ThinkSystem D2 Enclosure, Modular Enclosure, and ThinkSystem SD530 Compute Node
Setup Guide

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

Note

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

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

Contents

Chapter 1.   Introduction

The ThinkSystem D2 Enclosure, Modular Enclosure, and ThinkSystem SD530 Compute Node is a 2U 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.
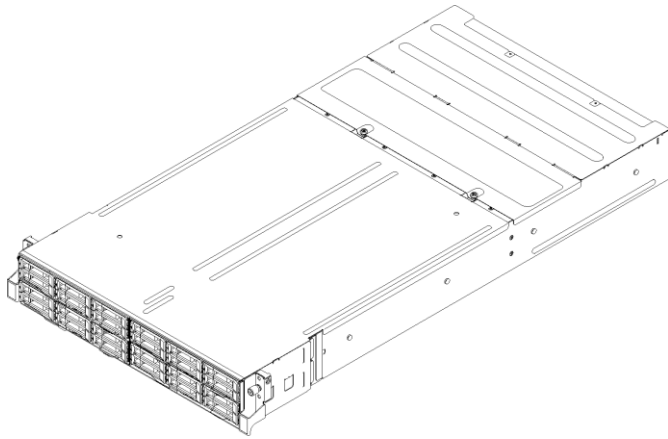
Figure 1. D2 Enclosure 7X20 and Modular Enclosure 7X22

The solution comes with a limited warranty. For details about the warranty, see:
https://datacentersupport.lenovo.com/documents/ht100742

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

Each SD530 supports up to six 2.5-inch hot-swap Serial Attached SCSI (SAS), Serial ATA (SATA) or Non-Volatile Memory express (NVMe) hard disk 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.
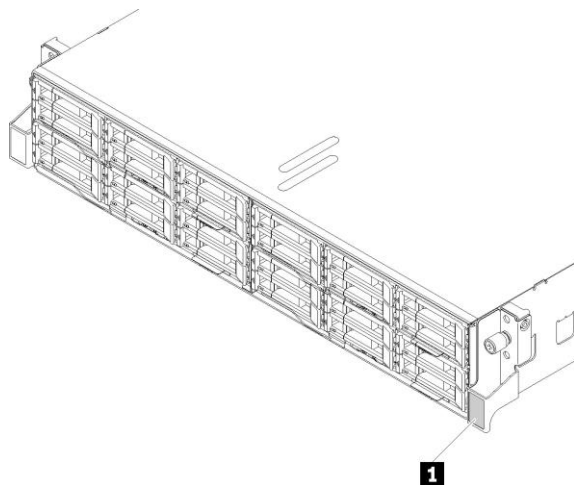
Figure 3. ID label on the front of the enclosure

Table 1. 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. Please keep the network access tag for future reference.
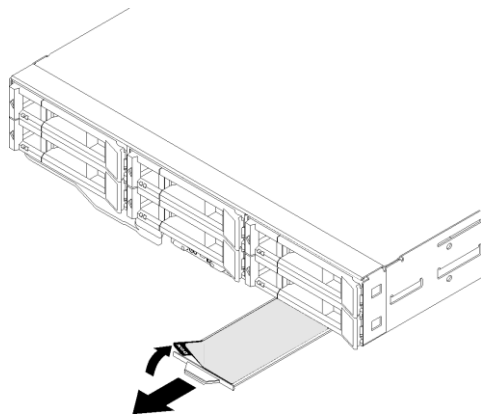
Figure 4. Network access tag on the front of the node

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.
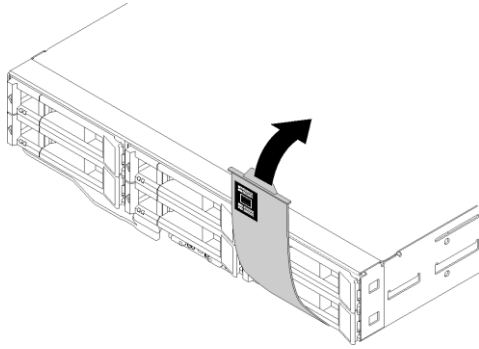
Figure 5. ID label on the front of the node

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

Solution package contents

When you receive your solution, verify that the shipment contains everything that you expected to receive.

The solution package includes the following items:

Note: Some of the items listed are available on select models only.

- Compute node(s)
- Enclosure
- Shuttle
- Rail installation kit (optional). Detailed instructions for installing the rail installation kit are provided in the package with the rail installation kit.
- Cable management arm or cable management bar.
- Material box, including items such as power cords, rack installation template, and accessory kit.

Features

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

Enclosure:

- **Redundant cooling and optional power capabilities**

  The enclosure supports a maximum of two 1100-watt , 1600-watt or 2000-watt hot-swap power supplies and five dual-motor hot-swap fans, which provide redundancy for a typical configuration. The redundant cooling by the fans in the enclosure enables continued operation if one of the fails.

  Note: You cannot mix 1100-watt, 1600-watt and 2000-watt power supplies in the enclosure.

- **PCI adapter capabilities**

  The enclosure supports up to eight low-profile PCIe x8 cards (two per node, from processor 1) or four low-profile PCIe x16 cards (one per node, from processor 1).

- **Network support**

  The enclosure supports 10Gb 8-port EIOM SFP+ or 10Gb 8-port EIOM Base-T (RJ45) EIOM cards, which provides either 10Gb or 1Gb Ethernet to each node in the enclosure. The minimum networking speed requirement for the EIOM card is 1Gbps.

- **Redundant networking connection**

  The Lenovo XClarity Controller provides failover capability to a redundant Ethernet connection with the applicable application installed. If a problem occurs with the primary Ethernet connection, all Ethernet traffic that is associated with the primary connection is automatically switched to the optional redundant Ethernet connection. If the applicable device drivers are installed, this switching occurs without data loss and without user intervention.

- **Systems-management capabilities**

  The enclosure comes with the System Management Module. When the SMM is used with the systems-management software that comes with the solution, you can manage the functions of the solution locally and remotely. The SMM also provides system monitoring, event recording, and network alert capability. For additional information, see the User Guide: *System Management Module User's Guide* at the http://datacentersupport.lenovo.com.

- **Features on Demand**

If a Features on Demand feature is integrated in the solution or in an optional device that is installed in the solution, you can purchase an activation key to activate the feature. For information about Features on Demand, see:

https://fod.lenovo.com/lkms

- **Mobile access to Lenovo Service Information website**

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

Node:

- **Multi-core processing**

  The compute node supports Intel Xeon E5-26xx v4 series multi-core processors. The compute node comes with one processor installed.

- **Large data-storage capacity and hot-swap capability (6 drive bays per node)**

  The solution supports a maximum of twenty-four 2.5-inch hot-swap Serial Attached SCSI (SAS), Serial ATA (SATA) or Non-Volatile Memory express (NVMe) drives.

- **Active Memory**

  The Active Memory feature improves the reliability of memory through memory mirroring. Memory mirroring mode replicates and stores data on two pairs of DIMMs within two channels simultaneously. If a failure occurs, the memory controller switches from the primary pair of memory DIMMs to the backup pair of DIMMs.

- **Large system-memory capacity**

  The solution supports up to a maximum of 384 GB of system memory. The memory controller supports error correcting code (ECC) for up to 4 industry-standard PC4-19200 (DDR4-2400), DDR4 (fourth-generation double-data-rate). For more information about the specific types and maximum amount of memory, see "Specifications" on page 6.

- **RAID support**

  The ThinkSystem RAID adapter provides hardware redundant array of independent disks (RAID) support to create configurations. The standard RAID adapter provides RAID levels 0, 1, 5, and 10. An optional RAID adapter is available for purchase.

  Note: During RAID rebuild process, HDD is considered as non-useable. HDD tray Yellow LED will blink and Global HDD status LED will be on. This EVENT will be logged in Lenovo XClarity Controller. When the rebuild process is completed, HDD tray Amber LED and Global HDD status LED will be off. User can refer to HBA utility to confirm current HDD/RAID status.

- **Integrated Trusted Platform Module (TPM)**

  This integrated security chip performs cryptographic functions and stores private and public secure keys. It provides the hardware support for the Trusted Computing Group (TCG) specification. You can download the software to support the TCG specification, when the software is available.

  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).

- **Lenovo XClarity Administrator**

  Lenovo XClarity Administrator is a centralized resource-management solution that enables administrators to deploy infrastructure faster and with less effort. The solution seamlessly integrates into System x, ThinkServer, and NeXtScale servers, as well as the Flex System converged infrastructure platform.

  Lenovo XClarity Administrator provides:

– Automated discovery

– Agent-free hardware management

– Monitoring

Administrators are able to find the right information and accomplish critical tasks faster through an uncluttered, dashboard-driven graphical user interface (GUI). Centralizing and automating foundational infrastructure deployment and lifecycle management tasks across large pools of systems frees up administrator time, and makes resources available to end-users faster.

Lenovo XClarity is easily extended into the leading virtualization management platforms from Microsoft and VMware using software plug-ins, called Lenovo XClarity Integrators. The solution improves workload uptime and service-level assurance by dynamically relocating workloads from affected hosts in the cluster during rolling solution reboots or firmware updates, or during predicted hardware failures.

For more information about Lenovo XClarity Administrator, see the http://shop.lenovo.com/us/en/systems/ software/systems-management/xclarity/ and the http://pic.dhe.ibm.com/infocenter/flexsys/information/topic/ com.lenovo.lxca.doc/aug_product_page.html.

- **Lenovo XClarity Controller (XCC)**

The Lenovo XClarity Controller is the common management controller for Lenovo ThinkSystem solution hardware. The Lenovo XClarity Controller consolidates multiple management functions in a single chip on the node system board.

Some of the features that are unique to the Lenovo XClarity Controller are enhanced performance, higher-resolution remote video, and expanded security options. For additional information about the Lenovo XClarity Controller, see:

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

- **UEFI-compliant server firmware**

Lenovo ThinkSystem firmware is Unified Extensible Firmware Interface (UEFI) 2.5 compliant. UEFI replaces BIOS and defines a standard interface between the operating system, platform firmware, and external devices.

Lenovo ThinkSystem servers are capable of booting UEFI-compliant operating systems, BIOS-based operating systems, and BIOS-based adapters as well as UEFI-compliant adapters.

Note: The solution does not support DOS (Disk Operating System).

- **Features on Demand**

If a Features on Demand feature is integrated in the solution or in an optional device that is installed in the solution, you can purchase an activation key to activate the feature. For information about Features on Demand, see:

https://fod.lenovo.com/lkms

- **Light path diagnostics**

Light path diagnostics provides LEDs to help you diagnose problems. For more information about the light path diagnostics, see Light path diagnostics panel and Light path diagnostics LEDs.

- **Mobile access to Lenovo Service Information website**

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

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 2. 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
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.

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

Table 2. Enclosure specifications (continued)

Specification	Description
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

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)

Compute node specifications

Features and specifications of the compute node.

Table 4. Compute node specifications

Specification	Description
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 http://www.lenovo.com/us/en/serverproven/.

Memory	• Minimum: 8 GB (single DDR4 DIMM per processor)
	• Maximum: 1,024 GB
	  – 512 GB (16 x 32 GB RDIMM)
	  – 1,024 GB (16 x 64 GB LRDIMM)
	• Type:
	  – PC4-21300 (dual-rank), 2666 MT/s, error correcting code (ECC), double-data-rate 4 (DDR4) registered DIMM (RDIMM) or load reduced DIMM (LRDIMM)
	• Supports (depending on the model):
	  – 8 GB, 16 GB, and 32 GB RDIMM
	  – 64 GB LRDIMM
	• Slots: 16 DIMM slots

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.

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.

Table 4. Compute node specifications (continued)

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)

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* .

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.

4. Enclosure is powered on.

5. Enclosure is removed from original shipping container and is installed but not in use, for example, during repair, maintenance, or upgrade.

PCIe expansion node specifications

Features and specifications of the PCIe expansion node.

PCIe expansion node specifications

Table 5. PCIe expansion node specifications

Specification	Description

Size	PCIe expansion node
	• Height: 53.4 mm (2.11 inches)
	• Depth: 562.0 mm (22.1 inches)
	• Width: 222.0 mm (8.7 inches)
	• Weight:
	  – Without PCIe adapter and cables: 2.1 kg (4.6 lb)
	  – Without PCIe adapter, with cables: 2.3 kg (5.1 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

Management options

Several management interfaces are available for managing your server. The management options described in this section are provided to support the direct management of Lenovo servers.

Function	Lenovo XClarity Administrator	Lenovo XClarity Integrator	Lenovo XClarity Energy Manager	Lenovo XClarity Provisioning Manager	Lenovo XClarity Essentials[1]	Lenovo XClarity Controller	Lenovo Capacity Planner	Lenovo Business Vantage
Multiple systems management	√	√	√		√			
Operating system deployment	√			√				
Firmware updates[2]	√[4]	√		√[3]	√[4]	√		
System configuration	√	√		√	√	√		
Events / alerts	√	√	√			√		
Inventory / Log	√[5]	√		√[6]	√[5]	√[5]		
Power management		√[7]	√					
Data center planning							√	
Security management								√[8]

Notes:

1. Lenovo XClarity Essentials includes Lenovo XClarity Essentials OneCLI, Lenovo XClarity Essentials Bootable Media Creator, and Lenovo XClarity Essentials UpdateXpress.

2. Most options can be updated through the Lenovo tools. Some options, such as GPU firmware or Omni-Path firmware require the use of vendor tools.

3. Firmware updates are limited to Lenovo XClarity Provisioning Manager, Lenovo XClarity Controller firmware, and UEFI updates only. Firmware updates for optional devices, such as adapters, are not supported.

4. The server UEFI settings for option ROM must be set to **Auto** or **UEFI** to update firmware using Lenovo XClarity Administrator or Lenovo XClarity Essentials.

5. The server UEFI settings for option ROM must be set to **Auto** or **UEFI** for detailed adapter card information, such as model name and firmware levels, to be displayed in Lenovo XClarity Administrator, Lenovo XClarity Controller, or Lenovo XClarity Essentials.

6. Limited inventory.

7. Power management function is supported by Lenovo XClarity Integrator for VMware vCenter.

8. Available only in the People's Republic of China.

Lenovo XClarity Administrator

Lenovo XClarity Administrator is a centralized, resource-management solution that simplifies infrastructure management, speeds responses, and enhances the availability of Lenovo server systems and solutions. It runs as a virtual appliance that automates discovery, inventory, tracking, monitoring, and provisioning for server, network, and storage hardware in a secure environment.

Lenovo XClarity Administrator provides a central interface to perform the following functions for all managed endpoints:
- **Manage and monitor hardware**. Lenovo XClarity Administrator provides agent-free hardware management. It can automatically discover manageable endpoints, including server, network, and storage hardware. Inventory data is collected for managed endpoints for an at-a-glance view of the managed hardware inventory and status.
- **Configuration management**. You can quickly provision and pre-provision all of your servers using a consistent configuration. Configuration settings (such as local storage, I/O adapters, boot settings, firmware, ports, and Lenovo XClarity Controller and UEFI settings) are saved as a server pattern that can be applied to one or more managed servers. When the server patterns are updated, the changes are automatically deployed to the applied servers.
- **Firmware compliance and updates**. 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.

  When an endpoint is out of compliance, you can use Lenovo XClarity Administrator to apply and activate firmware updates for all devices in that endpoint from a repository of firmware updates that you manage.
- **Operating System deployment**. You can use Lenovo XClarity Administrator to manage a repository of operating-system images and to deploy operating-system images to up to 28 managed servers concurrently.
- **Service and support**. Lenovo XClarity Administrator can be set up to collect and send diagnostic files automatically to your preferred service provider 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.

Lenovo XClarity Administrator can be integrated into external, higher-level management and automation platforms through open REST application programming interfaces (APIs). Using the REST APIs, Lenovo XClarity Administrator can easily integrate with your existing management infrastructure. In addition, you can automate tasks using the PowerShell toolkit or the Python toolkit.

To obtain the latest version of the Lenovo XClarity Administrator, see:

https://datacentersupport.lenovo.com/documents/LNVO-LXCAUPD

Documentation for Lenovo XClarity Administrator is available at:

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

Lenovo XClarity Integrator

Lenovo also provides the following integrators that you can use to manage Lenovo servers from higher-level management tools:
- Lenovo XClarity Integrator for VMware vCenter
- Lenovo XClarity Integrator Microsoft System Center

For more information about Lenovo XClarity Integrator, see:

Lenovo XClarity Energy Manager

Lenovo XClarity Energy Manager is a web-based power and temperature management solution designed for data center administrators. It monitors and manages the power consumption and temperature of servers, such as Converged, NeXtScale, System x, ThinkServer, and ThinkSystem servers, using the out-of-band method. Lenovo XClarity Energy Manager models data center physical hierarchy and monitors power and temperature at the server/group level. By analyzing monitored power and temperature data, Lenovo XClarity Energy Manager greatly improves business continuity and energy efficiency.

With Lenovo XClarity Energy Manager, administrators can take control of power usage through improved data analysis and lower the TCO (total cost of ownership). The tool optimizes data center efficiency by allowing administrators to:

- Monitor energy consumption, estimate power need, and re-allocate power to servers as needed via IPMI or Redfish.
- Track platform power consumption, inlet temperature, and component-level power consumption, such as CPU and memory power consumption.
- Visually check the layout of room, row and rack via 2D thermal map.
- Show events and send e-mail or SNMP trap notifications when certain faults occur or certain thresholds are reached.
- Limit the consumed amount of energy of an endpoint by setting up policies.
- Optimize energy efficiency by identifying hotspot or over-cooling servers to optimize cooling efficiency and identifying low-usage servers to save energy.
- Reduce the power consumption to the minimum level to prolong service time during emergency power event (such as a data-center power failure).

For more information about downloading, installation, and usage, see:

Lenovo XClarity Provisioning Manager

Lenovo XClarity Provisioning Manager is embedded software that provides a graphic user interface (GUI) for configuring the system with support for 10 languages. It simplifies the process of configuring Basic Input Output System (BIOS) settings and configuring Redundant Array of Independent Disks (RAID) in an GUI wizard. It also provides functions for updating applications and firmware, performing system diagnostics, and automating the process of installing the supported Windows, Linux, or VMware ESXi operating systems and associated device drivers.

Note: When you start a server and press F1, the Lenovo XClarity Provisioning Manager interface is displayed by default. However, the text-based interface to system configuration (the Setup Utility) is also available. From Lenovo XClarity Provisioning Manager, you can choose to restart the server and access the text-based interface. In addition, you can choose to make the text-based interface the default interface that is displayed when you press F1.

Lenovo XClarity Provisioning Manager provides a system summary of all installed devices and includes the following functions:

- **UEFI setup**. Use this function to configure UEFI system settings, such as processor configuration, start options, and user security. You can also view POST events and the System Event Log (SEL).
- **Firmware update**. Use this function to update the firmware for Lenovo XClarity Controller, Unified Extensible Firmware Interface (UEFI), Lenovo XClarity Provisioning Manager, and operating system device drivers.

- **RAID setup**. Use this function to configure RAID for the server. It provides an easy-to-use graphical wizard that supports a unified process for performing RAID setup for a variety of RAID adapters. You can also perform advanced RAID configuration from the UEFI Setup.

- **OS installation**. Use this function to deploy an operating system for the server with an easy-to-use Guided Install mode. Operating systems can be installed using unattended mode after you choose the Operating System version and basic settings; the device drivers are installed automatically.

  A Manual Install mode is also available. You can export the drivers from system, manually install the operating systems, and then install the drivers. This way, you do not need to go to the web to download device drivers.

  Note: In Guided Install mode, you can export the operating system installation settings to a response file during operating system installation. Then, you can use the Import function under the Cloning menu to apply the operating system installation settings to the target server.

- **Cloning**. Use this function to clone settings in one server to other similarly configured Lenovo servers.

  – **Export**: Export UEFI, RAID, and BMC settings for the current server to files respectively and save the files to a USB storage drive or a shared network folder.

  – **Import**: Apply UEFI, RAID, BMC, and operating system installation settings to the target server by using the files you have saved.

- **Diagnostics**. Use this function to view the overall health of devices installed in the server and to perform diagnostics for hard disk drives and memory. You can also collect service data that can be saved to a USB device and sent to Lenovo Support.

  Note: The service data collected by Lenovo XClarity Provisioning Manager does not include the operating system logs. To collect the operating system logs and the hardware service data, use Lenovo XClarity Essentials OneCLI.

Documentation for Lenovo XClarity Provisioning Manager is available at:

http://sysmgt.lenovofiles.com/help/topic/LXPM/LXPM_introduction.html

Lenovo XClarity Essentials

Lenovo XClarity Essentials (LXCE) is a collection of server management utilities that provides a less complicated method to enable customers to manage Lenovo ThinkSystem, System x, and Thinkserver servers more efficiently and cost-effectively.

Lenovo XClarity Essentials includes the following utilities:

- Lenovo XClarity Essentials OneCLI is a collection of several command line applications, which can be used to:

  – Configure the server.

  – Collect service data for the server. If you run Lenovo XClarity Essentials OneCLI from the server operating system (in-band), you can collect operating system logs as well. You can also choose to view the service data that has been collected or to send the service data to Lenovo Support.

  – Update firmware and device drivers for the server. Lenovo XClarity Essentials OneCLI can help to download UpdateXpress System Packs (UXSPs) for your server and update all the firmware and device drivers payloads within the UXSP.

  – Perform miscellaneous functions, such as rebooting the server or rebooting the BMC.

  To learn more about Lenovo XClarity Essentials OneCLI, see:

  https://datacentersupport.lenovo.com/documents/LNVO-CENTER

  Documentation for Lenovo XClarity Essentials OneCLI is available at:

- Lenovo XClarity Essentials Bootable Media Creator (BoMC) is a software application that applies UpdateXpress System Packs and individual updates to your system.

  Using Lenovo XClarity Essentials Bootable Media Creator, you can:

  – Update the server using an ISO image or CD.

  – Update the server using a USB key.

  – Update the server using the Preboot Execution Environment (PXE) interface.

  – Update the server in unattendance mode.

  – Update the server in Serial Over LAN (SOL) mode.

  To learn more about Lenovo XClarity Essentials Bootable Media Creator, see:

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

- Lenovo XClarity Essentials UpdateXpress is a software application that applies UpdateXpress System Packs and individual updates to your system.

  Using Lenovo XClarity Essentials UpdateXpress, you can:

  – Update the local server.

  – Update a remove server.

  – Create a repository of updates.

  To learn more about Lenovo XClarity Essentials UpdateXpress, see:

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

Lenovo XClarity Controller

Lenovo XClarity Controller is the management processor for the server. It is the third generation of the Integrated Management Module (IMM) service processor that consolidates the service processor functionality, super I/O, video controller, and remote presence capabilities into a single chip on the server system board.

There are two ways to access the management processor:

- **Web-based interface**. To access the web-based interface, point your browser to the IP address for the management processor.
- **Command-line interface**. To access the CLI interface, use SSH or Telnet to log in to the management processor.

Whenever power is applied to a server, the management processor is available. From the management processor interface, you can perform the following functions:

- Monitor all hardware devices installed in the server.
- Power the server on and off.
- View the system event log and system audit log for the server.
- Use the Remote management function to log in to the server itself.

Documentation for Lenovo XClarity Controller is available at:

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

Lenovo Capacity Planner

Lenovo Capacity Planner is a power consumption evaluation tool that enhances data center planning by enabling IT administrators and pre-sales to understand important parameters of different type of racks,

servers, and other devices. Lenovo Capacity Planner can dynamically calculate the power consumption, current, British Thermal Unit (BTU), and volt-ampere (VA) rating at the rack level, and therefore improves the efficiency of large scale deployments.

Lenovo Capacity Planner provides the following functions:

- Power and thermal evaluation of servers and network devices; generating evaluation reports.
- Customizable server configuration, workload, CPU turbo model, and fan speed for different user scenarios.
- Chassis-level and node-level customizable configuration for Flex System and High-Density servers.
- Visual memory configuration guidance for best memory performance.

More information about Lenovo Capacity Planner is available at:

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

Lenovo Business Vantage

Lenovo Business Vantage is a security software tool suite designed to work with the Trusted Cryptographic Module (TCM) adapter for enhanced security, to keep user data safe, and to erase confidential data completely from a hard disk drive.

Lenovo Business Vantage provides the following functions:

- **Data Safe**. Encrypt files to ensure data safety by using the TCM adapter.
- **Sure Erase**. Erase confidential data from a hard disk. This tool follows the industry standard method to do the erasing and allows the user to select different erasing levels.
- **Smart USB Protection**. Prohibit unauthorized access to the USB port of devices.
- **USB Data Safe**. Encrypt files to ensure data security on a USB storage device.

Note: This tool is available in the People's Republic of China only.

More information about Lenovo Business Vantage is available at:

http://support.lenovo.com.cn/lenovo/wsi/es/es.html

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 helps 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.
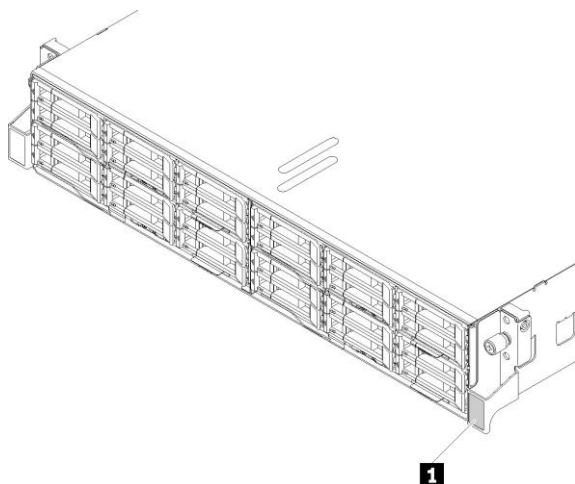
Figure 9. ID label on the front of the enclosure

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.
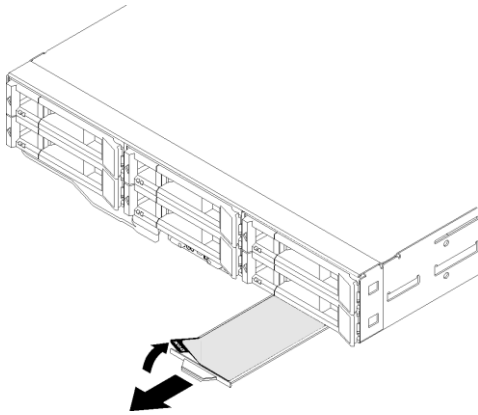
Figure 10. Network access tag on the front of the node

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.
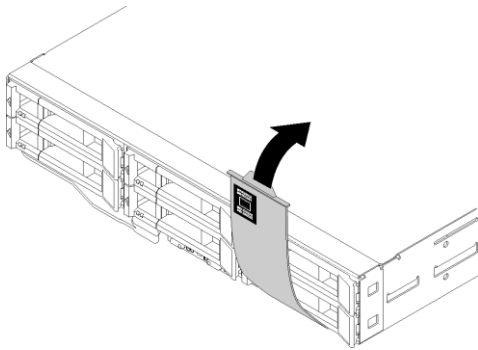

Figure 11. ID label on the front of the node

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 12. D2 enclosure 7X20 QR code

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

Figure 13. Modular enclosure 7X22 QR code

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

Figure 14. 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.
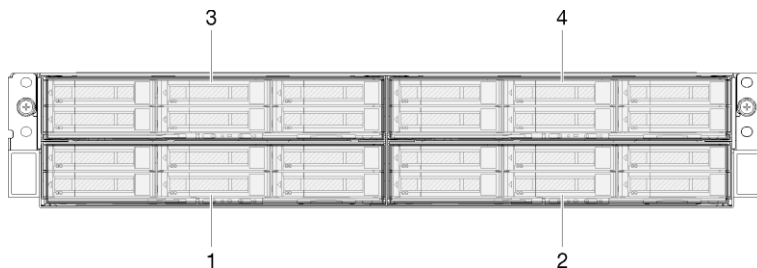
Figure 15. Enclosure front view with compute nodes and node bay numbering

Up to **two PCIe expansion node assemblies**.
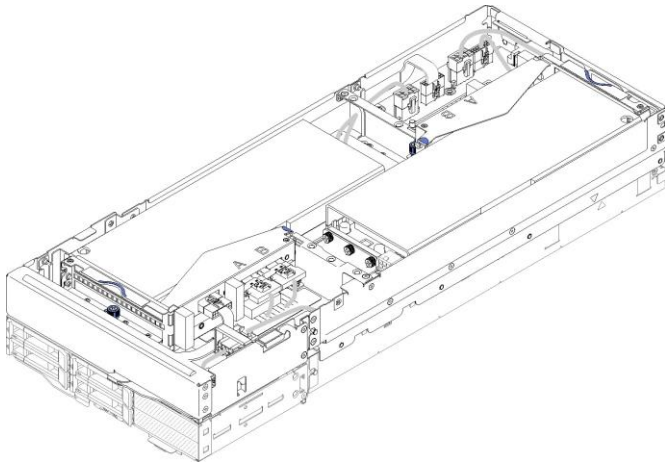
Figure 16. Compute-expansion node assembly

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 12 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.
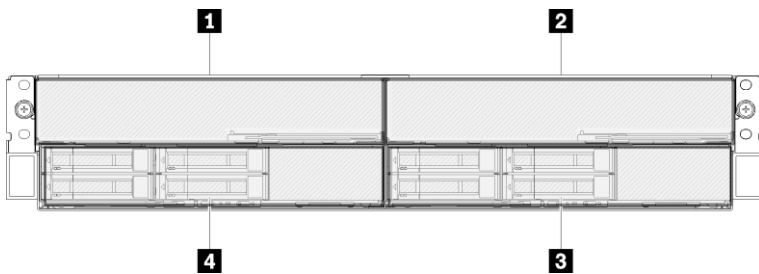
Figure 17. Enclosure front view with PCIe expansion node assemblies

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 18. 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 19. 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 33 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 Mobile. For more details, see http://sysmgt.lenovofiles.com/help/topic/ com.lenovo.systems.management.xcc.doc/product_page.html 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 20. 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

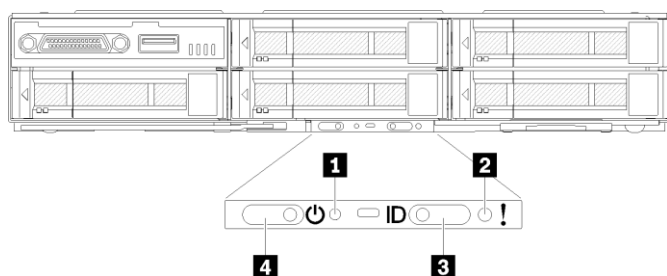The following illustration shows the controls and LEDs on the node operator panel.

Figure 21. 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.

• Turn on:

  ipmitool.exe -I lanplus -H <XCC's IP> -U USERID -P PASSW0RD raw 0x3a 0x08 0x01 0x00

• Turn off:

  ipmitool.exe -I lanplus -H <XCC's IP> -U USERID -P PASSW0RD raw 0x3a 0x08 0x01 0x01

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 27.

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
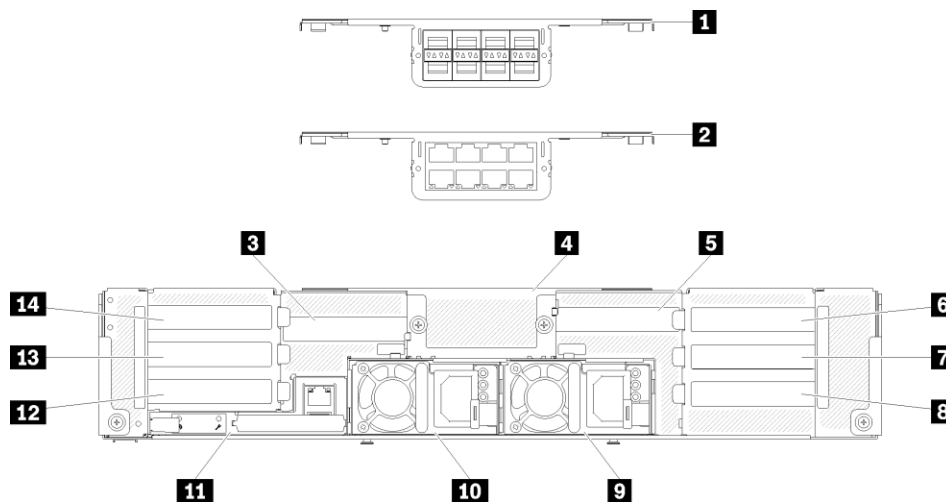
Figure 22. Rear view - The enclosure with x8 shuttle installed

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** Single Ethernet port 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
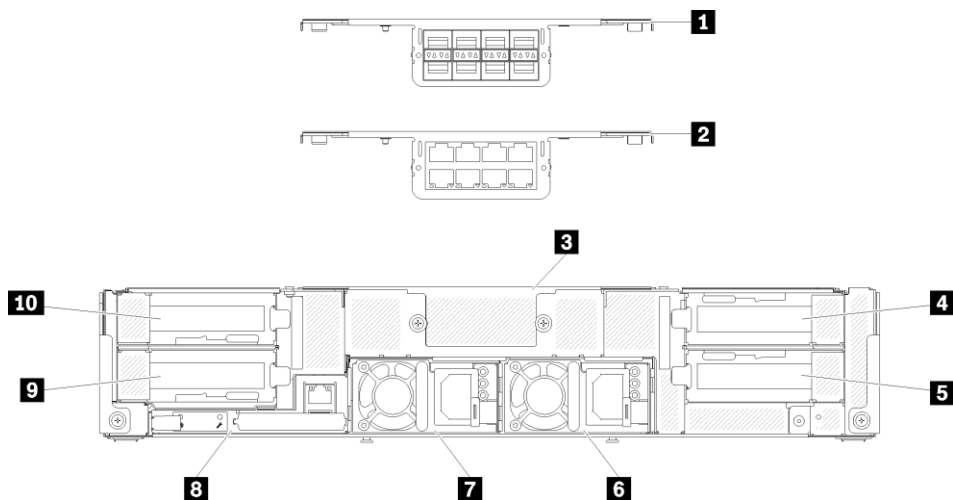
Figure 23. Rear view - The enclosure with x16 shuttle installed

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
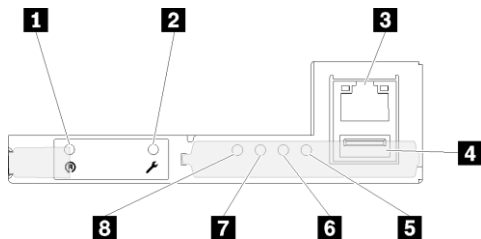
Figure 24. Rear view - Single Ethernet port SMM

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.

- Turn on:

  ipmitool.exe -I lanplus -H <SMM's IP> -U USERID -P PASSW0RD raw 0x32 0x97 0x01 0x01

- Turn off:

  ipmitool.exe -I lanplus -H <SMM's IP> -U USERID -P PASSW0RD 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 "Node operator panel" on page 24 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
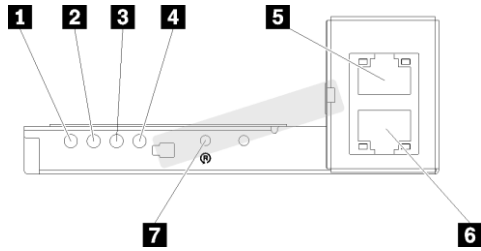
Figure 25. Rear view - Dual Ethernet port SMM

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.

- Turn on:

  ipmitool.exe -I lanplus -H <SMM's IP> -U USERID -P PASSW0RD raw 0x32 0x97 0x01 0x01

- Turn off:

  ipmitool.exe -I lanplus -H <SMM's IP> -U USERID -P PASSW0RD 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 "Node operator panel" on page 24 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.

PCIe slot LEDs

The following illustration shows the LEDs on the rear of PCIe 3.0 x16 shuttle.
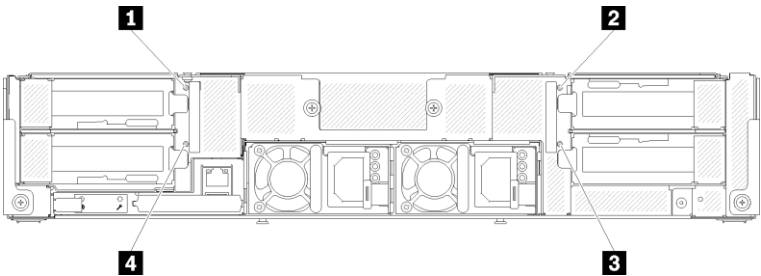
Figure 26. Rear view - PCIe 3.0 x16 LEDs

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.

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.
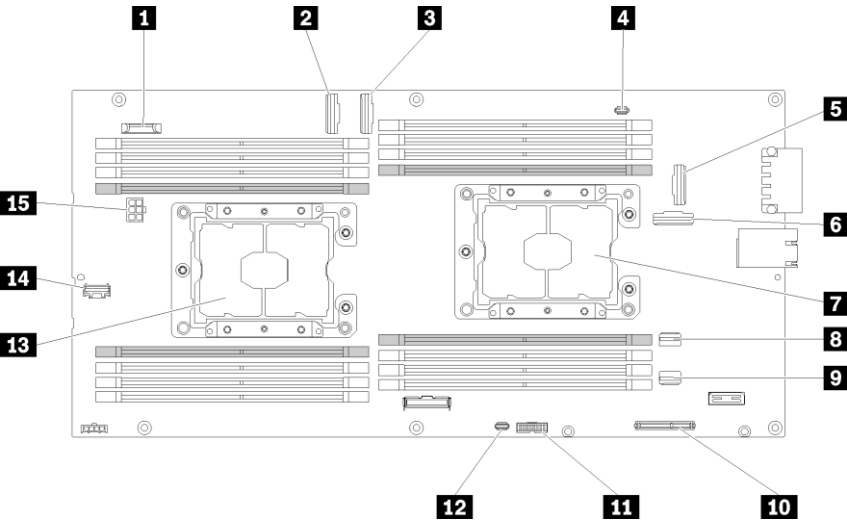
Figure 28. Internal connectors on the system board

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.
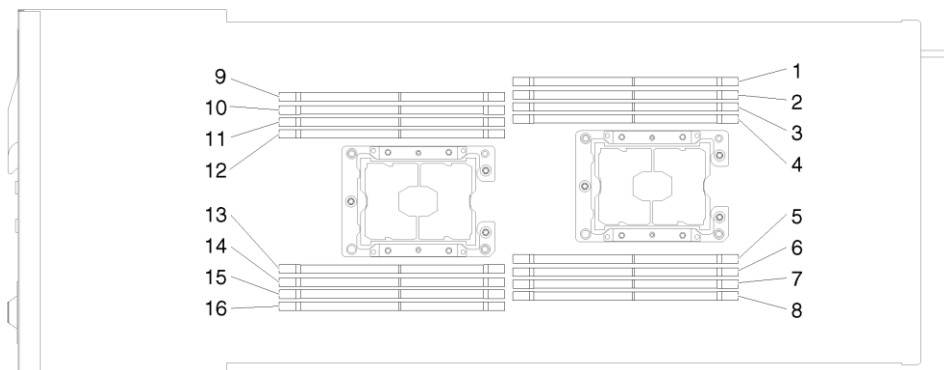
Figure 29. The location of the DIMM connectors on the system board

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.
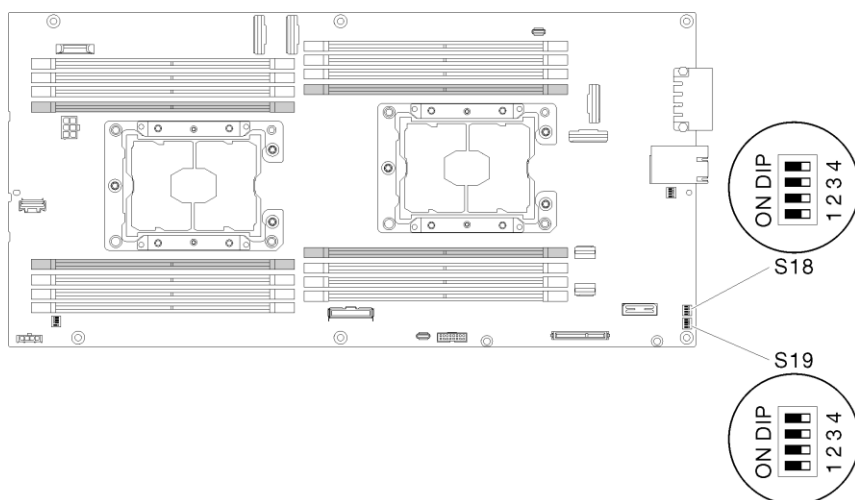
Figure 30. Location of the switches, jumpers, and buttons on the system board

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 http://thinksystem.lenovofiles.com/help/topic/ safety_documentation/pdf_files.html, "Installation Guidelines" on page 60, "Handling static-sensitive devices" on page 62, and "Power off the compute node" on page 125.

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 31). 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.
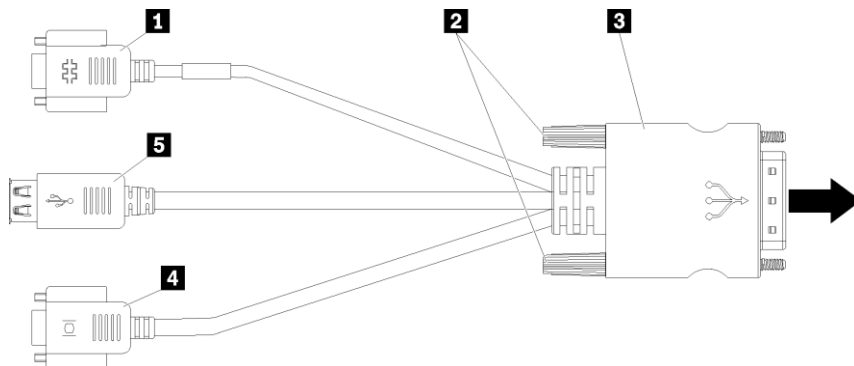
Figure 31. Connectors and components on the KVM breakout cable

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
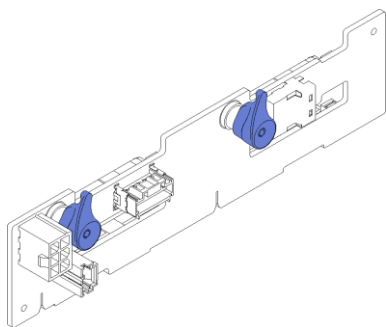
Figure 32. Four 2.5-inch SAS/SATA backplane

- Four 2.5-inch NVMe backplane
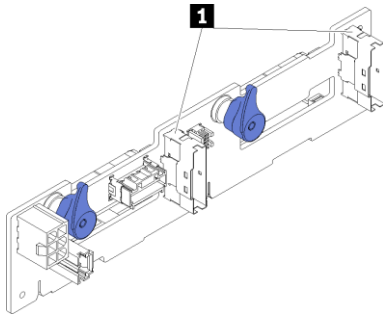
Figure 33. Four 2.5-inch NVMe backplane

1 NVMe connectors

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

- Six 2.5-inch SAS/SATA backplane
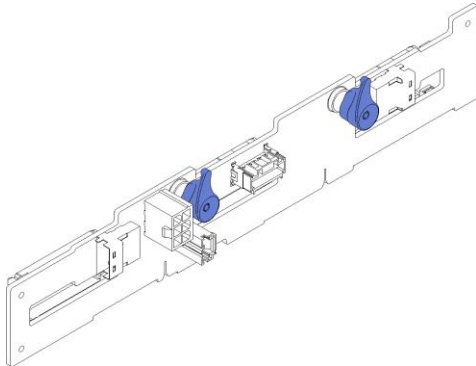
Figure 34. Six 2.5-inch SAS/SATA backplane

- Six 2.5-inch hot-swap SAS/SATA/NVMe backplane
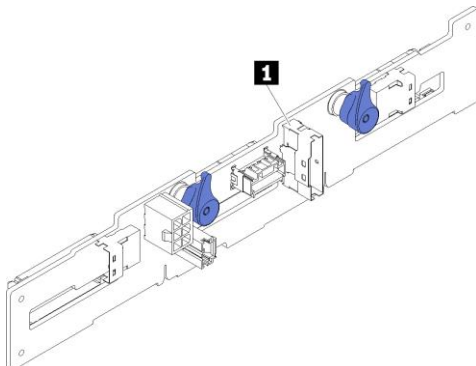
Figure 35. Six 2.5-inch hot-swap SAS/SATA/NVMe backplane

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.
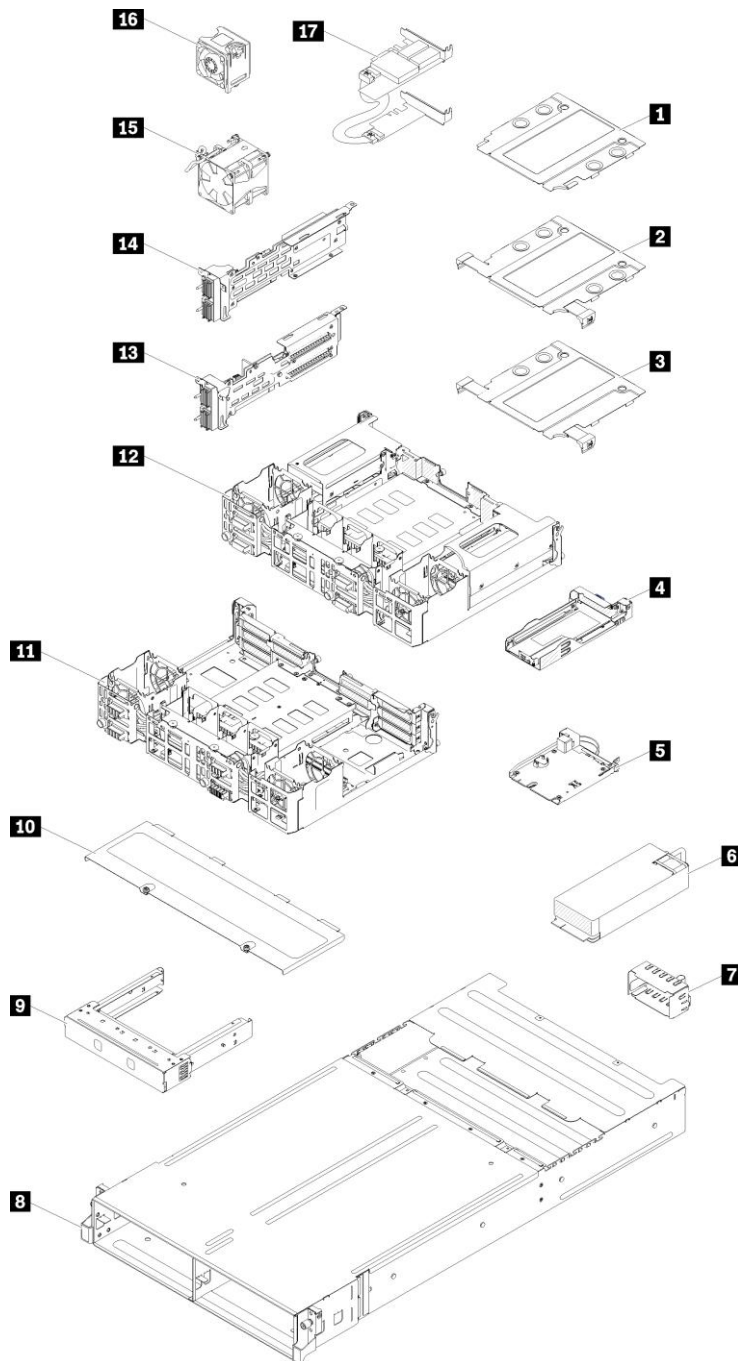
Figure 36. Enclosure components

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:** 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 listing, enclosure

Index	Description	Tier 1 CRU	Tier 2 CRU	FRU	Consuma-ble and Structural part
For more information about ordering the parts shown in Figure 36 "enclosure components" on page 37: https://datacentersupport.lenovo.com/products/servers/thinksystem/d2-enclosure/7X20/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) left			√	
14	PCIe I/O riser (PIOR) right			√	
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.
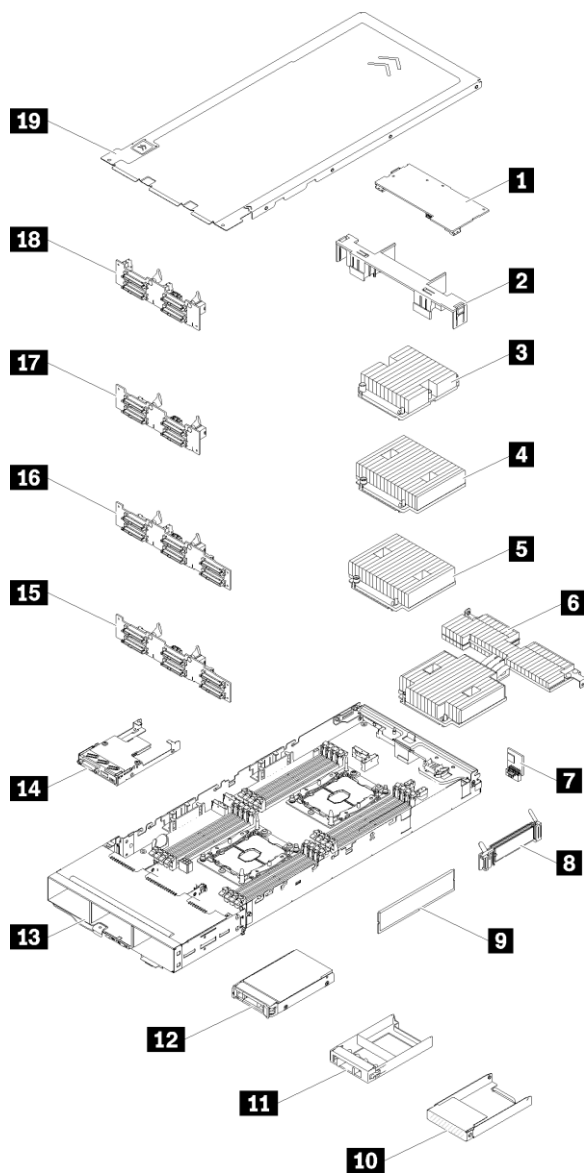
Figure 37. Compute node components

Table 22. Parts listing, 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 37 "compute node components" on page 39: https://datacentersupport.lenovo.com/products/servers/thinksystem/sd530/7x21/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 listing, 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	M.2 backplane	√			
9	DIMM	√			
10	2.5-inch drive bay blank (for empty bays next to the backplane)				√
11	2.5-inch drive bay blank panel (for drive bays on the backplane)	√			
12	2.5-inch hot-swap drive	√			
13	Compute node tray			√	
14	KVM breakout module	√			
15	2.5-inch 6-drive hot-swap SAS/SATA backplane			√	
16	2.5-inch 6-drive hot-swap SAS/SATA/NVMe backplane			√	
17	2.5-inch 4-drive hot-swap SAS/SATA backplane			√	
18	2.5-inch 4-drive hot-swap NVMe backplane			√	
19	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" in *Maintenance Manual* for detailed installation procedure and requirements.
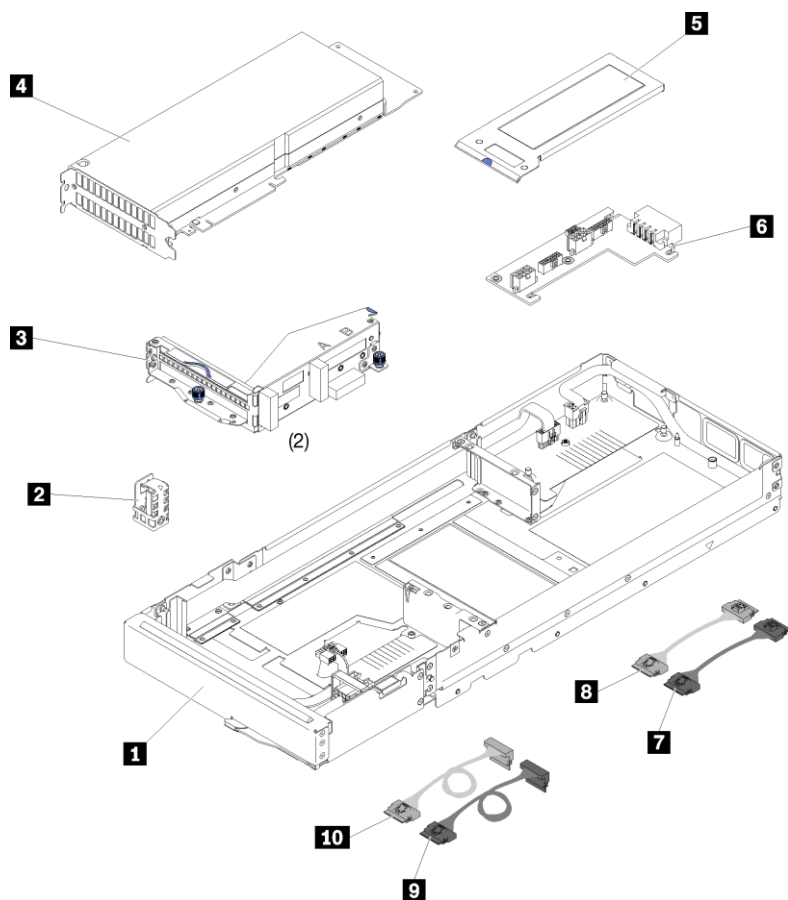
Figure 38. PCIe expansion node components

Table 23. Parts listing, PCIe expansion node

Index	Description	Tier 1 CRU	Tier 2 CRU	FRU	Structural
For more information about ordering the parts shown in Figure 38 "PCIe expansion node components" on page 41: https://datacentersupport.lenovo.com/products/servers/thinksystem/sd530/7x21/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	√			
7	PCIe#1-A cable	√			
8	PCIe#2-B cable	√			

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

Index	Description	Tier 1 CRU	Tier 2 CRU	FRU	Structural
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.

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

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.
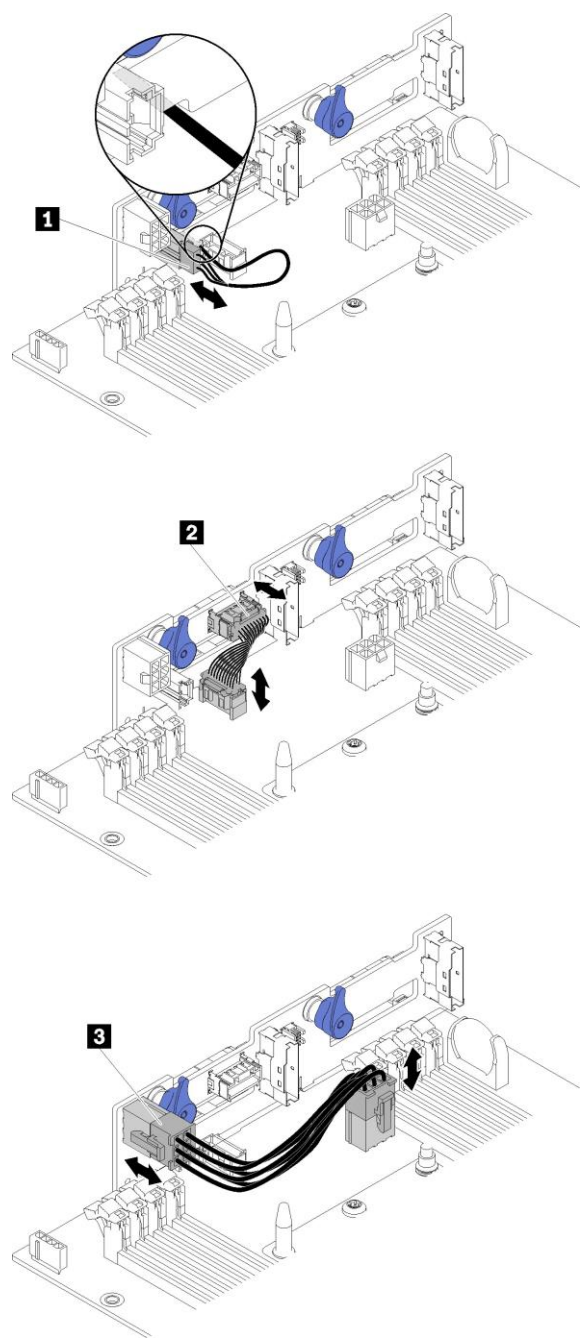
Four 2.5-inch-drive model

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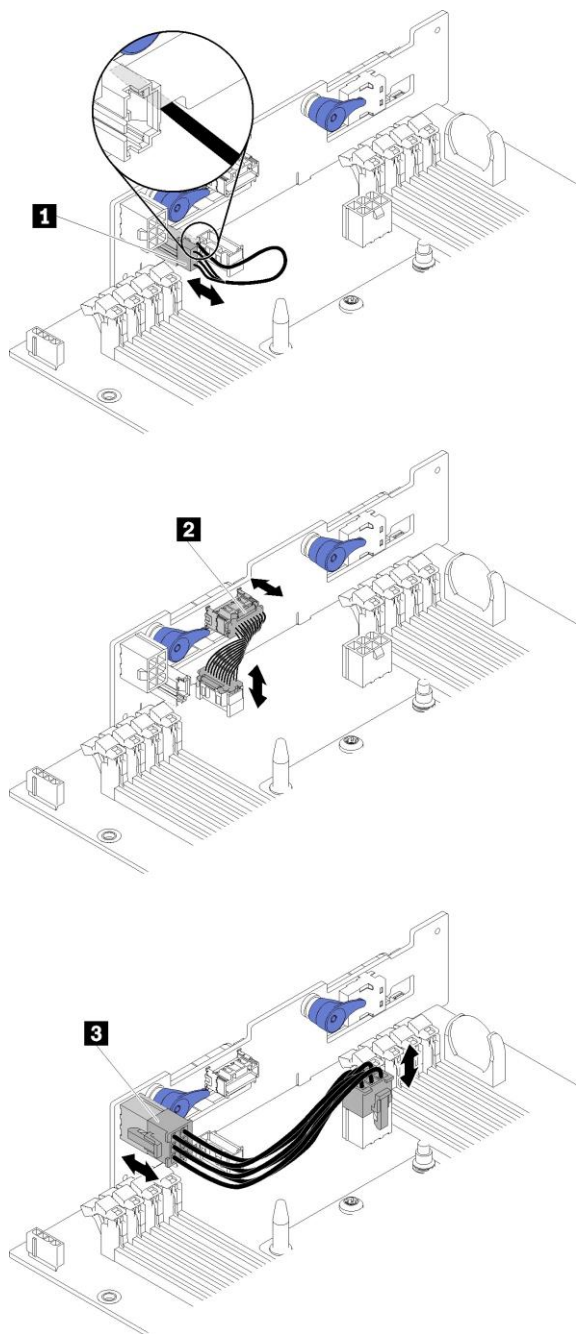
Figure 39. Four 2.5-inch hot-swap SAS/SATA backplane

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

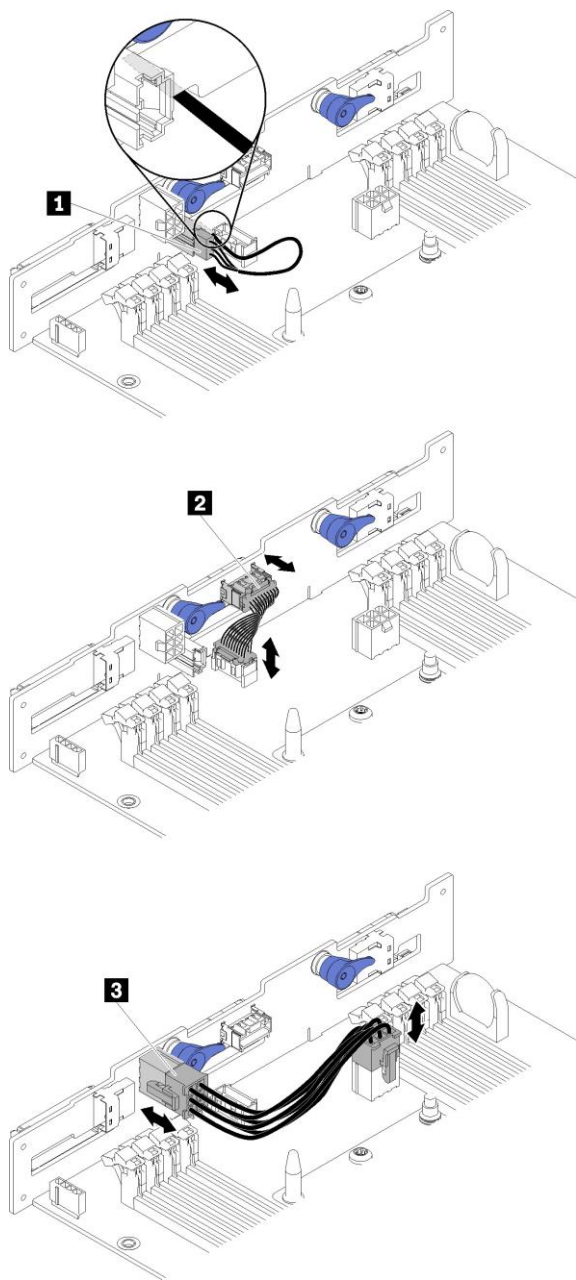| **1** Ambient sensor cable	**3** Backplane power cable
2 miscellaneous signal cable	

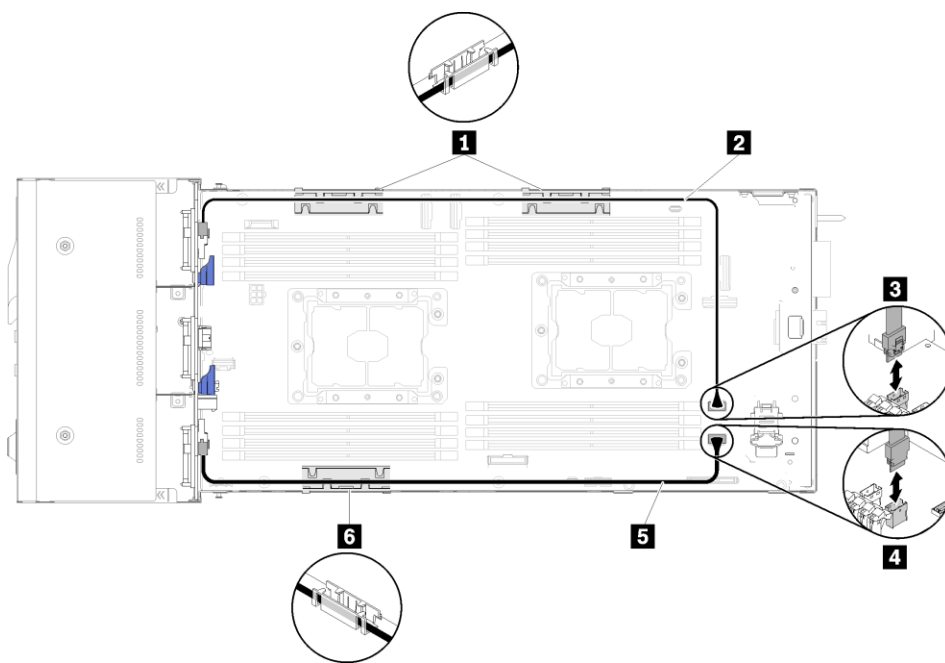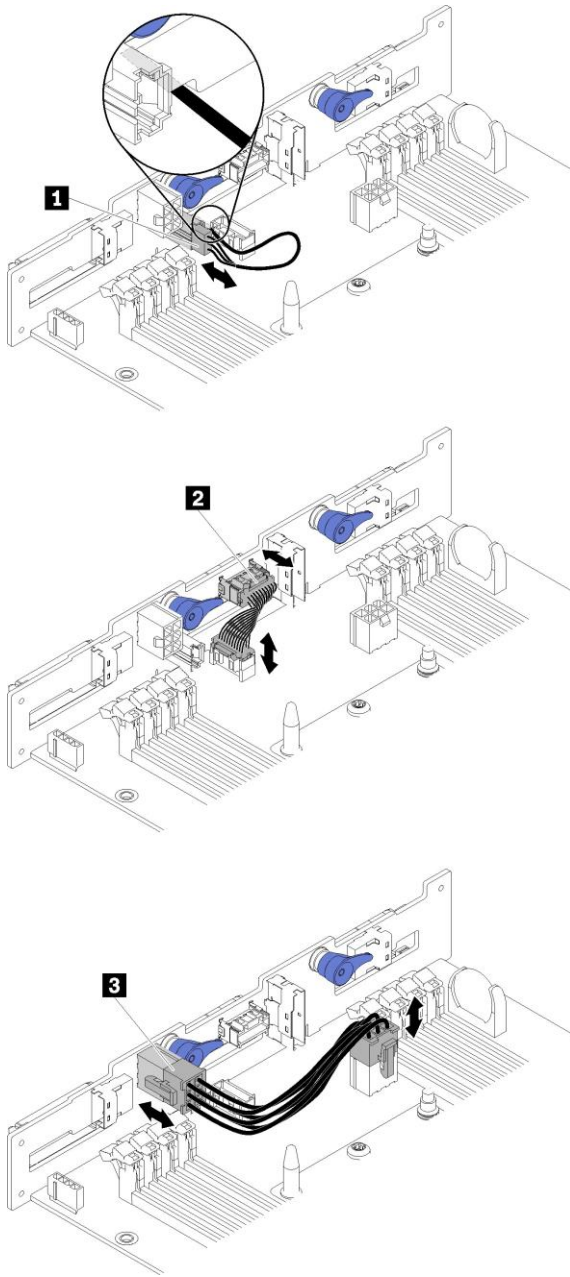- Four 2.5-inch drive cable routing
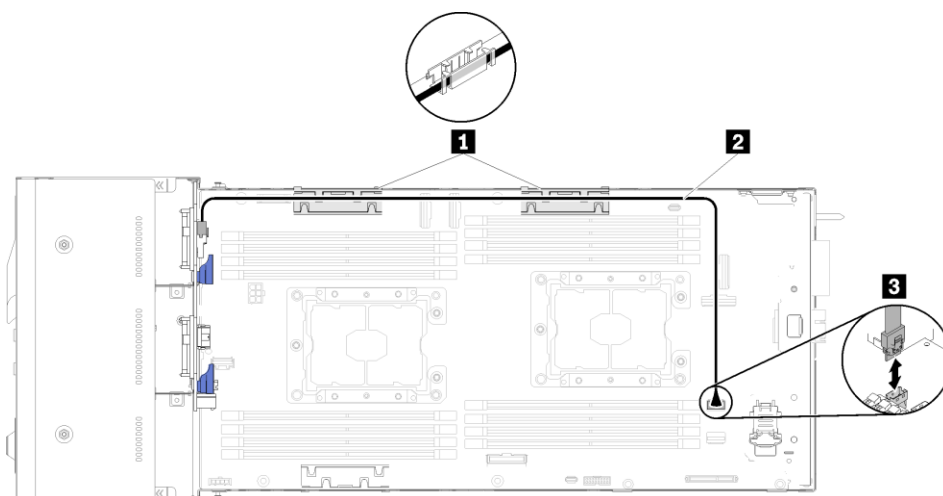
Figure 40. Four 2.5-inch drive cable routing

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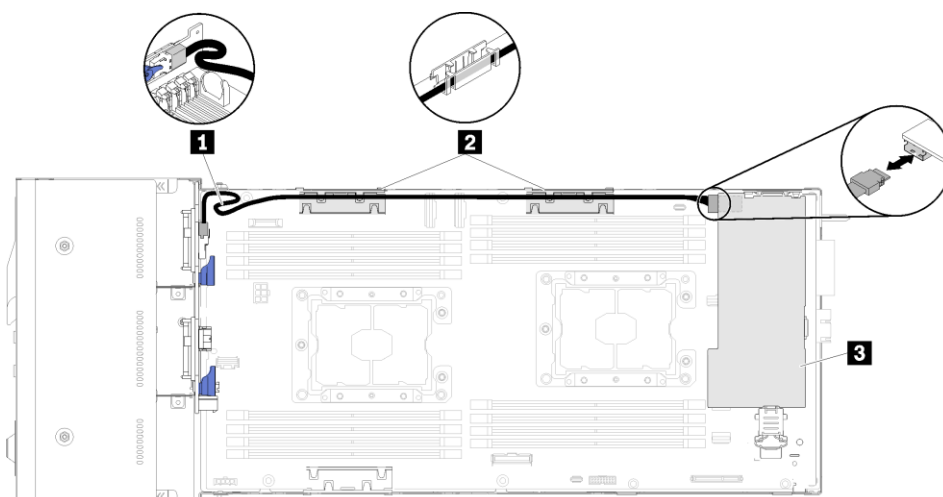
Figure 41. Four 2.5-inch drive with hardware RAID cable routing

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

• Four 2.5-inch NVMe backplane

Figure 42. Four 2.5-inch NVMe backplane

Table 27. 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
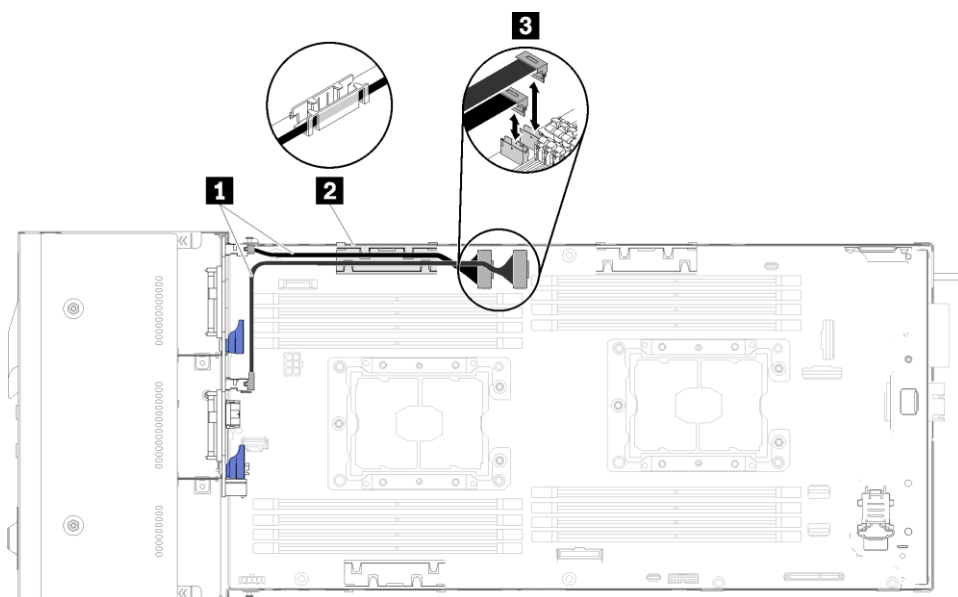
Figure 43. Four 2.5-inch drive cable routing (with NVMe)

Table 28. 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 44. Six 2.5-inch hot-swap SAS/SATA backplane

Table 29. 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 45. Six 2.5-inch drive cable routing

Table 30. 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
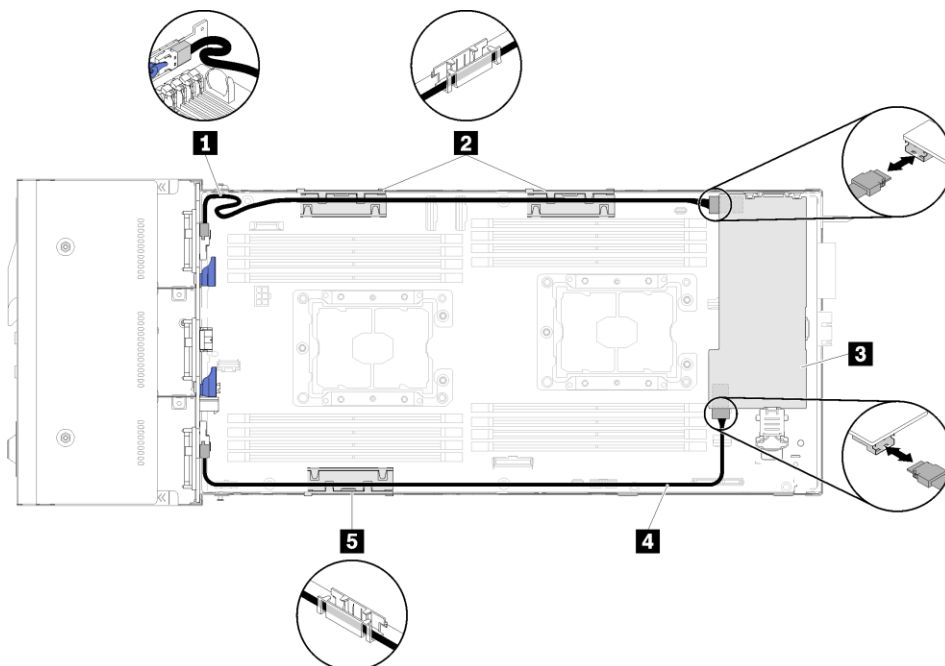
Figure 46. Six 2.5-inch drive with hardware RAID cable routing

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

Table 31. 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)

- Six 2.5-inch hot-swap SAS/SATA/NVMe backplane

Figure 47. Six 2.5-inch hot-swap SAS/SATA/NVMe backplane

Table 32. 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)
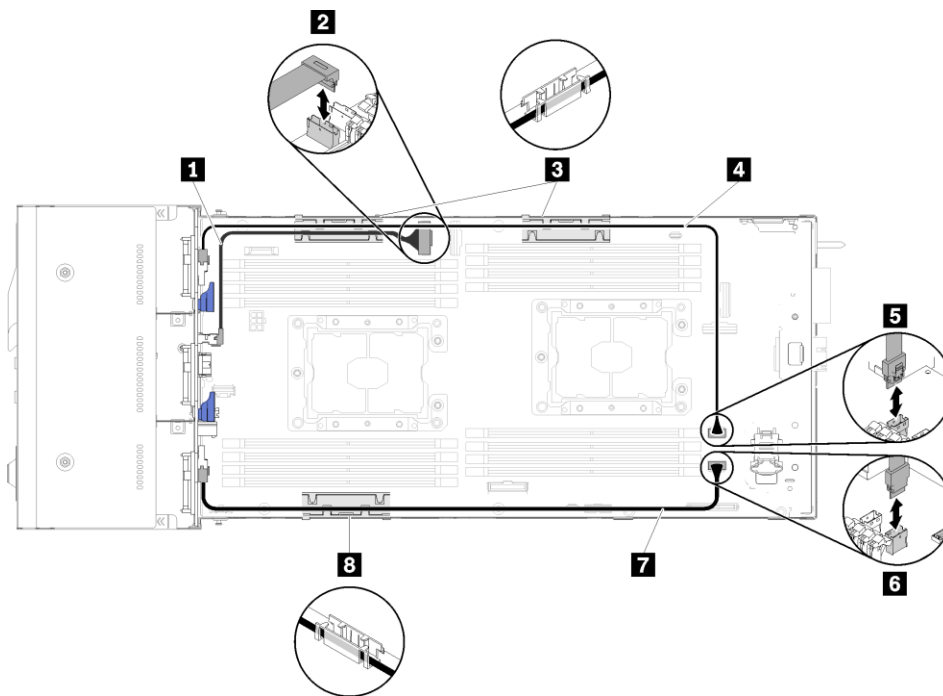
Figure 48. Six 2.5-inch drive cable routing (with NVMe)

Table 33. 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
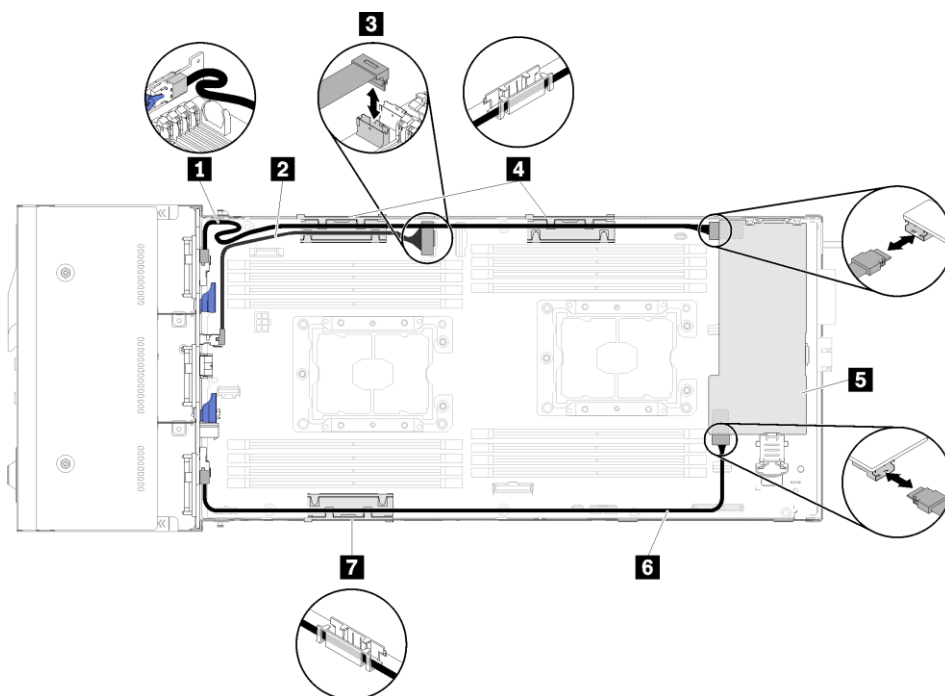
Figure 49. Six 2.5-inch drive (with NVMe) with hardware RAID cable routing

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

Table 34. 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.

- The right KVM breakout module (for four 2.5-inch-drive model)
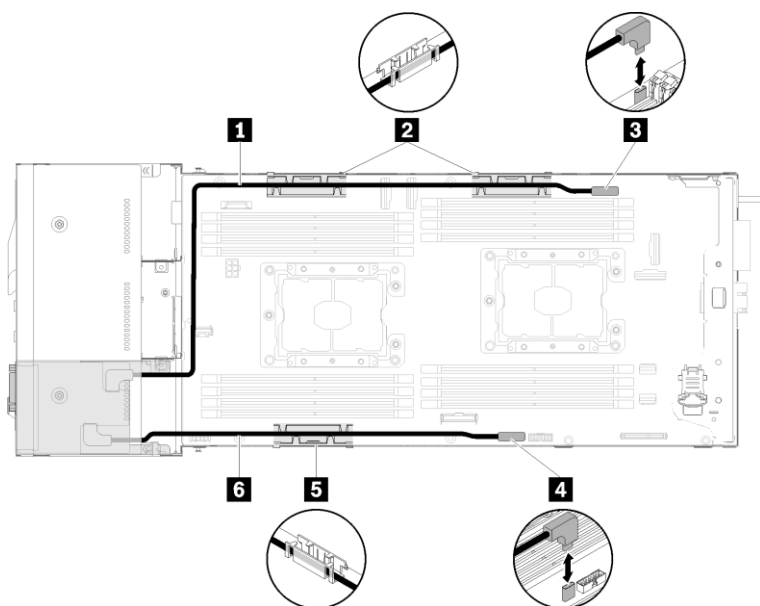
Figure 50. KVM breakout module installed in drive bay 4

Table 35. 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)
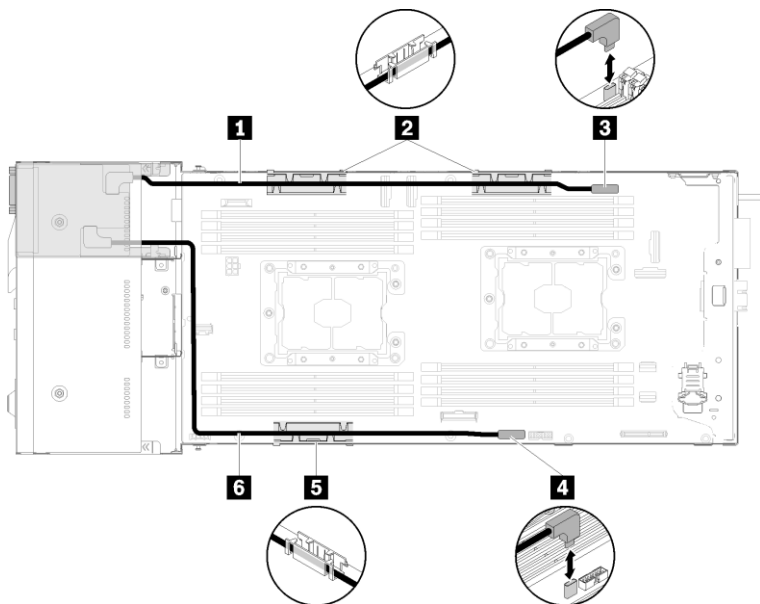
Figure 51. KVM breakout module installed in drive bay 0

Table 36. 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
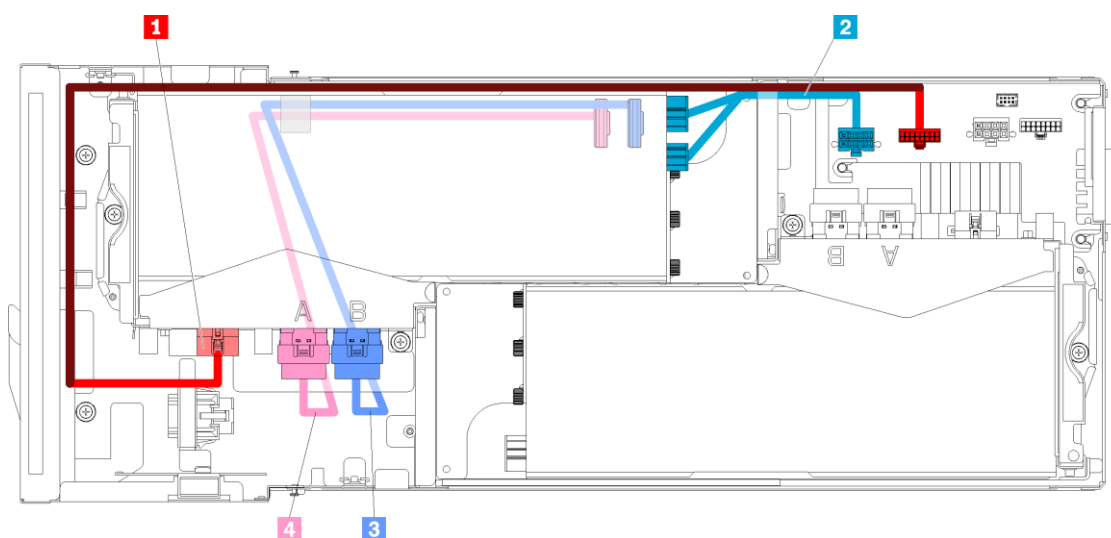
Figure 52. Front riser assembly cables

Table 37. 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
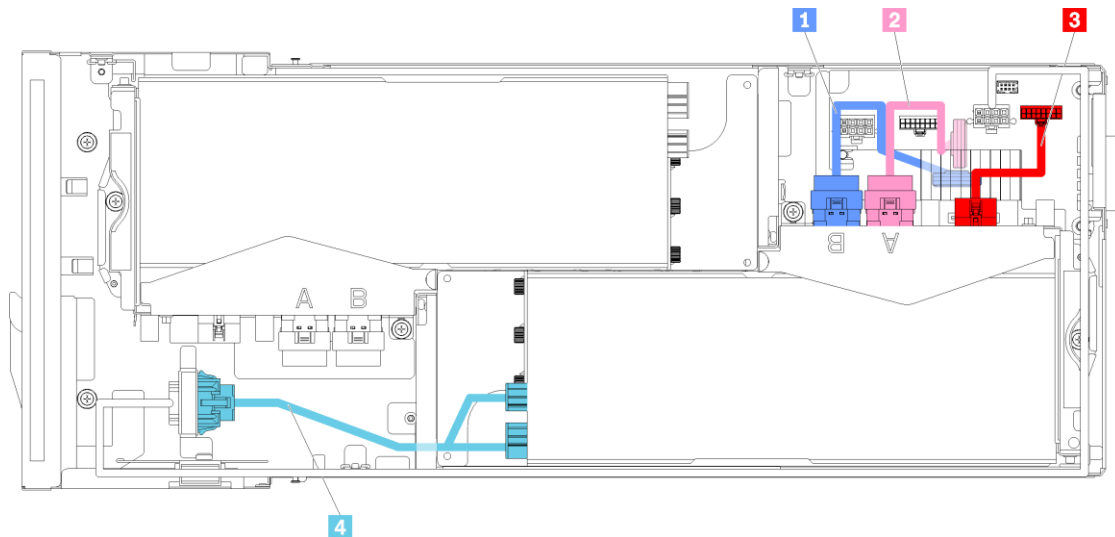
Figure 53. Rear riser assembly cables

Table 38. 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.
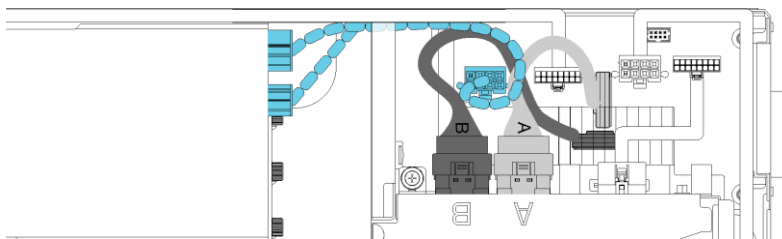
Figure 54. Routing PCIe#1-A, PCIe#2-B and the front riser auxiliary power cable

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Chapter 3. Solution hardware setup

To set up the solution, install any options that have been purchased, cable the solution, configure and update the firmware, and install the operating system.

Solution setup checklist

Use the solution setup checklist to ensure that you have performed all tasks that are required to set up your solution.

The solution setup procedure varies depending on the configuration of the solution when it was delivered. In some cases, the solution is fully configured and you just need to connect the solution to the network and an ac power source, and then you can power on the solution. In other cases, the solution needs to have hardware options installed, requires hardware and firmware configuration, and requires an operating system to be installed.

The following steps describe the general procedure for setting up a solution:

1. Unpack the solution package. See "Solution package contents" on page 4.

2. Set up the solution hardware.

   a. Install any required hardware or solution options. See the related topics in "Install solution hardware options" on page 62.

   b. If necessary, install the solution into a standard rack cabinet by using the rail kit shipped with the solution. See the *Rack Installation Instructions* that comes with optional rail kit.

   c. Connect the Ethernet cables and power cords to the solution. See "Rear view" on page 26 to locate the connectors. See "Cable the solution" on page 124 for cabling best practices.

   d. Power on the solution. See "Power on the compute node" on page 124.

      Note: You can access the management processor interface to configure the system without powering on the solution. Whenever the solution is connected to power, the management processor interface is available. For details about accessing the management node processor, see:

      http://sysmgt.lenovofiles.com/help/topic/com.lenovo.systems.management.xcc.doc/dw1lm_c_chapter2_openingandusing.html

   e. Validate that the solution hardware was set up successfully. See "Validate solution setup" on page 124.

3. Configure the system.

   a. Connect the Lenovo XClarity Controller to the management network. See "Set the network connection for the Lenovo XClarity Controller" on page 127.

   b. Update the firmware for the solution, if necessary. See "Update the firmware" on page 128.

   c. Configure the firmware for the solution. See "Configure the firmware" on page 131.

      The following information is available for RAID configuration:

      • https://lenovopress.com/lp0578-lenovo-raid-introduction

      • https://lenovopress.com/lp0579-lenovo-raid-management-tools-and-resources

   d. Install the operating system. See "Install the operating system" on page 133.

   e. Back up the solution configuration. See "Back up the solution configuration" on page 133.

   f. Install the applications and programs for which the solution is intended to be used.

Installation Guidelines

Use the installation guidelines to install components in your solution.

Before installing optional devices, read the following notices carefully:

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

- Read the safety information and guidelines to ensure that you work safely.
  - A complete list of safety information for all products is available at:
    http://thinksystem.lenovofiles.com/help/topic/safety_documentation/pdf_files.html
  - The following guidelines are available as well: "Handling static-sensitive devices" on page 62 and "Working inside the solution with the power on" on page 61.
- Make sure the components you are installing are supported by the solution. For a list of supported optional components for the solution, see http://www.lenovo.com/us/en/serverproven/.
- 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 ThinkSystem D2 Enclosure, Modular Enclosure, and ThinkSystem SD530 Compute Node 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 that the latest level of code is supported for the cluster solution before you update the code.
- It is good practice to make sure that the 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.
- Orange on a component or an orange 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. (Orange can also indicate touch points on hot-swap components.) See the instructions for removing or installing a specific hot-swap component for any additional procedures that you might have to perform before you remove or install the component.

- The Red strip on the drives, adjacent to the release latch, indicates that the drive can be hot-swapped if the 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

Guidelines to work inside the solution with the power on.

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

Use this information to handle static-sensitive devices.

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.

Install solution hardware options

This section includes instructions for performing initial installation of optional hardware. Each component installation procedure references any tasks that need to be performed to gain access to the component being replaced.

Installation procedures are presented in the optimum sequence to minimize work.

Attention: To ensure the components you install work correctly without problems, read the following precautions carefully.

- Make sure the components you are installing are supported by the solution. For a list of supported optional components for the solution, see http://www.lenovo.com/us/en/serverproven/.
- Always 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 ThinkSystem D2 Enclosure, Modular Enclosure, and ThinkSystem SD530 Compute Node Drivers and Software to download firmware updates for your solution.
- It is good practice to make sure that the solution is working correctly before you install an optional component.
- Follow the installation procedures in this section and use appropriate tools. Incorrectly installed components can cause system failure from damaged pins, damaged connectors, loose cabling, or loose components.

Install hardware options in the enclosure

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

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.

    - "Installation Guidelines" on page 60

2. Power off all the compute nodes and peripheral devices (see "Power off the compute node" on page 125).

3. Disengage all the compute nodes from the enclosure.

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

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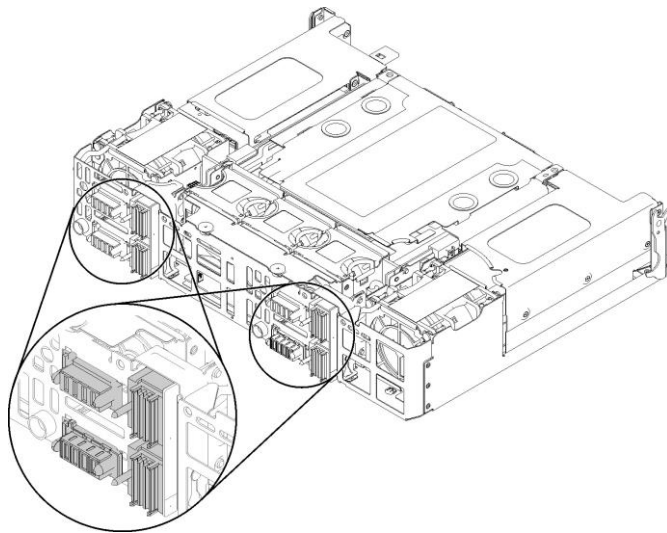
Figure 58. Shuttle connectors

Complete the following steps to remove the shuttle.

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

- Youtube: https://www.youtube.com/playlist?list=PLYV5R7hVcs-DOlbsCdADcoKQdMB2Uuk-T
- Youku: http://list.youku.com/albumlist/show/id_50483438

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.
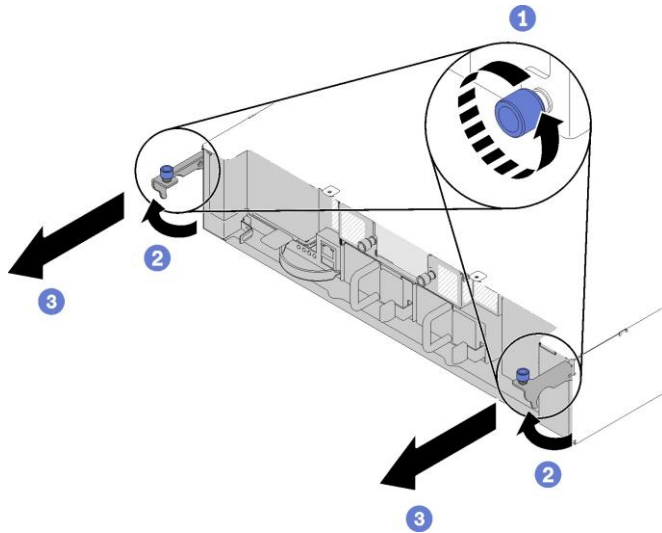
Figure 59. Shuttle removal

Step 3. Push two release latches and slide the whole shuttle out of the chassis.
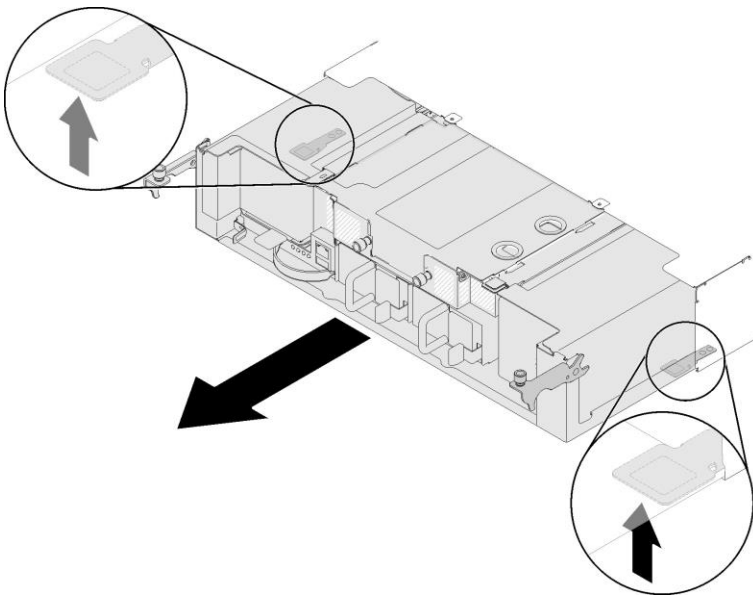
Figure 60. Shuttle removal

Attention: To prevent any damage to the shuttle connectors, make sure that you hold the shuttle properly to put it down as illustrated.
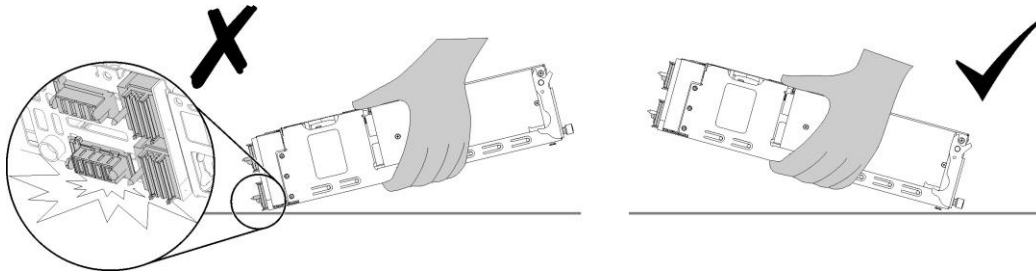
Figure 61. Shuttle connectors

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.

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.

    • "Installation Guidelines" on page 60

2. Power off all the compute nodes and peripheral devices (see "Power off the compute node" on page 125).

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. Remove the shuttle (see "Remove the shuttle" on page 63) and place it on the stable work surface.

Complete the following steps to remove the EIOM.

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

• Youtube: https://www.youtube.com/playlist?list=PLYV5R7hVcs-DOlbsCdADcoKQdMB2Uuk-T

• Youku: http://list.youku.com/albumlist/show/id_50483438

• For 10GbE cage (SFP+) model
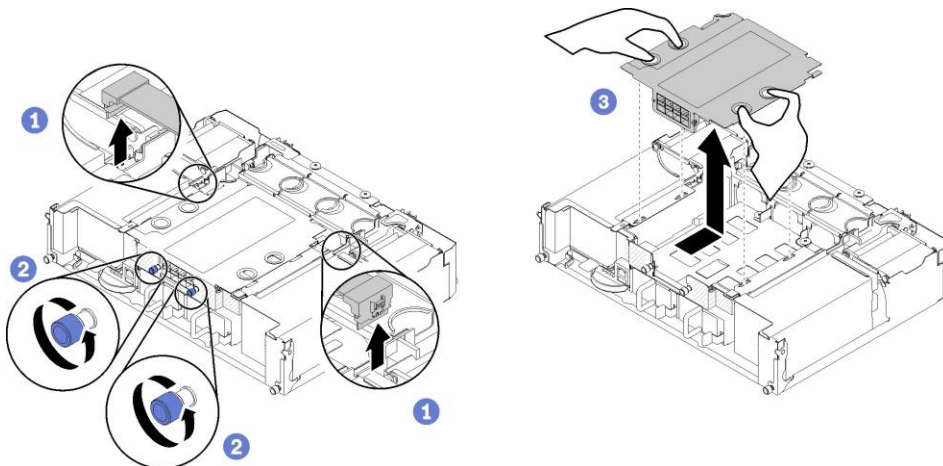
Figure 62. EIOM removal

• For 10GBASE-T cage (RJ-45) model
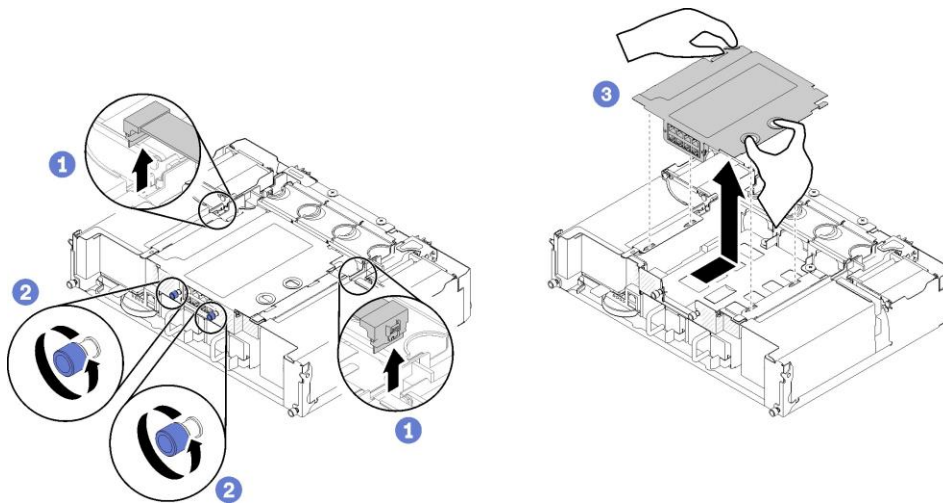
Figure 63. EIOM removal

• For EIOM filler
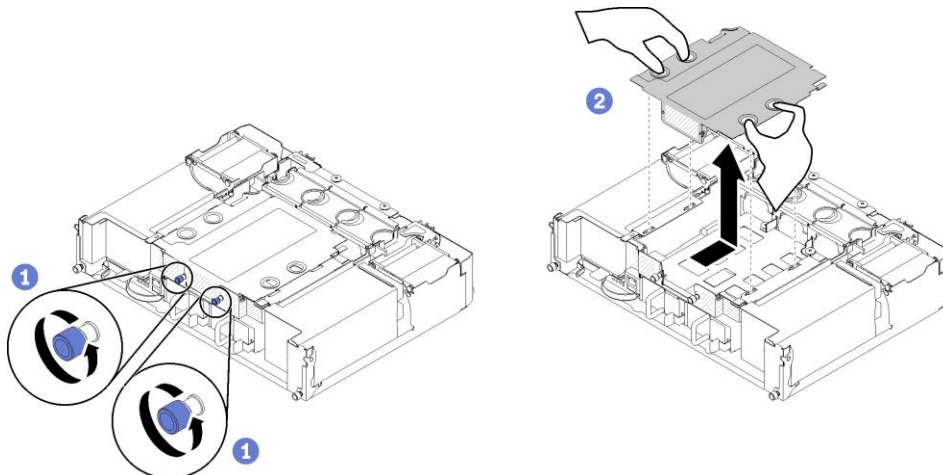
Figure 64. EIOM filler removal

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.

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 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.

   - "Installation Guidelines" on page 60

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.

Figure 65. 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.

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

- Youtube: https://www.youtube.com/playlist?list=PLYV5R7hVcs-DOlbsCdADcoKQdMB2Uuk-T

- Youku: http://list.youku.com/albumlist/show/id_50483438

Step 1. Remove the adapter cassette.

   a. Slide the release latch to the open position.

   b. Slide the adapter cassette out of the shuttle.
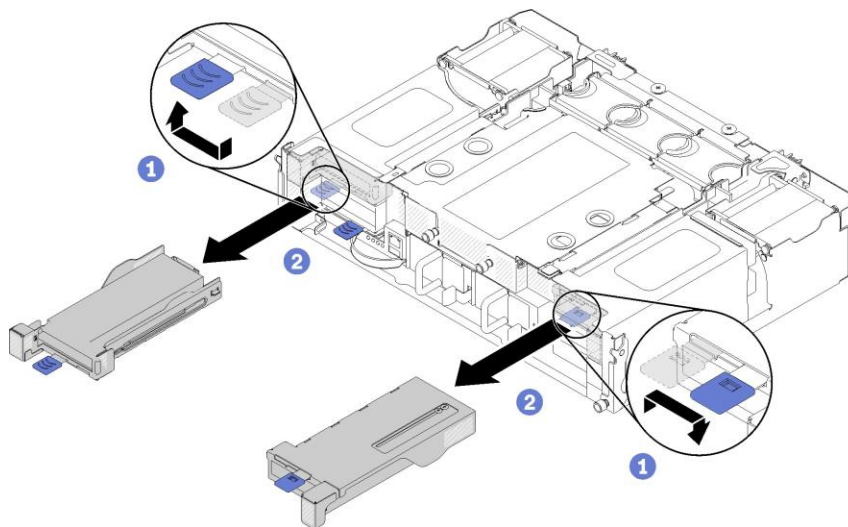
Figure 66. Adapter cassette removal

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.
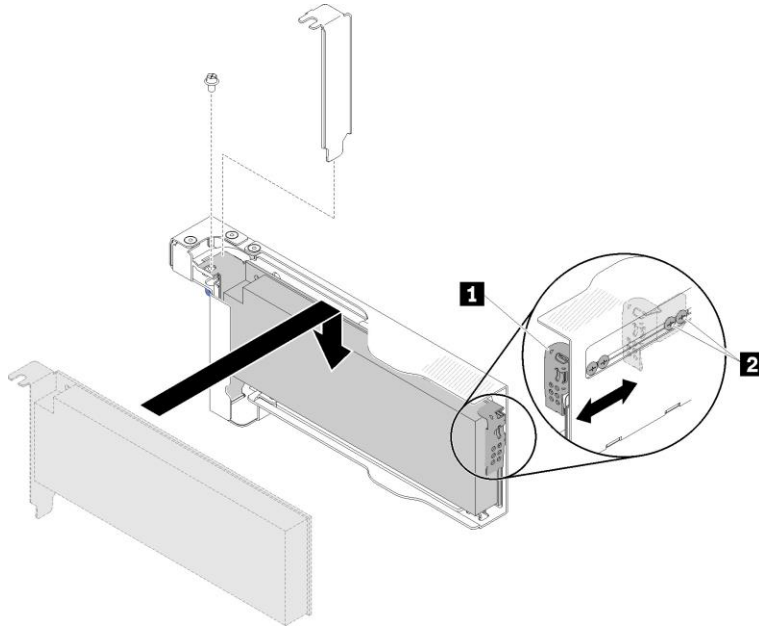
Figure 67. Adapter installation

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.
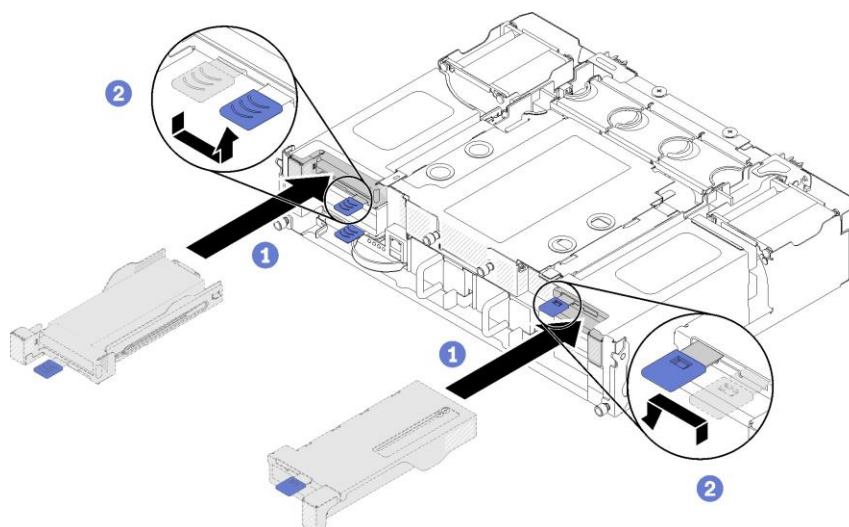
Figure 68. Adapter cassette installation

After you install a low-profile PCIe x16 adapter, complete the following steps.

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

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.

   • "Installation Guidelines" on page 60

2. Power off all the compute nodes and peripheral devices (see "Power off the compute node" on page 125).
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. Remove the shuttle from the enclosure (see "Remove the shuttle" on page 63).
6. Locate the adapter.

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

Figure 69. Adapter location

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

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

- Youtube: https://www.youtube.com/playlist?list=PLYV5R7hVcs-DOlbsCdADcoKQdMB2Uuk-T
- Youku: http://list.youku.com/albumlist/show/id_50483438
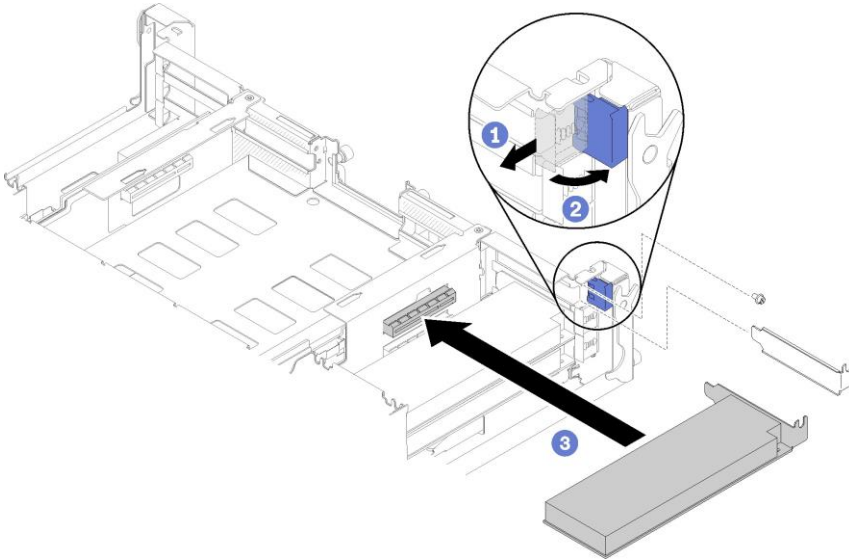
Figure 70. Adapter installation

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 102).
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 103).
4. Turn on all compute nodes.

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.

   - "Installation Guidelines" on page 60

2. Power off all the compute nodes and peripheral devices (see "Power off the compute node" on page 125).

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. Remove the shuttle (see "Remove the shuttle" on page 63).

6. Remove the EIOM card (see "Remove the EIOM" on page 65).

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

8. Locate the adapter.

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

Figure 71. Adapter location

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, if necessary.

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

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

- Youtube: https://www.youtube.com/playlist?list=PLYV5R7hVcs-DOlbsCdADcoKQdMB2Uuk-T
- Youku: http://list.youku.com/albumlist/show/id_50483438
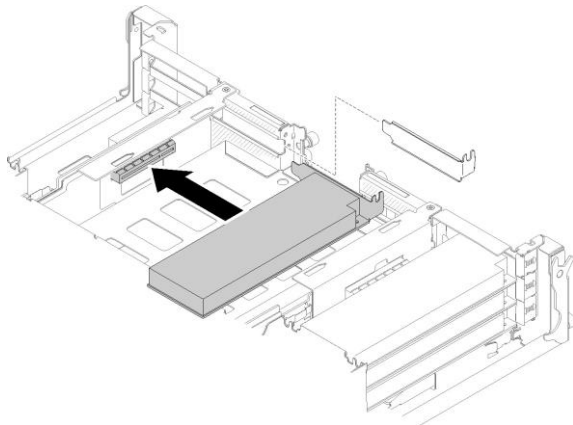
Figure 72. Adapter installation

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 74).

2. Reinstall the shuttle (see "Install the compute node cover" on page 102).

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 103).

5. Turn on all compute nodes.

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.

- **S001**

DANGER

> **Electrical current from power, telephone, and communication cables is hazardous.**
> **To avoid a shock hazard:**
>
> – **Do not connect or disconnect any cables or perform installation, maintenance, or reconfiguration of this product during an electrical storm.**
> – **Connect all power cords to a properly wired and grounded electrical outlet.**
> – **Connect to properly wired outlets any equipment that will be attached to this product.**
> – **When possible, use one hand only to connect or disconnect signal cables.**
> – **Never turn on any equipment when there is evidence of fire, water, or structural damage.**
> – **Disconnect the attached power cords, telecommunications systems, networks, and modems before you open the device covers, unless instructed otherwise in the installation and configuration procedures.**
> – **Connect and disconnect cables as described in the following table when installing, moving, or opening covers on this product or attached devices.**

To Connect:	To Disconnect:
1. Turn everything OFF.	1. Turn everything OFF.
2. First, attach all cables to devices.	2. First, remove power cords from outlet.
3. Attach signal cables to connectors.	3. Remove signal cables from connectors.
4. Attach power cords to outlet.	4. Remove all cables from devices.
5. Turn device ON.	

- **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:

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

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.

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

- Youtube: https://www.youtube.com/playlist?list=PLYV5R7hVcs-DOlbsCdADcoKQdMB2Uuk-T
- Youku: http://list.youku.com/albumlist/show/id_50483438
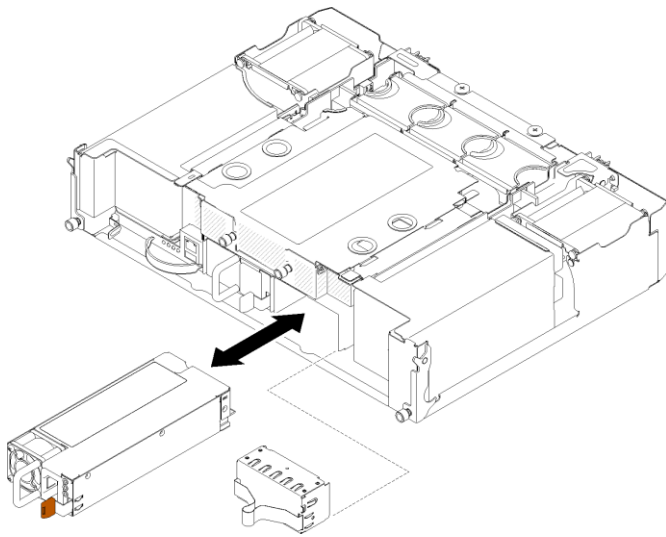
Figure 73. Hot-swap power supply installation

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.

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.

   - "Installation Guidelines" on page 60

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 125).

3. Disengage all the compute nodes from the enclosure.

4. Remove the shuttle (see "Remove the shuttle" on page 63) 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.

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

- Youtube: https://www.youtube.com/playlist?list=PLYV5R7hVcs-DOlbsCdADcoKQdMB2Uuk-T

- Youku: http://list.youku.com/albumlist/show/id_50483438

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
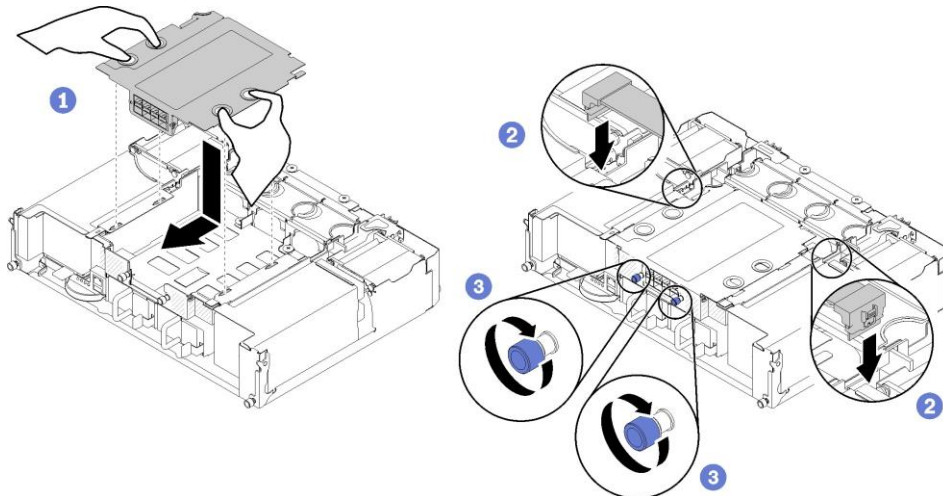
Figure 74. EIOM installation

   - For 10GBASE-T cage (RJ-45) model
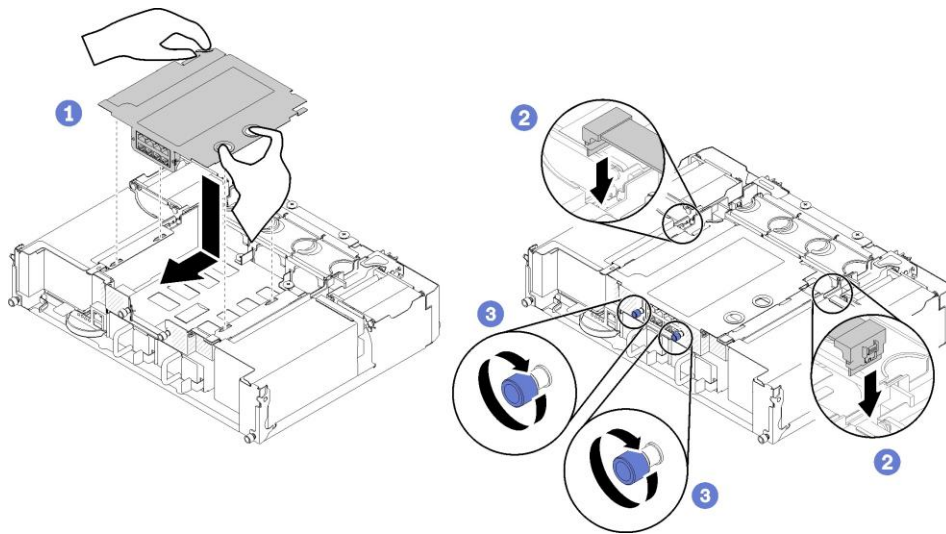
Figure 75. EIOM installation

- For EIOM filler
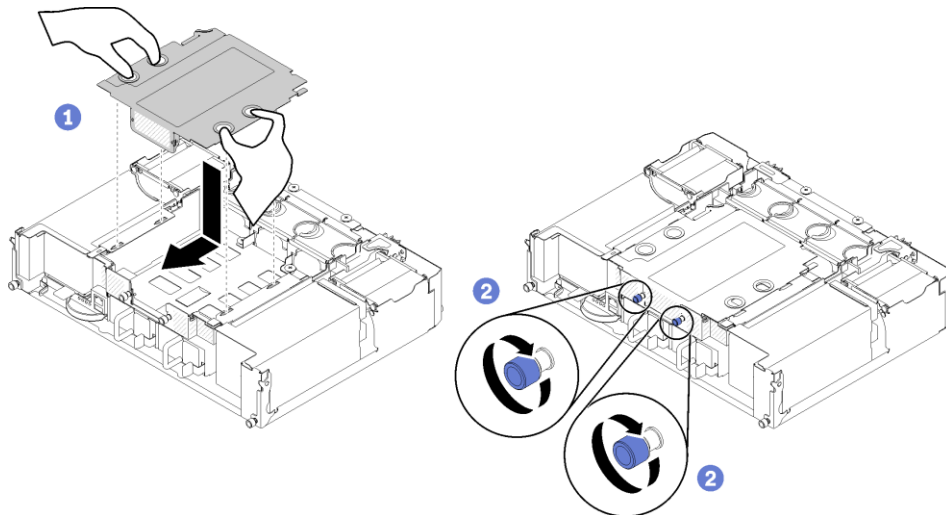
Figure 76. EIOM filler removal

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 76).
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 103).
4. Turn on all compute nodes.

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.

    • "Installation Guidelines" on page 60

2. Power off all the compute nodes and peripheral devices (see "Power off the compute node" on page 125).

3. Disengage all the compute nodes from the enclosure.

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

Attention: Be careful when you are removing or installing the shuttle to avoid damaging the shuttle connectors.
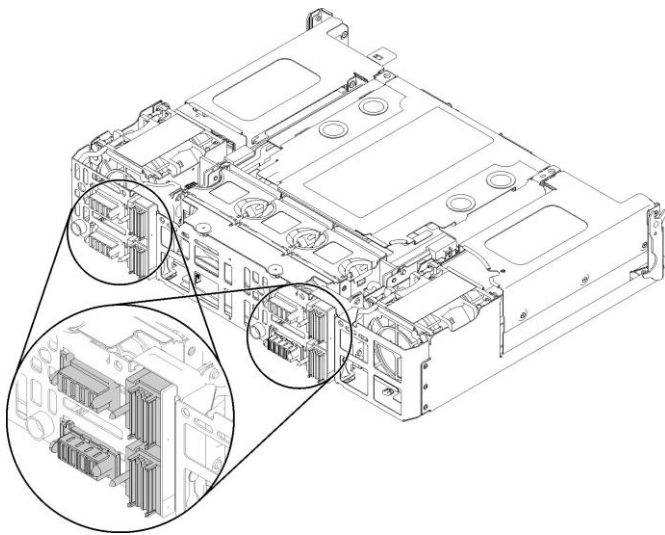
Figure 77. Shuttle connectors

Complete the following steps to install the shuttle.

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

• Youtube: https://www.youtube.com/playlist?list=PLYV5R7hVcs-DOlbsCdADcoKQdMB2Uuk-T

• Youku: http://list.youku.com/albumlist/show/id_50483438

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.
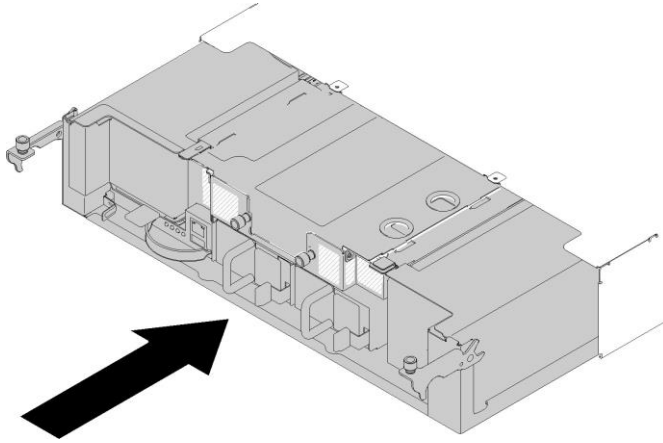
Figure 78. Shuttle installation

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.
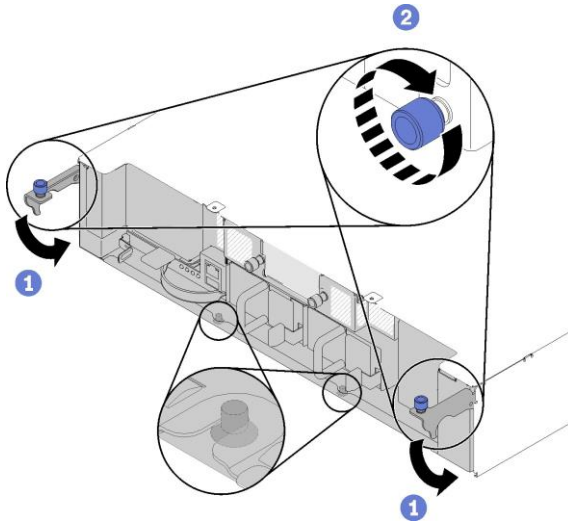
Figure 79. Shuttle installation

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 77).

2. Push all compute nodes back into the enclosure (see "Install a compute node in the enclosure" on page 103).

3. Turn on all compute nodes.

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.

   • "Installation Guidelines" on page 60

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.

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

- Youtube: https://www.youtube.com/playlist?list=PLYV5R7hVcs-DOlbsCdADcoKQdMB2Uuk-T
- Youku: http://list.youku.com/albumlist/show/id_50483438
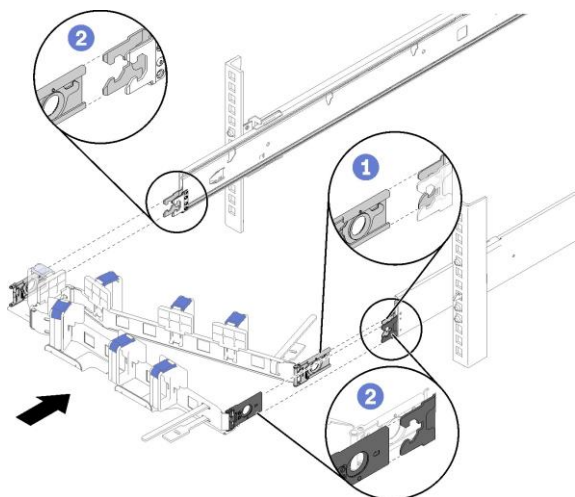
Figure 80. Cable management arm installation

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.

Install hardware options in the compute node

Use the following information to remove and install the options in the compute node.

Remove a compute node from the enclosure

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

Attention:

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 42. 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

Before you remove a compute node:

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

   - "Installation Guidelines" on page 60

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.

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

- Youtube: https://www.youtube.com/playlist?list=PLYV5R7hVcs-DOlbsCdADcoKQdMB2Uuk-T
- Youku: http://list.youku.com/albumlist/show/id_50483438
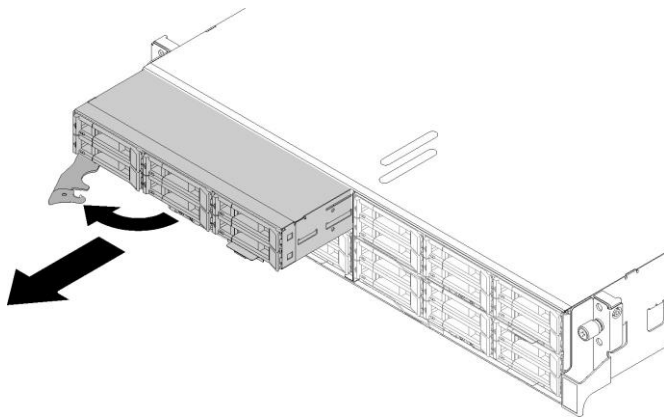
Figure 81. Node removal

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.

Remove the compute node cover

Use this procedure to remove the compute node cover.

Before you remove the compute node cover:

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

   - "Installation Guidelines" on page 60

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 78

Complete the following steps to remove the compute node cover.

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

- Youtube: https://www.youtube.com/playlist?list=PLYV5R7hVcs-DOlbsCdADcoKQdMB2Uuk-T
- Youku: http://list.youku.com/albumlist/show/id_50483438
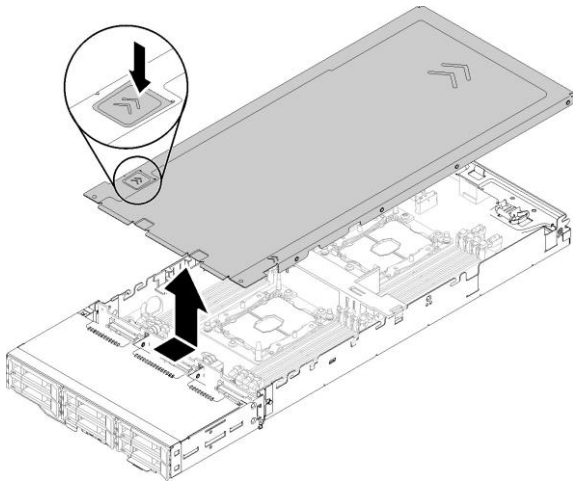
Figure 82. Compute node cover removal

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.

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.

   - "Installation Guidelines" on page 60

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 78).

4. Remove the compute node cover (see "Remove the compute node cover" on page 79).

Complete the following steps to remove the air baffle.

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

- Youtube: https://www.youtube.com/playlist?list=PLYV5R7hVcs-DOlbsCdADcoKQdMB2Uuk-T
- Youku: http://list.youku.com/albumlist/show/id_50483438
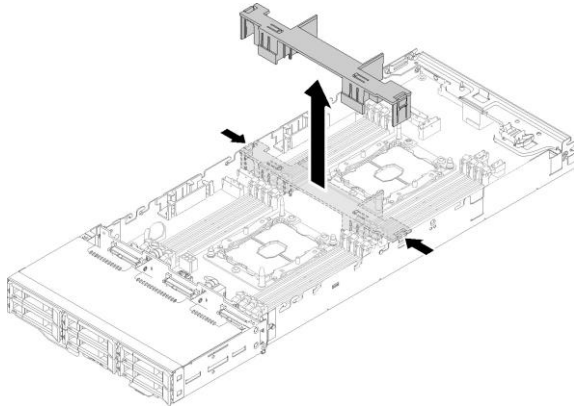
Figure 83. Air baffle removal

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.

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.

   - "Installation Guidelines" on page 60

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 78).

4. Remove the compute node cover (see "Remove the compute node cover" on page 79).

Complete the following steps to remove the M.2 backplane.

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

- Youtube: https://www.youtube.com/playlist?list=PLYV5R7hVcs-DOlbsCdADcoKQdMB2Uuk-T
- Youku: http://list.youku.com/albumlist/show/id_50483438

Figure 84. 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.

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.

    • "Installation Guidelines" on page 60

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 78).

4. Remove the compute node cover (see "Remove the compute node cover" on page 79).

5. Remove the M.2 backplane (see "Remove the M.2 backplane" on page 81).

Complete the following steps to install an M.2 drive in the M.2 backplane.

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

• Youtube: https://www.youtube.com/playlist?list=PLYV5R7hVcs-DOlbsCdADcoKQdMB2Uuk-T

• Youku: http://list.youku.com/albumlist/show/id_50483438

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.
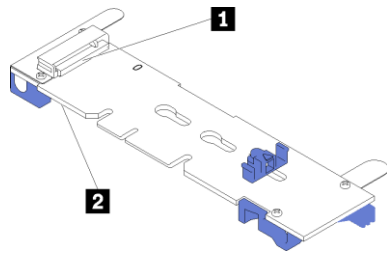
Figure 85. M.2 drive slot

Table 43. M.2 drive slot

◻ Slot 0	◻ 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.
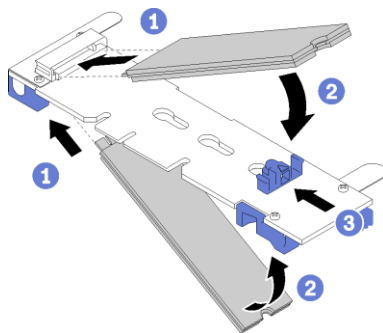
Figure 86. M.2 drive installation

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.
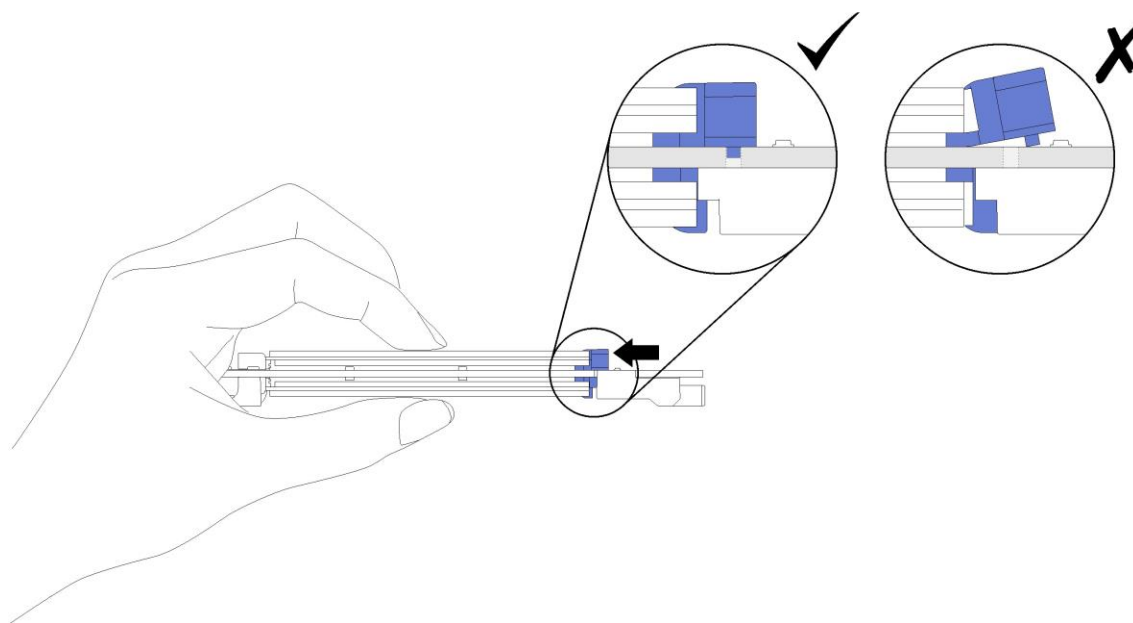
Figure 87. M.2 drive installation

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 97).
2. Reinstall the compute node cover (see "Install the compute node cover" on page 102).
3. Reinstall the compute node (see "Install a compute node in the enclosure" on page 103).
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.

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.

    • "Installation Guidelines" on page 60

To adjust the position of the retainer on the M.2 backplane, complete the following steps.

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

• Youtube: https://www.youtube.com/playlist?list=PLYV5R7hVcs-DOlbsCdADcoKQdMB2Uuk-T

• Youku: http://list.youku.com/albumlist/show/id_50483438

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.
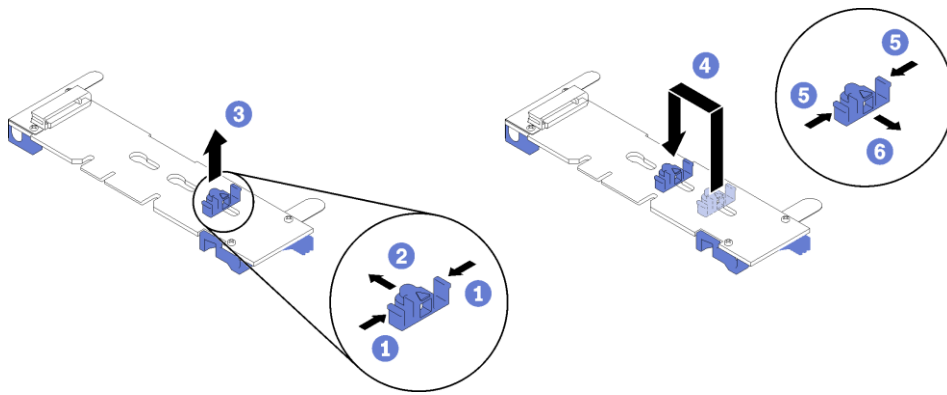
Install the KVM breakout module

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.

   - "Installation Guidelines" on page 60

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 78).

4. Remove the compute node cover (see "Remove the compute node cover" on page 79).

5. Remove the air baffle (see "Remove the air baffle" on page 80).

Complete the following steps to install the KVM breakout module.

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

- Youtube: https://www.youtube.com/playlist?list=PLYV5R7hVcs-DOlbsCdADcoKQdMB2Uuk-T
- Youku: http://list.youku.com/albumlist/show/id_50483438

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)
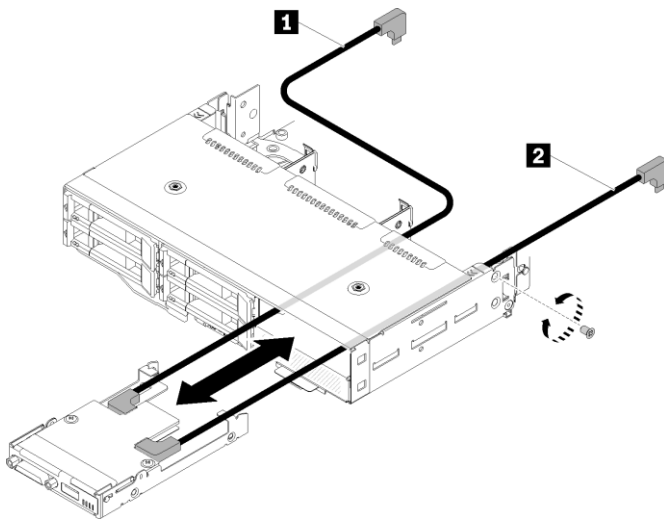
Figure 88. Right KVM breakout module installation

Table 44. 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.
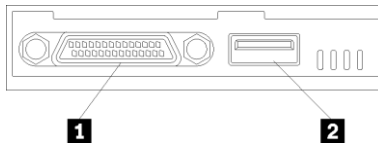
Figure 89. KVM breakout module

Table 45. KVM breakout module

1 KVM connector	**2** USB 3.0 connector

• The left KVM breakout module (for six 2.5-inch-drive model)
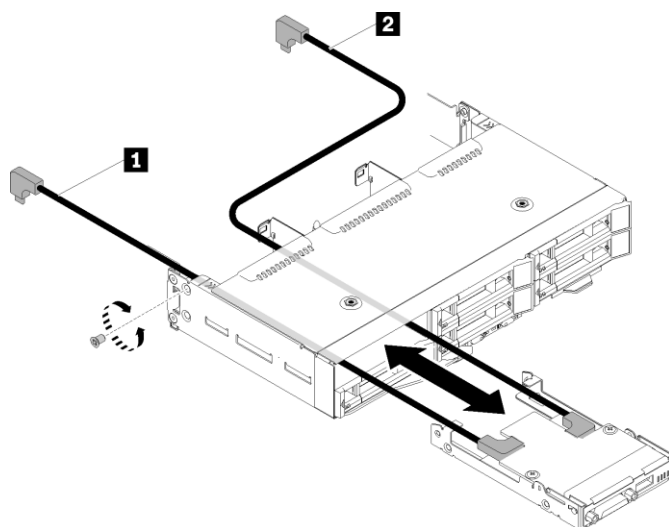
Figure 90. Left KVM breakout module installation

Table 46. 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.
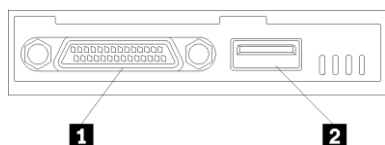
Figure 91. KVM breakout module

Table 47. 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)
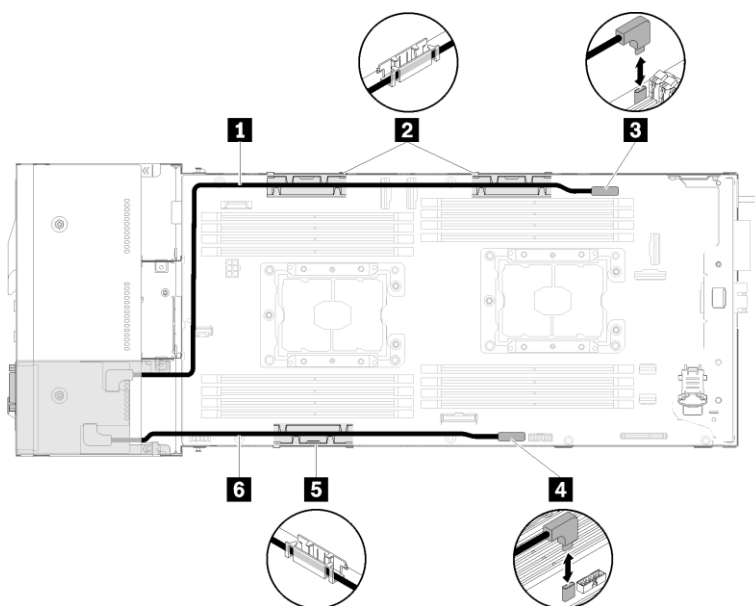
Figure 92. Right KVM breakout module cable routing

Table 48. 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)
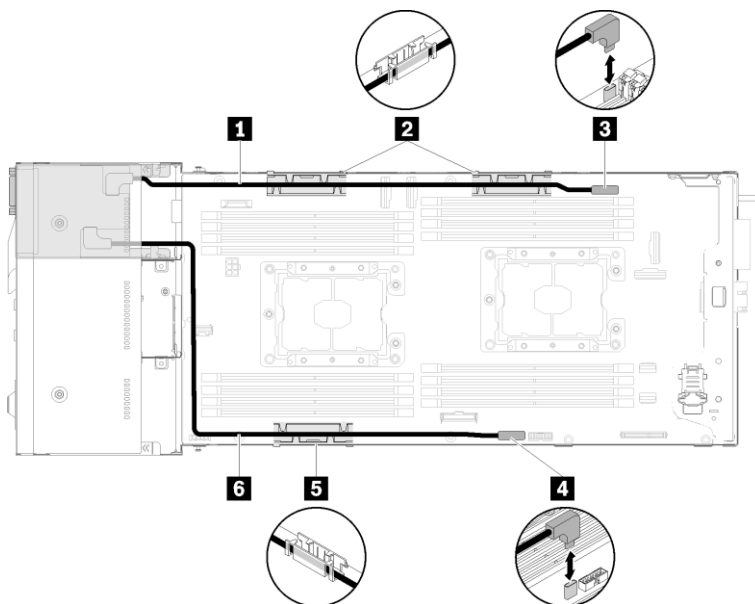
Figure 93. Left KVM breakout module cable routing

Table 49. 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 101).
2. Reinstall the node cover (see "Install the compute node cover" on page 102).
3. Reinstall the compute node (see "Install a compute node in the enclosure" on page 103).
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.

Install a hot-swap drive

Use this information to install a hard disk drive.

Before you install a drive:

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

   - "Installation Guidelines" on page 60

2. Remove the drive filler from the empty drive bay. Keep the filler panel in a safe place.

3. 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 http://www.lenovo.com/us/en/serverproven/.

- 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 http://www.lenovo.com/us/en/serverproven/.

Complete the following steps to install a drive:

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

- Youtube: https://www.youtube.com/playlist?list=PLYV5R7hVcs-DOlbsCdADcoKQdMB2Uuk-T
- Youku: http://list.youku.com/albumlist/show/id_50483438

Note: If you have only one drive, you must install it in the bay 0 (upper-left).
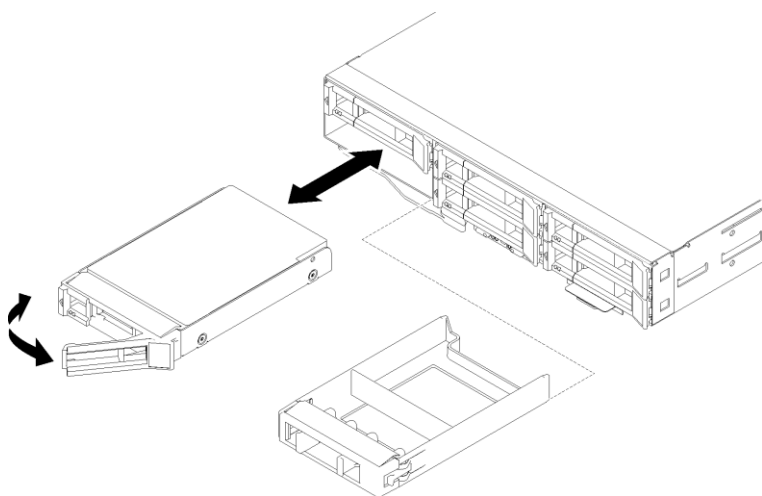
Figure 94. Drive installation

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.

Install memory modules

The following notes describe the types of DIMMs that the node supports and other information that you must consider when you install DIMMs.

- Confirm that the node supports the DIMM that you are installing (see http://www.lenovo.com/us/en/ serverproven/).

- When you install or remove DIMMs, the node configuration information changes. When you restart the node, the system displays a message that indicates that the memory configuration has changed. You can use the Setup utility to view the node configuration information, see ThinkSystem D2 Enclosure, Modular Enclosure, and ThinkSystem SD530 Compute Node *Setup Guide* for more information.

- Install higher capacity (ranked) DIMMs first, following the population sequence for the memory mode being used.

- The node supports only industry-standard double-data-rate 4 (DDR4), 2666 MT/s, PC4-21300 (single-rank or dual-rank), unbuffered or synchronous dynamic random-access memory (SDRAM) dual inline memory modules (DIMMs) with error correcting code (ECC).

- Do not mix RDIMMs, LRDIMMs and 3DS DIMMs in the same node.

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- The maximum operating speed of the node is determined by the slowest DIMM in the node.
- If you install a pair of DIMMs in DIMM connectors 1 and 3, the size and speed of the DIMMs that you install in DIMM connectors 1 and 3 must match each other. However, they do not have to be the same size and speed as the DIMMs that are installed in DIMM connectors 2 and 4.
- You can use compatible DIMMs from various manufacturers in the same pair.
- The specifications of a DDR4 DIMM are on a label on the DIMM, in the following format.
- *gggGBpheRxff* PC4-*wwwwaa-mccd-bb*

  where:

  - *gggGB* is the total capacity, in gigabytes, for primary bus (ECC not counted) 4GB, 8GB, 16GB, etc. (no space between digits and units)
  - *pheR* is the number of package ranks of memory installed and number of logical ranks per package rank

    - p =
      - 1 = 1 package rank of SDRAMs installed
      - 2 = 2 package ranks of SDRAMs installed
      - 3 = 3 package ranks of SDRAMs installed
      - 4 = 4 package ranks of SDRAMs installed
    - he = blank for monolithic DRAMs, else for modules using stacked DRAM:
      - h = DRAM package type
        - D = multi-load DRAM stacking (DDP)
        - Q = multi-load DRAM stacking (QDP)
        - S = single load DRAM stacking (3DS)
      - e = blank for SDP, DDP and QDP, else modules using 3DS stacks, logical ranks per package rank
        - 2 = 2 logical ranks in each package rank
        - 4 = 4 logical ranks in each package rank
        - 8 = 8 logical ranks in each package rank
    - R = rank(s)
    - xff = Device organization (data bit width) of SDRAMs used on this assembly
      - x4 = x4 organization (4 DQ lines per SDRAM)
      - x8 = x8 organization
      - x16 = x16 organization
  - *wwwww* is the DIMM bandwidth, in MBps: 2133, 2400, 2666, 2933, 3200
  - *aa* is the SDRAM speed grade
  - *m* is the DIMM type
    - E = Unbuffered DIMM (UDIMM), x64 primary + 8 bit ECC module data bus
    - L = Load Reduced DIMM (LRDIMM), x64 primary + 8 bit ECC module data bus
    - R = Registered DIMM (RDIMM), x64 primary + 8 bit ECC module data bus
    - U = Unbuffered DIMM (UDIMM) with no ECC (x64-bit primary data bus)
  - *cc* is the reference design file used for this design
  - *d* is the revision number of the reference design used
  - *bb* is the JEDEC SPD Revision Encoding and Additions level used on this DIMM

The following illustration shows the location of the DIMM connectors on the system board.
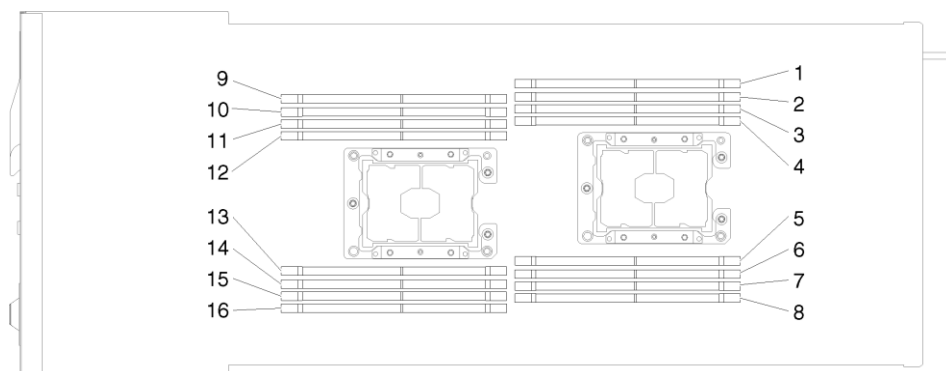
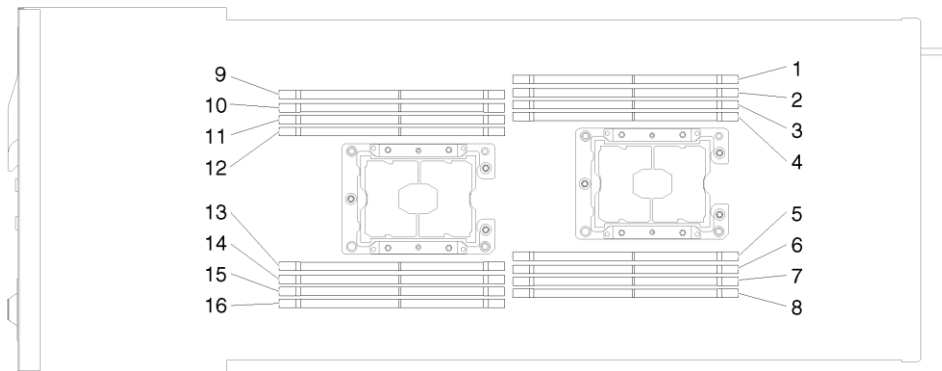*Figure 95. The location of the DIMM connectors on the system board*

Installation order

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

The following memory configurations are available:
- "Memory mirroring population sequence" on page 92
- "Memory rank sparing population sequence" on page 93
- "Independent memory mode population sequence" on page 92

For information about memory modes, see "Memory configuration" on page 132

Independent memory mode population sequence

Table 50. DIMM installation sequence (Independent mode/normal mode)

Number of processor	Installation sequence (connectors)
Processor 1 installed	6, 3, 7, 2, 8, 1, 5, 4
Processor 1 and 2 installed	6, 14, 3, 11, 7, 15, 2, 10, 8, 16, 1, 9, 5, 13, 4, 12

Memory mirroring population sequence

Table 51. DIMM installation sequence (mirror mode/lockstep mode)

Number of processors	Installation sequence (connectors)
Processor 1 installed	(6, 7), (2, 3), (8, 1)
Processor 1 and 2 installed	(6, 7, 14, 15), (2, 3), (10, 11), (1,8), (9, 16)

If you are installing 3, 6, 9 or 12 identical DIMMs for the mirroring mode, comply with the following installation sequence to achieve the best performance.

Table 52. DIMM installation sequence (mirror mode/lockstep mode for 3, 6, 9 and 12 identical DIMMs)

Number of processors	Installation sequence (connectors)
Processor 1 installed	(6, 7, 8), (1, 2, 3)
Processor 1 and 2 installed	(6, 7, 8), (14, 15, 16), (1, 2, 3), (9, 10, 11)

Memory rank sparing population sequence

Table 53. DIMM installation sequence (sparing mode)

Note: Signle-rank RDIMM is not supported by sparing. If you install signle-rank RDIMM, it switches to the independent mode automatically.

Number of processors	Installation sequence (connectors)
Processor 1 installed	6, 3, 7, 2, 8, 1, 5, 4
Processor 1 and 2 installed	6, 14, 3, 11, 7, 15, 2, 10, 8, 16, 1, 9, 5, 13, 4, 12

Install a DIMM

Use this information to install a DIMM.

Before you install a DIMM:

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

    • "Installation Guidelines" on page 60

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 78).

4. Remove the compute node cover (see "Remove the compute node cover" on page 79).

5. Remove the air baffle (see "Remove the air baffle" on page 80).

Attention: Memory modules are sensitive to static discharge and require special handling. In addition to the standard guidelines for Handling static-sensitive devices:

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

Figure 96. The location of the DIMM connectors on the system board

Complete the following steps to install a DIMM.

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

- Youtube: https://www.youtube.com/playlist?list=PLYV5R7hVcs-DOlbsCdADcoKQdMB2Uuk-T
- Youku: http://list.youku.com/albumlist/show/id_50483438

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 "Installation order" on page 92 for the required installation order.

Step 1.   Open the retaining clip on each end of the DIMM connector.

> **Attention:**
>
> - DIMMs are static-sensitive devices. The package must be grounded before it is opened.
> - To avoid breaking the retaining clips or damaging the DIMM connectors, open and close the clips gently.
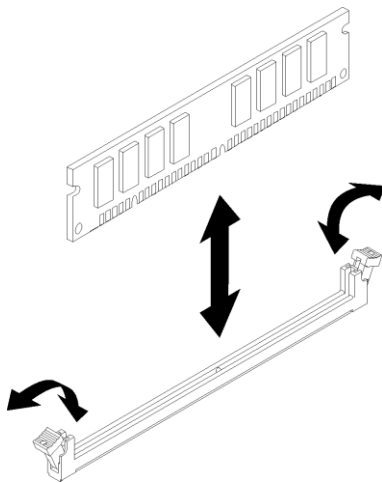
Figure 97. DIMM installation

Step 2.   Touch the static-protective package that contains the DIMM to any unpainted metal surface on the outside of the node. Then, remove the DIMM from the package.

Step 3.   Turn the DIMM so that the alignment slot align correctly with the alignment tab.

Step 4.   Insert the DIMM into the connector by aligning the edges of the DIMM with the slots at the ends of the DIMM connector.

Step 5.   Firmly press the DIMM straight down into the connector by applying pressure on both ends of the DIMM simultaneously. The retaining clips snap into the locked position when the DIMM is firmly seated in the connector.

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

Step 6.   Reconnect any cable that you removed.

After you install a DIMM, complete the following steps:

1. Reinstall the air baffle (see "Install the air baffle" on page 101).
2. Reinstall the compute node cover (see "Install the compute node cover" on page 102).
3. Reinstall the compute node (see "Install a compute node in the enclosure" on page 103).

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.

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.

   - "Installation Guidelines" on page 60

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 78).

4. Remove the compute node cover (see "Remove the compute node cover" on page 79).

5. Make sure the RAID adapter support bracket is installed. If not, install it into the node and secure it with three screws.
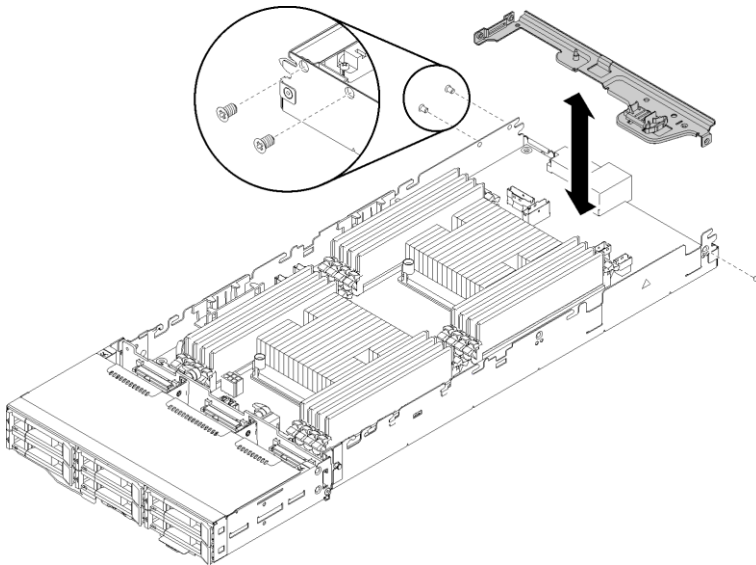
Figure 98. Installing the RAID adapter support bracket

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.

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

- Youtube: https://www.youtube.com/playlist?list=PLYV5R7hVcs-DOlbsCdADcoKQdMB2Uuk-T
- Youku: http://list.youku.com/albumlist/show/id_50483438

Complete the following steps to install a RAID adapter.

Step 1.   Connect the RAID adapter to the system board with the PCIe cable.
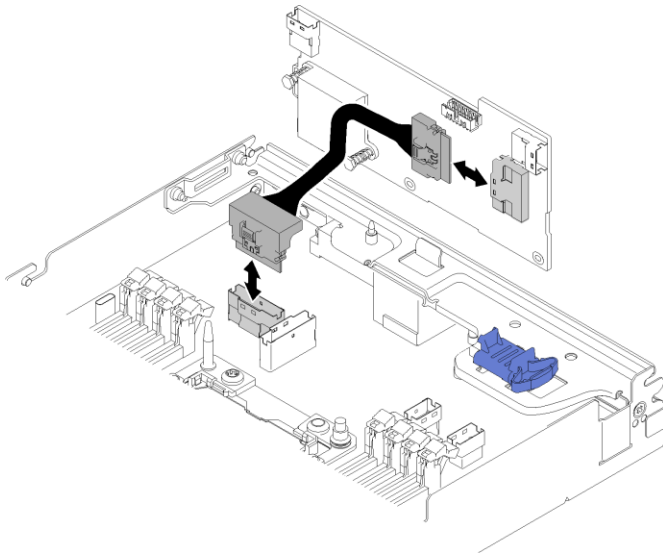
Figure 99. PCIe cable connection

Step 2. Connect the SAS/SATA cables (see "Internal cable routing" on page 43).

Step 3. Insert the end of the adapter into the slot on the side of the node.

Step 4. Align the other side of the adapter with the guide pin; then, lower the end until it snaps in place.
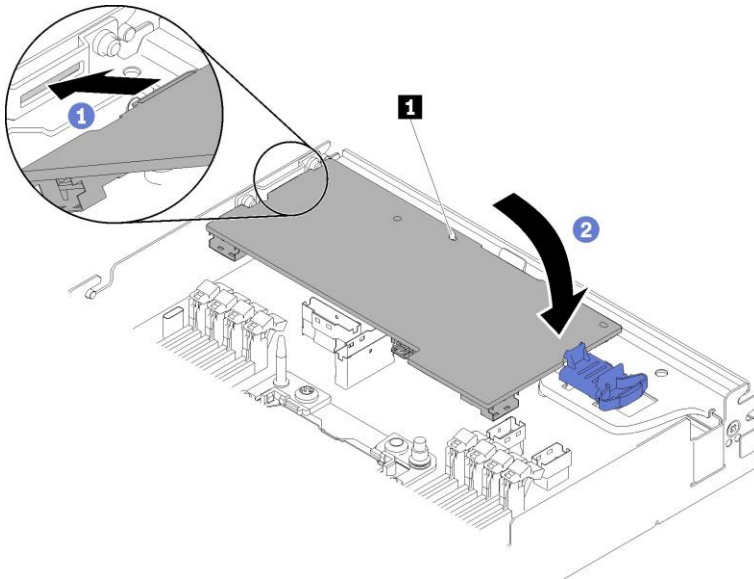
Figure 100. RAID adapter installation

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 101).

2. Reinstall the compute node cover (see "Install the compute node cover" on page 102).

3. Reinstall the compute node (see "Install a compute node in the enclosure" on page 103).

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.

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.

   • "Installation Guidelines" on page 60

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 78).

4. Remove the compute node cover (see "Remove the compute node cover" on page 79).

Complete the following steps to install the M.2 backplane.

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

• Youtube: https://www.youtube.com/playlist?list=PLYV5R7hVcs-DOlbsCdADcoKQdMB2Uuk-T

• Youku: http://list.youku.com/albumlist/show/id_50483438

Figure 101. 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 101).

2. Reinstall the compute node cover (see "Install the compute node cover" on page 102).

3. Reinstall the compute node (see "Install a compute node in the enclosure" on page 103).

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.

Install a processor-heat-sink module

The processor and heat sink are removed together as part of a processor-heat-sink-module (PHM) assembly. PHM installation requires a Torx T30 driver.

Note: If you are installing multiple options relating to the compute system board, the PHM installation should be performed first.

	"**Read** the installation Guidelines" on page 60		"**Power off** the system for this task" on page 125		"**ATTENTION: Static Sensitive Device** Ground package before opening" on page 62

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.

Notes:

- PHMs are keyed for the socket where they can be installed and for their orientation in the socket.
- See http://www.lenovo.com/us/en/serverproven/ 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" on page 128.
- Installing an additional PHM can change the memory requirements for your system. See "Install memory modules" on page 90 for a list of processor-to-memory relationships.
- Optional devices available for your system might have specific processor requirements. See the documentation that comes with the optional device for information.
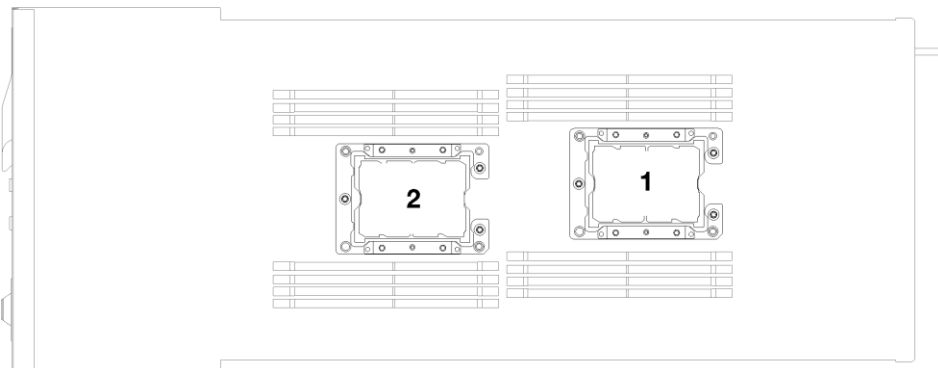
Figure 102. Processor locations

- The following types of heat sinks are applicable to SD530:
  - 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 installing a PHM:

Note: The PHM for your system might be different than the PHM shown in the illustrations.

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

   - "Installation Guidelines" on page 60

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 78).

4. Remove the compute node cover (see "Remove the compute node cover" on page 79).

5. Remove the air baffle (see "Remove the air baffle" on page 80).

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.
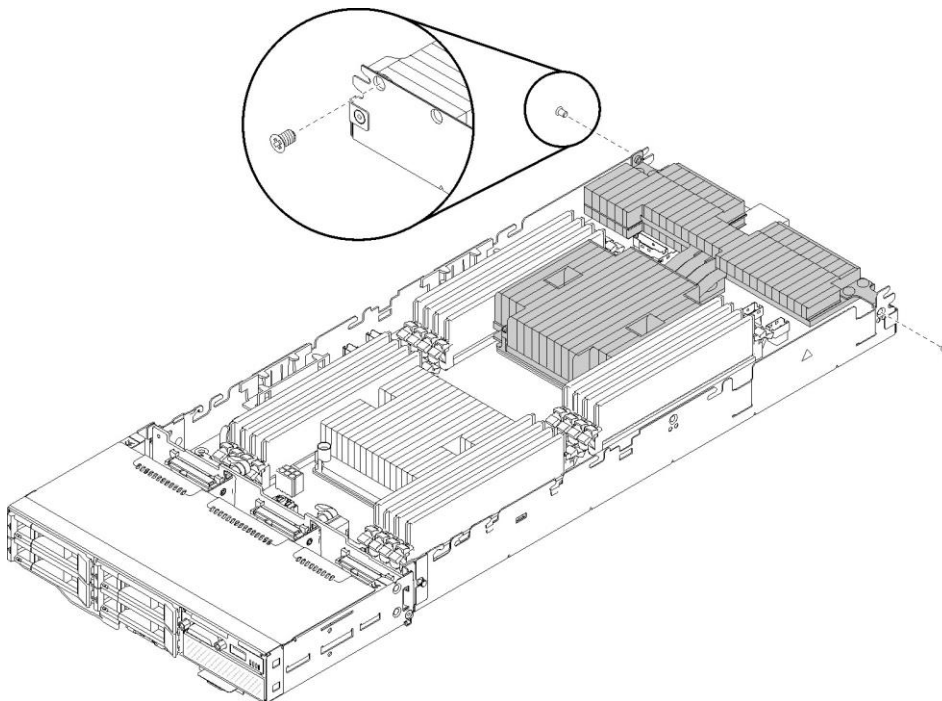
Figure 103. Securing the T-shaped heat sink with two screws

Note: Use Phillips #1 driver on these two screws.

Step 3.   Install the processor-heat-sink module on the system board.
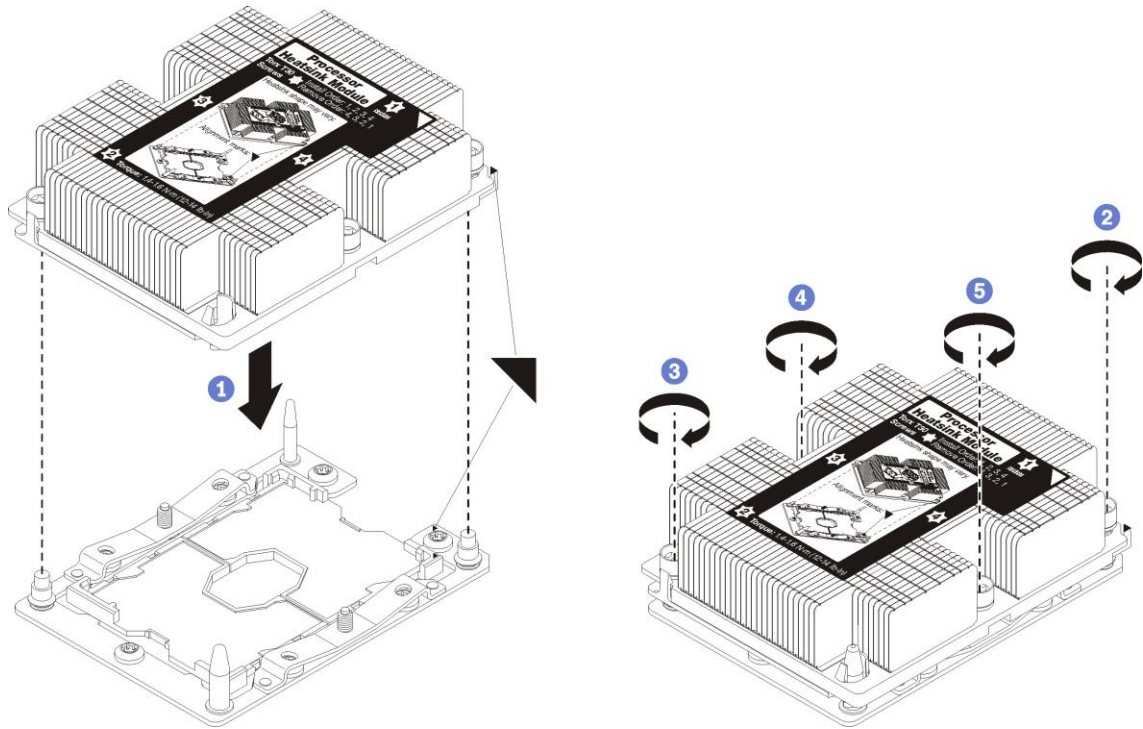
Figure 104. Installing a PHM

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 installing the PHM option:

1. If there are memory modules to install, install them. See "Install a DIMM" on page 93.
2. Reinstall the air baffle (see "Install the air baffle" on page 101).
3. Reinstall the compute node cover (see "Install the compute node cover" on page 102).
4. Reinstall the compute node (see "Install a compute node in the enclosure" on page 103).
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.

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.

- "Installation Guidelines" on page 60
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 78).
4. Remove the compute node cover (see "Remove the compute node cover" on page 79).

Complete the following steps to install the air baffle.

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

- Youtube: https://www.youtube.com/playlist?list=PLYV5R7hVcs-DOlbsCdADcoKQdMB2Uuk-T
- Youku: http://list.youku.com/albumlist/show/id_50483438
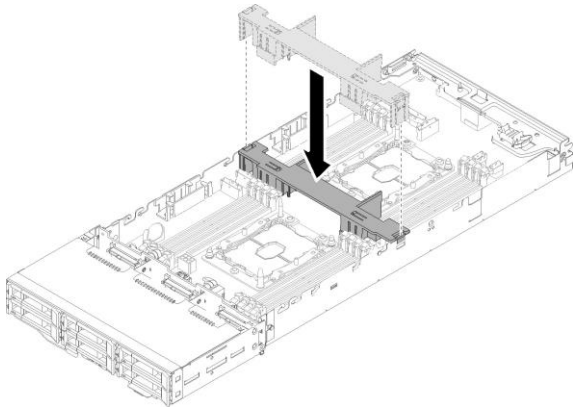
Figure 105. Air baffle installation

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 102).
2. Reinstall the compute node (see "Install a compute node in the enclosure" on page 103).
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.

Install the compute node cover
Use this procedure to install the compute node cover.

Before you install the compute node cover:
1. Read the following section(s) to ensure that you work safely.
   - "Installation Guidelines" on page 60
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 43.

5. Remove the compute node (see "Remove a compute node from the enclosure" on page 78).

Complete the following steps to install the compute node cover.

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

- Youtube: https://www.youtube.com/playlist?list=PLYV5R7hVcs-DOlbsCdADcoKQdMB2Uuk-T

- Youku: http://list.youku.com/albumlist/show/id_50483438
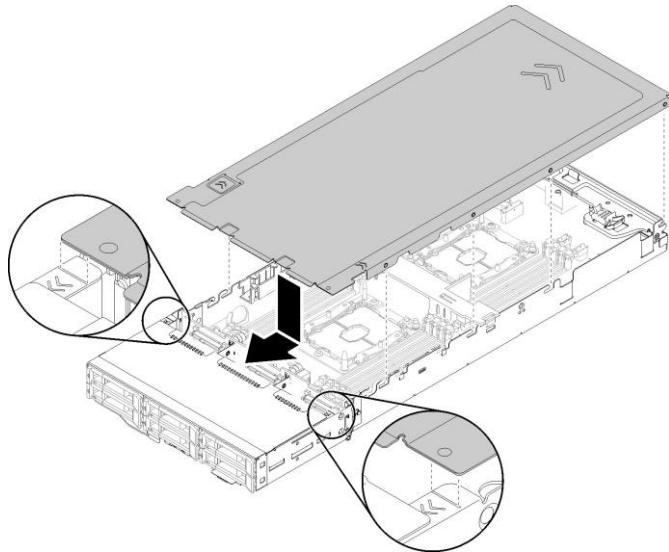
Figure 106. Compute node cover installation

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 103).

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.

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.

   • "Installation Guidelines" on page 60

Attention: Be careful when you are removing or installing the node to avoid damaging the node connectors.
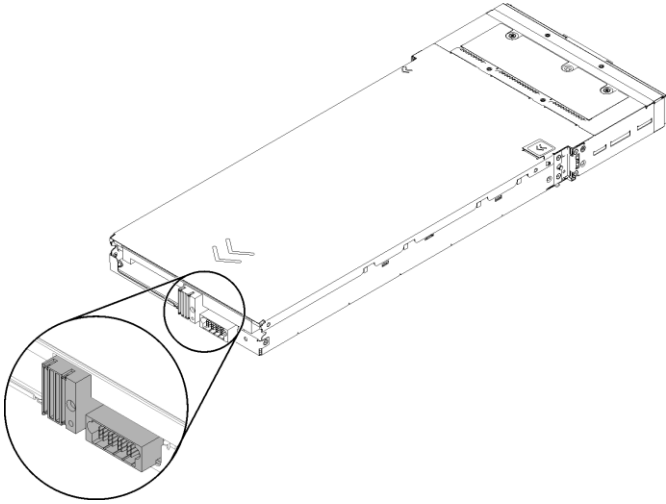
Figure 107. Node connectors

Complete the following steps to install the compute node in a enclosure.

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

• Youtube: https://www.youtube.com/playlist?list=PLYV5R7hVcs-DOlbsCdADcoKQdMB2Uuk-T

• Youku: http://list.youku.com/albumlist/show/id_50483438
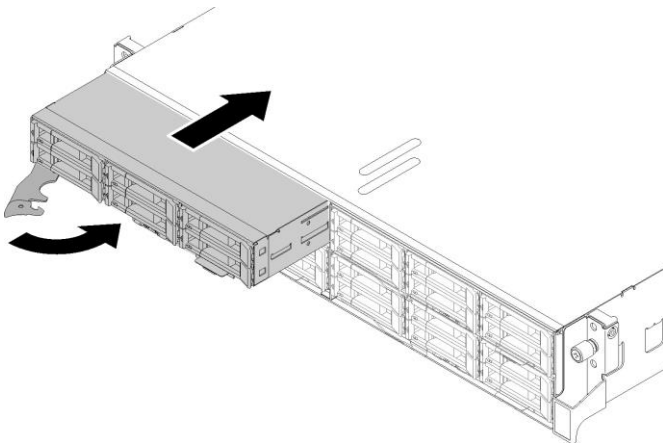
Figure 108. Node installation

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

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 ThinkSystem D2 Enclosure, Modular Enclosure, and ThinkSystem SD530 Compute Node *Setup Guide* for details.

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 ThinkSystem D2 Enclosure, Modular Enclosure, and ThinkSystem SD530 Compute Node *Setup Guide* for more details.

Install hardware options in the PCIe expansion node

Use the following information to remove and install the PCIe expansion node options.

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.

   • "Installation Guidelines" on page 60

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.
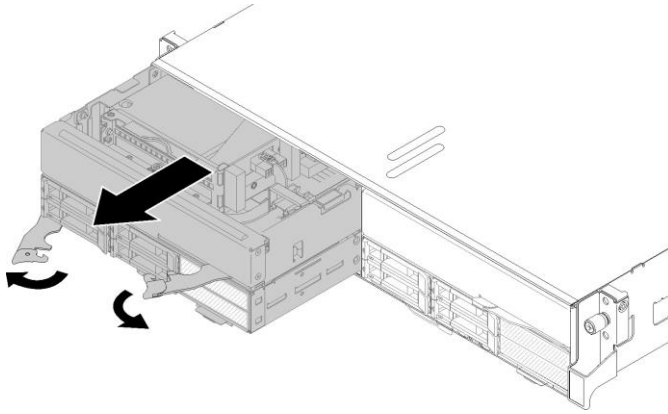
Figure 109. Compute-expansion node assembly removal

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.

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.

   • "Installation Guidelines" on page 60

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 105).

Complete the following steps to remove the rear cable cover.

Step 1.   Lift on the blue touch point of the rear cable cover.
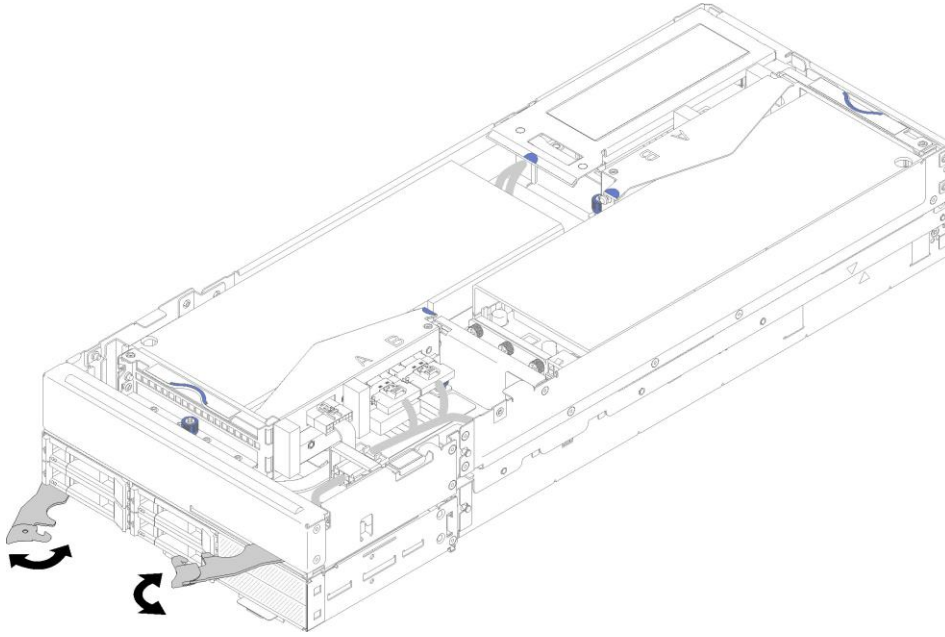
Figure 110. Rear cable cover removal

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 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.

   • "Installation Guidelines" on page 60

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 105).

3. Remove the rear cable cover (see "Remove the rear cable cover" on page 106).

4. Remove the riser miscellaneous cable from the front riser cage, and loosen the two captive screws to remove the riser cage from the node.
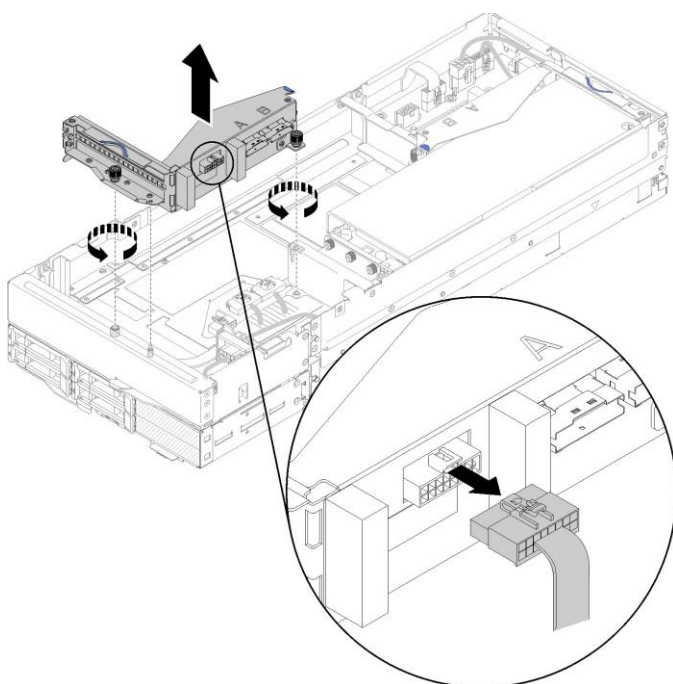
Figure 111. Disconnecting the riser miscellaneous cable from the riser cage and removing the riser cage from the expansion node

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.
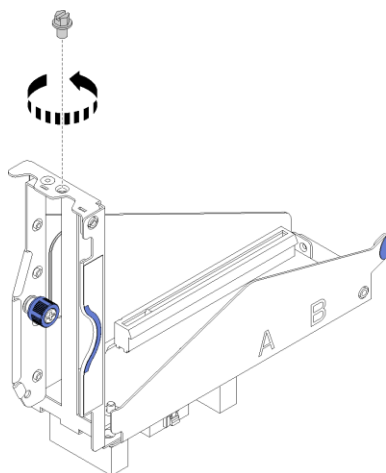
Figure 112. Removing the screw from the riser cage

Step 2.   Slide the adapter into the slot on the riser cage; then, fasten the screw to secure the adapter.
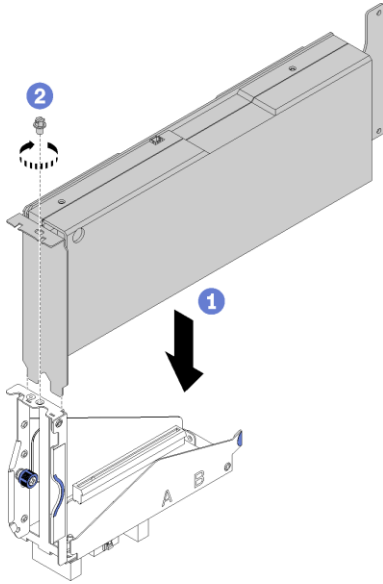
Figure 113. Installing an adapter into the riser cage

Step 3.   Connect the auxiliary power cable that comes with the adapter as illustrated.
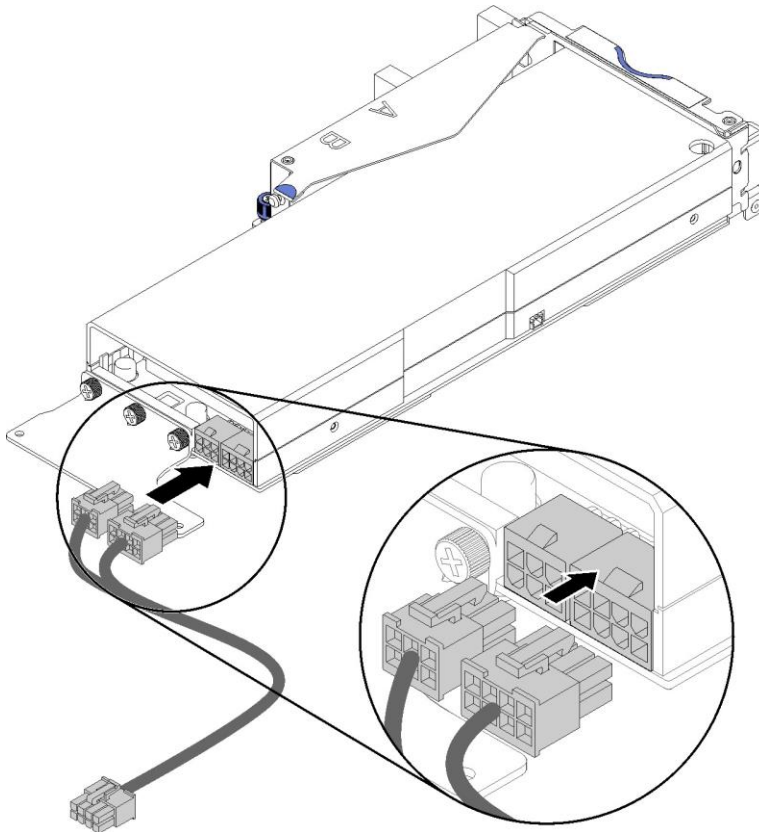
Figure 114. Connecting the auxiliary power cable to the adapter connectors

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.
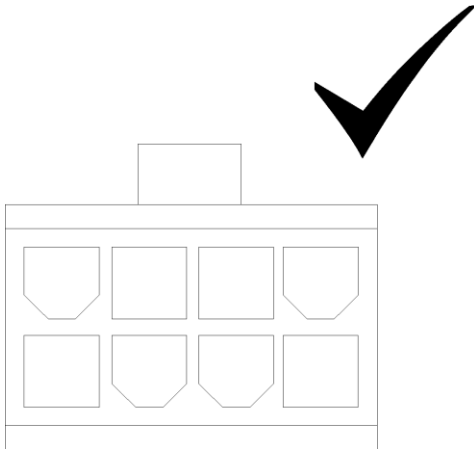
Figure 115. The connector of the auxiliary cable for SD530

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 110).
2. Install the rear cable cover (see "Install the rear cable cover" on page 113).
3. Install the PCIe expansion node assembly into the enclosure (see "Install the compute-expansion node assembly into the enclosure" on page 115).
4. Power on the compute node.

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.

   - "Installation Guidelines" on page 60

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 107) .
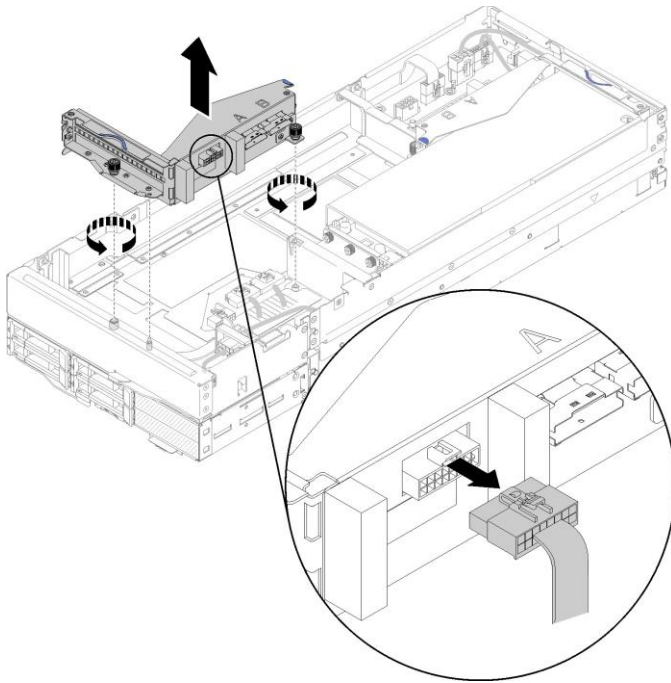
Figure 116. Riser cage removal

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.
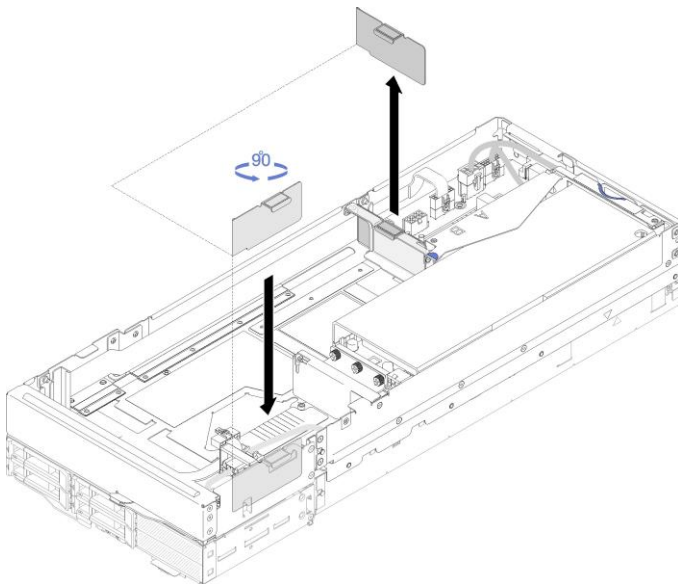
Figure 117. Airflow filler removal

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

Notes: For proper system cooling:

• 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.
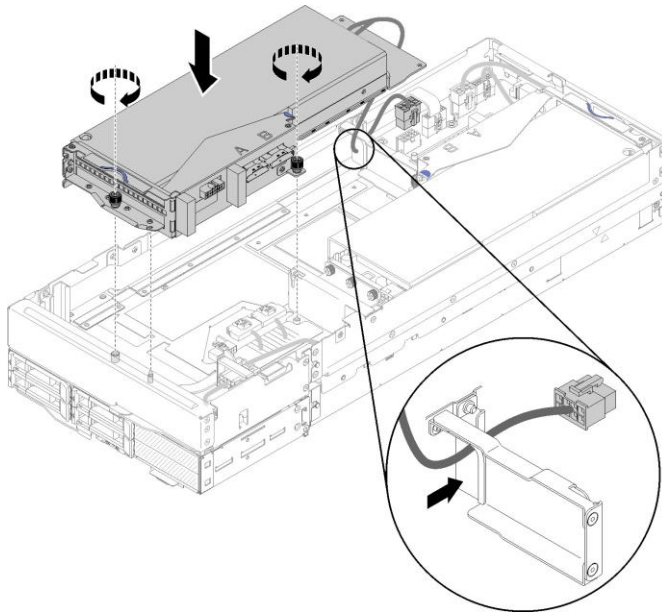
Figure 118. Installing the front riser assembly into the expansion node

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."
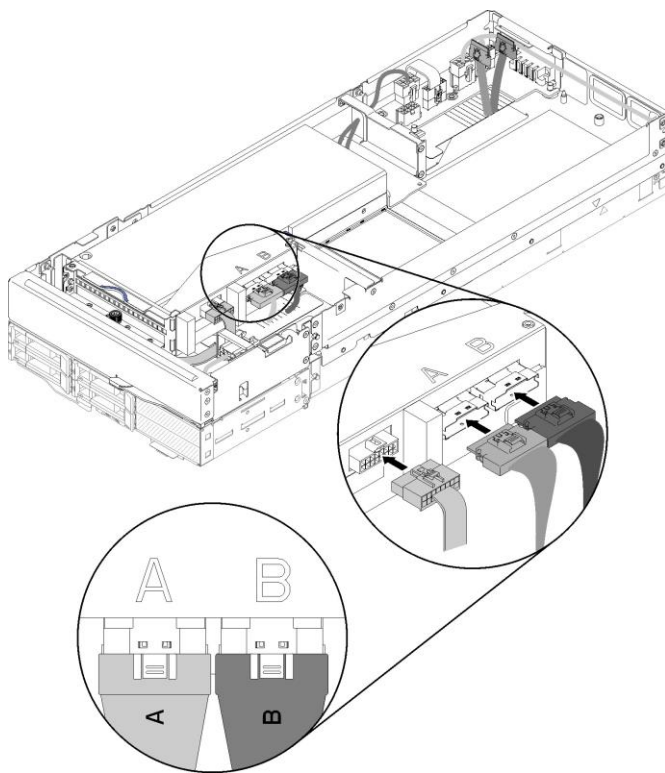
Figure 119. Connecting PCIe#3-A, PCIe#4-B and the riser miscellaneous cable to the front riser assembly

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.
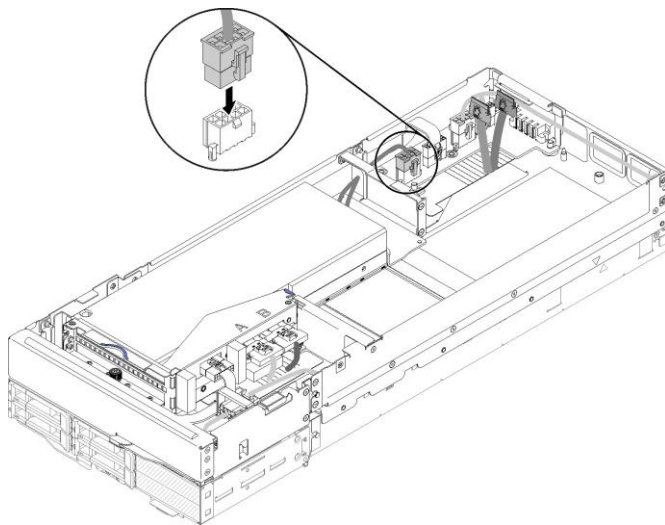
Figure 120. Connecting the auxiliary power cable to the expansion node

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.

   • "Installation Guidelines" on page 60

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.
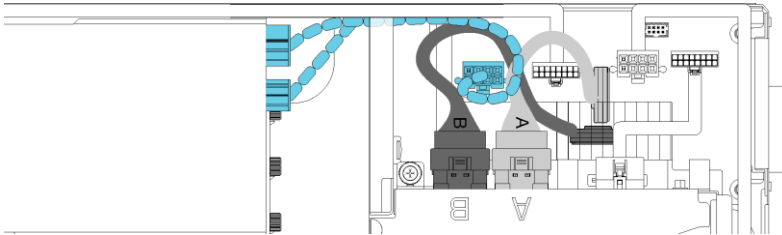
Figure 121. Routing PCIe#1-A, PCIe#2-B and the front riser auxiliary power cable

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.
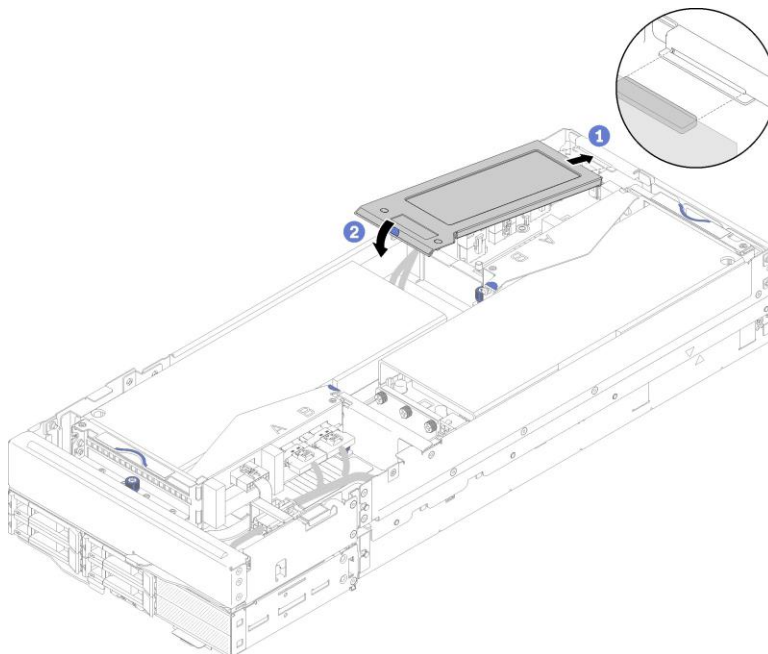
Figure 122. Rear cable cover installation

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 115).

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2. Power on the compute node.

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.

   • "Installation Guidelines" on page 60

Attention: When removing or installing the node assembly, be careful not to damage the node connectors.
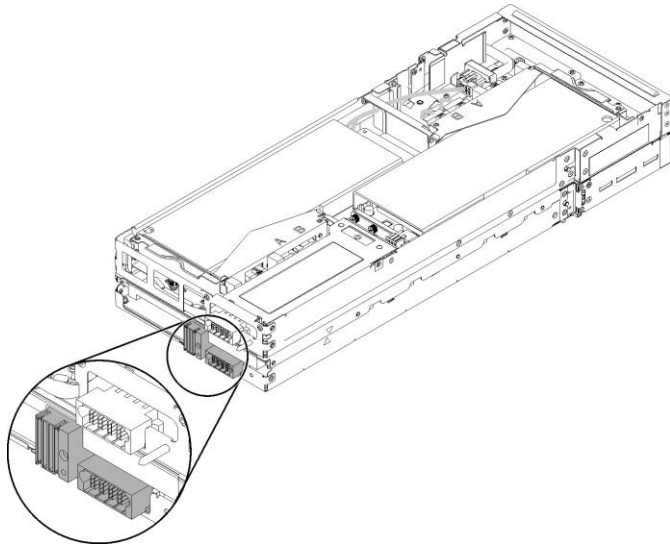
Figure 123. Connectors on the compute-expansion node assembly

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.
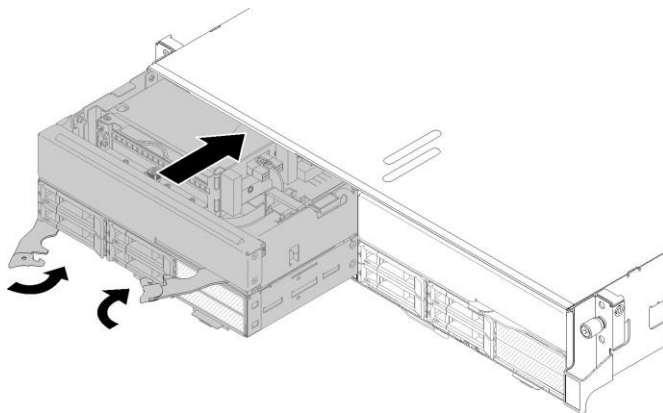
Figure 124. PCIe expansion node installation into the enclosure

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

   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 ThinkSystem D2 Enclosure, Modular Enclosure, and ThinkSystem SD530 Compute Node *Setup Guide* for details.

   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 ThinkSystem D2 Enclosure, Modular Enclosure, and ThinkSystem SD530 Compute Node *Setup Guide* for more details.

Install the enclosure in a rack

To install the enclosure in a rack, follow the following instructions.

To install the enclosure in a rack, follow the instructions that are provided in the Rail Installation Kit for the rails on which the enclosure will be installed.

Install slide rails into the rack

Use this information to install slide rails into the rack.

Note: The slide rails are extensible as shown in the following illustration.
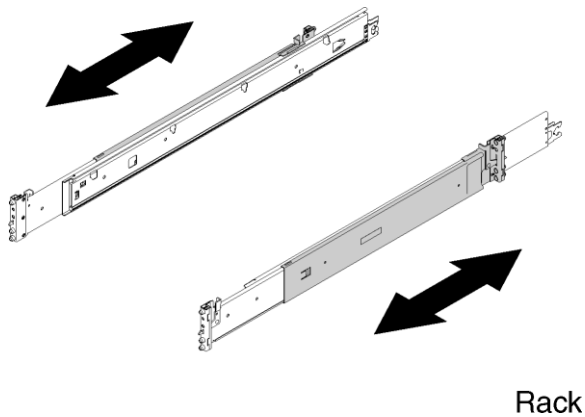
Rack

Figure 125. Slides

To install slide rails into the rack, complete the following steps.

1 Select the first slide rail you want to install. **2** Make sure the slide rail is shortened to the shortest position.

3 From the front of the rack cabinet, line up the pins on the rear of the slide rail with the flange holes at the rear of the rack. **4** Push the slide rail so that the pins and the latch go into the place. **Note:** The holes on the rack will either be square-shaped or round-shaped. Rack Rear Round hole rack Square hole rack *Figure 126. Left slide rear installation*	**5** Pull the slide forward and insert the pins and the latch into the EIA flange holes at the front of the rack. **Note:** The holes on the rack will either be square-shaped or round-shaped. Rack Front *Figure 127. Left slide front installation*
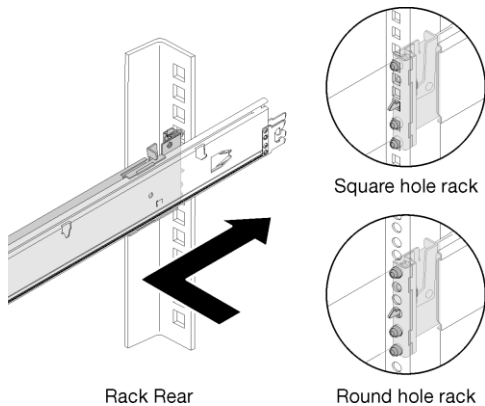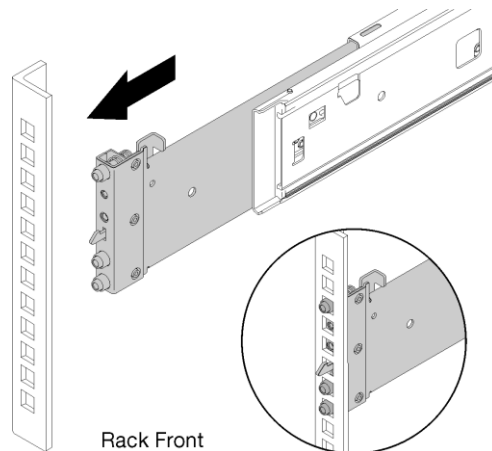
6 Repeat steps **2** to **5** to install the other slide rail. Make sure that each slide rail is securely engaged in the flange by inspecting that the hook has caught and by sliding back and forward to ensure the slide does not pop out.

Install the enclosure on the slide rails

Use this information to install the enclosure on the slide rails.

Attention: Before you install the enclosure, make sure that all compute nodes and the shuttle are removed out of the enclosure.

To install the enclosure on the rails, complete the following steps.

1 Pull the slide rails forward until the rails click into place. **2** Push up the front latches. **3** Pull the slides all the way out. *Figure 128. Slides*
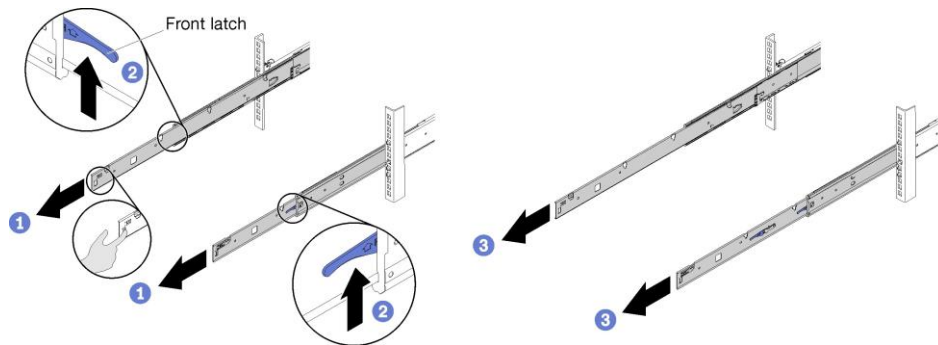
4 Carefully lift the enclosure. **Note:** Make sure all compute nodes and the shuttle are removed out of the enclosure. *Figure 129. Enclosure*	**5** Tilt and lower the enclosure; then, push the slides toward the enclosure and make sure the farthest nailheads go into the slots on the slides. **6** Slowly lower the enclosure down and make sure the other 3 nailheads slip into the slots. **Attention:** You can only install the enclosure successfully when the slides are fully extended. *Figure 130. Enclosure installation*
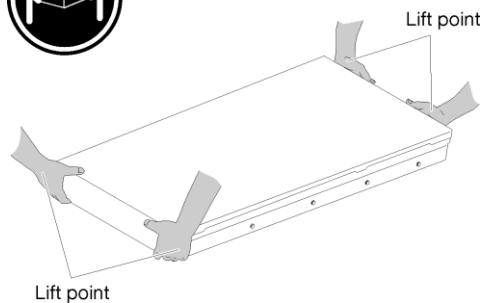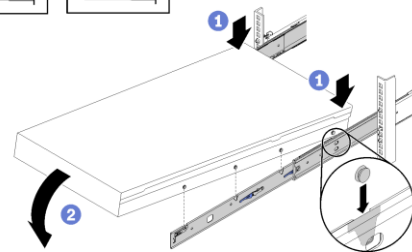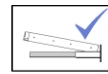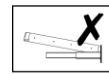
Slide the enclosure into the rack

Use this information to slide the enclosure into the rack.

To slide the enclosure into the rack, complete the following steps.

1 Push up the rear latches on the slide rails.
2 Push the enclosure until the slide rails click into place
3 Push up the front latches on the slide rails.
4 Push the enclosure all the way into the rack.
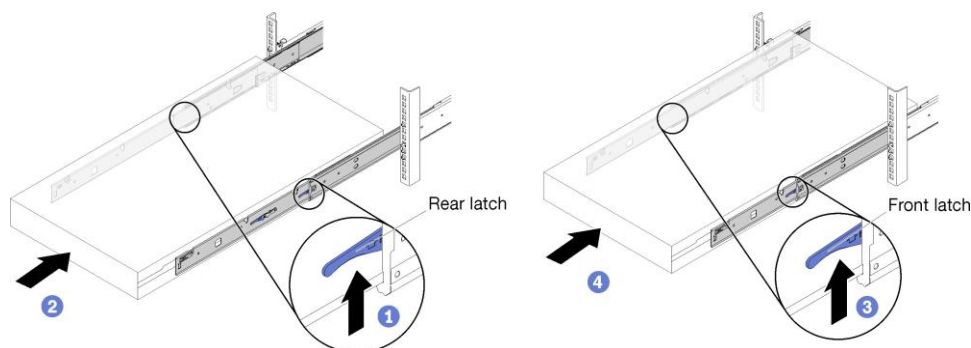
Figure 131. Enclosure installation

Secure the enclosure in the rack for shipping

Use this information to secure the enclosure in the rack for shipping.

To secure the enclosure in the rack for shipping, complete the following steps.

1 Insert the two M5 screws and washers; then, fasten the two M5 screws to secure the slides to the rack flanges.
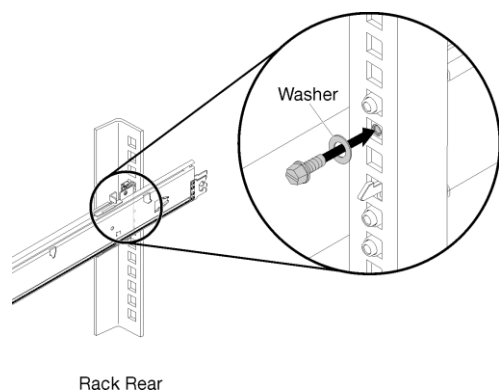
Figure 132. Screws installation

2 Fasten the two thumbscrews located on the front of the enclosure.
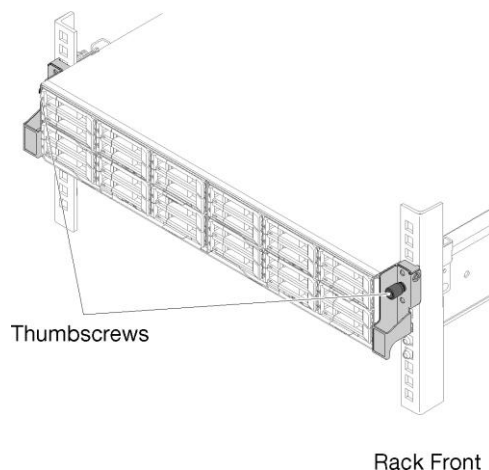
Figure 133. Thumbscrews

3 Install the compute nodes and the shuttle back to the enclosure. For detailed information, please see *Setup Guide* or *Maintenance Manual*.

Install the cable management arm

Use this information to install the cable management arm.

ThinkSystem D2 Cable Management Arm contains the following items.

Note: The illustration in this document might differ slightly from your hardware.

Cable Management Arm box contents

Slide mounting clips   Velcro straps (2)

Baskets (7)

Long velcro strap   Slide mounting clip
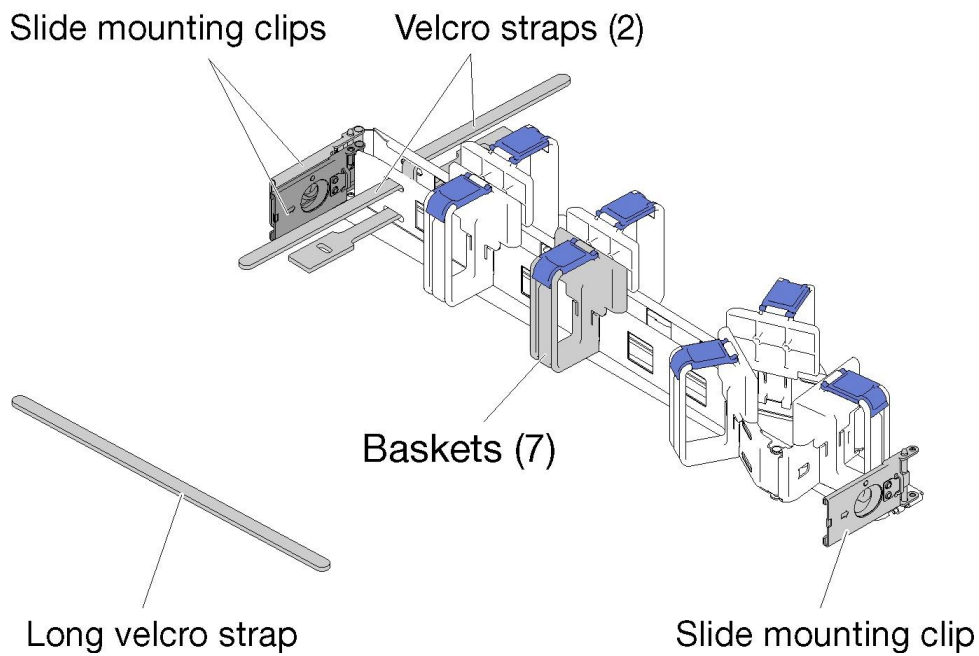
Figure 134. Cable management arm box contents

- One cable management arm
  - Two velcro straps (pre-attached)
  - One long velcro strap (used for shipping with a rack only)
  - Seven cable baskets (pre-attached)
  - Three slide mounting clips
- Installation guide

To install the cable management arm, complete the following steps.
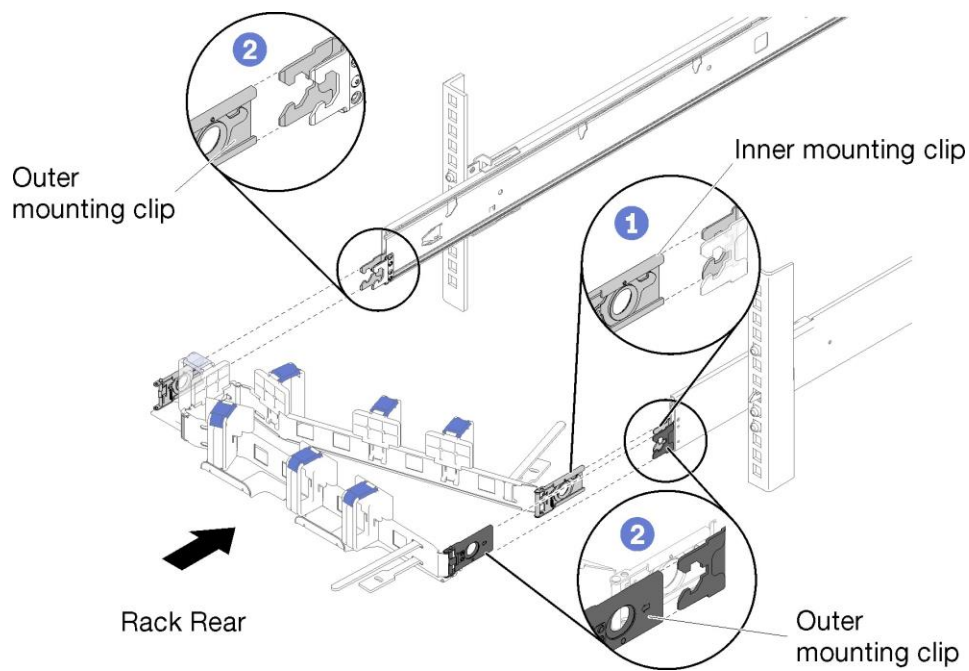
Figure 135. Cable management arm installation

Step 1. Make sure the enclosure is pushed fully into the rack and the thumbscrews are tightened.

Step 2. Align the inner mounting clip with the inner tab on the slide, then, push it until it snaps into place.

Step 3. Align two outer mounting clips with the outer tabs on the slides; then, push them until they snap into place.

Connect and route cables

Use this information to connect and route cables.

Note: Use the cable straps provided on the cable management arm to retain the cables and prevent them from sagging.

To connect and route cables, complete the following steps.

Figure 136. Cable routing

Step 1. Open the blue retaining clips on the seven cable baskets.

Step 2. Attach the power cords and other cables to the rear of the enclosure.

Step 3. Route the cables and power cords in the cable management arm.

Step 4. Use the two cable straps to tightly secure the cables to the front and rear of the cable management arm.

Step 5. Close the blue retaining clips on the seven cable baskets.

Step 6. Carefully slide the enclosure back and forward to ensure the cables do not pinch, bind, or hang down into the U space directly below the enclosure.

Remove the cable management arm
Use this information to remove the cable management arm.

To remove the cable management arm, complete the following steps.
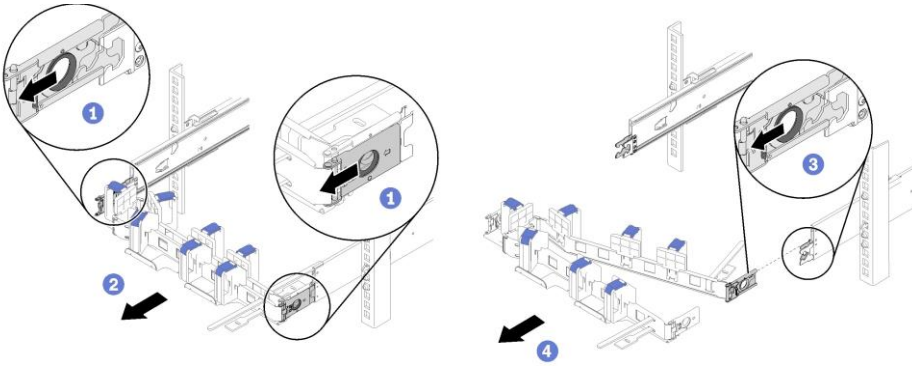
Rack Rear

Figure 137. Cable management arm removal

Step 1.   Disconnect all the cables from the cable management arm.

Step 2.   Pull the two outer mounting clip release latches backward to disengage the cable management arm.

Step 3.   Pull the inner mounting clip release latch backward to disengage the cable management arm.

Step 4.   Remove the cable management arm out of the slide rails.

Change the cable management arm for installation tothe other side of the rack

See this section to learn how to change the CMA for installation to the other side of the rack.

To install the cable management arm on the opposite side, complete the following steps:

Step 1.   Press the release latch.

Step 2.   Pull the mounting clip up to remove the cable management arm out of the shelf.

Step 3.   Press the release latch of the other mounting clip.

Step 4.   Pull the mounting clip up to remove it.
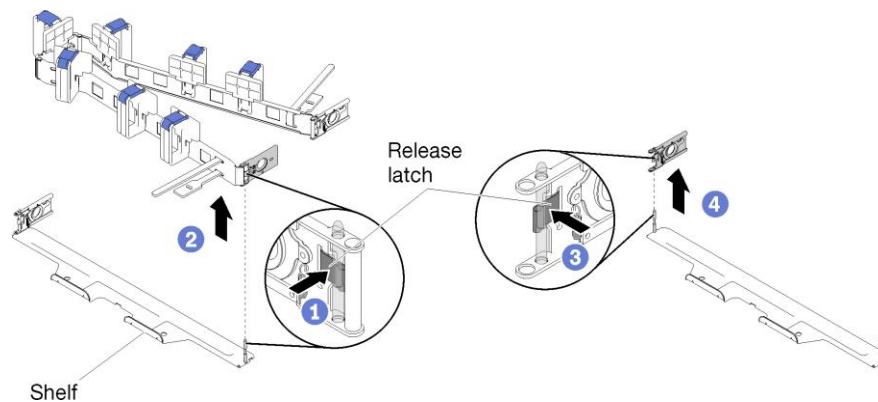
Figure 138. Mounting clip removal

Step 5.   Align the mounting clip hole with the hinge pin; then, push the mounting clip to insert it.

Step 6.   Turn and orient the cable management arm as illustrated.

Step 7.   Align the other mounting clip hole with the hinge pin and push it to insert the cable management arm to the shelf.
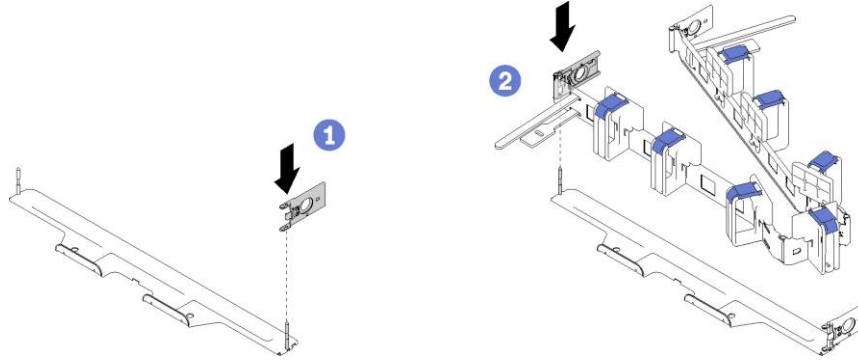
Figure 139. Mounting clip installation

Cable the solution

Attach all external cables to the solution. Typically, you will need to connect the solution to a power source, to the data network, and to storage. In addition, you will need to connect the solution to the management network.

Connect to power

Connect the solution to power.

Connect to the network

Connect the solution to the network.

Connect to storage

Connect the solution to any storage devices.

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" on page 125.

Validate solution setup

After powering up the solution, make sure that the LEDs are lit and that they are green.

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 "Power on the compute node" on page 124.

Chapter 4. System configuration

Complete these procedures to configure your system.

Set the network connection for the Lenovo XClarity Controller

Before you can access the Lenovo XClarity Controller over your network, you need to specify how Lenovo XClarity Controller will connect to the network. Depending on how the network connection is implemented, you might need to specify a static IP address as well.

The procedure for setting the network connection will depend on whether or not you have a video connection to the server.

- If a monitor is attached to the server, you can use Lenovo XClarity Controller to set the network connection.
- If no monitor attached to the server, you can set the network connection through the Lenovo XClarity Controller interface. Connect an Ethernet cable from your laptop to Lenovo XClarity Controller connector on the server.

   Note: Make sure that you modify the IP settings on the laptop so that it is on the same network as the server default settings.

   The default IPv4 address and the IPv6 Link Local Address (LLA) is provided on the Lenovo XClarity Controller Network Access label that is affixed to the Pull Out Information Tab.

Important: The Lenovo XClarity Controller is set initially with a user name of USERID and password of PASSW0RD (with a zero, not the letter O). This default user setting has Supervisor access. Change this user name and password during your initial configuration for enhanced security.

You can use the Lenovo XClarity Administrator Mobile app to connect to the Lenovo XClarity Controller interface and configure the network address. For additional information about the Mobile app, see the following site:

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

Complete the following steps to connect the Lenovo XClarity Controller to the network using the Lenovo XClarity Provisioning Manager.

Step 1.   Start the server.

Step 2.   When you see <F1> Setup, press F1.

Step 3.   Specify how the Lenovo XClarity Controller will connect to the network.

- If you choose a static IP connection, make sure that you specify an IPv4 or IPv6 address that is available on the network.
- If you choose a DHCP connection, make sure that the MAC address for the server has been configured in the DHCP server.

Step 4.   Click **OK** to continue starting the server.

Enable System Management Module network connection via Lenovo XClarity Controller

If no KVM breakout module is available to access Lenovo XClarity Controller logs with, enable System Management Module network connection via XCC first. For more information, see "Web interface access" in *System Management Module User's Guide.*

Set front USB port for Lenovo XClarity Controller connection

Before you can access the Lenovo XClarity Controller through the front USB port, you need to configure the USB port for Lenovo XClarity Controller connection.

Your server has a front panel USB port that you can use as an Lenovo XClarity Controller management connection. See "Front view" on page 21 for the location of this connector.

You can switch the front panel USB port between normal and Lenovo XClarity Controller management operation by performing one of the following steps.

- Hold the blue ID button on the front panel for at least 3 seconds until its LED flashes slowly (once every couple of seconds). See "Front view" on page 21 for the location of the ID button.

- From the Lenovo XClarity Controller management controller CLI, run the usb**f**p command. For information about using the Lenovo XClarity Controller CLI, see http://sysmgt.lenovofiles.com/help/topic/ com.lenovo.thinksystem.xcc.doc/dw1lm_c_ch7_commandlineinterface.html.

- From the Lenovo XClarity Controller management controller web interface, click **BMC Configuration** > **Network** > **Front Panel USB Port Management**. For information about Lenovo XClarity Controller web interface functions, see http://sysmgt.lenovofiles.com/help/topic/ com.lenovo.thinksystem.xcc.doc/dw1lm_r_immactiondescriptions.html.

You can also check the current setting of the front panel USB port using the Lenovo XClarity Controller management controller CLI (usbfp command) or the Lenovo XClarity Controller management controller web interface (**BMC Configuration** > **Network** > **Front Panel USB Port Management**). See http:// sysmgt.lenovofiles.com/help/topic/com.lenovo.thinksystem.xcc.doc/dw1lm_c_ch7_commandlineinterface.html or http://sysmgt.lenovofiles.com/help/topic/com.lenovo.thinksystem.xcc.doc/dw1lm_r_immactiondescriptions.html.

Update the firmware

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

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

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

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

http://lenovopress.com/LP0656

Important terminology

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

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

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

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

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

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

Tool	In-band update	Out-of-band update	On-target update	Off-target update	Graphical user interface	Command-line interface	Supports UXSPs
Lenovo XClarity Essentials Bootable Media Creator Supports core system firmware and I/O firmware updates. You can update the Microsoft Windows operating system, but device drivers are not included on the bootable image	√				√	√	√
Lenovo XClarity Administrator Supports core system firmware and I/O firmware updates	√	√		√	√		

The latest firmware can be found at the following site:

http://datacentersupport.lenovo.com/products/servers/thinksystem/sd530/7X21/downloads

- **Lenovo XClarity Provisioning Manager**

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

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

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

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

- **Lenovo XClarity Controller**

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

  Notes:

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

    Additional information about configuring Ethernet over USB is available at:

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

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

  – If one or more sets of shared PCIe dual adapters are installed in the enclosure, make sure to:

    1. Power off all the nodes with adapters installed before updating the firmware.

    2. Reboot the nodes with auxiliary adapters installed after updating the firmware.

    See the following table for the location of share PCIe dual adapters.

Table 54. 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

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

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

- **Lenovo XClarity Essentials OneCLI**

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

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

  http://sysmgt.lenovofiles.com/help/topic/toolsctr_cli_lenovo/onecli_c_update.html

- **Lenovo XClarity Essentials UpdateXpress**

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

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

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

- **Lenovo XClarity Essentials Bootable Media Creator**

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

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

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

- **Lenovo XClarity Administrator**

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

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

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

Configure the firmware

Several options are available to install and set up the firmware for the server.

Important: Do not configure option ROMs to be set to **Legacy** unless directed to do so by Lenovo Support. This setting prevents UEFI drivers for the slot devices from loading, which can cause negative side effects for Lenovo software, such as Lenovo XClarity Administrator and Lenovo XClarity Essentials OneCLI, and to the Lenovo XClarity Controller. The side effects include the inability to determine adapter card details, such as model name and firmware levels. When adapter card information is not available, generic information for the

model name, such as "Adapter 06:00:00" instead of the actually model name, such as "ThinkSystem RAID 930-16i 4GB Flash." In some cases, the UEFI boot process might also hang.

- **Lenovo XClarity Provisioning Manager**

  From Lenovo XClarity Provisioning Manager, you can configure the UEFI settings for your server.

  Note: The Lenovo XClarity Provisioning Manager provides a Graphical User Interface to configure a server. The text-based interface to system configuration (the Setup Utility) is also available. From Lenovo XClarity Provisioning Manager, you can choose to restart the server and access the text-based interface. In addition, you can choose to make the text-based interface the default interface that is displayed when you press F1.

- **Lenovo XClarity Essentials OneCLI**

  You can use the config application and commands to view the current system configuration settings and make changes to Lenovo XClarity Controller and UEFI. The saved configuration information can be used to replicate or restore other systems.

  For information about configuring the server using Lenovo XClarity Essentials OneCLI, see:

  http://sysmgt.lenovofiles.com/help/topic/toolsctr_cli_lenovo/onecli_c_settings_info_commands.html

- **Lenovo XClarity Administrator**

  You can quickly provision and pre-provision all of your servers using a consistent configuration. Configuration settings (such as local storage, I/O adapters, boot settings, firmware, ports, and Lenovo XClarity Controller and UEFI settings) are saved as a server pattern that can be applied to one or more managed servers. When the server patterns are updated, the changes are automatically deployed to the applied servers.

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

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

- **Lenovo XClarity Controller**

  You can configure the management processor for the server through the Lenovo XClarity Controller Web interface or through the command-line interface.

  For information about configuring the server using Lenovo XClarity Controller, see:

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

Memory configuration

Memory performance depends on several variables, such as memory mode, memory speed, memory ranks, memory population and processor.

More information about optimizing memory performance and configuring memory is available at the Lenovo Press website:

https://lenovopress.com/servers/options/memory

In addition, you can take advantage of a memory configurator, which is available at the following site:

http://1config.lenovo.com/#/memory_configuration

RAID configuration

Using a Redundant Array of Independent Disks (RAID) to store data remains one of the most common and cost-efficient methods to increase node's storage performance, availability, and capacity.

RAID increases performance by allowing multiple drives to process I/O requests simultaneously. RAID can also prevent data loss in case of a drive failure by reconstructing (or rebuilding) the missing data from the failed drive using the data from the remaining drives.

RAID array (also known as RAID drive group) is a group of multiple physical drives that uses a certain common method to distribute data across the drives. A virtual drive (also known as virtual disk or logical drive) is a partition in the drive group that is made up of contiguous data segments on the drives. Virtual drive is presented up to the host operating system as a physical disk that can be partitioned to create OS logical drives or volumes.

An introduction to RAID is available at the following Lenovo Press website:

https://lenovopress.com/lp0578-lenovo-raid-introduction

Detailed information about RAID management tools and resources is available at the following Lenovo Press website:

https://lenovopress.com/lp0579-lenovo-raid-management-tools-and-resources

Install the operating system

Several options are available to install an operating system on the solution.

- **Lenovo XClarity Administrator**

  If you are managing your solution using Lenovo XClarity Administrator, you can use it to deploy operating-system images to up to 28 managed servers concurrently. For more information about using Lenovo XClarity Administrator to deploy operating system images, see:

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

- **Lenovo XClarity Provisioning Manager**

  Lenovo XClarity Provisioning Manager is used to install operating system of single solution. You can complete operating system installation by following the instructions in Lenovo XClarity Provisioning Manager OS Installation function.

- **Install the operating system manually**

  If you cannot install the operating system through Lenovo XClarity Administrator or Lenovo XClarity Provisioning Manager, you can install the operating system manually. For more information about installing a specific operating system:

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

  2. Click **How-tos & Solutions**.

  3. Select an operating system and the installation instructions will be displayed.

Back up the solution configuration

After setting up the solution or making changes to the configuration, it is a good practice to make a complete backup of the solution configuration.

Make sure that you create backups for the following solution components:

- **Management processor**

  You can back up the management processor configuration through the Lenovo XClarity Controller interface. For details about backing up the management processor configuration, see:

http://sysmgt.lenovofiles.com/help/topic/com.lenovo.systems.management.xcc.doc/NN1ia_c_backupthexcc.html

Alternatively, you can use the **save** command from Lenovo XClarity Essentials OneCLI to create a backup of all configuration settings. For more information about the **save** command, see:

http://sysmgt.lenovofiles.com/help/topic/toolsctr_cli_lenovo/onecli_r_save_command.html

- **Operating system**

  Use your own operating-system and user-data backup methods to back up the operating system and user data for the solution.

Chapter 5.   Resolving installation issues

Use this information to resolve issues that you might have when setting up your system.

Use the information in this section to diagnose and resolve problems that you might encounter during the initial installation and setup of your 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.

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 http://www.lenovo.com/us/en/serverproven/.
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 cannot recognize a drive

Complete the following steps until the problem is solved.

1. Verify that the drive is supported for the solution. See http://www.lenovo.com/us/en/serverproven/ 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 drives. When you start a solution and press F1, the Lenovo XClarity Provisioning Manager interface is displayed by default. You can perform hard drive diagnostics from this interface. From the Diagnostic page, click **Run Diagnostic ➙ HDD test**.

   Based on those tests:

   - If the adapter passes the test but the drives are not recognized, replace the backplane signal cable and run the tests again.
   - Replace the backplane.
   - If the adapter fails the test, disconnect the backplane signal cable from the adapter and run the tests again.
   - If the adapter fails the test, replace the adapter.

Displayed system memory less than installed physical memory

Complete the following steps until the problem is resolved:

Note: Each time you install or remove a DIMM, you must disconnect the 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.
   - 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.

2. Reseat the DIMMs, and then restart the solution.

3. Check the POST error log:

   - If a DIMM was disabled by a systems-management interrupt (SMI), replace the DIMM.
   - If a DIMM was disabled by the user or by POST, reseat the DIMM; then, run the Setup utility and enable the DIMM.

4. Run memory diagnostics. When you start a solution and press F1, the Lenovo XClarity Provisioning Manager interface is displayed by default. You can perform memory diagnostics from this interface. From the Diagnostic page, click **Run Diagnostic ➙ Memory test**.

5. Reverse the DIMMs between the channels (of the same processor), and then restart the solution. If the problem is related to a DIMM, replace the failing DIMM.

6. Re-enable all DIMMs using the Setup utility, and then restart the solution.

7. (Trained technician only) Install the failing DIMM into a DIMM connector for processor 2 (if installed) to verify that the problem is not the processor or the DIMM connector.

8. (Trained technician only) Replace the system board.

A Lenovo optional device that was just installed does not work.

1. Make sure that:
   - The device is supported for the solution (see http://www.lenovo.com/us/en/serverproven/).
   - You followed the installation instructions that came with the device and the device is installed correctly.
   - You have not loosened any other installed devices or cables.

- You updated the configuration information in 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, 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.

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 6 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.

Appendix A. Getting help and technical assistance

If you need help, service, or technical assistance or just want more information about Lenovo products, you will find a wide variety of sources available from Lenovo to assist you.

On the World Wide Web, up-to-date information about Lenovo systems, optional devices, services, and support are available at:

http://datacentersupport.lenovo.com

Note: This section includes references to IBM web sites and information about obtaining service. IBM is Lenovo's preferred service provider for ThinkSystem.

Before you call

Before you call, there are several steps that you can take to try and solve the problem yourself. If you decide that you do need to call for assistance, gather the information that will be needed by the service technician to more quickly resolve your problem.

Attempt to resolve the problem yourself

You can solve many problems without outside assistance by following the troubleshooting procedures that Lenovo provides in the online help or in the Lenovo product documentation. The Lenovo product documentation also describes the diagnostic tests that you can perform. The documentation for most systems, operating systems, and programs contains troubleshooting procedures and explanations of error messages and error codes. If you suspect a software problem, see the documentation for the operating system or program.

You can find the product documentation for your ThinkSystem products at the following location:

http://thinksystem.lenovofiles.com/help/index.jsp

You can take these steps to try to solve the problem yourself:

- Check all cables to make sure that they are connected.
- Check the power switches to make sure that the system and any optional devices are turned on.
- Check for updated software, firmware, and operating-system device drivers for your Lenovo product. The Lenovo Warranty terms and conditions state that you, the owner of the Lenovo product, are responsible for maintaining and updating all software and firmware for the product (unless it is covered by an additional maintenance contract). Your service technician will request that you upgrade your software and firmware if the problem has a documented solution within a software upgrade.
- If you have installed new hardware or software in your environment, check http://www.lenovo.com/us/en/ serverproven/ to make sure that the hardware and software is supported by your product.
- Go to http://datacentersupport.lenovo.com and check for information to help you solve the problem.
  - Check the Lenovo forums at https://forums.lenovo.com/t5/Datacenter-Systems/ct-p/sv_eg to see if someone else has encountered a similar problem.

You can solve many problems without outside assistance by following the troubleshooting procedures that Lenovo provides in the online help or in the Lenovo product documentation. The Lenovo product documentation also describes the diagnostic tests that you can perform. The documentation for most systems, operating systems, and programs contains troubleshooting procedures and explanations of error

messages and error codes. If you suspect a software problem, see the documentation for the operating system or program.

Gathering information needed to call Support

If you believe that you require warranty service for your Lenovo product, the service technicians will be able to assist you more efficiently if you prepare before you call. You can also see http://datacentersupport.lenovo.com/warrantylookup for more information about your product warranty.

Gather the following information to provide to the service technician. This data will help the service technician quickly provide a solution to your problem and ensure that you receive the level of service for which you might have contracted.

- Hardware and Software Maintenance agreement contract numbers, if applicable
- Machine type number (Lenovo 4-digit machine identifier)
- Model number
- Serial number
- Current system UEFI and firmware levels
- Other pertinent information such as error messages and logs

As an alternative to calling Lenovo Support, you can go to https://www-947.ibm.com/support/servicerequest/Home.action 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 http://sysmgt.lenovofiles.com/help/topic/com.lenovo.systems.management.xcc.doc/NN1ia_c_servicesandsupport.html.

  – For more information about using the CLI to collect service data, see http://sysmgt.lenovofiles.com/help/topic/com.lenovo.systems.management.xcc.doc/nn1ia_r_ffdccommand.html.

- **Lenovo XClarity Administrator**

  Lenovo XClarity Administrator can be set up to collect and send diagnostic files automatically to Lenovo Support when certain serviceable events occur in Lenovo XClarity Administrator and the managed endpoints. You can choose to send diagnostic files to Lenovo Support using Call Home or to another service provider using SFTP. You can also manually collect diagnostic files, open a problem record, and send diagnostic files to the Lenovo Support Center.

You can find more information about setting up automatic problem notification within the Lenovo XClarity Administrator at http://sysmgt.lenovofiles.com/help/topic/com.lenovo.lxca.doc/admin_setupcallhome.html.

- **Lenovo XClarity Essentials OneCLI**

  Lenovo XClarity Essentials OneCLI has inventory application to collect service data. It can run both in-band and out-of-band. When running in-band within the host operating system on the 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 http://sysmgt.lenovofiles.com/help/topic/toolsctr_cli_lenovo/onecli_r_getinfor_command.html.

Contacting Support

You can contact Support to obtain help for your issue.

You can receive hardware service through a Lenovo Authorized Service Provider. To locate a service provider authorized by Lenovo to provide warranty service, go to https://datacentersupport.lenovo.com/serviceprovider and use filter searching for different countries. For Lenovo support telephone numbers, see https://datacentersupport.lenovo.com/supportphonelist. In the U.S. and Canada, call 1-800-426-7378.

In the U.S. and Canada, hardware service and support is available 24 hours a day, 7 days a week. In the U.K., these services are available Monday through Friday, from 9 a.m. to 6 p.m.

China product support

To contact product support in China, go to:
http://support.lenovo.com.cn/lenovo/wsi/es/ThinkSystem.html

You can also call 400-106-8888 for product support. The call support is available Monday through Friday, from 9 a.m. to 6 p.m.

Taiwan product support

To contact product support for Taiwan, call 0800–016–888. The call support is available 24 hours a day, 7 days a week.

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