt_tools_smm/smm_smm_ recovery.html.

Demo video

Watch the procedure on YouTube

Watch the procedure on YouTube

MicroSD card removal and installation for dual Ethernet port SMM
Use this information to remove and install the microSD card from and into the dual Ethernet port SMM for data backup and restore.

Before you remove and install the microSD card for SMM data backup and restore:

1. Read the following section(s) to ensure that you work safely.

   - "Safety" on page iii
   - "Installation Guidelines" on page 61

2. Make sure the SMM that you have is a dual Ethernet port SMM. If it is a single Ethernet port SMM, go to "USB flash drive removal and installation for single Ethernet port SMM" on page 128 instead. See "System Management Module (SMM)" on page 25 to discern the type of SMM that you have.

Complete the following steps to remove and install the microSD card for SMM data backup and restore.

Step 1. Complete the following steps to perform backup of SMM settings, enclosure VPD and PDM VPD. For more information, see https://thinksystem.lenovofiles.com/help/topic/mgt_tools_smm/smm_smm_recovery.html.

     a. Update the solution firmware to the latest level.

     b. Log in to SMM web interface.

     c. Go to **System Information** section, and select **enclosure VPD** or **PDM VPD** tab.

     d. Perform data backup.

Step 2. Remove the dual Ethernet port SMM (see "Remove the System Management Module (SMM)" on page 125).

Step 3. Locate the microSD card holder on the dual Ethernet port SMM.
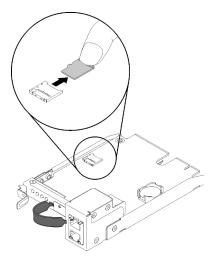
Figure 133. MicroSD card removal

Step 4. Press on the microSD card, and pull it way from the holder.

Step 5. Locate the microSD card holder on the new dual Ethernet port SMM.

     Note: For proper data restore, make sure to replace the dual Ethernet port SMM with another unit of the same type of SMM. Do not replace the dual Ethernet port SMM with a single Ethernet port SMM.

Step 6. Align the microSD card with the card holder; then, gently push the microSD card into the holder .
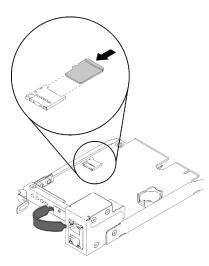
Figure 134. MicroSD card installation

After you install the microSD card into the dual Ethernet port SMM for data restore, complete the following steps.

1. Install the dual Ethernet port SMM into the shuttle (see "Install the System Management Module (SMM)" on page 126).

2. Connect all cables to the dual Ethernet port SMM.

3. Log in to SMM web interface, and perform data restore of SMM settings, enclosure VPD and PDM VPD. For more information, see https://thinksystem.lenovofiles.com/help/topic/mgt_tools_smm/smm_smm_recovery.html.

CMOS battery replacement for SMM

Use the following procedures to remove and install the CMOS battery from and into the SMM.

Remove the CMOS battery from the SMM

Use this information to remove the CMOS battery from the SMM.

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

- **S002**

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

- **S004**

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

Do not:

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

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

Before you remove the CMOS battery from the SMM:

1. Read the following section(s) to ensure that you work safely.

   • "Safety" on page iii
   • "Installation Guidelines" on page 61

2. Remove the SMM (see "Remove the System Management Module (SMM)" on page 125).

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

• When replacing the battery, you must replace it with another CMOS battery of the exact same type made by the same manufacturer.

• To order replacement batteries, call 1-800-426-7378 in the United States, and 1-800-465-7999 or 1-800-465-6666 in Canada. Outside the U.S. and Canada, call your Lenovo marketing representative or authorized reseller.

• After you replace the battery, you must reconfigure the time settings.

• To avoid possible danger, read and follow the following safety statement.

Complete the following steps to remove the CMOS battery from the SMM.

Step 1.   Locate the battery on the SMM.
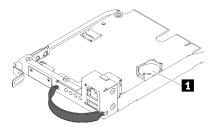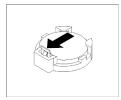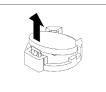
Figure 135. CMOS battery on the SMM

Table 52. CMOS battery

1 CMOS battery

Step 2.   Gently press the battery retaining clip with your fingernail. The battery should pop free from the socket.
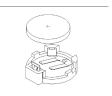
Figure 136. Battery removal

> **Attention:** Do not lift the battery with excessive force, as it may cause damages to the socket on the SMM. Consequently, it might be necessary to replace the SMM.

Step 3.   Lift the battery from the socket.

Step 4.   Dispose of the battery as required by local ordinances or regulations. See the *Environmental Notices and User's Guide* for more information.

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

Demo video

Watch the procedure on YouTube

Install the CMOS battery into the SMM
Use this information to install the CMOS battery into the SMM.

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

- **S002**

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

- **S004**

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

Do not:

- **Throw or immerse into water**

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

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

Before you install the CMOS battery into the SMM:

1. Read the following section(s) to ensure that you work safely.

   - "Safety" on page iii
   - "Installation Guidelines" on page 61

2. Remove the SMM (see "Remove the System Management Module (SMM)" on page 125).

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

- When replacing the battery, you must replace it with another CMOS battery of the exact same type made by the same manufacturer.
- To order replacement batteries, call 1-800-426-7378 in the United States, and 1-800-465-7999 or 1-800-465-6666 in Canada. Outside the U.S. and Canada, call your Lenovo marketing representative or authorized reseller.
- After you replace the battery, you must reconfigure the time settings.
- To avoid possible danger, read and follow the following safety statement.

Complete the following steps to install the CMOS battery into the SMM.

Step 1. Locate the CMOS battery on the SMM, and remove it (see "Remove the CMOS battery from the SMM" on page 132).
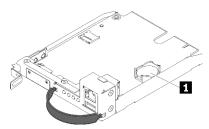
Figure 137. CMOS battery on the SMM

Table 53. CMOS battery

1 CMOS battery

Step 2. Follow any special handling and installation instructions that come with the battery to be installed.

Step 3. Tilt the battery to insert it into the socket.
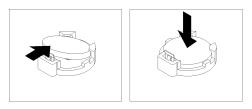
Figure 138. CMOS battery installation

Step 4. As you slide the battery into place, press the battery down into the socket until it clicks into place.

After you install the CMOS battery into the SMM, complete the following steps.

1. Reinstall the SMM (see "Install the System Management Module (SMM)" on page 126).
2. Start the Setup Utility and reset the configuration.

Demo video

Watch the procedure on YouTube

Replace components in the compute node

Use the following information to remove and install components from and into the compute node.

Note: If you are replacing components in the compute node to which a PCIe expansion node is installed, go to "Disengage the PCIe expansion node from a compute node" on page 198 before replacing component, and "Re-engage the PCIe expansion node to a compute node " on page 200 after completing replacing the components.

Air baffle replacement

Use the following procedures to remove and install the air baffle.

Remove the air baffle

Use this procedure to remove the air baffle.

Before removing the air baffle:

1. Read the following section(s) to ensure that you work safely.

   - "Safety" on page iii
   - "Installation Guidelines" on page 61

2. Turn off the corresponding compute node that you are going to perform the task on.
3. Remove the compute node (see "Remove a compute node from the enclosure" on page 65).
4. Remove the compute node cover (see "Remove the compute node cover" on page 141).

Complete the following steps to remove the air baffle.
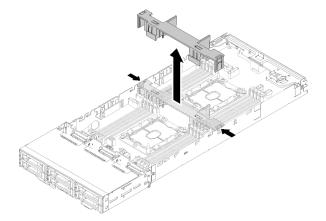
Figure 139. Air baffle removal

Step 1. Slightly push the right and left release latches; then, lift the air baffle out of the node.

Attention: For proper cooling and airflow, replace the air baffle before you turn on the node. Operating the node with the air baffle removed might damage node components.

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

Demo video

Install the air baffle

Use this procedure to install the air baffle.

Before you install the air baffle:

1. Read the following section(s) to ensure that you work safely.

   - "Safety" on page iii
   - "Installation Guidelines" on page 61

2. Turn off the corresponding compute node that you are going to perform the task on.

3. Remove the compute node (see "Remove a compute node from the enclosure" on page 65).

4. Remove the compute node cover (see "Remove the compute node cover" on page 141).

Complete the following steps to install the air baffle.
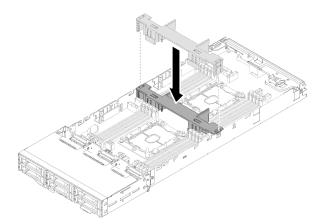
Figure 140. Air baffle installation

Step 1.   Align the air baffle tabs with the baffle slots on both sides of the chassis; then, lower the air baffle into the node. Press the air baffle down until it is securely seated.

Attention:

- For proper cooling and airflow, reinstall the air baffle before you turn on the node. Operating the node with the air baffle removed might damage node components.
- Pay attention to the cables routed along the sidewalls of the node as they may catch under the air baffle.

After you install the air baffle, complete the following steps.

1. Reinstall the compute node cover (see "Install the compute node cover" on page 142).

2. Reinstall the compute node (see "Install a compute node in the enclosure" on page 69).

3. Check the power LED to make sure it transitions between fast blink and slow blink to indicate the node is ready to be powered on.

Demo video

[Watch the procedure on YouTube](#)

CMOS battery (CR2032) replacement

Use the following procedures to remove and install the CMOS battery (CR2032).

Remove the CMOS battery

Use this information to remove the CMOS battery.

To avoid possible danger, read and follow the following safety statement.

- **S002**

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

- **S004**

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

Do not:

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

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

Before you remove the CMOS battery:

1. Read the following section(s) to ensure that you work safely.

    - ["Safety" on page iii](#)
    - ["Installation Guidelines" on page 61](#)

2. Turn off the corresponding compute node that you are going to perform the task on.

3. Remove the compute node (see "Remove a compute node from the enclosure" on page 65).

4. Remove the compute node cover (see "Remove the compute node cover" on page 141).

The following notes describe information that you must consider when replacing the battery.

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

- If you replace the original lithium battery with a heavy-metal battery or a battery with heavy-metal components, be aware of the following environmental consideration. Batteries and accumulators that contain heavy metals must not be disposed of with normal domestic waste. They will be taken back free of charge by the manufacturer, distributor, or representative, to be recycled or disposed of in a proper manner.

- After you replace the battery, you must reconfigure the solution and reset the system date and time.

Complete the following steps to remove the CMOS battery.

Figure 141. CMOS battery removal

Step 1. Remove the CMOS battery:

    a. Use a fingernail to press the top of the battery clip away from the battery. The battery pops up when it is released.

    b. Use your thumb and index finger to lift the battery from the socket.

       Attention: Do not lift the battery by using excessive force. Failing to remove the battery properly may damage the socket on the system board. Any damage to the socket may require replacing the system board.

Step 2. Dispose of the CMOS battery as required by local ordinances or regulations.

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

Demo video

Watch the procedure on YouTube

Install the CMOS battery (CR2032)
Use this information to install the CMOS battery.

To avoid possible danger, read and follow the following safety statement.

- <u>S002</u>

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

- S004

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

Do not:

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

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

Before you install the CMOS battery:

1. Read the following section(s) to ensure that you work safely.

   - "Safety" on page iii
   - "Installation Guidelines" on page 61

2. Turn off the corresponding compute node that you are going to perform the task on.

3. Remove the compute node (see "Remove a compute node from the enclosure" on page 65).

4. Remove the compute node cover (see "Remove the compute node cover" on page 141).

The following notes describe information that you must consider when replacing the system battery in the node.

- When replacing the system battery, you must replace it with a lithium battery of the same type from the same manufacturer.
- After you replace the system-board battery, you must reconfigure the node and reset the system date and time.
- To avoid possible danger, read and follow the following safety statement.

Complete the following steps to install the CMOS battery.

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

Step 2. Insert the new CMOS battery:

a. Orient the battery so that the positive side faces up.

b. Tilt the battery so that you can insert it into the socket on the side opposite the battery clip.

Figure 142. CMOS battery installation

c. Press the battery down into the socket until it clicks into place. Make sure that the battery clip holds the battery securely.

After you install the CMOS battery, complete the following steps:

1. Reinstall the compute node cover (see "Install the compute node cover" on page 142).

2. Reinstall the compute node (see "Install a compute node in the enclosure" on page 69).

3. Check the power LED to make sure it transitions between fast blink and slow blink to indicate the node is ready to be powered on.

Demo video

Watch the procedure on YouTube

Compute node cover replacement

Use the following procedures to remove and install the compute node cover.

Remove the compute node cover

Use this procedure to remove the compute node cover.

S014

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

S033

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

Before you remove the compute node cover:

1. Read the following section(s) to ensure that you work safely.

   - "Safety" on page iii
   - "Installation Guidelines" on page 61

2. Turn off the corresponding compute node that you are going to perform the task on.

3. Remove the node from the enclosure. See "Remove a compute node from the enclosure" on page 65

Complete the following steps to remove the compute node cover.
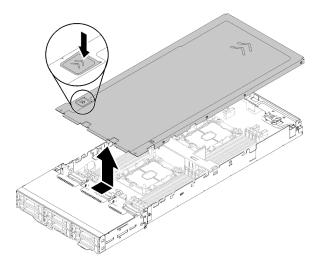
Figure 143. Compute node cover removal

Step 1.   Push the cover-release latch on the top of the node cover.

Step 2.   Slide the cover toward the rear of the node until the cover has disengaged from the node; then, lift the cover away from the node.

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

Demo video

Watch the procedure on YouTube

Install the compute node cover

Use this procedure to install the compute node cover.

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.

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

Before you install the compute node cover:

1. Read the following section(s) to ensure that you work safely.

   - "Safety" on page iii
   - "Installation Guidelines" on page 61

2. Turn off the corresponding compute node that you are going to perform the task on.

3. Make sure that all components are installed and seated correctly and that you have not left loose tools or parts inside the node.

4. Make sure that all internal cables are correctly routed. See "Internal cable routing" on page 41.

5. Remove the compute node (see "Remove a compute node from the enclosure" on page 65).

Complete the following steps to install the compute node cover.
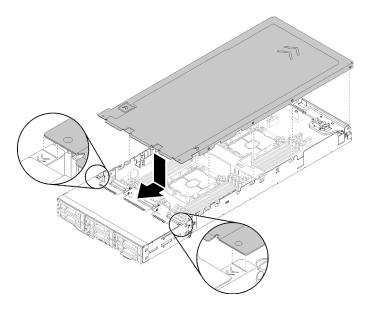
Figure 144. Compute node cover installation

Note: Before sliding the cover forward, make sure that all the tabs on the front, rear, and side of the cover engage the side walls correctly. If the pins do not engage the enclosure correctly, it will be very difficult to remove the cover next time.

Step 1. Align the cover pins with the notches in the side walls of the node, then, position the cover on top of the node.

> **Note:** Align the front of the cover with lines in the node as shown in the illustration would help you to install the cover correctly.

Step 2.   Slide the cover forward until the cover latches in place.

After you install the node cover, complete the following steps.

1. Reinstall the compute node (see "Install a compute node in the enclosure" on page 69).

2. Check the power LED to make sure it transitions between fast blink and slow blink to indicate the node is ready to be powered on.

Demo video

Watch the procedure on YouTube

Memory module replacement

Use the following procedures to remove and install a memory module.

Remove a memory module

Use this information to remove a memory module. This section applies to both DRAM DIMMs and DCPMMs.

Before you remove a memory module:

1. If you are removing a DCPMM in App Direct or Mixed Memory Mode, make sure to:

   a. Back up the stored data.

   b. If the App Direct capacity is interleaved:

      1) Delete all the created namspaces and filesystems in the operating system.

      2) Perform secure erase on all the DCPMMs that are installed. Go to **Intel Optane DCPMMs ➙ Security ➙ Press to Secure Erase** to perform secure erase.

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

      If the App Direct capacity is not interleaved:

      1) Delete the namespace and filesystem of the DCPMM unit to be replaced in the operating system.

      2) Perform secure erase on the DCPMM unit that is to be replaced. Go to **Intel Optane DCPMMs ➙ Security ➙ Press to Secure Erase** to perform secure erase.

2. Read the following section(s) to ensure that you work safely.

   • "Safety" on page iii
   • "Installation Guidelines" on page 61

3. Turn off the corresponding compute node that you are going to perform the task on.

4. Remove the compute node (see "Remove a compute node from the enclosure" on page 65).

5. Remove the compute node cover (see "Remove the compute node cover" on page 141).

6. Remove the air baffle (see "Remove the air baffle" on page 136).

Attention: Memory modules are sensitive to static discharge and require special handling. In addition to the standard guidelines for "Handling static-sensitive devices" on page 63:

• 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.

Complete the following steps to remove a memory module.
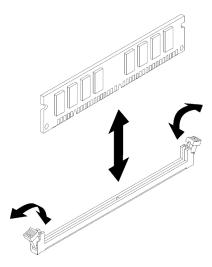
Figure 145. Memory module removal

Step 1. Carefully press down the retaining clips on each end of the memory module connector and remove the memory module.

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

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

Demo video

Watch the procedure on YouTube

Install a memory module
Use this information to install a memory module. This section applies to both DRAM DIMMs and DCPMMs.

See "Memory module installation rules and order" in *Setup Guide* for detailed information about memory configuration and setup.

Before you install a memory module:
1. If you are installing DCPMMs for the first time, follow the instructions in "DC Persistent Memory Module (DCPMM) setup" in *Setup Guide* so that the system supports DCPMMs.
2. Read the following section(s) to ensure that you work safely.
   - "Safety" on page iii
   - "Installation Guidelines" on page 61
3. Turn off the corresponding compute node that you are going to perform the task on.

4. Remove the compute node (see "Remove a compute node from the enclosure" on page 65).

5. Remove the compute node cover (see "Remove the compute node cover" on page 141).

6. Remove the air baffle (see "Remove the air baffle" on page 136).

Attention: Memory modules are sensitive to static discharge and require special handling. In addition to the standard guidelines for "Handling static-sensitive devices" on page 63:

- 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.

The following illustration shows the location of the memory module connectors on the system board. The following illustration shows the location of the memory module connectors on the system board.
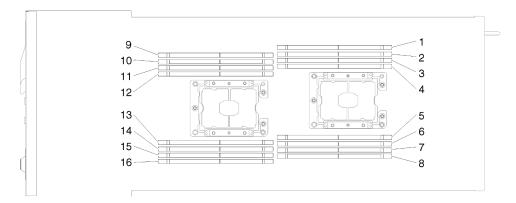
Figure 146. The location of the memory module connectors on the system board

Complete the following steps to install a memory module.

Important: Before installing a memory module, make sure that you understand the required installation order, depending on whether you are implementing memory mirroring, memory rank sparing, or independent Memory Mode. See "Memory module installation order" in *Setup Guide* for the required installation order.

Step 1. Open the retaining clip on each end of the memory module connector.

Attention:

- Memory modules are static-sensitive devices. The package must be grounded before it is opened.

- To avoid breaking the retaining clips or damaging the memory module connectors, open and close the clips gently.
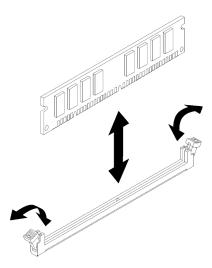
Figure 147. Memory module installation

Step 2. Touch the static-protective package that contains the memory module to any unpainted metal surface on the outside of the node. Then, remove the memory module from the package.

Step 3. Turn the memory module so that the alignment slot align correctly with the alignment tab.

Step 4. Insert the memory module into the connector by aligning the edges of the memory module with the slots at the ends of the memory module connector.

Step 5. Firmly press the memory module straight down into the connector by applying pressure on both ends of the memory module simultaneously. The retaining clips snap into the locked position when the memory module is firmly seated in the connector.

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

Step 6. Reconnect any cable that you removed.

After you install a memory module, complete the following steps:

1. Reinstall the air baffle (see "Install the air baffle" on page 137).

2. Reinstall the compute node cover (see "Install the compute node cover" on page 142).

3. Reinstall the compute node (see "Install a compute node in the enclosure" on page 69).

4. Check the power LED to make sure it transitions between fast blink and slow blink to indicate the node is ready to be powered on.

5. If you have installed a DCPMM:

   a. Update the system firmware to the latest version (see "Update the firmware" in *Setup Guide*).

   b. Make sure the firmware of all the DCPMM units is the latest version. If not, update it to the latest version (see https://sysmgt.lenovofiles.com/help/topic/com.lenovo.lxca.doc/update_fw.html).

   c. Configure DCPMMs and DRAM DIMMs (see "Configure DC Persistent Memory Module (DCPMM)" in *Setup Guide*).

   d. Restore the data that have been backed up if necessary.

Demo video

Watch the procedure on YouTube

Drive replacement

Use the following procedures to remove and install a drive.

Remove a hot-swap drive

Use this procedure to remove a drive.

Before you remove a drive:

1. Read the following section(s) to ensure that you work safely.

   - "Safety" on page iii
   - "Installation Guidelines" on page 61

2. Make sure you save the data on your drive, especially if it is part of a RAID array, before you remove it from the node.

Attention:

- To make sure that there is adequate system cooling, do not operate the solution for more than 2 minutes without either a drive or a filler panel installed in each bay.

- Before you make changes to drives, drive controllers (including controllers that are integrated on the system board), drive backplanes, or drive cables, back up all important data that is stored on drives.

- Before you remove any component of a RAID array, back up all RAID configuration information.

- If one or more NVMe solid-state drives are to be removed, disable them beforehand in OS.

Complete the following steps to remove a drive.
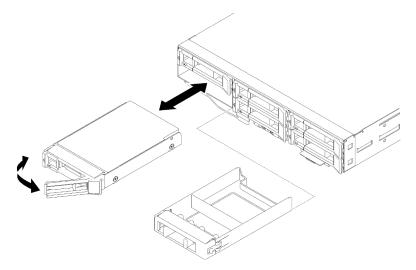
Figure 148. Drive removal

Step 1.   Slide the latch to unlock the drive handle.

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

After you remove the drive:

1. Install either a drive bay filler or a replacement drive (see "Install a hot-swap drive" on page 149).

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

Demo video

Install a hot-swap drive

Use this procedure to install a drive.

Before you install a drive:

1. Read the following section(s) to ensure that you work safely.

   - "Safety" on page iii
   - "Installation Guidelines" on page 61

2. Touch the static-protective package that contains the drive to any unpainted metal surface on the solution; then, remove the drive from the package and place it on a static-protective surface.

The following notes describe the type of drives that the node supports and other information that you must consider when you install a drive. For a list of supported drives, see https://serverproven.lenovo.com/.

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

- You can install up to six hot-swap SAS/SATA 2.5-inch drives for each node.

- The electromagnetic interference (EMI) integrity and cooling of the solution are protected by having all bays and PCI and PCI Express slots covered or occupied. When you install a drive, PCI, or PCI Express adapter, save the EMC shield and filler panel from the bay or PCI or PCI Express adapter slot cover in the event that you later remove the device.

- For a complete list of supported optional devices for the node, see https://serverproven.lenovo.com/.

Complete the following steps to install a drive:

Note: If you have only one drive, you must install it in the bay 0 (upper-left).
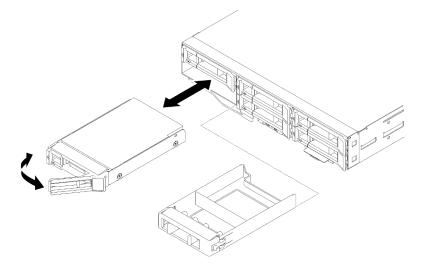
Figure 149. Drive installation

Step 1. Install the drive in the drive bay:

      a.   Make sure that the tray handle is in the open (unlocked) position.

      b.   Align the drive with the guide rails in the bay.

c. Gently push the drive into the bay until the drive stops.

d. Rotate the tray handle to the closed (locked) position and you can hear a click.

e. Check the drive status LED to verify that the drive is operating correctly. If the yellow drive status LED of a drive is lit continuously, that drive is faulty and must be replaced. If the green drive activity LED is flashing, the drive is being accessed.

Step 2. If you are installing additional drives, do so now.

After you install all the drives, complete the following step.

1. If the node is configured for RAID operation using a RAID adapter, you will have to reconfigure your disk arrays after you install drives. See the RAID adapter documentation for additional information about RAID operation and complete instructions for using the RAID adapter.

Demo video

[Watch the procedure on YouTube](#)

Drive backplane replacement

Use the following procedures to remove and install the Drive backplane.

Remove the drive backplane

Use this information to remove the drive backplane.

Before you remove the drive backplane:

1. Read the following section(s) to ensure that you work safely.

   • "Safety" on page iii
   • "Installation Guidelines" on page 61

2. Turn off the corresponding compute node that you are going to perform the task on.

3. Remove the compute node (see "Remove a compute node from the enclosure" on page 65).

4. Remove the compute node cover (see "Remove the compute node cover" on page 141).

5. Slightly pull out all the drives or fillers from the node to disengage them from the drive backplane (see "Remove a hot-swap drive" on page 148 or "Remove a drive bay blank" on page 152).

Complete the following steps to remove the drive backplane.
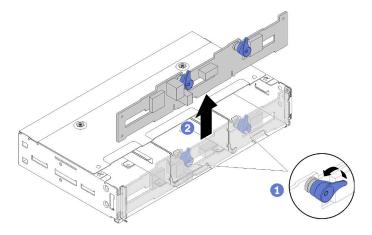
Figure 150. Drive backplane removal

Step 1.   Disconnect the power cable from the system board.

> **Attention:** To avoid damaging the system board, make sure to follow the instructions in "Internal cable routing" on page 41 when disconnecting cables from the system board.

Step 2.   Disconnect all the signal cables from the backplane.

Step 3.   Pull the two latches and lift the backplane to disengage and remove the backplane from the node.

Step 4.   Disconnect the ambient sensor cable.

Step 5.   Disconnect the power cable from the backplane.

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

Demo video

Watch the procedure on YouTube

Install the drive backplane

Use this information to install the drive backplane.

Before you install the drive backplane:

1. Read the following section(s) to ensure that you work safely.

   - "Safety" on page iii
   - "Installation Guidelines" on page 61

2. Turn off the corresponding compute node that you are going to perform the task on.

3. Remove the compute node (see "Remove a compute node from the enclosure" on page 65).

4. Remove the compute node cover (see "Remove the compute node cover" on page 141).

5. Pull the drives or fillers out of the node slightly to disengage them from the drive backplane (see "Remove a hot-swap drive" on page 148).

You can refer to "2.5-inch drive backplanes" on page 32 for detailed backplane introduction.

Important:

1. Do not mix nodes with the four-drive backplane and six-drive backplanes in the same enclosure. Mixing the four-drive backplane and six-drive backplanes may cause unbalanced cooling.

2. Before installing a four 2.5-inch NVMe backplane, make sure two processors are installed.

Complete the following steps to install the drive backplane.
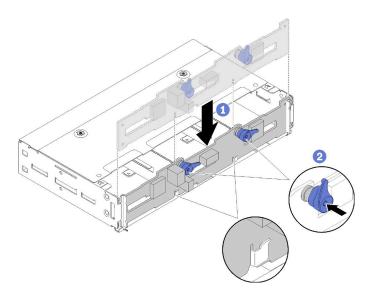
Figure 151. Drive backplane installation

Step 1. Connect the ambient sensor cable.

Step 2. Align the backplane with the backplane slots in the side walls of the node.

Step 3. Lower the backplane into the slots in the chassis and push the two latches.

> **Note:** Make sure the ambient sensor cable is routed through the slot on the bottom backplane.

Step 4. Connect all the required cables. For detailed cable routing, see "Internal cable routing" on page 41.

After you install the drive backplane, complete the following steps.

1. Reinstall the drives and filler panels (see "Install a hot-swap drive" on page 149).
2. If the air baffle is removed, reinstall it (see "Install the air baffle" on page 137).
3. Reinstall the compute node cover (see "Install the compute node cover" on page 142).
4. Reinstall the compute node (see "Install a compute node in the enclosure" on page 69).
5. Check the power LED to make sure it transitions between fast blink and slow blink to indicate the node is ready to be powered on.

Demo video

Watch the procedure on YouTube

Drive bay blank replacement

Use the following procedures to remove and install a 2.5-inch drive bay blank.

Note: 2.5-inch drive bay blanks apply to the empty drive bays on a drive backplane, while drive bay blank panels apply to the empty bays next to the 2.5-inch 4 drives hot-swap backplane. See "Parts list" on page 34 to discern the two components.

Remove a drive bay blank

Use this procedure to remove a drive bay blank.

Before removing a drive bay blank:

1. Read the following section(s) to ensure that you work safely.

- "Safety" on page iii
- "Installation Guidelines" on page 61

2. Remove the compute node (see "Remove a compute node from the enclosure" on page 65).

3. Remove the compute node cover (see "Remove the compute node cover" on page 141).

Complete the following steps to remove a drive bay blank.

Step 1. Orient the node so you can access the screw retaining the drive bay blank. Please refer to the following illustrations to find the correct orientation.

Step 2. Remove the screw as illustrated.

Step 3. Push the blank from the rear of the node (close to the backplane) towards the front to disengage it from the backplane.

- For the drive bay blank in drive bay 0 and 1
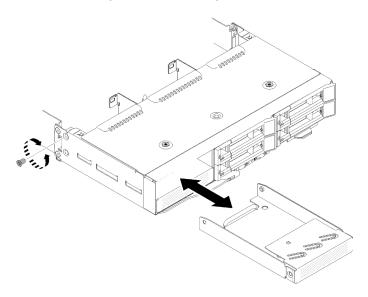
Figure 152. Drive bay blank (in drive bay 0 and 1) removal

- For the drive bay blank in drive bay 2
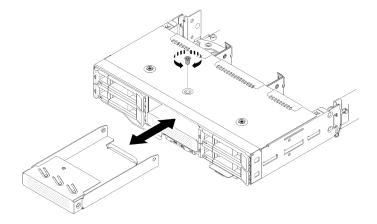
Figure 153. Drive bay blank (in drive bay 2) removal

- For the drive bay blank in drive bay 3

Note: The following illustration shows the underside of the node.
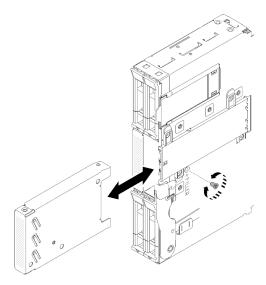
Figure 154. Drive bay blank (in drive bay 3) removal

- For the drive bay blank in drive bay 4 and 5
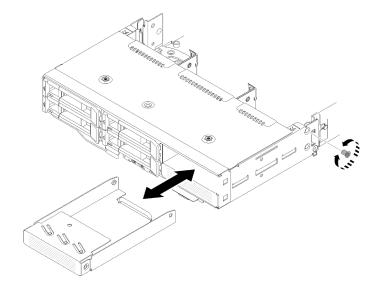
Figure 155. Drive bay blank (in drive bay 4 and 5) removal

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

Install a drive bay blank

Use this procedure to install a drive bay blank.

Before installing a drive bay blank:

1. Read the following section(s) to ensure that you work safely.

   - "Safety" on page iii
   - "Installation Guidelines" on page 61

2. Remove the compute node (see "Remove a compute node from the enclosure" on page 65).

3. Remove the compute node cover (see "Remove the compute node cover" on page 141).

Complete the following steps to install a drive bay blank.

Step 1. Slide the blank into the drive bay until the screw hole in the filler aligns with the hole on the node.

Step 2. Fasten the screw.

- For the drive bay blank in drive bay 0 and 1
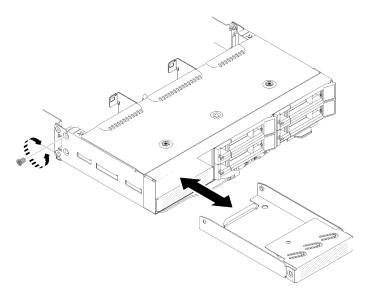
Figure 156. Drive bay blank (in drive bay 0 and 1) installation

- For the drive bay blank in drive bay 2
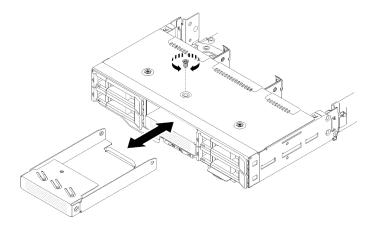
Figure 157. Drive bay blank (in drive bay 2) installation

- For the drive bay blank in drive bay 3

  Note: The following illustration shows the underside of the node.
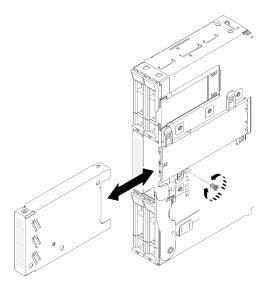
Figure 158. Drive bay blank (in drive bay 3) installation

- For the drive bay blank in drive bay 4 and 5
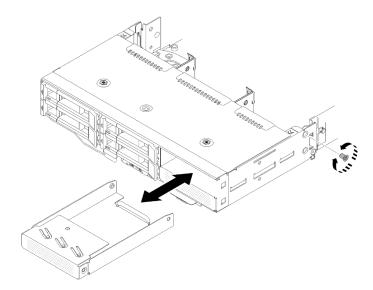
Figure 159. Drive bay blank (in drive bay 4 and 5) installation

After you install a drive bay blank, complete the following steps:

1. Reinstall the compute node cover (see "Install the compute node cover" on page 142).
2. Reinstall the compute node (see "Install a compute node in the enclosure" on page 69).

KVM breakout module replacement

Use the following procedures to remove and install the KVM breakout module.

Remove the KVM breakout module

Use this information to remove the breakout module.

Before you remove the KVM breakout module:

1. Read the following section(s) to ensure that you work safely.

-
-

2. Turn off the corresponding compute node that you are going to perform the task on.

3. Remove the node (see).

4. Remove the compute node cover (see).

5. Remove the air baffle (see).

Complete the following steps to remove the KVM breakout module.

The right KVM breakout module (for four 2.5-inch-drive model)
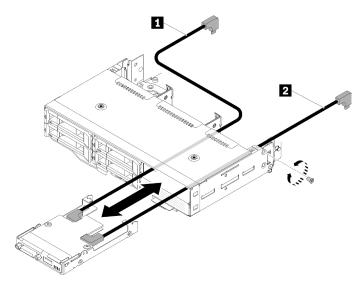
Figure 160. Right KVM breakout module removal

Table 54. Components on the right KVM breakout module removal

1 Long signal cable	**2** Short signal cable

The left KVM breakout module (for six 2.5-inch-drive model)
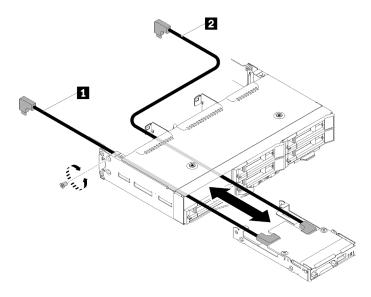
Figure 161. Left breakout module removal

Table 55. Components on the left KVM breakout module removal

1 Short signal cable	**2** Long signal cable

Step 1. Loosen the screw.

Step 2. Disconnect all of the cables from the system board.

> **Attention:** To avoid damaging the system board, make sure to follow the instructions in "Internal cable routing" on page 41 when disconnecting cables from the system board.

Step 3. Push the KVM breakout module from the rear of the compute node and slide the it out of the compute node.

> **Note:** Be careful as you route the cables through the openings in the backplane or the drive bay.

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

Demo video

Watch the procedure on YouTube

Install the KVM breakout module

Use this information to install the KVM breakout module.

Before you install the KVM breakout module:

1. Read the following section(s) to ensure that you work safely.

   - "Safety" on page iii
   - "Installation Guidelines" on page 61

2. Turn off the corresponding compute node that you are going to perform the task on.

3. Remove the node (see "Remove a compute node from the enclosure" on page 65).

4. Remove the compute node cover (see "Remove the compute node cover" on page 141).

5. Remove the air baffle (see "Remove the air baffle" on page 136).

Complete the following steps to install the KVM breakout module.

Step 1. Connect all required cables to the KVM breakout module.

Step 2. Carefully route cables through the drive bay and the drive backplane.

- The right KVM breakout module (for four 2.5-inch-drive model)
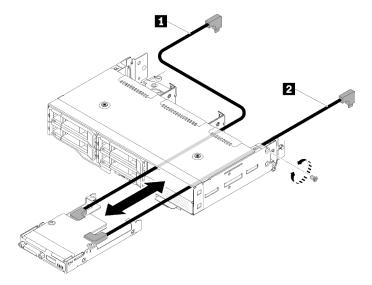
Figure 162. Right KVM breakout module installation

Table 56. Components on the right KVM breakout module installation

1 Long signal cable	**2** Short signal cable

Attention: Make sure the USB 3.0 connector is on your right side as illustrated to ensure the correct installation.
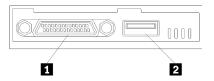
Figure 163. KVM breakout module

Table 57. KVM breakout module

1 KVM connector	**2** USB 3.0 connector

- The left KVM breakout module (for six 2.5-inch-drive model)
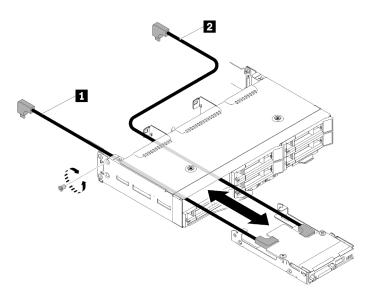
Figure 164. Left KVM breakout module installation

Table 58. Components on the left KVM breakout module installation

1 Short signal cable	**2** Long signal cable

Attention: Make sure the USB 3.0 connector is on your right side as illustrated to ensure the correct installation.
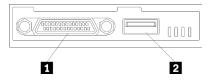
Figure 165. KVM breakout module

Table 59. KVM breakout module

1 KVM connector	**2** USB 3.0 connector

Step 3. Insert the KVM breakout module into the node.

Step 4. Fasten the screw.

Step 5. Connect required cables to connectors as shown in the following illustrations.

Note: Manage cables in plastic cable guides located on side of compute node.

- The right KVM breakout module (for four 2.5-inch-drive model)
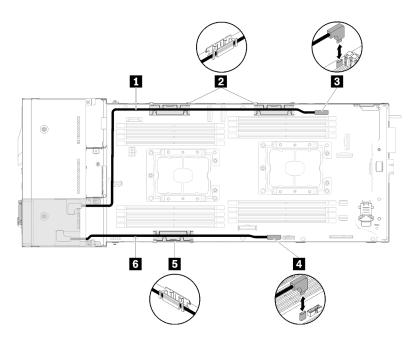
Figure 166. Right KVM breakout module cable routing

Table 60. Components on the right KVM breakout module cable routing

1 Long signal cable	**3** KVM breakout cable connector
2 **5** Internal cable management basket	**4** USB connector
6 Short signal cable	

- The left KVM breakout module (for six 2.5-inch-drive model)
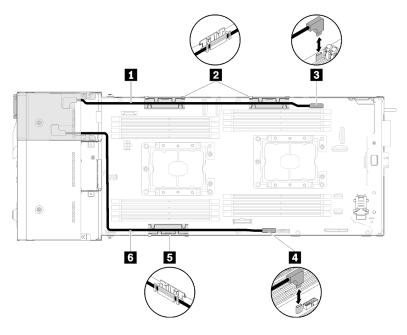
Figure 167. Left KVM breakout module cable routing

Table 61. Components on the left KVM breakout module cable routing

1 Short signal cable	**3** KVM breakout cable connector
2 **5** Internal cable management basket	**4** USB connector
6 Long signal cable	

Note: While KVM breakout cable is connected, the USB key should not be wider than 19 mm.

After you install the KVM breakout module, complete the following steps.

1. Reinstall the air baffle (see "Install the air baffle" on page 137).
2. Reinstall the node cover (see "Install the compute node cover" on page 142).
3. Reinstall the compute node (see "Install a compute node in the enclosure" on page 69).
4. Reconnect the power cords and any cables that you removed.
5. Check the power LED to make sure it transitions between fast blink and slow blink to indicate the node is ready to be powered on.

Demo video

Watch the procedure on YouTube

M.2 backplane replacement

Use the following procedures to remove and install the M.2 backplane.

Remove the M.2 backplane

Use this information to remove the M.2 backplane.

Before you remove the M.2 backplane:

1. Read the following section(s) to ensure that you work safely.

   - "Safety" on page iii
   - "Installation Guidelines" on page 61

2. Turn off the corresponding compute node that you are going to perform the task on.
3. Remove the compute node (see "Remove a compute node from the enclosure" on page 65).
4. Remove the compute node cover (see "Remove the compute node cover" on page 141).

Complete the following steps to remove the M.2 backplane.
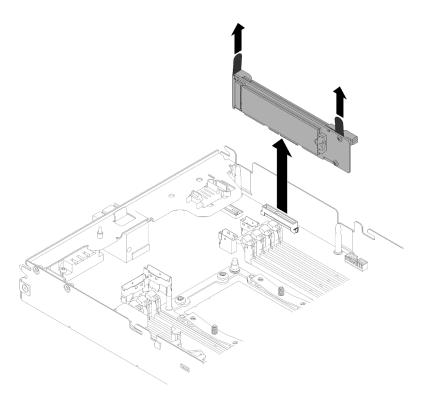
Figure 168. M.2 backplane removal

Step 1. Remove the M.2 backplane from the system board by pulling up on both ends of the backplane at the same time.

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

Demo video

Watch the procedure on YouTube

Install the M.2 backplane
Use this information to install the M.2 backplane.

Before you install the M.2 backplane:

1. Read the following section(s) to ensure that you work safely.

    - "Safety" on page iii
    - "Installation Guidelines" on page 61

2. Turn off the corresponding compute node that you are going to perform the task on.

3. Remove the compute node (see "Remove a compute node from the enclosure" on page 65).

4. Remove the compute node cover (see "Remove the compute node cover" on page 141).

Complete the following steps to install the M.2 backplane.
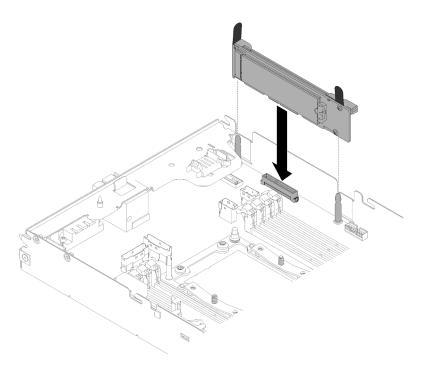
Figure 169. M.2 backplane installation

Step 1. Align the openings located at the bottom of the blue plastic supports at each end of the M.2 backplane with the guide pins on the system board; then, insert the backplane in the system board connector. Press down on the M.2 backplane to fully seat it.

After you install the M.2 backplane, complete the following steps:

1. If the air baffle is removed, reinstall it (see "Install the air baffle" on page 137).

2. Reinstall the compute node cover (see "Install the compute node cover" on page 142).

3. Reinstall the compute node (see "Install a compute node in the enclosure" on page 69).

4. Check the power LED to make sure it transitions between fast blink and slow blink to indicate the node is ready to be powered on.

Demo video

Watch the procedure on YouTube

M.2 drive replacement in the M.2 backplane

Use the following procedures to remove and install the M.2 drive from and into the M.2 backplane.

Remove an M.2 drive in the M.2 backplane

Use this information to remove an M.2 drive in the M.2 backplane.

Before you remove an M.2 drive in the M.2 backplane:

1. Read the following section(s) to ensure that you work safely.

   • "Safety" on page iii
   • "Installation Guidelines" on page 61

2. Turn off the corresponding compute node that you are going to perform the task on.

3. Remove the compute node (see "Remove a compute node from the enclosure" on page 65).

4. Remove the compute node cover (see "Remove the compute node cover" on page 141).

5. Remove the M.2 backplane (see "Remove the M.2 backplane" on page 162).

Complete the following steps to remove an M.2 drive from the M.2 backplane.
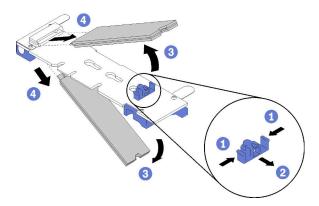
Figure 170. M.2 drive removal

Step 1. Press both sides of the retainer and slide it backward to loosen the M.2 drive from the M.2 backplane.

>   **Note:** If your M.2 backplane has two M.2 drives, they will both release outward when you slide the retainer backward.

Step 2. Remove the M.2 drive by rotating it away from the M.2 backplane and pulling away from the connector at an angle (approximately 30 degrees).

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

Demo video

Watch the procedure on YouTube

Install an M.2 drive in the M.2 backplane

Use this information to install an M.2 drive in the M.2 backplane.

Before you install an M.2 drive in the M.2 backplane:

1. Read the following section(s) to ensure that you work safely.

   - "Safety" on page iii
   - "Installation Guidelines" on page 61

2. Turn off the corresponding compute node that you are going to perform the task on.

3. Remove the compute node (see "Remove a compute node from the enclosure" on page 65).

4. Remove the compute node cover (see "Remove the compute node cover" on page 141).

5. Remove the M.2 backplane (see "Remove the M.2 backplane" on page 162).

Complete the following steps to install an M.2 drive in the M.2 backplane.

Step 1. Locate the connector on each side of the M.2 backplane.

>   **Notes:**

- Some M.2 backplanes support two identical M.2 drives. When two drives are installed, align and support both drives when sliding the retainer forward to secure the drives.
- Install the M.2 drive in slot 0 first.
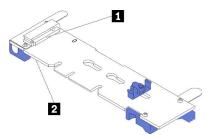
Figure 171. M.2 drive slot

Table 62. M.2 drive slot

1 Slot 0	**2** Slot 1

Step 2. Insert the M.2 drive at an angle (approximately 30 degrees) into the connector and rotate it until the notch catches on the lip of the retainer; then, slide the retainer forward (toward the connector) to secure the M.2 drive in the M.2 backplane.
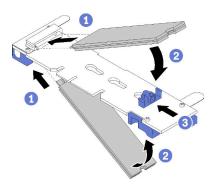
Figure 172. M.2 drive installation

Attention: When sliding the retainer forward, make sure the two nubs on the retainer enter the small holes on the M.2 backplane. Once they enter the holes, you will hear a soft "click" sound.
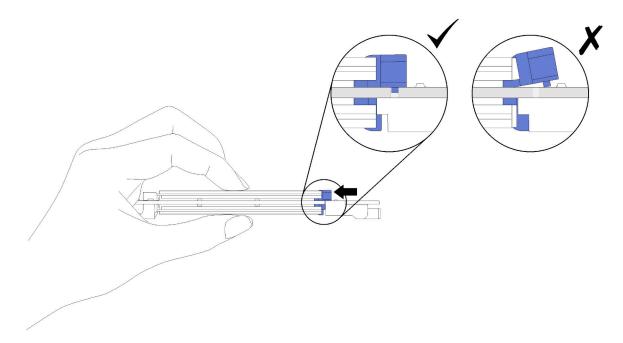
Figure 173. M.2 drive installation

After you install an M.2 drive in the M.2 backplane, complete the following steps:

1. Reinstall the M.2 backplane (see "Install the M.2 backplane" on page 163).
2. Reinstall the compute node cover (see "Install the compute node cover" on page 142).
3. Reinstall the compute node (see "Install a compute node in the enclosure" on page 69).
4. Check the power LED to make sure it transitions between fast blink and slow blink to indicate the node is ready to be powered on.

Demo video

Watch the procedure on YouTube

How to adjust the position of the retainer on the M.2 backplane
Use this information to adjust the position of the retainer on the M.2 backplane.

Before you adjust the position of the retainer on the M.2 backplane, complete the following steps:

1. Read the following section(s) to ensure that you work safely.

   - "Safety" on page iii
   - "Installation Guidelines" on page 61
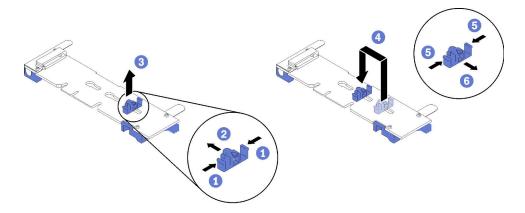
To adjust the position of the retainer on the M.2 backplane, complete the following steps.

Watch the procedure

A video of the installation and removal process is available at Youtube: https://www.youtube.com/playlist?list=PLYV5R7hVcs-DOlbsCdADcoKQdMB2Uuk-T

Step 1. Locate the correct keyhole that the retainer should be installed into to accommodate the particular size of the M.2 drive you wish to install.

Step 2. Press both sides of the retainer and move it forward until it is in the large opening of the keyhole; then, remove it from the backplane.

Step 3.   Insert the retainer into the correct keyhole and slide it backwards until the nubs are in the holes.

Processor and heat sink replacement
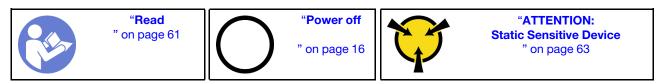
Use the following procedures to replace an assembled processor and heat sink, known as a processor-heat-sink module (PHM), a processor, or a heat sink.

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

Important: The processor can throttle in response to thermal conditions, temporarily lowering its speed to reduce heat output. In instances where a few processor cores are throttled for an extremely short time period (100 ms or less), the only indication might be an entry in the operating system event log with no corresponding entry in the system XCC event log. If this situation occurs, the event can be ignored and processor replacement is not required.

Remove a processor and heat sink

Processors are to be accessed from the top of the compute nodes, which are to be removed from the enclosure for processor and heat sink replacement. This task has instructions for removing an assembled processor and heat sink, known as a processor-heat-sink module (PHM), a processor, and a heat sink. All of these tasks require a Torx T30 driver.

	"**Read**" on page 61	"**Power off**" on page 16	"**ATTENTION: Static Sensitive Device**" on page 63

Attention:

- Each processor socket must always contain a cover or a PHM. When removing or installing a PHM, protect empty processor sockets with a cover.

- Do not touch the processor socket or processor contacts. Processor-socket contacts are very fragile and easily damaged. Contaminants on the processor contacts, such as oil from your skin, can cause connection failures.

- Remove and install only one PHM at a time. If the system board supports multiple processors, install the PHMs starting with the first processor socket.

- Do not allow the thermal grease on the processor or heat sink to come in contact with anything. Contact with any surface can compromise the thermal grease, rendering it ineffective. Thermal grease can damage components, such as electrical connectors in the processor socket. Do not remove the grease cover from a heat sink until you are instructed to do so.

- Thermal grease can stay functional on the heat sink for two years. When installing a new heat sink, make sure to check the manufacturing date to ensure the thermal grease is still functioning. If the date is over two years ago, replace the thermal grease to avoid seating issues.

Before you remove a PHM:

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

1. Read the following section(s) to ensure that you work safely.

   - "Safety" on page iii
   - "Installation Guidelines" on page 61

2. Turn off the corresponding compute node that you are going to perform the task on.

3. Remove the compute node or compute-expansion node assembly from the chassis (see "Remove a compute node from the enclosure" on page 65 or "Remove the compute-expansion node assembly from the enclosure" on page 79).

4. Remove the compute node cover or disengage the PCIe expansion node (see "Remove the compute node cover" on page 141 or "Disengage the PCIe expansion node from a compute node" on page 198).

5. Remove the air baffle (see "Remove the air baffle" on page 136).

Figure 174. Processor locations

Complete the following steps to remove a PHM.

Step 1.   If the processor comes with a T-shaped heat sink, remove the two screws on the sides of the node.
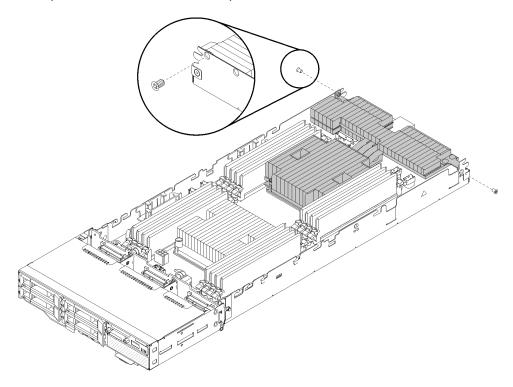
Figure 175. Removing screws that secure the T-shaped heat sink

Step 2.   Remove the PHM from the system board.
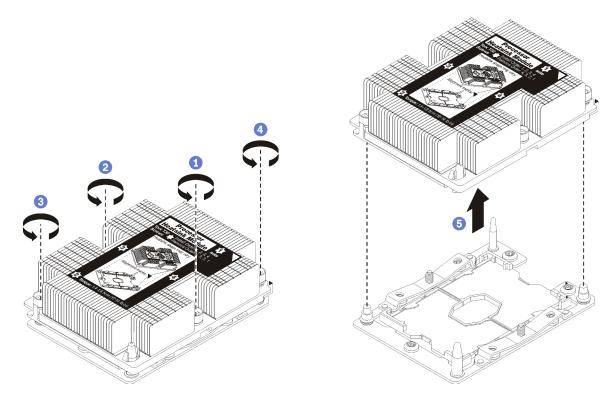
Figure 176. Removing a PHM

Attention: To prevent damage to components, make sure that you follow the indicated loosening sequence.

a. Fully loosen the Torx T30 captive fasteners on the processor-heat-sink module *in the removal sequence shown* on the heat-sink label.

b. Lift the processor-heat-sink module from the processor socket.

After you remove a PHM:
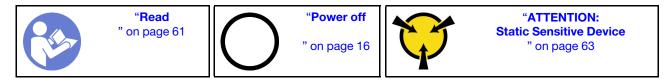
1. If you are removing the PHM as part of a system board replacement, set the PHM aside.

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

Demo video

[Watch the procedure on YouTube](#)

Install a processor and heat sink

This task has instructions for installing an assembled processor and heat sink, known as a processor-heat-sink module (PHM), a processor, and a heat sink. All of these tasks require a Torx T30 driver.

"**Read** " on page 61	"**Power off** " on page 16	"**ATTENTION: Static Sensitive Device** " on page 63

Attention:

- Each processor socket must always contain a cover or a PHM. When removing or installing a PHM, protect empty processor sockets with a cover.

- Do not touch the processor socket or processor contacts. Processor-socket contacts are very fragile and easily damaged. Contaminants on the processor contacts, such as oil from your skin, can cause connection failures.

- Remove and install only one PHM at a time. If the system board supports multiple processors, install the PHMs starting with the first processor socket.

- Do not allow the thermal grease on the processor or heat sink to come in contact with anything. Contact with any surface can compromise the thermal grease, rendering it ineffective. Thermal grease can damage components, such as electrical connectors in the processor socket. Do not remove the grease cover from a heat sink until you are instructed to do so.

- Thermal grease can stay functional on the heat sink for two years. When installing a new heat sink, make sure to check the manufacturing date to ensure the thermal grease is still functioning. If the date is over two years ago, replace the thermal grease to avoid seating issues.

Notes:

- PHMs are keyed for the socket where they can be installed and for their orientation in the socket.

- See https://serverproven.lenovo.com/ for a list of processors supported for your system. 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 *Product_name Setup Guide*.

- Optional devices available for your system might have specific processor requirements. See the documentation that comes with the optional device for information.
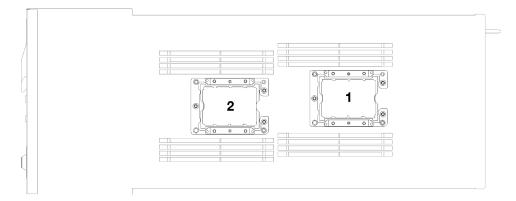
Figure 177. Processor locations

- The following types of heat sinks are applicable to SD530:

  - **108x108x24.5mm heat sink** is only applicable to processor socket 1.

- **85x108x24.5mm heat sink** is only applicable to processor socket 2.
    - Low voltage configuration
        - **108x108x24.5mm heat sink** is only applicable to processor socket 1.
        - **85x108x24.5mm heat sink** is only applicable to processor socket 2.
    - High voltage configuration
        - **T-shaped heat sink** is only applicable to processor socket 1.
        - **105x108x24.5mm heat sink** is only applicable to processor socket 2.

Before you install a PHM:

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

1. Read the following section(s) to ensure that you work safely.

    - "Safety" on page iii
    - "Installation Guidelines" on page 61

2. Turn off the corresponding compute node that you are going to perform the task on.

3. Remove the compute node or compute-expansion node assembly from the chassis (see "Remove a compute node from the enclosure" on page 65 or "Remove the compute-expansion node assembly from the enclosure" on page 79).

4. Remove the compute node cover or disengage the PCIe expansion node (see "Remove the compute node cover" on page 141 or "Disengage the PCIe expansion node from a compute node" on page 198).

5. Remove the air baffle (see "Remove the air baffle" on page 136).

6. Remove the existing PHM, if one is installed. See "Remove a processor and heat sink" on page 169.

    Note: Replacement processors come with both rectangular and square processor retainers. A rectangular retainer comes attached to the processor. The square retainer can be discarded.

7. If you are replacing a heat sink, remove the processor identification label from the old heat sink and place it on the new heat sink in the same location. The label is on the side of the heat sink closest to the triangular alignment mark.

    If you are unable to remove the label and place it on the new heat sink, or if the label is damaged during transfer, write the processor serial number from the processor identification label on the new heat sink in the same location as the label would be placed using a permanent marker.

Step 1.   Remove the processor socket cover, if one is installed on the processor socket, by placing your fingers in the half-circles at each end of the cover and lifting it from the system board.

Step 2.   If the processor comes with a T-shaped hear sink, secure the heat sink with two screws on the sides of the node.
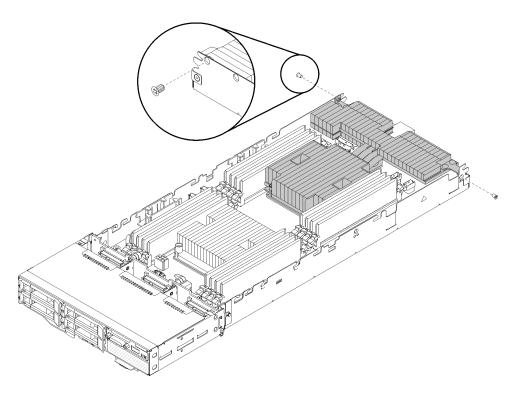
Figure 178. Securing the T-shaped heat sink with two screws

Note: Use Phillips #1 driver on these two screws.

Step 3. Install the processor-heat-sink module on the system board.
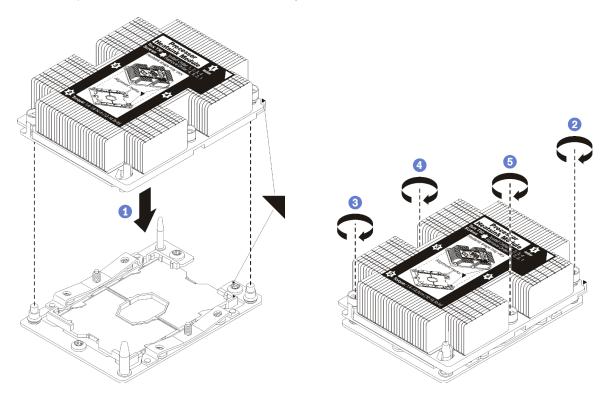
Figure 179. Installing a PHM

a. Align the triangular marks and guide pins on the processor socket with the PHM; then, insert the PHM into the processor socket.

   Attention: To prevent damage to components, make sure that you follow the indicated tightening sequence.

b. Fully tighten the Torx T30 captive fasteners *in the installation sequence shown* on the heat-sink label. Tighten the screws until they stop; then, visually inspect to make sure that there is no gap between the screw shoulder beneath the heat sink and the processor socket. (For reference, the torque required for the nuts to fully tighten is 1.4 - 1.6 newton-meters, 12 - 14 inch-pounds).

After you install a PHM:

1. Reinstall the air baffle (see "Install the air baffle" on page 137).

2. Reinstall the compute node cover or re-engage the PCIe expansion node (see "Install the compute node cover" on page 142 or "Re-engage the PCIe expansion node to a compute node " on page 200).

3. Reinstall the compute node or the compute-expansion node assembly (see "Install a compute node in the enclosure" on page 69 or "Install the compute-expansion node assembly into the enclosure" on page 80).

4. Check the power LED to make sure it transitions between fast blink and slow blink to indicate the node is ready to be powered on.

5. Power on the node.

   Check the power LED to make sure it transitions between fast blink and slow blink to indicate the node is ready to be powered on.

Demo video

Watch the procedure on YouTube

RAID adapter replacement

Use the following procedures to remove and install a RAID adapter.

Remove a RAID adapter from the compute node

Use this information to remove a RAID adapter from the compute node.

Before you remove a RAID adapter from the compute node:

1. Read the following section(s) to ensure that you work safely.

   - "Safety" on page iii
   - "Installation Guidelines" on page 61

2. Turn off the corresponding compute node that you are going to perform the task on.

3. Remove the compute node (see "Remove a compute node from the enclosure" on page 65).

4. Remove the compute node cover (see "Remove the compute node cover" on page 141).

Complete the following steps to remove a RAID adapter from the compute node.
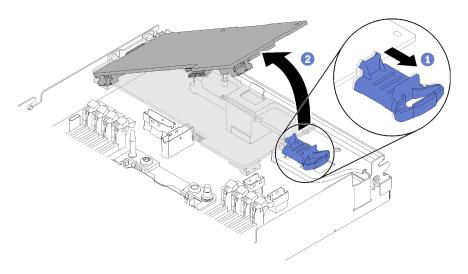
Figure 180. RAID adapter removal

Step 1.   Push the blue release latch.

Step 2.   Tilt the adapter to remove it from the node.

Step 3.   Disconnect the SAS/SATA cables (up to two) from the underside of the adapter.

Step 4.   Disconnect the PCIe cable from the underside of the adapter.

> **Attention:** To avoid damaging the system board, make sure to follow the instructions in "Internal cable routing" on page 41 when disconnecting cables from the system board.
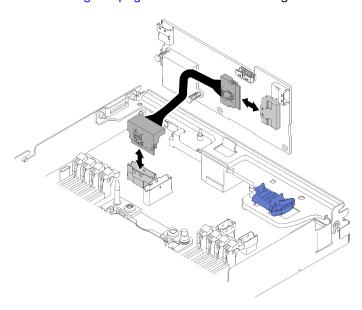
Figure 181. Cable removal

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

Demo video

[Watch the procedure on YouTube](#)

Install a RAID adapter into the compute node

Use this information to install a RAID adapter into the compute node.

Before you install a RAID adapter into the compute node.:

1. Read the following section(s) to ensure that you work safely.

   - "Safety" on page iii
   - "Installation Guidelines" on page 61

2. Turn off the corresponding compute node that you are going to perform the task on.

3. Remove the compute node (see "Remove a compute node from the enclosure" on page 65).

4. Remove the compute node cover (see "Remove the compute node cover" on page 141).

5. Make sure the RAID adapter support bracket is installed. If not, install it into the node and secure it with three screws.
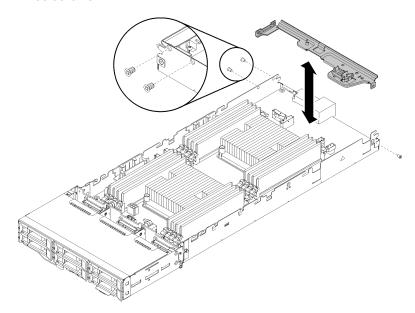
Figure 182. Installing the RAID adapter support bracket

6. Touch the static-protective package that contains the RAID adapter to any unpainted metal surface on the node; then, remove the adapter from the package.

7. Place the RAID adapter, component side up, on a flat, static-protective surface and set any jumpers or switches as described by the adapter manufacturer.

Complete the following steps to install a RAID adapter.
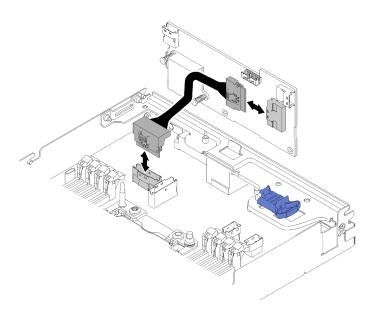
Figure 183. Connecting the PCIe cable

Step 1. Connect the PCIe cable from the PCIe slot 1 connector to the RAID adapter. See "System-board internal connectors" on page 29 to locate the PCIe slot 1 connector.

Step 2. Connect SAS/SATA cables (up to two) to the RAID adapter.
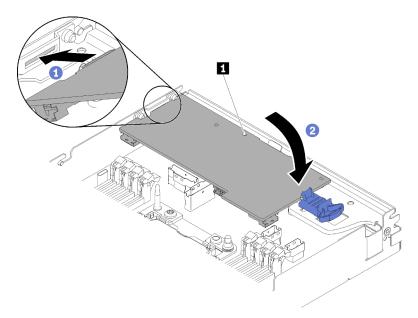
Figure 184. RAID adapter installation

Step 3. Insert the end of the adapter into the slot.

Step 4. Align the adapter with the guide pin **1**; then, lower and rotate down the adapter to insert it.

After you install a RAID adapter into the compute node, complete the following steps.

1. If the air baffle is removed, reinstall it (see "Install the air baffle" on page 137).
2. Reinstall the compute node cover (see "Install the compute node cover" on page 142).
3. Reinstall the compute node (see "Install a compute node in the enclosure" on page 69).

4. Check the power LED to make sure it transitions between fast blink and slow blink to indicate the node is ready to be powered on.

Demo video

[Watch the procedure on YouTube](#)

Replace components in the PCIe expansion node

Use the following information to remove and install components in the PCIe expansion node.

If you are installing the PCIe expansion node option kit, start from "Install the PCIe expansion node to a compute node" on page 205.

PCIe adapter replacement

Use the following procedures to remove and install a PCIe adapter from and into the riser cage.

Remove a PCIe adapter from the riser cage

Use this information to remove a PCIe adapter from the riser cage.

Before you remove a PCIe adapter from the riser cage:

1. Read the following section(s) to ensure that you work safely.

    - "Safety" on page iii
    - "Installation Guidelines" on page 61

2. If the compute-expansion node assembly is installed in the enclosure, remove it (see "Remove the compute-expansion node assembly from the enclosure" on page 79).

3. Remove the rear cable cover (see "Remove the rear cable cover" on page 214).

4. Remove the PCIe riser assembly from the expansion node (see "Remove a PCIe riser assembly from the compute-expansion node assembly" on page 184).

Complete the following steps to remove a PCIe adapter from the riser cage.

Step 1.   Remove the screw that secures the adapter to the riser cage.
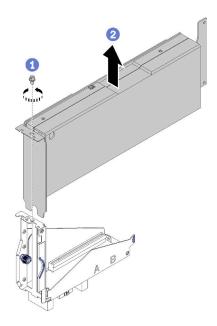
Figure 185. Removing the adapter from the riser cage

Step 2. Slide the adapter out along the slot on the riser cage.

After removing the PCIe adapter from the riser cage, install a functioning adapter into the riser cage (see). Otherwise, complete the following steps:

1. Fasten the screw to the riser cage.
2. Tighten the two captive screw on the riser cage and secure it to the expansion node for future use.
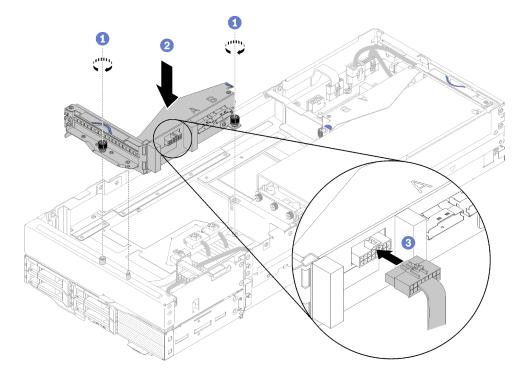
Figure 186. Front riser cage installation

3. Connect the front riser miscellaneous cable to the riser cage.

Demo video

Install a PCIe adapter into the riser cage

Use this information to install a PCIe adapter into the riser cage.

Before you install a PCIe adapter into the riser cage:

1. Read the following section(s) to ensure that you work safely.

   - "Safety" on page iii
   - "Installation Guidelines" on page 61

2. If the compute-expansion node assembly is installed in the enclosure, remove it (see "Remove the compute-expansion node assembly from the enclosure" on page 79).

3. Remove the rear cable cover (see "Remove the rear cable cover" on page 214).

4. If an adapter has been installed in the riser cage, remove the PCIe riser assembly from the expansion node assembly (see "Remove a PCIe riser assembly from the compute-expansion node assembly" on page 184), and remove the adapter from the riser cage (see "Remove a PCIe adapter from the riser cage" on page 179). If no adapter has been installed in the riser cage, disconnect the front riser miscellaneous cable first if you are removing the front riser cage; then, loosen the two captive screws to remove the riser cage from the node.
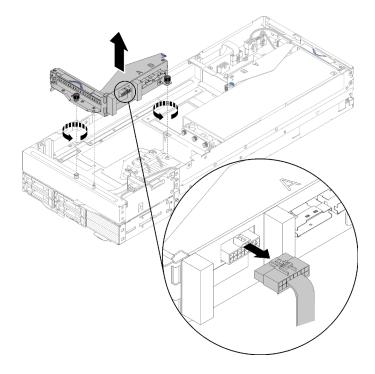
Figure 187. Disconnecting the front riser miscellaneous cable from the riser cage and removing the riser cage from the expansion node

Complete the following steps to install a PCIe adapter into the riser cage.

Step 1.   If no adapter has been installed in the riser cage, remove the screw from the riser cage.
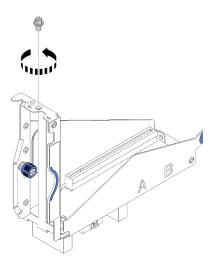
Figure 188. Removing the screw from the riser cage

Step 2.   Slide the adapter into the slot on the riser cage; then, fasten the screw to secure the adapter.
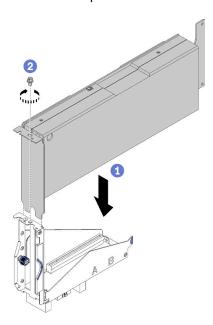
Figure 189. Installing an adapter into the riser cage

Step 3.   Connect the auxiliary power cable that comes with the adapter as illustrated.
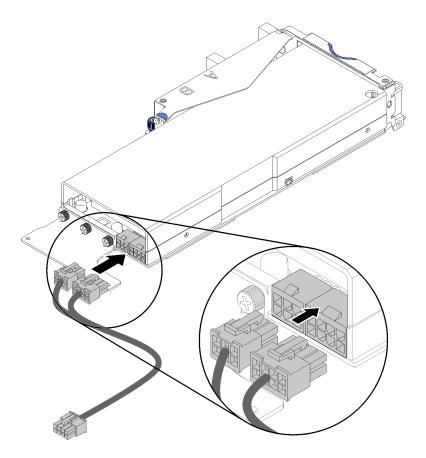
Figure 190. Connecting the auxiliary power cable to the adapter connectors

Attention: The PCIe adapter may come with more than one auxiliary power cable, and it is of crucial importance to adopt the cable specifically meant for SD530. Carefully examine the end of cable for PCIe expansion node, and make sure it is exactly the same as illustrated.
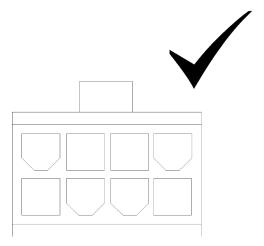
Figure 191. The connector of the auxiliary cable for SD530

Notes:

1. The auxiliary power cable that comes with your adapter might look different from that in the illustration.
2. The location of connectors might be different from that in the illustration.

After you install the PCIe adapter into the riser cage, complete the following steps:

1. Install the PCIe riser assembly into the PCIe expansion node (see "Install a PCIe riser assembly into the PCIe expansion node assembly " on page 190).

2. Install the rear cable cover (see "Install the rear cable cover" on page 215).

3. Install the PCIe expansion node assembly into the enclosure (see "Install the compute-expansion node assembly into the enclosure" on page 80).

4. Power on the compute node.

Demo video

Watch the procedure on YouTube

PCIe riser assembly replacement

Use the following procedures to remove and install the PCIe riser assembly from and into the PCIe expansion node.

Remove a PCIe riser assembly from the compute-expansion node assembly

Use this information to remove a PCIe riser assembly from the compute-expansion node assembly.

Before you remove the PCIe riser assembly from the compute-expansion node assembly:

1. Read the following section(s) to ensure that you work safely.

   - "Safety" on page iii
   - "Installation Guidelines" on page 61

2. If the compute-expansion node assembly is installed in the enclosure, remove it (see "Remove the compute-expansion node assembly from the enclosure" on page 79).

3. Remove the rear cable cover (see "Remove the rear cable cover" on page 214).

Complete the following steps based on the PCIe riser assembly to be removed.

Remove the front PCIe riser assembly

Step 1.   Disconnect PCIe#3-A, PCIe#4-B and the riser miscellaneous cable from the front riser assembly.
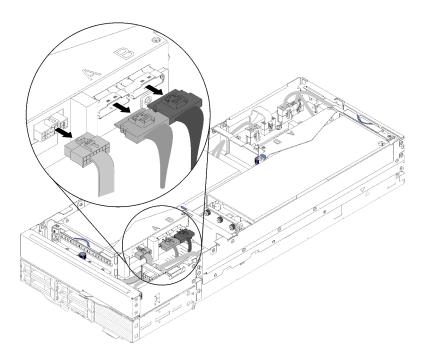
Figure 192. Disconnecting PCIe#3-A, PCIe#4-B and the riser miscellaneous cable

Step 2. Press on the latch of the auxiliary power cable connector to disengage and disconnect it from the expansion node.
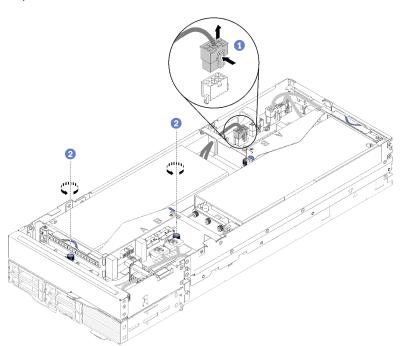
Figure 193. Disconnecting the auxiliary power cable and loosening captive screws of the front riser assembly

Step 3. Loosen the two captive screws that secure the front riser assembly to the expansion node.

Step 4. Remove the front riser assembly from the expansion node.
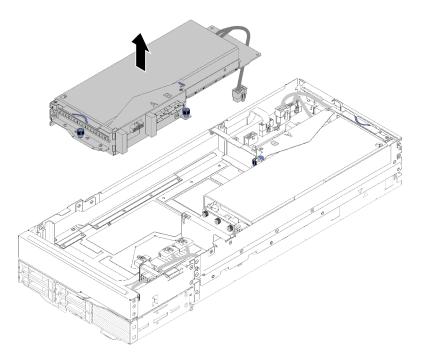
Figure 194. Removing the front riser assembly from the expansion node

Remove the rear PCIe riser assembly

Step 1. If the front riser assembly is installed in the expansion node, disconnect the front riser auxiliary power cable from the expansion node.
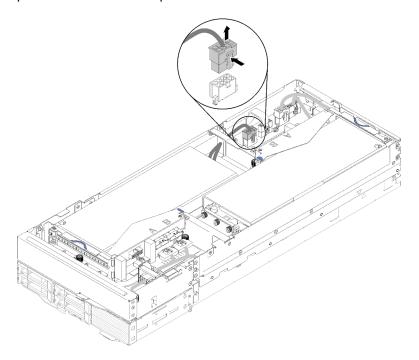
Figure 195. Disconnecting the front riser auxiliary power cable

Step 2. Disconnect PCIe#1-A, PCIe#2-B and the riser miscellaneous cable from the rear riser assembly.
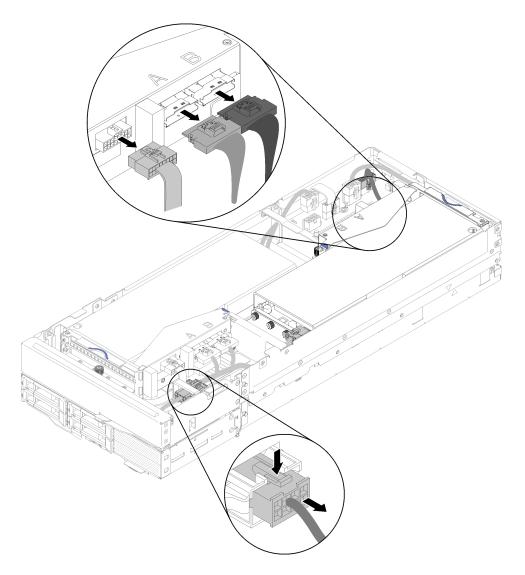
Figure 196. Disconnecting PCIe#1-A, PCIe#2-B, rear riser miscellaneous and auxiliary power cable

Step 3. Press on the latch of the auxiliary power cable connector to disengage and disconnect it from the expansion node.

Step 4. Loosen the two captive screws, and remove the rear riser assembly from the expansion node.
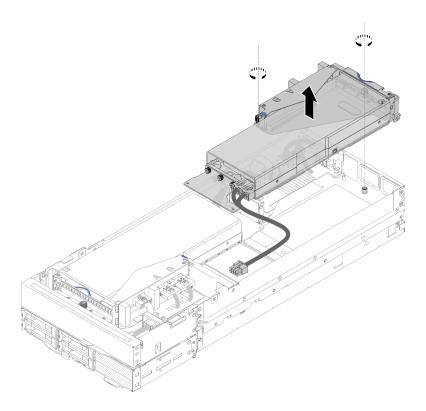
Figure 197. Removing the rear riser assembly from the expansion node

After removing the PCIe riser assembly from the expansion node, complete the following steps:

1. If only one adapter is installed and no new adapter is to be installed, make sure the adapter is installed in the rear riser slot. If not, complete the following steps:

   a. Remove the front riser assembly (see "Remove the front PCIe riser assembly " on page 184).

   b. Keep the adapter in the riser assembly, and install it to the rear riser slot (see "Install the rear PCIe riser assembly" on page 193).

   c. Remove the airflow filler from the side of the expansion node, and place it into the gap by the front riser slot.
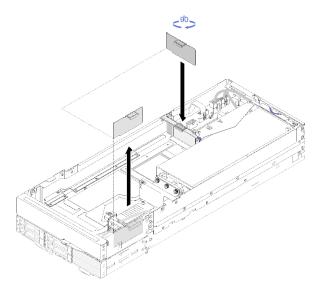
Figure 198. Airflow filler installation

    d. Tighten the two captive screw on the riser cage and secure it to the expansion node for future use.
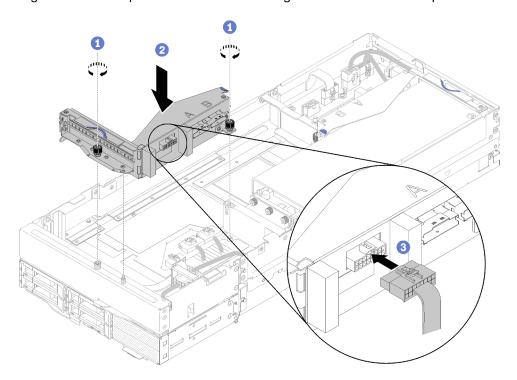
Figure 199. Front riser cage installation

    Connect the front riser miscellaneous cable to the riser cage.

2. Install the rear cable cover (see "Install the rear cable cover" on page 215).

3. Install the PCIe expansion node assembly into the enclosure (see "Install the compute-expansion node assembly into the enclosure" on page 80).

4. Power on the compute node.

Demo video

Watch the procedure on YouTube

Watch the procedure on YouTube

Install a PCIe riser assembly into the PCIe expansion node assembly

Use this information to install a PCIe riser assembly into the compute-expansion node assembly.

Before you install a PCIe riser assembly into the compute-expansion node assembly:

1. Read the following section(s) to ensure that you work safely.

   • "Safety" on page iii
   • "Installation Guidelines" on page 61

2. If no adapter is installed in the riser cage, disconnect the front riser miscellaneous cable first if you are removing the front riser cage, and loosen the two captive screws to remove the riser cage from the expansion node; then, install an adapter into the riser cage (see "Install a PCIe adapter into the riser cage" on page 181) .
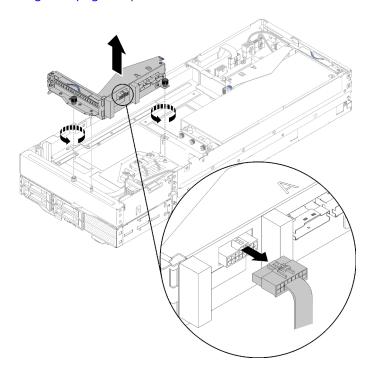
Figure 200. Riser cage removal

3. If you are installing a new adapter in addition to an existing one, remove the airflow filler from the gap by the front riser slot, and place it into the gap on the side of the expansion node as illustrated.
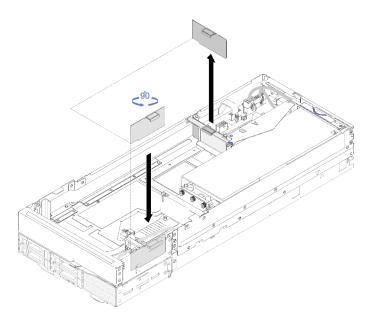
Figure 201. Airflow filler removal

Complete the following steps to install a PCIe riser assembly into the PCIe expansion node assembly.

Notes: For proper system cooling:

- Always start the installation from the rear riser slot (go to).
- When only one adapter is to be installed, make sure the adapter is install in the rear riser slot, and place the airflow filler into the gap by the front riser slot.

Install the front PCIe riser assembly

Step 1. Pass the auxiliary power cable through the narrow window as illustrated; then, align the riser assembly to the guide pins on the expansion node, and lower it until it stops.
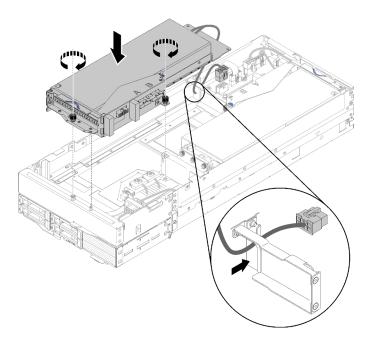
Figure 202. Installing the front riser assembly into the expansion node

Step 2.   Tighten the two captive screws to secure the riser assembly to the expansion node.

Step 3.   Connect PCIe#3-A cable to the riser connector labeled "A."
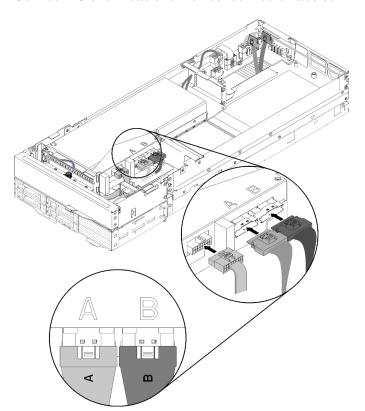
Figure 203. Connecting PCIe#3-A, PCIe#4-B and the riser miscellaneous cable to the front riser assembly

Step 4.   Connect PCIe#4-B cable to the riser connector labeled "B."

Step 5.   Connect the riser miscellaneous cable to the riser assembly.

Step 6.   Connect the auxiliary power cable to the expansion node.
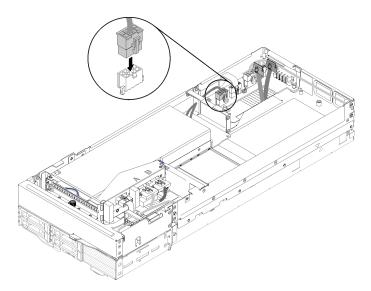
Figure 204. Connecting the auxiliary power cable to the expansion node

Install the rear PCIe riser assembly

Step 1.   Pass the auxiliary power cable through the narrow window as illustrated; then, align the riser assembly to the guide pins on the expansion node, and lower it until it stops.
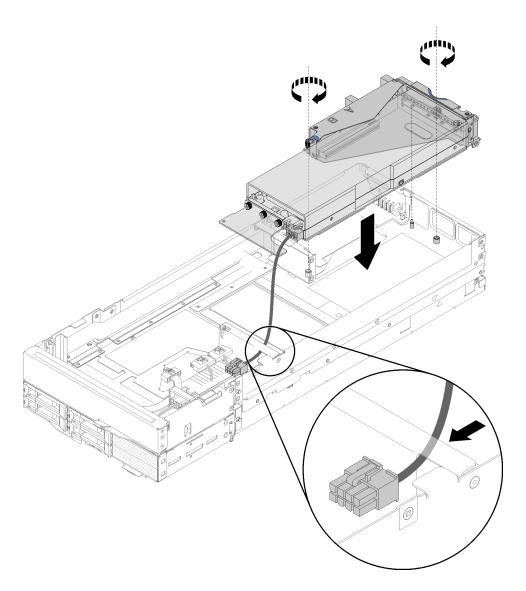
Figure 205. Installing the rear riser assembly into the expansion node

Step 2. Tighten the two captive screws to secure the riser assembly to the expansion node.

Step 3. Connect the auxiliary power cable to the expansion node.
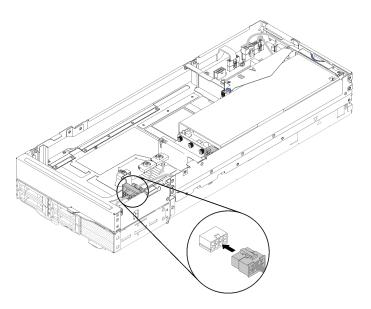
Figure 206. Connecting the auxiliary power cable to the expansion node

Step 4.   If the front riser assembly is installed in the expansion node, disconnect the front riser auxiliary power cable from the expansion node.
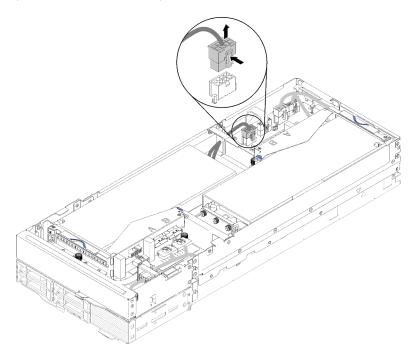
Figure 207. Disconnecting the front riser auxiliary power cable

Step 5.   Route PCIe#2-B cable between the two front riser power connectors, and connect it to the riser connector labeled "B."
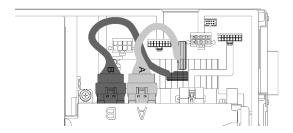
Figure 208. Routing PCIe#1-A and PCIe#2-B cable

Step 6.   Route PCIe#1-A cable between the two front riser power connectors, above PCIe#2-B cable, and connect it to the riser connector labeled "A."

Step 7.   Connect the riser miscellaneous cable to the riser assembly.
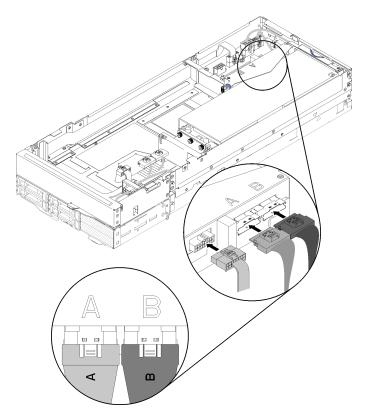
Figure 209. Connecting PCIe#1-A, PCIe#2-B and the riser miscellaneous cable to the rear riser assembly

Step 8.   If the front riser auxiliary power cable has been disconnected earlier, loop it back into the gap between the two front riser power connectors, route it above PCIe#2-B cable, and reconnect it to the expansion node.
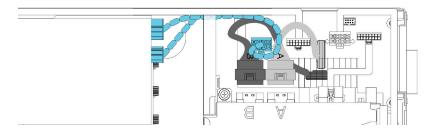
Figure 210. Routing the front riser auxiliary power cable to the expansion node

After you install the PCIe riser assembly into the compute-expansion node assembly, complete the following steps:

1. If only one adapter is installed, remove the airflow filler from the side of the expansion node, and place it into the gap by the front riser slot.
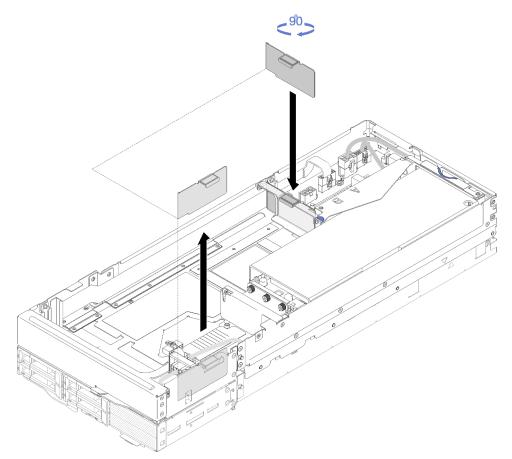
Figure 211. Air filler installation

2. Install the rear cable cover (see "Install the rear cable cover" on page 215).

3. Install the PCIe expansion node assembly into the enclosure (see "Install the compute-expansion node assembly into the enclosure" on page 80).

4. Turn on all compute nodes.

Demo video

Watch the procedure on YouTube

PCIe expansion node disengagement/re-engagement

Use the following procedures to disengage and re-engage the PCIe expansion node from and to a compute node.

Disengage the PCIe expansion node from a compute node

Use this information to disengage the PCIe expansion node from a compute node before replacing components in the compute node underneath.

Before you disengage the PCIe expansion node from a compute node:

1. Read the following section(s) to ensure that you work safely.

    - "Safety" on page iii
    - "Installation Guidelines" on page 61

2. If the compute-expansion node assembly is installed in the enclosure, remove it (see "Remove the compute-expansion node assembly from the enclosure" on page 79).

3. Remove the rear cable cover (see "Remove the rear cable cover" on page 214).

Complete the following steps to disengage the PCIe expansion node from a compute node.

Step 1. If the front riser assembly is installed in the expansion node, disconnect the front riser auxiliary power cable from the expansion node.
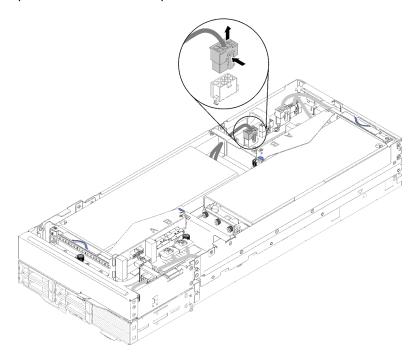
Figure 212. Disconnecting the front riser auxiliary power cable

Step 2. Disconnect the four PCIe cables.
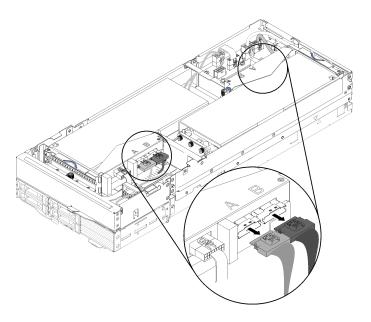
Figure 213. Disconnecting the four PCIe cables

Note: Make sure all four PCIe cables are disconnected.

Step 3. Loosen the two captive screws near the front of the expansion node; then, slide the expansion node slightly backward to disengage it from the compute node.
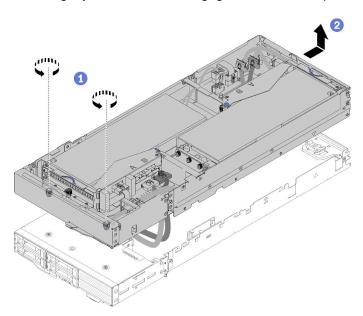
Figure 214. Disengaging the expansion node from the compute node

Step 4. Pivot the disengaged expansion node with the bottom next to the compute node as illustrated.
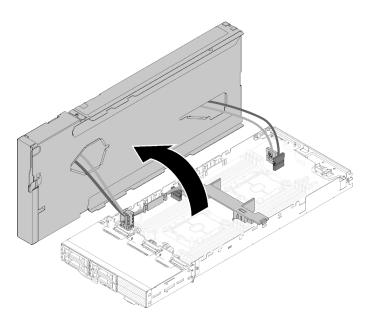
Figure 215. Pivoting the expansion node away from the compute node

After you disengage the PCIe expansion node from the compute node, see "Replace components in the compute node" on page 136 for replacement of the components in the compute node.

Re-engage the PCIe expansion node to a compute node

Use this information to re-engage the PCIe expansion node to the compute node after finishing replacing components in the compute node.

Before you re-engage the PCIe expansion node to a compute node:

1. Read the following section(s) to ensure that you work safely.

    - "Safety" on page iii
    - "Installation Guidelines" on page 61

2. Make sure all disconnected cables in the compute node are re-connected.

3. Make sure all components removed from the compute node are reinstalled, particularly the air baffle.

Complete the following steps to re-engage the PCIe expansion node to a compute node.

Step 1. Pivot the expansion node over the top of the compute node.
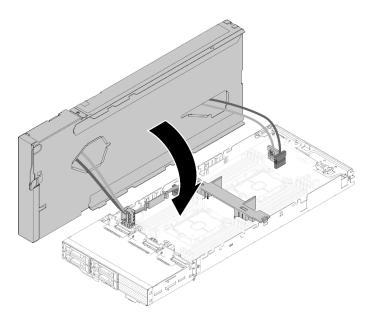
Figure 216. Pivoting the expansion node over the top of the compute node

Step 2. Align the triangles located on the sides of both the expansion node and the compute node; then, slide the expansion node slightly forward, and secure it by tightening the two captive screws near the front of the expansion node.
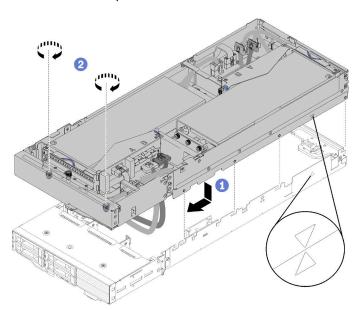
Figure 217. Re-engaging the expansion node to the compute node

Step 3. Route PCIe#2-B cable between the two front riser power connectors, below the front riser auxiliary power cable, and connect it to the riser connector labeled "B."
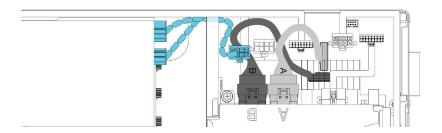
Figure 218. Routing PCIe#1-A and PCIe#2-B cable

Step 4. Route PCIe#1-A between the two front riser power connectors, above the PCIe#2-B cable, and connect it to the riser connector labeled "A."

Step 5. Connect PCIe#3-A cable to the riser connector labeled "A."
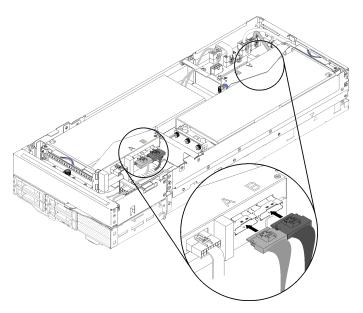
Figure 219. Connecting the four PCIe cables

Step 6. Connect PCIe#4-B cable to the riser connector labeled "B."

After you re-engage the PCIe expansion node to a compute node, complete the following steps:

1. If the front riser auxiliary power cable has been disconnected, reconnect it to the expansion node.
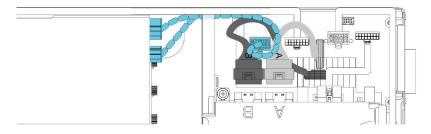
Figure 220. Reconnecting the auxiliary cable of the front riser assembly to the expansion node

2. Install the rear cable cover (see "Install the rear cable cover" on page 215).

3. Install the PCIe expansion node assembly into the enclosure (see).

4. Power on the compute node.

Demo video

PCIe expansion node replacement

Use the following procedures to remove and install the PCIe expansion node from and to a compute node.

Remove the PCIe expansion node from a compute node

Use this information to remove the PCIe expansion node from the compute node, to which it is installed.

Before you remove the PCIe expansion node from the compute node:

1. Read the following section(s) to ensure that you work safely.

   •

   •

2. If the compute-expansion node assembly is installed in the enclosure, remove it (see).

Complete the following steps to remove the PCIe expansion node from the compute node.

Step 1.   Remove the rear cable cover (see).

Step 2.   Remove both riser assemblies (see).

Step 3.   Loosen the two captive screws near the front of the expansion node; then, slide the expansion node slightly backward to disengage it from the compute node.
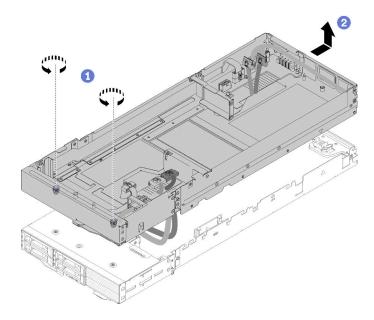
Figure 221. Disengaging the expansion node from the compute node

Step 4.   Pivot the disengaged expansion node with the bottom next to the compute node as illustrated.

Figure 222. Pivoting the expansion node away from the compute node

Step 5. Remove the four PCIe cables from the underside of the expansion node.
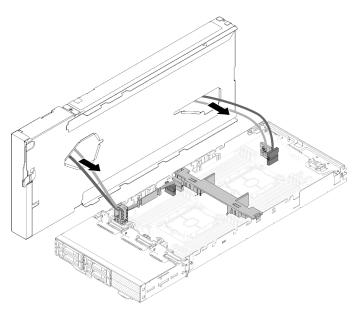
Figure 223. Removing the four PCIe cables from the underside of the expansion node

Step 6. If necessary, complete the following steps to remove the cable bracket from the compute node:

a. Carefully slide the two PCIe cables out of the cable bracket, one at a time, while paying close attention to corners and edges of the cable bracket.

b. Remove the screw and the cable bracket.
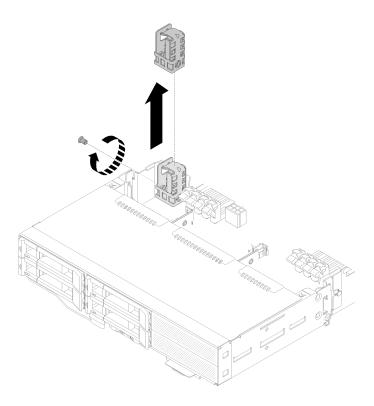
Figure 224. Cable bracket removal from the compute node

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

Install the PCIe expansion node to a compute node

Use this information to install the PCIe expansion node to a compute node.

Before you install the PCIe expansion node to a compute node:

1. Read the following section(s) to ensure that you work safely.

   - "Safety" on page iii
   - "Installation Guidelines" on page 61

2. Make sure the compute node configuration meets the following requirements.

   - No RAID adapter should be installed in the compute node.
   - Only four-drive backplanes are supported.
   - No more than 12 DIMMs should be installed in the compute node.
   - When two GPU adapters are installed:

     a. Two processors are required in the compute node.
     b. Four-drive NVMe backplane is not supported.

Complete the following steps to install the PCIe expansion node to a compute node.

Step 1. Remove the screw that secures the cable bracket to the expansion node, and remove the cable bracket.
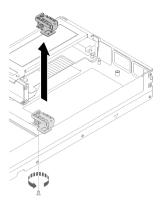
Figure 225. Cable bracket removal from the expansion node

Step 2. Pull the cables on the side of the compute node slightly to make space for the cable bracket.
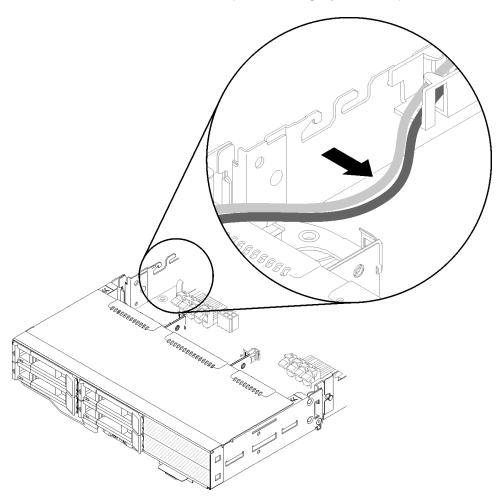
Figure 226. Pulling the cables to make space for the cable bracket

Step 3. Align the hook on the cable bracket to the slot on the side of the compute node as illustrated, and lower it until it stops.
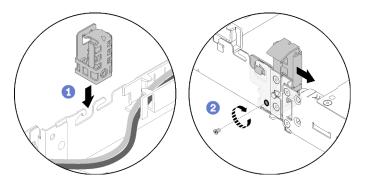
Figure 227. Cable bracket installation to the compute node

Step 4.   Slide the cable bracket slightly forward, and fasten the screw to secure it to the compute node.

Step 5.   Remove the rear cable cover (see "Remove the rear cable cover" on page 214).

Step 6.   Disconnect the front riser miscellaneous cable from the front riser cage; then, loosen the two captive screws from each riser cage, and remove the riser cages from the expansion node.

Note: If you only plan to install one adapter, remove the rear riser cage only.
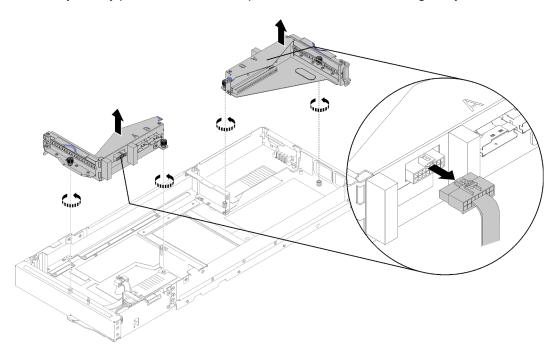
Figure 228. Disconnecting the front riser miscellaneous cable and removing riser cages from the expansion node

Step 7.   Connect PCIe#3-A and PCIe#4-B cable to the compute node as illustrated.
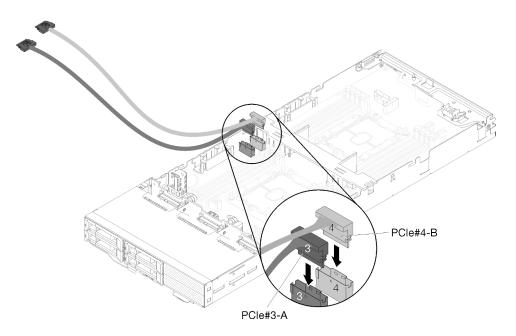
Figure 229. Connecting PCIe#3-A and PCIe#4-B cable to the compute node

Note: Keep the caps on PCIe cable connectors until connecting the cables to the compute node or to the riser assemblies.

Step 8. Pass the cables through the cable guide based on the following compute node configurations.

When the compute node comes with the right KVM breakout module, pass the cables in the following order, one at a time:

a. PCIe#3-A cable

b. PCIe#4-B cable

c. Long KVM signal cable

d. SAS/SATA cable

When the compute node comes without the right KVM breakout module, pass the cables in the following order, one at a time:

a. PCIe#3-A cable

b. PCIe#4-B cable

c. SAS/SATA cable

Note: When you install a KVM breakout module, make sure the other signal cable passes through the cable guide on the other side of the compute node (see "KVM breakout module" on page 53).
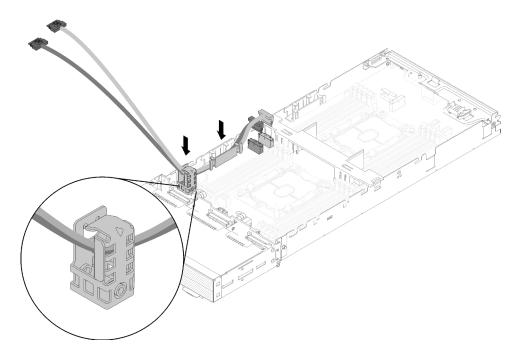
Figure 230. Passing cables through the cable guide and the cable bracket

Step 9.   Pass PCIe#3-A and PCIe#4-B cable through the cable bracket, one at a time, while paying close attention to corners and edges of the cable bracket.

Step 10. If other components are to be installed in the compute node, install them (see "Replace components in the compute node" on page 136).

Note: For proper cooling, make sure the air baffle is installed before engaging the expansion node to the compute node (see "Install the air baffle" on page 137).

Step 11. Face the bottom of the expansion node next to the cable bracket; then, pass PCIe#3-A and PCIe#4-B cable through the underside of the expansion node as illustrated.
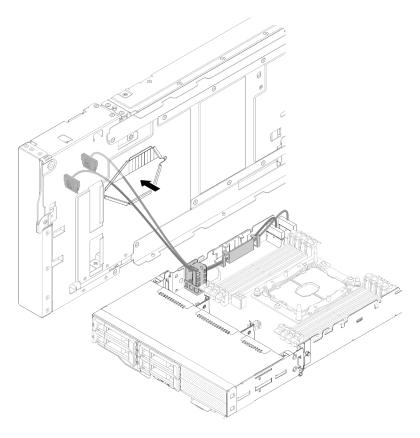
Figure 231. Passing PCIe#3-A and PCIe#4-B cable through the expansion node

Step 12. Pivot the expansion node over the top of the compute node.
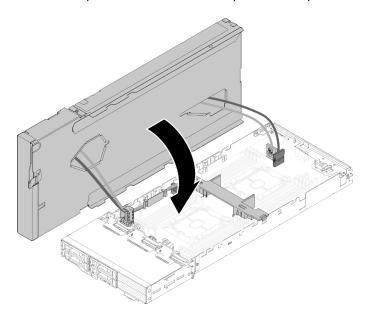
Figure 232. Pivoting the expansion node over the top of the compute node

Step 13. Align the triangles located on the sides of both the expansion node and the compute node; then, slide the expansion node slightly forward, and secure it by tightening the two captive screws near the front of the expansion node.
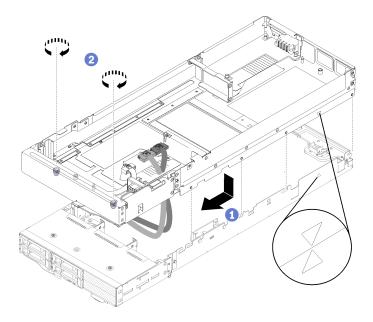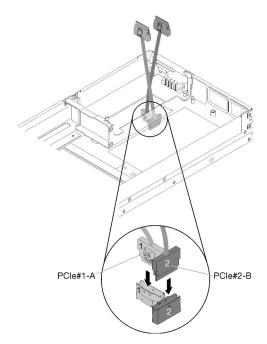
Figure 233. Engaging the expansion node to the compute node

Step 14. Route PCIe#1-A and PCIe#2-B cable down through the expansion node from top side, and connect them to the compute node connectors as illustrated.

Figure 234. Connecting PCIe#1-A and PCIe#2-B cable to the compute node

Step 15. Install the adapters into the riser cages (see "Install a PCIe adapter into the riser cage" on page 181).

Step 16. Install the riser assemblies into the expansion node (see "Install a PCIe riser assembly into the PCIe expansion node assembly " on page 190).

Step 17. If only one adapter is installed in the expansion node (in the rear riser slot), make sure to remove the airflow filler from the side of the expansion node, and place it in the slot by the front riser slot.
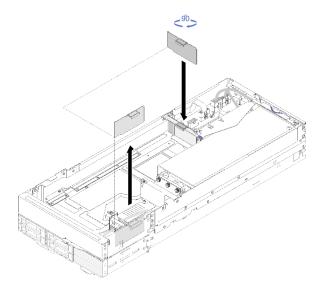
Figure 235. Airflow filler installation

Step 18. Install the rear cable cover (see "Install the rear cable cover" on page 215).

After you install the PCIe expansion node to the compute node, complete the following steps:

1. Install the PCIe expansion node assembly into the enclosure (see "Install the compute-expansion node assembly into the enclosure" on page 80).

2. Power on the compute node.

PCIe expansion node power board replacement

Use the following procedures to remove and install the PCIe expansion node power board.

Remove the PCIe expansion node power board

Use this information to remove the PCIe expansion node power board.

Before you remove the PCIe expansion node power board:

1. Read the following section(s) to ensure that you work safely.

   • "Safety" on page iii
   • "Installation Guidelines" on page 61

2. If the compute-expansion node assembly is installed in the enclosure, remove it (see "Remove the compute-expansion node assembly from the enclosure" on page 79).

3. Remove the rear cable cover (see "Remove the rear cable cover" on page 214).

4. Remove both riser assemblies from the expansion node (see "Remove a PCIe adapter from the riser cage" on page 179).

5. Remove all the other cables connected to the power board.

Complete the following steps to remove the PCIe expansion node power board.

Step 1.   Remove the screws that secure the expansion node power board.
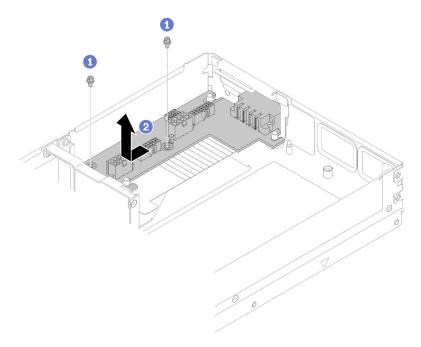
Figure 236. Expansion node power board removal

Step 2.   Slide the power board slightly forward to disengage and remove it.

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

Install the PCIe expansion node power board

Use this information to install the PCIe expansion node power board.

Before you install the PCIe expansion node power board:

1. Read the following section(s) to ensure that you work safely.

   • "Safety" on page iii

   • "Installation Guidelines" on page 61

2. If the compute-expansion node assembly is installed in the enclosure, remove it (see "Remove the compute-expansion node assembly from the enclosure" on page 79).

3. Remove the rear cable cover (see "Remove the rear cable cover" on page 214).

4. Remove both riser assemblies from the expansion node (see "Remove a PCIe adapter from the riser cage" on page 179).

5. If an expansion node power board has been installed, remove it (see "Remove the PCIe expansion node power board" on page 212).

Complete the following steps to install the PCIe expansion node power board.

Step 1.   Align the expansion node power board to the guide pins; then, slide it slightly backward until it stops.
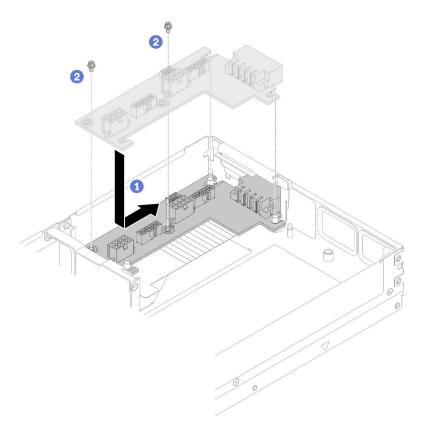
Figure 237. Expansion node power board installation

Step 2.   Fasten the screws to secure it to the expansion node.

After you install the PCIe expansion node power board, complete the following steps:

1. Install the PCIe riser assemblies to the PCIe expansion node (see "Install a PCIe adapter into the riser cage" on page 181).

2. Install the rear cable cover (see "Install the rear cable cover" on page 215).

3. Install the PCIe expansion node assembly into the enclosure (see "Install the compute-expansion node assembly into the enclosure" on page 80).

4. Power on the compute node.

Rear cable cover replacement

Use the following procedures to remove and install the rear cable cover.

Remove the rear cable cover

Use this information to remove the rear cable cover.

Before you remove the rear cable cover:

1. Read the following section(s) to ensure that you work safely.

   • "Safety" on page iii

   • "Installation Guidelines" on page 61

2. If the compute-expansion node assembly is installed in the enclosure, remove it (see "Remove the compute-expansion node assembly from the enclosure" on page 79).

Complete the following steps to remove the rear cable cover.

Step 1. Lift on the blue touch point of the rear cable cover.
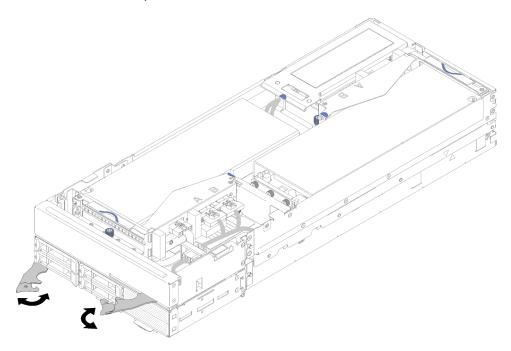
Figure 238. Rear cable cover removal

Step 2. Remove the rear cable cover.

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

Install the rear cable cover

Use this information to install the rear cable cover.

Before you install the rear cable cover:

1. Read the following section(s) to ensure that you work safely.

   - "Safety" on page iii
   - "Installation Guidelines" on page 61

2. If the PCIe#2-B cable is connected to the rear riser assembly, make sure it is routed under the PCIe#1-A cable through the gap between the two front riser power connectors.

3. If the PCIe#1-A cable is connected to the rear riser assembly, make sure it is routed above the PCIe#2-B cable through the gap between the two front riser power connectors.

4. When both riser assemblies are installed, make sure the front riser auxiliary power cable is looped back into the gap between the two front riser power connectors, and routed above the PCIe#2-B cable.
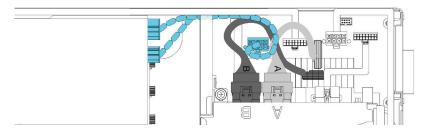
Figure 239. Routing PCIe#1-A, PCIe#2-B and the front riser auxiliary power cable

Complete the following steps to install the rear cable cover.

Step 1.   Align the side of the rear cable cover to the slot on the end of the expansion node.
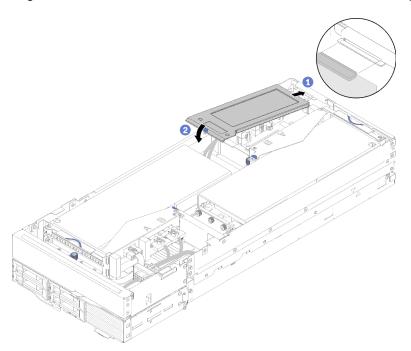
Figure 240. Rear cable cover installation

Step 2.   Press down at the touch point until the rear cable cover snaps into place.

After you install the rear cable cover, complete the following steps:

1. Install the PCIe expansion node assembly into the enclosure (see "Install the compute-expansion node assembly into the enclosure" on page 80).

2. Power on the compute node.

Complete the parts replacement

Use this information to complete the parts replacement.

To complete the parts replacement, do the following:

1. Ensure that all components have been reassembled correctly and that no tools or loose screws are left inside your server.

2. Properly route and secure the cables in the server. Refer to the cable connecting and routing information for each component.

3. If you have removed the server cover, reinstall it. See "Install the compute node cover" on page 142.

4. Reconnect external cables and power cords to the server.

   Attention: To avoid component damage, connect the power cords last.

5. Update the server configuration.

   - Download and install the latest device drivers: http://datacentersupport.lenovo.com
   - Update the system firmware. See "Firmware updates" on page 12.
   - Update the UEFI configuration.
   - Reconfigure the disk arrays if you have installed or removed a hot-swap drive or a RAID adapter. See the Lenovo XClarity Provisioning Manager User Guide, which is available for download at: http://datacentersupport.lenovo.com

Note: Make sure the latest version of ThinkSystem M.2 with Mirroring Enablement Kit Firmware is applied to avoid virtual disk/array missing after system board replacement.

Chapter 4. Problem determination

Use the information in this section to isolate and resolve issues that you might encounter while using your solution.

Lenovo solutions can be configured to automatically notify Lenovo Support if certain events are generated. You can configure automatic notification, also known as Call Home, from management applications, such as the Lenovo XClarity Administrator. If you configure automatic problem notification, Lenovo Support is automatically alerted whenever a solution encounters a potentially significant event.

To isolate a problem, you should typically begin with the event log of the application that is managing the solution:

- If you are managing the solution 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 solutions. These alerts are stored in the Lenovo XClarity Controller Event Log. If the solution is managed by the Chassis Management Module 2 or by the Lenovo XClarity Administrator, alerts are automatically forwarded to those management applications.

Note: For a listing of events, including user actions that might need to be performed to recover from an event, see the *Messages and Codes Reference*, which is available at:http://thinksystem.lenovofiles.com/help/ index.jsp

Lenovo XClarity Administrator event log

If you are using Lenovo XClarity Administrator to manage server, network, and storage hardware, you can view the events from all managed devices through the XClarity Administrator.
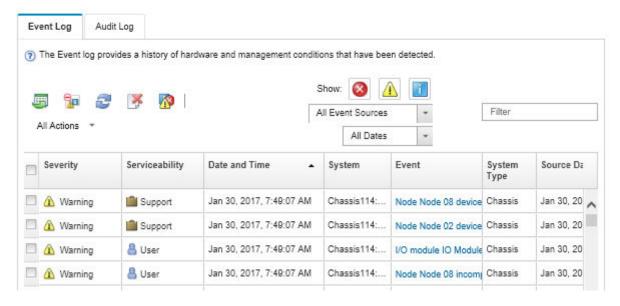
Figure 241. Lenovo XClarity Administrator event log

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

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

System Management Module event log

The SMM event log contains all events received from all nodes in the enclosure. In addition, it includes events related to power and cooling.

Note: New SMM events are appended to the end of the event log. The log can store up to 4, 096 events; you must clear the log to add additional events.

Figure 242. SMM event log

Lenovo XClarity Controller event log

The Lenovo XClarity Controller monitors the physical state of the solution 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 solution.

The Lenovo XClarity Controller monitors all components of the solution and posts events in the Lenovo XClarity Controller event log.
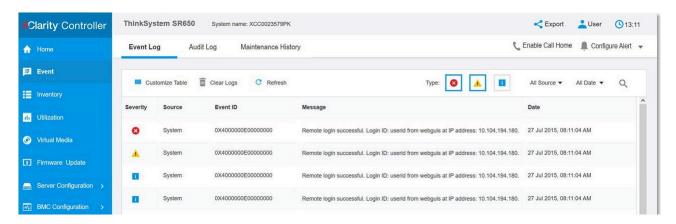
Figure 243. Lenovo XClarity Controller event log

For more information about accessing the Lenovo XClarity Controller event log, see:

"Viewing Event Logs" section in the XCC documentation compatible with your server at https://pubs.lenovo.com/lxcc-overview/

Collecting event logs

Complete the following steps to collect event logs.

Collecting event logs with KVM breakout module/cable

1. Press F1 to display Lenovo XClarity Provisioning Manager system setup interface and check XCC's IP address.

   Note: The default XCC's IP address is 192.168.70.125

2. Connect XCC.

3. Use the following command to enable SMM network.

   ```
   ipmitool -I lanplus -H <XCC's IP> -U USERID -P PASSWORD raw 0x3A 0xF1 0x01
   ```

4. Use the portable Lenovo XClarity Essentials OneCLI to download FFDC logs.

5. (Trained service technicians only) Upload FFDC logs to https://servicetools.lenovo.com/index.shtml.

6. (Trained service technicians only) Diagnose the log data to find out the problems and follow instructions in Chapter 4 "Problem determination" on page 219.

Collecting event logs without KVM breakout module/cable

1. Check the DHCP server for IP address.

   Note: If there is no DHCP server, ensure the defective node is installed in the enclosure and disengage other nodes from the enclosure.

2. Connect the XCC with dedicated IP or static IP via SMM RJ45 or share NIC.

   Note: By default, RJ45 port on the SMM communicates to XCC directly.

3. Press F1 to display Lenovo XClarity Provisioning Manager system setup interface and check XCC's IP address.

Note: All default XCC's IP address is 192.168.70.125, make sure there is only one XCC with default IP connecting to the SMM RJ45 port.

4. Connect XCC.

5. Use the following command to enable SMM network.

   `ipmitool -I lanplus -H <XCC's IP> -U USERID -P PASSWORD raw 0x3A 0xF1 0x01`

6. Use the portable Lenovo XClarity Essentials OneCLI to download FFDC logs.

7. (Trained service technicians only) Upload FFDC logs to https://servicetools.lenovo.com/index.shtml.

8. (Trained service technicians only) Diagnose the log data to find out the problems and follow instructions in Chapter 4 "Problem determination" on page 219.

Checking POST status

Use this information to check POST status.

Complete the following steps to check POST status.

1. Use the following command to enable SOL.

   `ipmitool -I lanplus -H [XCC's IP] -U user -P pass sol deactivate`

2. If you see **UEFI:POST END** on the screen, it indicates the POST is completed.

3. Provide the POST status and FFDC logs to your service technician.

   Note: To collect FFDC logs, see "Collecting event logs" on page 221 for more details.

Node operator panel

Node operator panel is a system of LEDs on various external and internal components of the solution that leads you to the failed component. When an error occurs, LEDs are lit on the on the operator panel on the front of the node, then on the failed component. By viewing the LEDs in a particular order, you can often identify the source of the error.

The following illustration shows the node operator panel, which are located on the front of the node.
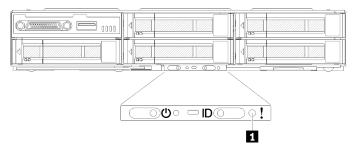
Figure 244. Node operator panel

Table 63. Light path diagnostics: LED status and actions

LED	Description	Action
1 System-error LED (yellow) ⚠️	LED on: An error has occurred.	1. Check the system-locator LED and check log LED and follow the instructions. 2. Check the Lenovo XClarity Controller event log and the system-error log for information about the error. 3. Save the log if necessary and clear the log afterward.

Power supply LEDs

AC power-supply LEDs

The following illustration shows the locations of the power-supply LEDs on the AC power supply.
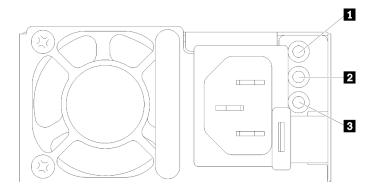
Figure 245. AC power-supply LEDs

Table 64. AC power-supply LEDs

1 Power input LED (green)	**3** Power error LED (yellow)
2 Power output LED (green)	

The following table describes the problems that are indicated by various combinations of the power-supply LEDs on an AC power supply and suggested actions to correct the detected problems.

AC power-supply LEDs			Description	Action	Notes
AC	**DC**	**Error (!)**			
On	On/ Blinking	Off	Normal operation.		When the DC LED is blinking as a 1Hz rate, the power supply unit is at Zero-Output mode, i.e. no DC power output from this power supply unit

Off	Off	Off	No AC power to the solution or a problem with the AC power source.	1. Check the AC power to the solution. 2. Make sure that the power cord is connected to a functioning power source. 3. Restart the solution. If the error remains, check the power-supply LEDs. 4. If the problem remains, replace the power-supply	This is a normal condition when no AC power is present.
Off	Off	On	The power supply has failed.	Replace the power supply.	
Off	On/ Blinking	Off	The power supply has failed.	Replace the power supply.	
Off	On/ Blinking	On	The power supply has failed.	Replace the power supply.	
On	Off	Off	Power-supply not fully seated, faulty system board, or the power supply has failed.	1. Reseat the power supply. 2. Use the Power Configurator utility to ensure current system power consumption is under limitation. 3. Check the error LEDs on the system board and the Lenovo XClarity Controller error messages.	Typically indicates a power-supply is not fully seated.
On	Off	On	The power supply has failed.	Replace the power supply.	
On	On/ Blinking	On	The power supply has failed.	Replace the power supply.	

General problem determination procedures

Use the information in this section to resolve problems if the event log does not contain specific errors or the solution 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 solution.

2. Make sure that the solution is cabled correctly.

3. Remove or disconnect the following devices if applicable, one at a time, until you find the failure. Power on and configure the server each time you remove or disconnect a device.
   - Any external devices,
   - Surge-suppressor device (on the solution).
   - Printer, mouse, and non-Lenovo devices,
   - Each adapter.
   - Hard disk drives.
   - Memory modules until you reach the minimal configuration that is supported for the solution.

   Note: See "Enclosure specifications" on page 2 to determine the minimum configuration for your server.

4. Power on the solution.

If the problem is solved when you remove an adapter from the solution, 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 solution passes all system tests, suspect a network cabling problem that is external to the solution.

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 solution. For more information about event logs, see "Event logs" on page 219

Step 2. Check for short circuits, for example, if a loose screw is causing a short circuit on a circuit board.

Step 3. Remove the adapters and disconnect the cables and power cords to all internal and external devices until the solution is at the minimum configuration that is required for the solution to start. See "Specifications" on page 2 to determine the minimum configuration for your solution.

Step 4. Reconnect all ac power cords and turn on the solution. If the solution starts successfully, reseat the adapters and devices one at a time until the problem is isolated.

If the solution does not start from the minimum configuration, see "Power supply LEDs" on page 223 to 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 solution are installed and that they are at the latest level.

Step 2. Make sure that the Ethernet cable is installed correctly.

- The cable must be securely attached at all connections. If the cable is attached but the problem remains, try a different cable.
- If you set the Ethernet controller to operate at 100 Mbps or 1000 Mbps, you must use Category 5 cabling.

Step 3. Determine whether the switch supports auto-negotiation. If it does not, try configuring the integrated Ethernet controller manually to match the speed and duplex mode of the switch.

Step 4. Check the Ethernet controller LEDs on the rear panel of the solution. These LEDs indicate whether there is a problem with the connector, cable, or switch.

- The Ethernet link status LED is lit when the Ethernet controller receives a link pulse from the switch. If the LED is off, there might be a defective connector or cable or a problem with the switch.

- 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 switch and network are operating and that the correct device drivers are installed.

Step 5. Check the Network activity LED on the rear of the server. The Network activity LED is lit when data is active on the Ethernet network. If the Network activity LED is off, make sure that the hub and network are operating and that the correct device drivers are installed.

Step 6. Check for operating-system-specific causes of the problem, and also make sure that the operating system drivers are installed correctly.

Step 7. Make sure that the device drivers on the client and solution are using the same protocol.

If the Ethernet controller still cannot connect to the network but the hardware appears to be working, the network administrator must investigate other possible causes of the error.

Troubleshooting by symptom:

Use this information to find solutions to problems that have identifiable symptoms.

To use the symptom-based troubleshooting information in this section, complete the following steps:

1. Check the event log of the application that is managing the solution and follow the suggested actions to resolve any event codes.

   - If you are managing the solution 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.

2. Review this section to find the symptoms that you are experiencing and follow the suggested actions to resolve the issue.

3.

Drive problems

Use this information to resolve issues related to the drives.

Solution cannot recognize a drive

Complete the following steps until the problem is solved.

1. Verify that the drive is supported for the solution. See https://serverproven.lenovo.com/ for a list of supported hard drives.

2. Make sure that the drive is seated in the drive bay properly and that there is no physical damage to the drive connectors.

3. Run the diagnostics tests for the SAS/SATA adapter and hard disk drives. When you start a server and press the key according to the on-screen instructions, the LXPM interface is displayed by default. (For more information, see the "Startup" section in the LXPM documentation compatible with your server at https://pubs.lenovo.com/lxpm-overview/.) You can perform hard drive diagnostics from this interface. From the Diagnostic page, click **Run Diagnostic ➔ HDD test/Disk Drive Test**.

   Depending on the LXPM version, you may see **HDD test** or **Disk Drive Test**.

   Based on those tests:

- If the adapter passes the test but the drives are not recognized, replace the backplane signal cable and run the tests again.

- Replace the backplane.

- If the adapter fails the test, disconnect the backplane signal cable from the adapter and run the tests again.

- If the adapter fails the test, replace the adapter.

EIOM card problems

Use this information to resolve issues related the to the EIOM card.

EIOM problems

Complete the following steps until the problem is resolved:

1. Use the following steps to check whether the problem is related to the EIOM card. Once you find out the problem is related to the EIOM card, replace the EIOM card.

   a. Check XCC event logs to see if any power fault events related to the EIOM card.

   b. Ensure the activity LED or the link LED is lit when the cable is connected.

   c. Swap the compute nodes to test the EIOM card.

   d. Update the firmware to the latest version.

2. If the error recurs, check FFDC logs for more details.

   Note: To collect FFDC logs, see "Collecting event logs" on page 221 for more details.

Intermittent problems

Use this information to solve intermittent problems.

- "Intermittent external device problems" on page 227
- "Intermittent KVM problems" on page 227
- "Intermittent unexpected reboots" on page 228

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 the key according to the on-screen instructions to display the LXPM system setup interface. (For more information, see the "Startup" section in the LXPM documentation compatible with your server at https://pubs.lenovo.com/lxpm-overview/.) Then, click **System Settings ➙ 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 the key according to the on-screen instructions to display the LXPM system setup interface. (For more information, see the "Startup" section in the LXPM documentation compatible with your server at https://pubs.lenovo.com/lxpm-overview/.) Then, click **BMC Settings ➙ POST Watchdog Timer**.

2. If the reset occurs after the operating system starts, enter the operating system when the system operates normally and set up operating system kernel dump process (Windows and Linux base operating systems will be using different method). Enter the UEFI setup menus and disable the feature, or disable it with the following OneCli command.
   `OneCli.exe config set SystemRecovery.RebootSystemOnNMI Disable --bmcxcc_userid PASSWORD@xcc_ipaddress`

3. See the management controller event log to check for an event code that indicates a reboot. See "Event logs" on page 219 for information about viewing the event log. If you are using Linux base operating system, then capture all logs back to Lenovo support for further investigation.

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 228
- "Mouse does not work" on page 229
- "KVM switch problems" on page 229
- "USB-device does not work" on page 229

All or some keys on the keyboard do not work

1. Make sure that:
   - The keyboard cable is securely connected.
   - The server and the monitor are turned on.

2. If you are using a USB keyboard, run the Setup utility and enable keyboardless operation.

3. If you are using a USB keyboard and it is connected to a USB hub, disconnect the keyboard from the hub and connect it directly to the server.

4. Try to install the USB keyboard into a different USB port as available.

5. 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. Try to install the USB mouse into a different USB port as available.

4. 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 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.

Memory problems

Use this information to resolve issues related to memory.

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Displayed system memory less than installed physical memory

Complete the following steps until the problem is solved:

Note: Each time you install or remove a memory module, you must disconnect the solution from the power source; then, wait 10 seconds before restarting the solution.

1. Make sure that:

    -   No error LEDs are lit on the operator information panel.
    -   Memory mirrored channel does not account for the discrepancy.
    -   The memory modules are seated correctly.

- You have installed the correct type of memory module (see "Specifications" on page 2 for requirements).
- If you changed the memory, you updated the memory configuration in the Setup utility.
- All banks of memory are enabled. The solution might have automatically disabled a memory bank when it detected a problem, or a memory bank might have been manually disabled.
- There is no memory mismatch when the solution is at the minimum memory configuration.
- When DCPMMs are installed:
    a. If the memory is set in App Direct or Mixed Memory Mode, all the saved data have been backed up, and created namespaces are deleted before any DCPMM is replaced.
    b. Refer to "Intel Optane DC Persistent Memory Module (DCPMM) setup" in *Setup Guide* and see if the displayed memory fits the mode description.
    c. If DCPMMs are recently set in Memory Mode, turn it back to App Direct Mode and examine if there is namespace that has not been deleted (see "Intel Optane DC Persistent Memory Module (DCPMM) setup" in *Setup Guide*).
    d. Go to the Setup Utility, select **System Configuration and Boot Management** ➙ **Intel Optane DCPMMs** ➙ **Security**, and make sure all the DCPMM units are unlocked.

2. Reseat the memory modules, and then restart the solution.

3. Check the POST error log:
   - If a memory module was disabled by a systems-management interrupt (SMI), replace the memory module.
   - If a memory module was disabled by the user or by POST, reseat the memory module; then, run the Setup utility and enable the memory module.

4. Run memory diagnostics. Power on the system and press **F1** when the logo screen appears, the Lenovo XClarity Provisioning Manager interface will start. Perform memory diagnostics with this interface. Go to **Diagnostics** ➙ **Run Diagnostic** ➙ **Memory test** or **DCPMM test**.

   When DCPMMs are installed, run diagnostics based on the current DCPMM mode:

   - App Direct Mode

     – Run **DCPMM Test** for DCPMMs.

     – Run **Memory Test** for DRAM DIMMs.

   - Memory Mode and Mixed Memory Mode

     – Run **DCPMM Test** for App Direct capacity of DCPMMs.

     – Run **Memory Test** for memory capacity of DCPMMs.

     Note: DRAM DIMMs in these two modes act as cache, and are not applicable to memory diagnostics.

5. Reverse the modules between the channels (of the same processor), and then restart the solution. If the problem is related to a memory module, replace the failing memory module.

   Note: When DCPMMs are installed, only adopt this method in Memory Mode.

6. Re-enable all memory modules using the Setup Utility, and restart the system.

7. (Trained technician only) Install the failing memory module into a memory module connector for processor 2 (if installed) to verify that the problem is not the processor or the memory module connector.

8. (Trained technician only) Replace the node.

Multiple memory modules in a channel identified as failing

Note: Each time you install or remove a memory module, you must disconnect the solution from the power source; then, wait 10 seconds before restarting the solution.

1. Reseat the memory modules; then, restart the solution.

2. Remove the highest-numbered memory module of those that are identified and replace it with an identical known good memory module; then, restart the solution. Repeat as necessary. If the failures continue after all identified memory modules are replaced, go to step 4.

3. Return the removed memory modules, one at a time, to their original connectors, restarting the solution after each memory module, until a memory module fails. Replace each failing memory module with an identical known good memory module, restarting the solution after each memory module replacement. Repeat step 3 until you have tested all removed memory modules.

4. Replace the highest-numbered memory module of those identified; then, restart the solution. Repeat as necessary.

5. Reverse the memory modules between the channels (of the same processor), and then restart the solution. If the problem is related to a memory module, replace the failing memory module.

6. (Trained technician only) Install the failing memory module into a memory module connector for processor 2 (if installed) to verify that the problem is not the processor or the memory module connector.

7. (Trained technician only) Replace the system board.

Attempt to change to another DCPMM mode fails

After the DCPMM mode is changed and the system is successfully restarted, if the DCPMM mode stays the same instead of being changed, check the DRAM DIMMs and DCPMM capacity to see if it meets the requirement of the new mode (see "DC Persistent Memory Module (DCPMM) setup" in *Setup Guide*).

Extra namespace appears in an interleaved region

If there are two created namespaces in one interleaved region, VMware ESXi ignores the created namespaces and creates an extra new namespace during system booting. To solve this problem, delete the created namespaces in either the Setup Utility or the operating system before the first booting with ESXi.

Monitor and video problems

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

- "Screen is blank" on page 231
- "Screen goes blank when you start some application programs" on page 232
- "The monitor has screen jitter, or the screen image is wavy, unreadable, rolling, or distorted." on page 232
- "Management controller remote presence cannot work" on page 232

Screen is blank

1. If the solution 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 solution.

2. The management controller remote presence function is disabled if you install an optional video adapter. To use the management controller remote presence function, remove the optional video adapter.

3. If the solution installed with the graphical adapters while turning on the solution, the Lenovo logo displays on the screen after approximately 3 minutes. This is normal operation while the system loads.

4. Make sure that:
   - The solution is turned on. If there is no power to the solution.
   - The monitor cables are connected correctly.
   - The monitor is turned on and the brightness and contrast controls are adjusted correctly.

5. Make sure that the correct solution is controlling the monitor, if applicable.

6. Make sure that corrupted solution firmware is not affecting the video; see .

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.

   Note: 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 solution each time:
   a. Monitor cable
   b. Video adapter (if one is installed)
   c. Monitor
   d. (Trained technician only) System board.

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.

Network problems

Use this information to resolve issues related to networking.

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Cannot wake solution 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 solution is connected to the network using Ethernet 5 connector, check the event log (see), and make sure:
   a. Make sure that there are no events related to the network adapter.
   b. The room temperature is not too high (see).
   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 solution and disconnect it from the power source; then, wait 10 seconds before restarting the solution.

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.

3. Make sure the LDAP account OS is in the support list.

Observable problems

Use this information to solve observable problems.

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 solution 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 solution 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 solution, see https://serverproven.lenovo.com/.

3. (Trained technician only) Make sure that processor 1 is seated correctly

4. (Trained technician only) Remove processor 2 and restart the solution.

5. Replace the following components one at a time, in the order shown, restarting the solution each time:

   a. (Trained technician only) Processor

   b. (Trained technician only) System board

Solution 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.

Solution 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 solution to fail POST (the power-on self-test).

If this occurs, the solution responds in either of the following ways:

- The solution restarts automatically and attempts POST again.

- The solution hangs, and you must manually restart the solution for the solution to attempt POST again.

After a specified number of consecutive attempts (automatic or manual), the solution to reverts to the default UEFI configuration and starts System Setup so that you can make the necessary corrections to the configuration and restart the solution. If the solution 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. Click **System Settings ➡ Recovery ➡ POST Attempts ➡ POST Attempts Limit**. Available options are 3, 6, 9, and 255.

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 items that you removed one at a time, restarting the system each time, until the error occurs. Replace the item for which the error occurs.

   - If the system does not restart, suspect the system board.

Unusual smell

Complete the following steps until the problem is solved.

1. An unusual smell might be coming from newly installed equipment.

2. If the problem remains, contact Lenovo Support.

Solution seems to be running hot

Complete the following steps until the problem is solved.

Multiple compute nodes or chassis:

1. Make sure that the room temperature is within the specified range (see "Specifications" on page 2).

2. Check the management processor event log for rising temperature events. If there are no events, the compute node is running within normal operating temperatures. Note that you can expect some variation in temperature.

Cracked parts or cracked chassis

Contact Lenovo Support.

Optional-device problems

Use this information to solve problems related to optional devices.

- "Insufficient PCIe resources are detected." on page 235
- "A Lenovo optional device that was just installed does not work." on page 235
- "A Lenovo optional device that worked previously does not work now. " on page 236

Insufficient PCIe resources are detected.

If you see an error message stating "Insufficient PCI Resources Detected," complete the following steps until the problem is resolved:

1. Remove one of the PCIe adapters.

2. Restart the system and press F1 to display the Lenovo XClarity Provisioning Manager system setup interface.

3. Click **UEFI Setup ➙ System Settings ➙ Devices and I/O Ports ➙ MM Config Base**; then, modify the setting to the lower memory capacity. For example, modify 3 GB to 2 GB or modify 2 GB to 1 GB.

4. Save the settings and restart the system.

5. The action for this step will differ based on whether or not the reboot is successful.

   - If the reboot is successful, shutdown the solution and reinstall the PCIe card you removed.

   - If the reboot failed, repeat step 2 to step 5.

A Lenovo optional device that was just installed does not work.

1. Make sure that:

- The device is supported for the solution (see https://serverproven.lenovo.com/).
- You followed the installation instructions that came with the device and the device is installed correctly.
- You have not loosened any other installed devices or cables.
- You updated the configuration information in the Setup utility. Whenever memory or any other device is changed, you must update the configuration.

2. Reseat the device that you just installed.

3. Check XCC event log for related errors. Refer to *ThinkSystem D2 Enclosure, Modular Enclosure, Modular Enclosure for 6U Configuration and ThinkSystem SD530 Compute Node Messages and Codes Reference* and follow the instructions to fix the errors.

4. Replace the device that you just installed.

A Lenovo optional device that worked previously does not work now.

1. Make sure that all of the cable connections for the device are secure.

2. If the device comes with test instructions, use those instructions to test the device.

3. Check XCC event log for related errors. Refer to *ThinkSystem D2 Enclosure, Modular Enclosure, Modular Enclosure for 6U Configuration and ThinkSystem SD530 Compute Node Messages and Codes Reference* and follow the instructions to fix the errors.

4. If the failing device is a SCSI device, make sure that:
   - The cables for all external SCSI devices are connected correctly.
   - The last device in each SCSI chain, or the end of the SCSI cable, is terminated correctly.
   - Any external SCSI device is turned on. You must turn on an external SCSI device before you turn on the solution.

5. Reseat the failing device.

6. Replace the failing device.

Power on and power off problems

Use this information to resolve issues when powering on or powering off the solution.

-
-

Solution does not power on

Complete the following steps until the problem is resolved:

1. Check XCC web page can be logged in via out-of-band network interface.

2. Check the power button LED. If the power button LED is flashing slowly, press the power button to turn on the solution.

3. Check power supplies are installed correctly and power supply LEDs are lit normally.

4. If one or more sets of shared PCIe dual adapters are installed in the enclosure, reseat the nodes and the shared PCIe adapters that are installed in the enclosure, and reboot the nodes.

5. If the error recurs, check FFDC logs for more details.

   Note: To collect FFDC logs, see "Collecting event logs" on page 221 for more details.

Solution 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 solution by pressing the power button and holding it down for 5 seconds.

c. Restart the solution.

d. If the solution fails POST and the power button does not work, disconnect the power cord for 20 seconds; then, reconnect the power cord and restart the solution.

2. If the problem remains or if you are using an ACPI-aware operating system, suspect the system board.

Serial-device problems

Use this information to solve problems related to serial devices.

- "Number of serial ports identified by the operating system is less than the number of installed ports" on page 237
- "Serial device does not work" on page 237

Number of serial ports identified by the operating system is less than the number of installed ports

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 solution.
   - The serial port is enabled and is assigned a unique address.
   - The device is connected to the correct connector (see "System-board internal connectors" on page 29).

2. Reseat the following components:

   a. Failing serial device

   b. Serial cable

3. Replace the following components one at a time, restarting the solution each time:

   a. Failing serial device

   b. Serial cable

4. (Trained technician only) Replace the system board.

Software problems

Use this information to solve software problems.

1. To determine whether the problem is caused by the software, make sure that:
   - The node 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 node might have a memory-address conflict.
   - The software is designed to operate on the solution.
   - Other software works on the solution.
   - The software works on another solution.

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.

System Management Module problems

Use this information to resolve issues related the to the System Management Module.

-
-
-
-
-

Solution does not power on

Complete the following steps until the problem is resolved:

1. Make sure the SMM status LED is working normally (see "System Management Module (SMM)" on page 25).

2. Make sure the power LED status is flashing slowly.

3. Make sure the XCC status LED is flashing normally.

4. Check SMM event log to see if XCC fail or not.

5. Re-plug the node and check item 1 to item 4 again with minimum configuration, if the solution till cannot be powered on.

6. Swap the node to another slot and power on again.

7. If the error recurs, replace the system board.

System Management Module status LED is continuously on or off

Complete the following steps until the problem is resolved:

1. Remove and reinstall the SMM (see "Remove the System Management Module (SMM)" on page 125 and "Install the System Management Module (SMM)" on page 126).

2. If the problem persists, replace the SMM.

System Management Module ping failure

Complete the following steps until the problem is solved.

1. Collect SNMP trap event logs.

2. Check LEDs to diagnose the SMM status.

   Note: See "System Management Module (SMM)" on page 25 for SMM LEDs details.

3. If the power LED and the status LED are working normally, re-install the SMM.

4. Press reset pinhole for over four seconds to reset the SMM by default setting; then, enable the SMM network via XCC.

5. Replace the SMM.

Fans failed while the System Management Module is working normally

Complete the following steps until the problem is solved.

1. Check SMM and SNMP event logs to see if there is any fan fault issue.

2. If there is a fan fault issue, replace the failing fan.

3. Use the following command to disable automatic fan control.

   `ipmitool -I lanplus -H [ip] -U USERID -P PASSWORD raw 0x32 0xc6 0x00`

4. Use the following command to set the fan speed to full speed.

   `ipmitool -I lanplus -H [ip] -U USERID -P PASSWORD raw 0x32 0xc4 0x64`

5. Go to SMM website or use the following command to check fan speed settings.

   `ipmitool -I lanplus -H [ip] -U USERID -P PASSWORD sensor`

   If there is any fan does not meet full speed, replace the failing fan.

6. Use the following command to enable automatic fan control.

   `ipmitool -I lanplus -H [ip] -U USERID -P PASSWORD raw 0x32 0xc6 0x01`

7. If the error recurs, check FFDC logs for more details.

   Note: To collect FFDC logs, see "Collecting event logs" on page 221 for more details.

Setting the D2 enclosure serial number for the System Management Module

Use the following command to change the serial number:

`ipmitool -I lanplus -H [ip] -U USERID -P PASSWORD raw 0x32 0xAF 0x05 0x01 [sn]`

An example to set the serial number to "5151515151" would be:

`ipmitool -I lanplus -H 192.168.80.125 -U USERID -P PASSWORD raw 0x32 0xAF 0x05 0x01 0x35 0x31 0x35 0x31 0x35 0x31 0x35 0x31 0x35 0x31`

Note: Ensure that SMM firmware is v1.02 [TESM07D] or higher, with which enclosure serial number can be changed with IPMI command.

Appendix A. Hardware disassembling for recycle

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

Disassemble the compute node for recycle

Follow the instructions in this section to disassemble the compute node before recycling.

Before disassembling the compute node:

1. Remove the compute node or compute-expansion node assembly from the enclosure (see "Remove a compute node from the enclosure" on page 65 or "Remove the compute-expansion node assembly from the enclosure" on page 79).

Complete the following steps to disassemble the compute node for recycle:

Step 1. Remove one of the following components from the compute node:

- Compute node cover: see "Remove the compute node cover" on page 141.
- PCIe expansion node: see "Remove the PCIe expansion node from a compute node" on page 203.

Step 2. If the RAID adapter is installed:

a. Remove the RAID adapter (see "Remove a RAID adapter from the compute node" on page 175).

b. Remove the three screws that secure the RAID adapter support bracket, and remove the support bracket.
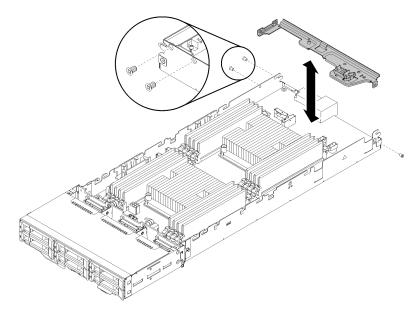
Figure 246. Removing the RAID adapter support bracket

Step 3. Remove the other components from the node, and install them to the replacement compute node (see "Replace a compute node" on page 66).

Note: Make sure to install the drives and memory modules to the equivalent drive bay or slot in the replacement compute node.

Step 4. Remove the CMOS battery (see "Remove the CMOS battery" on page 138).

Step 5. Complete the following steps to remove the three cable management baskets.

① Press and hold on the latch in the middle of the cable management basket with a tool with flat tip.

② Slide the basket towards the rear of the node, and remove it.
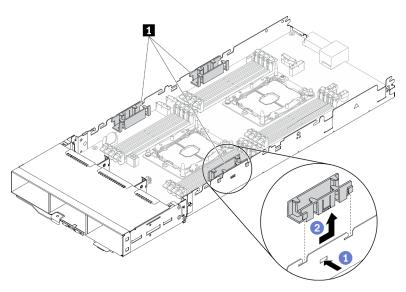
Figure 247. Removing the cable management basket

Step 6. Remove the eight screws that secure the system board to the compute node, and remove the system board.
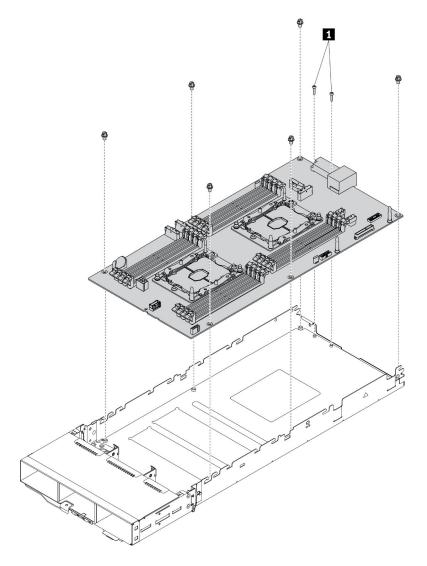
Figure 248. Disassembling the compute node

1 Screws that secure the system board connector to the compute tray

After disassembling the compute node, comply with local regulations when recycling it.

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 https://pubs.lenovo.com/

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

- Check all cables to make sure that they are connected.
- Check the power switches to make sure that the system and any optional devices are turned on.
- Check for updated software, firmware, and operating-system device drivers for your Lenovo product. The Lenovo Warranty terms and conditions state that you, the owner of the Lenovo product, are responsible for maintaining and updating all software and firmware for the product (unless it is covered by an additional maintenance contract). Your service technician will request that you upgrade your software and firmware if the problem has a documented solution within a software upgrade.
- If you have installed new hardware or software in your environment, check https://serverproven.lenovo.com/ to make sure that the hardware and software 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 solution issue or at the request of Lenovo Support, you might need collect service data that can be used for further analysis. Service data includes information such as event logs and hardware inventory.

Service data can be collected through the following tools:

- **Lenovo XClarity Provisioning Manager**

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

- **Lenovo XClarity Controller**

  You can use the Lenovo XClarity Controller web interface or the CLI to collect service data for the solution. The file can be saved and sent to Lenovo Support.

  – For more information about using the web interface to collect service data, see the "Downloading service data" section in the XCC documentation version compatible with your server at https://pubs.lenovo.com/lxcc-overview/.

  – For more information about using the CLI to collect service data, see the "ffdc command" section in the XCC documentation version compatible with your server at https://pubs.lenovo.com/lxcc-overview/.

- **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 solution, 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 https://pubs.lenovo.com/lxce-onecli/onecli_r_getinfor_command.

Contacting Support

You can contact Support to obtain help for your issue.

You can receive hardware service through a Lenovo Authorized Service Provider. To locate a service provider authorized by Lenovo to provide warranty service, go to https://datacentersupport.lenovo.com/serviceprovider and use filter searching for different countries. For Lenovo support telephone numbers, see https://datacentersupport.lenovo.com/supportphonelist for your region support details.

Appendix C. Notices

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> *Lenovo (United States), Inc.*
> *1009 Think Place*
> *Morrisville, NC 27560*
> *U.S.A.*
> *Attention: Lenovo VP of Intellectual Property*

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Important notes

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

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

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

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

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

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

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

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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:

https://pubs.lenovo.com/important_notices/

Taiwan Region BSMI RoHS declaration

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

Taiwan Region import and export contact information

Contacts are available for Taiwan Region import and export information.

委製商/進口商名稱: 台灣聯想環球科技股份有限公司
進口商地址: 台北市南港區三重路 66 號 8 樓
進口商電話: 0800-000-702

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