



ThinkSystem SD650 Dual Node DWC Tray and NeXtScale n1200 DWC Enclosure Setup Guide



Machine Type: 7X58 and 5468

Note

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

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

http://systemx.lenovofiles.com/help/topic/com.lenovo.sysx.safety.doc/safety_pdf.pdf

The server is intended for use in a system/rack always installed on the load side of Power Distribution Unit (PDU) or Uninterruptible Power Supply (UPS) supplying a maximum 20 A branch circuit protection. The overall system/rack connection to mains power is to be a Pluggable Type B connector.

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>

Tenth Edition (January 2025)

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Chapter 1. Introduction

The ThinkSystem SD650 Neptune® DWC Trays and DW612 Neptune® DWC Enclosure is a 6U solution designed for high-volume network transaction processing. This solution includes a single enclosure that can contain up to six SD650 trays, which are designed to deliver a dense, scalable platform for distributed enterprise and hyperconverged solutions.

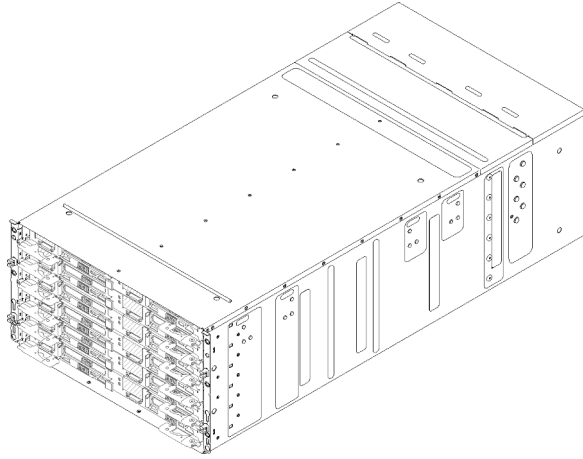


Figure 1. Enclosure with six SD650 trays installed

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

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

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.

- DWC tray
- Enclosure
- Rail installation kit (optional). Detailed instructions for installing the rail installation kit are provided in the package with the rail installation kit.
- 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.

Your solution implements the following features and technologies:

- **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>

- **Lenovo XClarity Controller (XCC)**

The Lenovo XClarity Controller is the common management controller for Lenovo ThinkSystem server hardware. The Lenovo XClarity Controller consolidates multiple management functions in a single chip on the server 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, refer to the XCC documentation compatible with your server at:

<https://pubs.lenovo.com/lxcc-overview/>

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

- **UEFI-compliant server firmware**

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

Lenovo ThinkSystem solutions 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).

- **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 maximum of 2,384 TB system memory (2 TB with DCPMM and 384 GB RDIMMs in Memory Mode). The solution supports synchronous dynamic random-access memory (SDRAM) registered dual inline memory modules (DIMMs) with error correcting code (ECC). For more information about the specific types and maximum amount of memory, see “Specifications” on page 3.

- **Integrated network support**

The tray comes with an integrated 1-port Gigabit Ethernet controller with RJ-45 connector, which supports connection to a 1000 Mbps network.

- **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.

Trusted Platform Module (TPM) has two versions - TPM 1.2 and TPM 2.0. You can change the TPM version from 1.2 to 2.0 and back again.

For more information on TPM configurations, see “Enable TPM/TCM” in the *Maintenance Manual*.

Note: For customers in Chinese Mainland, a Lenovo-qualified TPM 2.0 adapter or a Trusted Cryptographic Module (TCM) adapter (sometimes called a daughter card) may be pre-installed.

- **Large data-storage capacity**

The simple-swap solution models support the following drives:

- Supports up to four 2.5-inch simple-swap Serial ATA (SATA) hard disk drives per tray
- Supports up to two 2.5-inch simple-swap Serial ATA (SATA) NVMe solid-state drives per tray

- **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 solution provides a QR code on the system service label, which is on the cover of the solution, 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.

- **Active Energy Manager**

Lenovo XClarity Energy Manager is a power and temperature management solution for data centers. You can monitor and manage the power consumption and temperature of Converged, NeXtScale, System x, ThinkServer solutions and ThinkServer servers, and improve energy efficiency using Lenovo XClarity Energy Manager.

- **Optional power capabilities**

The solution supports a maximum of six 1300-watt, 1500-watt or 2000-watt hot-swap power supplies.

Note: You cannot mix 1300-watt, 1500-watt and 2000-watt power supplies in the solution.

- **ThinkSystem RAID support**

The ThinkSystem RAID provides software RAID supports for RAID levels 0 and 1 while integrated on-board hardware RAID supports for RAID levels 1.

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

Table 1. Enclosure specifications

Specification	Description
Power supply	<p>Supports six hot-swap ac power supplies</p> <ul style="list-style-type: none">• 1300-watt ac• 1500-watt ac• 2000-watt ac <p>Important:</p> <ol style="list-style-type: none">1. Power supplies and redundant power supplies in the enclosure must be with the same power rating, wattage or efficiency Level.2. Power supplies with 240 V dc are not hot-swappable. To remove the power cord, ensure you have turned off the server or disconnected the dc power sources at the breaker panel.3. In order for the ThinkSystem products to operate error free in both a DC or AC electrical environment, a TN-S earthing system which complies to 60364-1 IEC 2005 standard has to be present or installed.
Fan power control (FPC) module	<ul style="list-style-type: none">• Hot-swappable
Size	<p>6U enclosure</p> <ul style="list-style-type: none">• Height: 263.3 mm (10.37 inches)• Depth: 914.5 mm (36 inches)• Width: 447 mm (17.6 inches)• Weight:<ul style="list-style-type: none">– Fully configured (stand-alone): approximately 135.5 kg (298 lbs)– Empty enclosure (with midplane, FPC, and cables): approximately 25 kg (55 lbs)
Acoustical noise emissions	<ul style="list-style-type: none">• Operation: 7.0 bels• Idle: 6.5 bels <p>Notes:</p> <ul style="list-style-type: none">• The following readings are worst case for the air cooling. The water cooling results would be significantly less.• The declared acoustic noise level are based on specified configurations and they may change depending on configuration/condition changes.• The declared acoustic noise levels may increase greatly, if high-power components are installed such as high-power NICs, high-power processors and GPUs.
Heat output	<p>Approximate heat output:</p> <ul style="list-style-type: none">• Minimum configuration (with one minimal configuration tray): 433 BTU per hour (127 watts)• Maximum configuration (with six maximal configuration trays): 40946 BTU per hour (12000 watts)

Table 1. Enclosure specifications (continued)

Specification	Description
Electrical input	<ul style="list-style-type: none"> • Sine-wave input (50-60 Hz) required • Input voltage range: <ul style="list-style-type: none"> – Minimum: 200 V AC – Maximum: 240 V AC
Water requirement	<p>Attention: The water required to initially fill the system side cooling loop must be reasonably clean, bacteria-free water (<100 CFU/ml) such as de-mineralized water, reverse osmosis water, de-ionized water, or distilled water. The water must be filtered with an in-line 50 micron filter (approximately 288 mesh). The water must be treated with anti-biological and anti-corrosion measures. Environment quality must be maintain over the lifetime of the system to receive warranty and support on affecting components. For more information please see Lenovo Neptune Direct Water-Cooling Standards.</p> <ul style="list-style-type: none"> • Minimum water flow rate: 6.0 liters per minute per enclosure, assuming 1.0 lpm per compute tray with 6 trays per enclosure (1 tray consists of 2 compute nodes) <ul style="list-style-type: none"> – For processors below 205 W: 6.0 liters per minute per enclosure, assuming 1.0 lpm per compute tray with 6 trays per enclosure (1 tray consists of 2 compute nodes) • Maximum pressure: 4.4 bars

Tray specifications

Table 2. Tray specifications

Specification	Description
Size	<p>Tray</p> <ul style="list-style-type: none"> • Height: 41.0 mm (1.6 inches) • Depth: 742.0 mm (29.2 inches) • Width: 438.0 mm (17.25 inches) • Weight estimation: 17.2 kg (38 lb)
Environment	<p>Attention: Environment quality must be maintain over the lifetime of the system to receive warranty and support on affecting components. For water quality requirement, see Lenovo Neptune Direct Water-Cooling Standards.</p> <p>The SD650 tray complies with ASHRAE class A2 specifications. The SD650 tray is supported in the following environment:</p> <ul style="list-style-type: none"> • Water Temperature: <ul style="list-style-type: none"> – Operating: ASHRAE class W4: 2 - 45°C (35.6 - 113°F) <p>Note: The SD650 tray supports up to 50°C for special configurations and for end-users with sufficient data center operating conditions. Consult your local Lenovo representative for more information.</p> • Air temperature: <ul style="list-style-type: none"> – Operating: ASHRAE class A2: 10 - 35°C (50 - 95°F); when the altitude exceeds 900 m (2953 ft), the maximum ambient temperature value decreases by 1°C (1.8°F) with every 300 m (984 ft) of altitude increase. – Solution off: 5 - 45°C (41 - 113°F) – Shipping/storage: -40 - 60°C (-40 - 140°F) • Maximum altitude: 3048 m (10 000 ft) • Relative Humidity (non-condensing): <ul style="list-style-type: none"> – Operating: <ul style="list-style-type: none"> – ASHRAE Class A2: 8% - 80%, maximum dew point : 21°C (70°F) – Shipment/storage: 8% - 90% • Particulate contamination: <p>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 <i>Particulate contamination</i> .</p> <p>Note: The solution is designed for standard data center environment and recommended to be placed in industrial data center.</p>

Node specifications

Table 3. Node specifications

Specification	Description
Processor (depending on the model)	<ul style="list-style-type: none">• Supports up to two Intel Xeon series multi-core processors per node (1 tray consists of 2 nodes)• Level-3 cache <p>Notes:</p> <ol style="list-style-type: none">1. Use the Setup utility to determine the type and speed of the processors in the node.2. For a list of supported processors, see https://serverproven.lenovo.com/.3. With certain processors installed, if UEFI Boot Mode is set to Legacy then PXE Boot from the onboard Gigabit Ethernet port may not work as expected and is not supported. The affected processors are all processors with embedded Omni Path fabric. These are processors models that have an F at the end of the model name and include (but not limited to) the following processor models:<ul style="list-style-type: none">• Intel Xeon Gold 6126F Processor• Intel Xeon Gold 6130F Processor• Intel Xeon Gold 6138F Processor• Intel Xeon Gold 6142F Processor• Intel Xeon Gold 6148F Processor• Intel Xeon Platinum 8160F Processor• Intel Xeon Platinum 8176F Processor
Memory	<p>See “Memory module installation rules and order” on page 31 for detailed information about memory configuration and setup.</p> <ul style="list-style-type: none">• Slots: 12 DIMM slots + 4 DC Persistent Memory Module (DCPMM) slots per node (1 tray consists of 2 nodes)• Minimum: 8 GB (single DDR4 DIMM per processor)• Maximum: 768 GB<ul style="list-style-type: none">– 384 GB (12 x 32GB RDIMM)– 768 GB (12 x 64GB LRDIMM)• Maximum: 2.384 TB (4x 512GB (DCPMM + 12x 32GB RDIMM) in Memory Mode• Type:<ul style="list-style-type: none">– PC4-21300 (dual-rank), 2933 MT/s, error correcting code (ECC), double-data-rate 4 (DDR4) registered DIMM (RDIMM) or load reduced DIMM (LRDIMM)– DC Persistent Memory Module (DCPMM)• Supports (depending on the model):<ul style="list-style-type: none">– 8 GB, 16 GB, and 32 GB size DIMMs– 64 GB LRDIMM– 128 GB, 256 GB, and 512 GB DCPMM

Table 3. Node specifications (continued)

Specification	Description
Drive bays	<p>Supports up to two 2.5-inch simple-swap SATA/NVMe drive bays per node (1 tray consists of 2 nodes).</p> <p>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.</p> <p>Supports the following 2.5-inch simple-swap drive:</p> <ul style="list-style-type: none"> • Two 2.5-inch 7mm SATA solid-state drives per node (1 tray consists of 2 nodes) • One 2.5-inch 15mm SATA/NVMe hard disk drive/solid-state drive per node (1 tray consists of 2 nodes)
M.2 drive/backplane	<p>ThinkSystem M.2 with Mirroring Enablement Kit contains dual M.2 backplane supports up to two identical M.2 drives.</p> <p>Supports 2 different physical sizes of M.2 drives:</p> <ul style="list-style-type: none"> • 42 mm (2242) • 80 mm (2280) <p>See “Install an M.2 drive into the M.2 backplane” on page 51 for supported M.2 drive configurations.</p>
RAID	<ul style="list-style-type: none"> • Software RAID supports for RAID levels 0 and 1 for SATA storages • Integrated on-board Hardware RAID supports for RAID levels 1 for M.2 SSD
Video controller (integrated into Lenovo XClarity Controller)	<ul style="list-style-type: none"> • ASPEED • SVGA compatible video controller • Avocent Digital Video Compression • Video memory is not expandable <p>Note: Maximum video resolution is 1920 x 1200 at 60 Hz.</p>
Input/Output (I/O) features	<ul style="list-style-type: none"> • Front panel • KVM breakout cable connector • One STD USB 3.0 connector with Intel DCI feature • One 1GbE Ethernet connector with share-NIC feature for Lenovo XClarity Controller access • One 1GbE Ethernet connector dedicated for Lenovo XClarity Controller access

Table 3. Node specifications (continued)

Specification	Description
Operating systems	<p>Supported and certified operating systems include:</p> <ul style="list-style-type: none"> • Microsoft Windows Server • VMware ESXi • Red Hat Enterprise Linux • SUSE Linux Enterprise Server <p>References:</p> <ul style="list-style-type: none"> • Complete list of available operating systems: https://lenovopress.lenovo.com/osig. • OS deployment instructions: “Deploy the operating system” on page 90.
Minimum configuration for debugging	<ul style="list-style-type: none"> • One n1200 Enclosure • One SD650 Dual Node DWC Tray (contains two computer nodes) • One processor on location 1 on specific node • One CFF v2 power supply (any type) • One DIMM (any type) on specific node • One disk (any type)(If OS is needed for debugging)

Upgrade existing NeXtScale nx360 M5 to ThinkSystem SD650

The following enclosure requirements are mandatory if you are upgrading existing NeXtScale nx360 M5 to SD650.

Attention: Only Lenovo Professional Service - Data Center Services is allowed to perform the upgrading task.

- Update all firmware to the latest level
- Flow rate only needs to be adjusted if 205 W processors installed. If 205 W processors installed, increase the water flow rate to 1.25 liters per minute per tray.

Management options

The XClarity portfolio and other system management options described in this section are available to help you manage the servers more conveniently and efficiently.

Overview

Options	Description
Lenovo XClarity Controller	<p>Baseboard management controller. (BMC)</p> <p>Consolidates the service processor functionality, Super I/O, video controller, and remote presence capabilities into a single chip on the server system board.</p> <p>Interface</p> <ul style="list-style-type: none"> • CLI application • Web GUI interface • Mobile application • REST API <p>Usage and downloads</p> <p>https://pubs.lenovo.com/lxcc-overview/</p>
Lenovo XClarity Administrator	<p>Centralized interface for multi-server management.</p> <p>Interface</p> <ul style="list-style-type: none"> • Web GUI interface • Mobile application • REST API <p>Usage and downloads</p> <p>http://sysmgt.lenovofiles.com/help/topic/com.lenovo.lxca.doc/aug_product_page.html</p>
Lenovo XClarity Essentials toolset	<p>Portable and light toolset for server configuration, data collection, and firmware updates. Suitable both for single-server or multi-server management contexts.</p> <p>Interface</p> <ul style="list-style-type: none"> • OneCLI: CLI application • Bootable Media Creator: CLI application, GUI application • UpdateXpress: GUI application <p>Usage and downloads</p> <p>https://pubs.lenovo.com/lxce-overview/</p>

Options	Description
Lenovo XClarity Provisioning Manager	<p>UEFI-based embedded GUI tool on a single server that can simplify management tasks.</p> <p>Interface</p> <ul style="list-style-type: none"> • Web interface (BMC remote access) • GUI application <p>Usage and downloads</p> <p>https://pubs.lenovo.com/lxpm-overview/</p> <p>Important: Lenovo XClarity Provisioning Manager (LXPM) supported version varies by product. All versions of Lenovo XClarity Provisioning Manager are referred to as Lenovo XClarity Provisioning Manager and LXPM in this document, unless specified otherwise. To see the LXPM version supported by your server, go to https://pubs.lenovo.com/lxpm-overview/.</p>
Lenovo XClarity Integrator	<p>Series of applications that integrate the management and monitoring functionalities of the Lenovo physical servers with the software used in a certain deployment infrastructure, such as VMware vCenter, Microsoft Admin Center, or Microsoft System Center while delivering additional workload resiliency.</p> <p>Interface</p> <p>GUI application</p> <p>Usage and downloads</p> <p>https://pubs.lenovo.com/lxci-overview/</p>
Lenovo XClarity Energy Manager	<p>Application that can manage and monitor server power and temperature.</p> <p>Interface</p> <ul style="list-style-type: none"> • Web GUI Interface <p>Usage and downloads</p> <p>https://datacentersupport.lenovo.com/solutions/Invo-lxem</p>
Lenovo Capacity Planner	<p>Application that supports power consumption planning for a server or rack.</p> <p>Interface</p> <ul style="list-style-type: none"> • Web GUI Interface <p>Usage and downloads</p> <p>https://datacentersupport.lenovo.com/solutions/Invo-lcp</p>

Functions

Options		Functions						
		Multi-system mgmt	OS deployment	System configuration	Firmware updates ¹	Events/alert monitoring	Inventory/logs	Power mgmt
Lenovo XClarity Controller				√	√ ²	√	√ ⁴	
Lenovo XClarity Administrator		√	√	√	√ ²	√	√ ⁴	
Lenovo XClarity Essentials toolset	OneCLI	√		√	√ ²	√	√ ⁴	
	Bootable Media Creator			√	√ ²		√ ⁴	
	UpdateXpress			√	√ ²			
Lenovo XClarity Provisioning Manager			√	√	√ ³		√ ⁵	
Lenovo XClarity Integrator		√	√ ⁶	√	√	√	√	√ ⁷
Lenovo XClarity Energy Manager		√				√		√
Lenovo Capacity Planner								√ ⁸

Notes:

1. Most options can be updated through the Lenovo tools. Some options, such as GPU firmware or Omni-Path firmware require the use of supplier tools.
2. The server UEFI settings for option ROM must be set to **Auto** or **UEFI** to update firmware using Lenovo XClarity Administrator, Lenovo XClarity Essentials, or Lenovo XClarity Controller.
3. Firmware updates are limited to Lenovo XClarity Provisioning Manager, Lenovo XClarity Controller, 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** 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.
5. Limited inventory.
6. The Lenovo XClarity Integrator deployment check for System Center Configuration Manager (SCCM) supports Windows operating system deployment.
7. Power management function is supported only by Lenovo XClarity Integrator for VMware vCenter.
8. It is highly recommended that you check the power summary data for your server using Lenovo Capacity Planner before purchasing any new parts.

Chapter 2. Solution components

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

Identifying your component

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

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

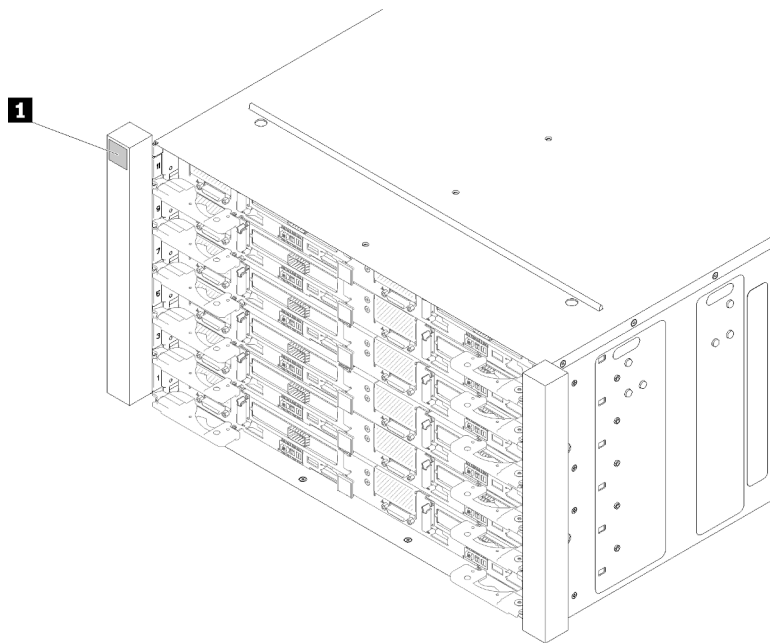


Figure 2. Enclosure label on the front of the enclosure

Table 4. Enclosure label on the front of the enclosure

1 Enclosure label

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

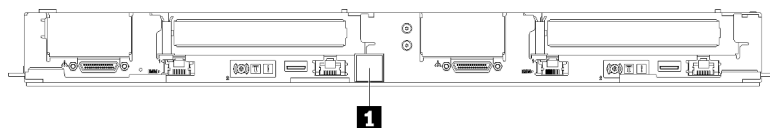


Figure 3. Tray label on the front of the tray

Table 5. Tray label on the front of the tray

1 Tray label

QR code

In addition, the system Service Label is located on the inside surface of the tray cover, provides a quick reference (QR) code for mobile access to service information. You can scan the QR code with a mobile device using a QR code reader application and get quick access to the Service Information web page. The Service Information web page provides additional information for parts installation and replacement videos, and error codes for solution support.

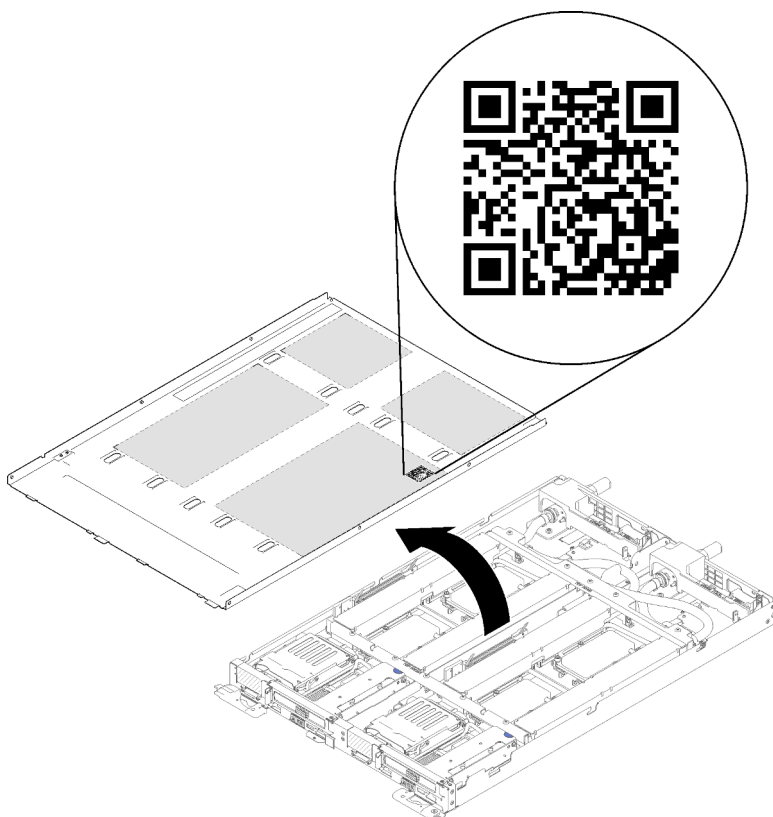


Figure 4. Service Label and QR code

Network access tag

The Lenovo XClarity Controller network access information for both nodes can be found on the pull out information tag located at the front of the tray. You can use the information on the pull out tag to access the XCC MAC address and LLA for each node. The left node information is on the left side and the right node information is on the right side. You can also use the information tag for your own node labeling information such as the hostname, the system name and the inventory bar code.

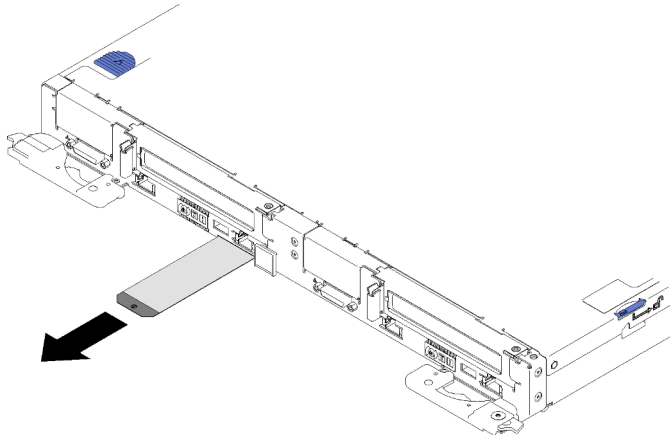


Figure 5. Network access information on the pull out tag

Front view

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

Enclosure

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

The enclosure supports up to six trays.

The following illustration shows six trays installed in the enclosure.

The slot numbers are indicated on both sides of the enclosure.

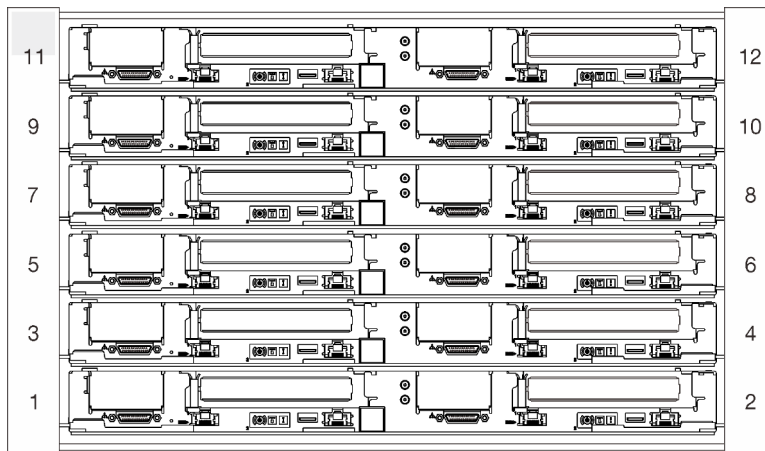


Figure 6. Enclosure

Tray

The following illustrations show the controls, LEDs, and connectors on the front of each tray.

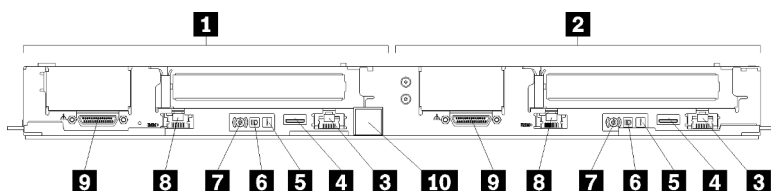


Figure 7. Tray

Table 6. Tray indicators, controls, and connectors

1 Left node (odd bay numbers)	6 Identification LED
2 Right node (even bay numbers)	7 Power button/LED
3 Dedicated LAN RJ45 port for Lenovo XClarity Controller access	8 Ethernet RJ45 port with share-NIC feature to access Lenovo XClarity Controller
4 USB 3.0 connector	9 KVM breakout cable connector
5 System error LED	10 Tray label

Rear view

The following illustration shows the components on the rear of the enclosure.

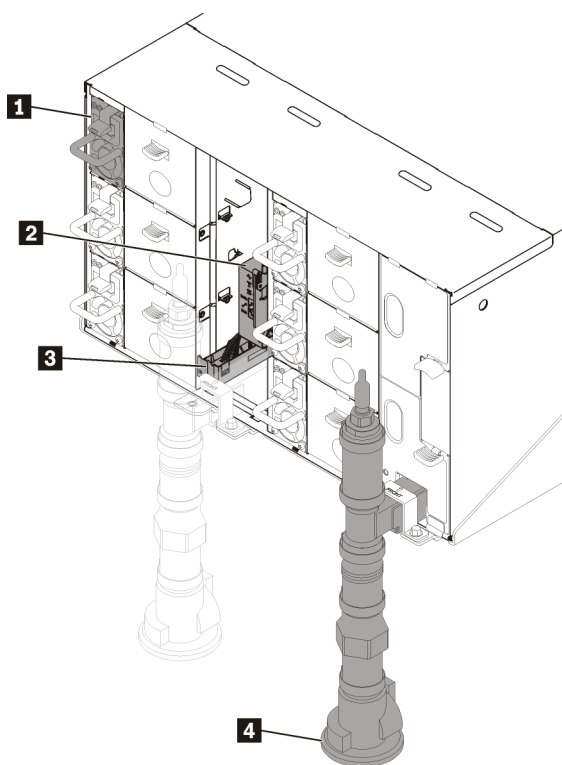


Figure 8. Rear view

Table 7. Rear view

1 Power supply	3 Drip sensor assembly
2 Fan and power control module	4 Manifold

Fan power control (FPC) module

The following illustration shows the connectors and LEDs on the FPC module.

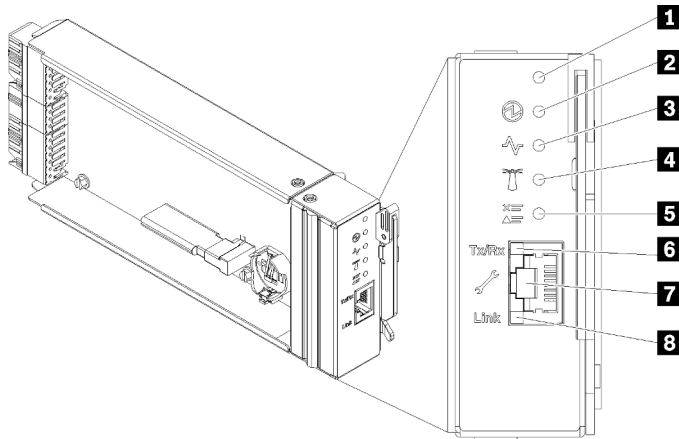


Figure 9. FPC connectors and LEDs

Table 8. FPC connectors and LEDs

1 Reset button hole	5 Check log LED (yellow)
2 Power LED (green)	6 Ethernet port activity (RJ-45) LED (green)
3 Activity LED (green)	7 Dedicated Ethernet port for FPC management access
4 Identification LED (blue)	8 Ethernet port link (RJ-45) LED (green)

1 Reset button: Press the button for 1 to 4 seconds, FPC reboots. Press over 4 seconds, FPC reboots and loads to the default settings.

2 Power-on LED: When this LED is lit (green), it indicates that the FPC has power.

3 Activity LED: When this LED is lit (green), it indicates that the FPC is actively controlling the enclosure.

4 Identification LED: When this LED is lit (blue), it indicates the enclosure location in a rack.

5 Check log LED: When this LED is lit (yellow), it indicates that a system error has occurred. Check the FPC event log for additional information.

6 Ethernet port activity (RJ-45) LED: When this LED is flashing (green), it indicates that there is activity through the remote management and console (Ethernet) port over the management network.

7 Dedicated Ethernet port for FPC management access: Use this connector to access FPC management.

8 Ethernet port link (RJ-45) LED: When this LED is lit (green), it indicates that there is an active connection through the remote management and console (Ethernet) port to the management network.

Power supplies

The ThinkSystem DW612 Neptune® DWC Enclosure Type 7D1L supports six autoranging power supplies.

The power supplies get electrical power from a 200 - 240 V ac power source and convert the ac input into 12 V outputs. The power supplies are capable of autoranging within the input voltage range. There is one

common power domain for the enclosure that distributes power to each of the DWC tray and modules through the system midplane.

AC redundancy is achieved by distributing the ac power cord connections between independent ac circuits.

Each power supply has internal fans and a controller. The power supply controller can be powered by any installed power supply that is providing power through the midplane.

Attention: The power supplies contain internal cooling fans. Do not obstruct the fan exhaust vents.

You have to install all of the six power supplies regardless of the type of power supply, the enclosure power load, or selected enclosure power policy.

The ThinkSystem DW612 Neptune® DWC Enclosure Type 7D1L does not support mixing of low input voltage power supplies with high input voltage power supplies. For example, if you install a power supply with an input voltage of 100 - 127 V ac in a enclosure that is powered by 200 - 240 V ac power supplies, the 100 - 127 V power supply will not power on. The same restriction applies to a enclosure that is powered by 100 - 127 V ac power supplies. If you install a 200 - 240 V ac power supply in a enclosure that is powered by 100 - 127 V ac power supplies, the 200 - 240 V ac power supply will not power on.

The following illustration shows the power supply:

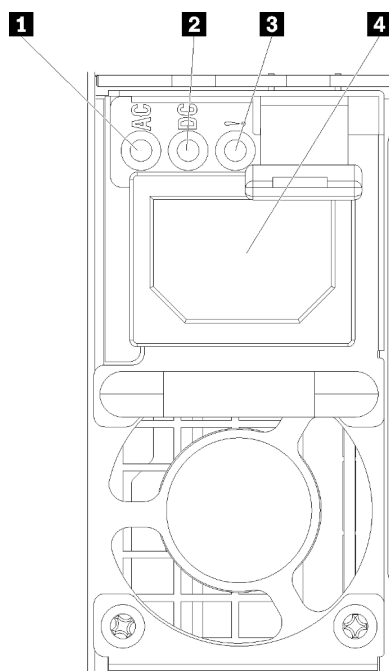


Figure 10. Power supply LEDs and connectors

1 Input (AC) power LED (green)	3 Power supply error LED (yellow)
2 Output (DC) power LED (green)	

There are three LEDs on each power supply:

1 AC power LED (green): When this LED is lit (green), it indicates that ac power is being supplied to the power supply.

2 DC power LED (green): When this LED is lit (green), it indicates that dc power is being supplied from the power supply to the enclosure midplane.

3 Power supply error LED (yellow): When this LED is lit (yellow), it indicates that there is a fault with the power supply.

Note: Before unplugging the ac power cord from the power supply, or removing the power supply from the enclosure, verify that the capacity of the remaining power supplies are sufficient to meet the minimum power requirements for all components in the enclosure.

Internal cable routing

Some of the components in the solution have internal cables and 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 IFT processors, might require additional internal cabling. See the documentation that is provided for the option to determine any additional cabling requirements and instructions.

2.5-inch drive models

The following illustrations show the cable routing for 2.5-inch drive models.

1x2.5-inch drive model

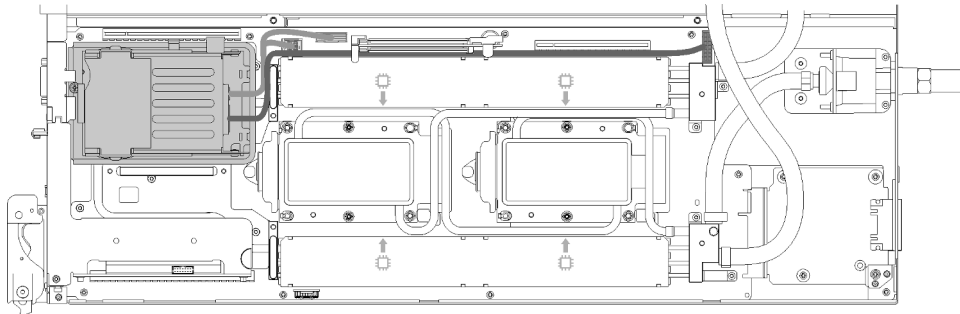


Figure 11. Cable routing - 1x2.5-inch drive model

2x2.5-inch drive model

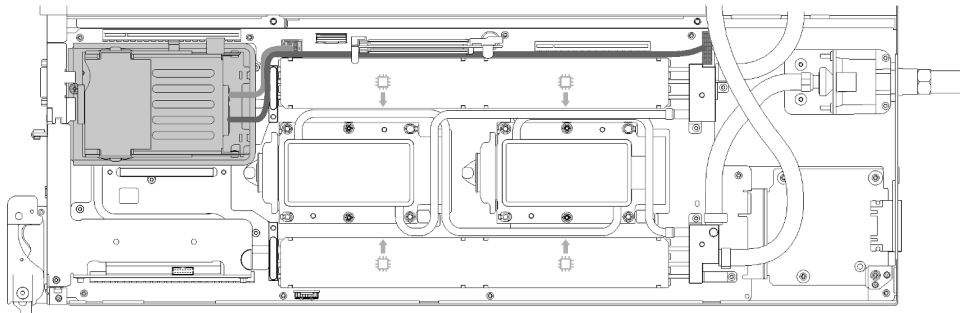


Figure 12. Cable routing - 2x2.5-inch drive model

Internal Faceplate Transition (IFT) adapter

The following illustration shows the cable routing for the Internal Faceplate Transition (IFT) adapter.

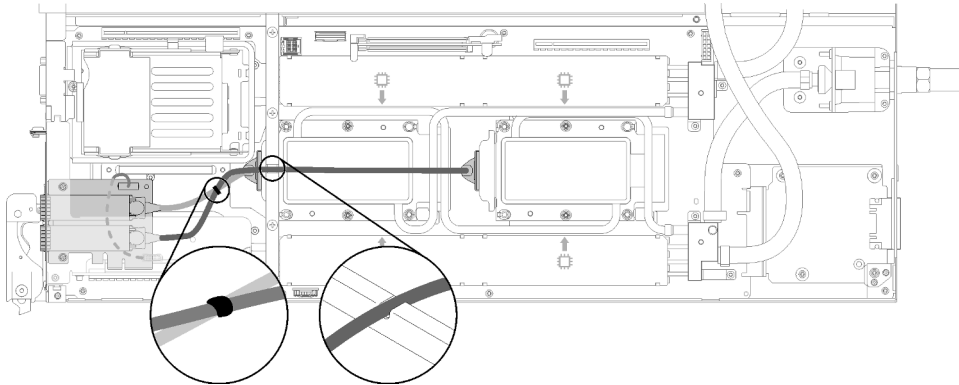


Figure 13. Cable routing - Internal Faceplate Transition (IFT) adapter

Parts list

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

For more information about ordering the parts shown in [Figure 14 “Enclosure components” on page 20](#):

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

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

- **Enclosure components**

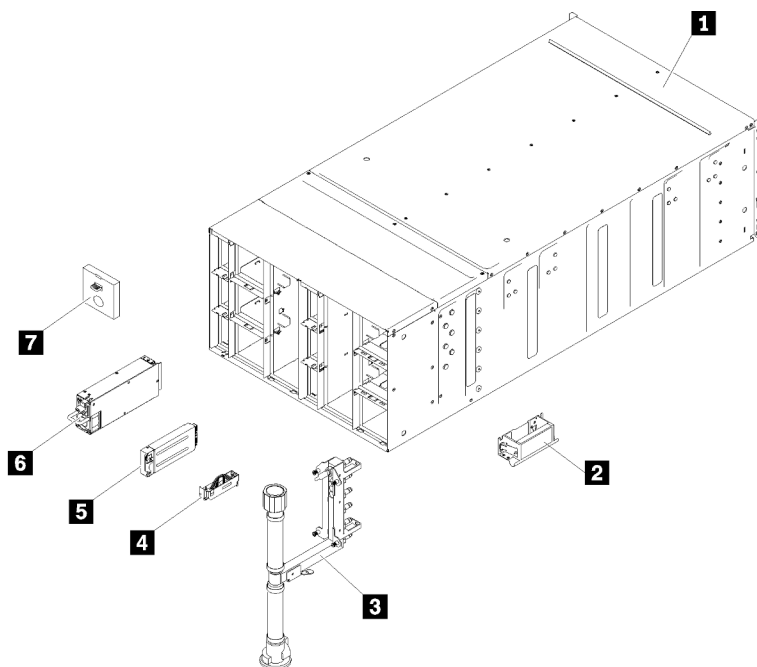


Figure 14. Enclosure components

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

- **Tier 1 customer replaceable unit (CRU):** Replacement of Tier 1 CRUs is your responsibility. If Lenovo installs a Tier 1 CRU at your request with no service agreement, you will be charged for the installation.
- **Tier 2 customer replaceable unit (CRU):** You may install a Tier 2 CRU yourself or request Lenovo to install it, at no additional charge, under the type of warranty service that is designated for your solution.
- **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 9. Parts list

Index	Description	Tier 1 CRU	Tier 2 CRU	FRU	Consumable and Structural part
<p>For more information about ordering the parts shown in Figure 14 “Enclosure components” on page 20:</p> <p>http://datacentersupport.lenovo.com/us/en/products/servers/thinksystem/sd650-dwc-dual-node-tray/7x58/parts</p> <p>It is highly recommended that you check the power summary data for your server using Lenovo Capacity Planner before purchasing any new parts.</p>					
1	6U enclosure assembly			✓	
2	Lift handle	✓			
3	Manifold assembly			✓	
4	Drip sensor assembly			✓	
5	Fan and power control module module	✓			
6	Power supply	✓			
7	Fan module filler	✓			

- DWC tray components

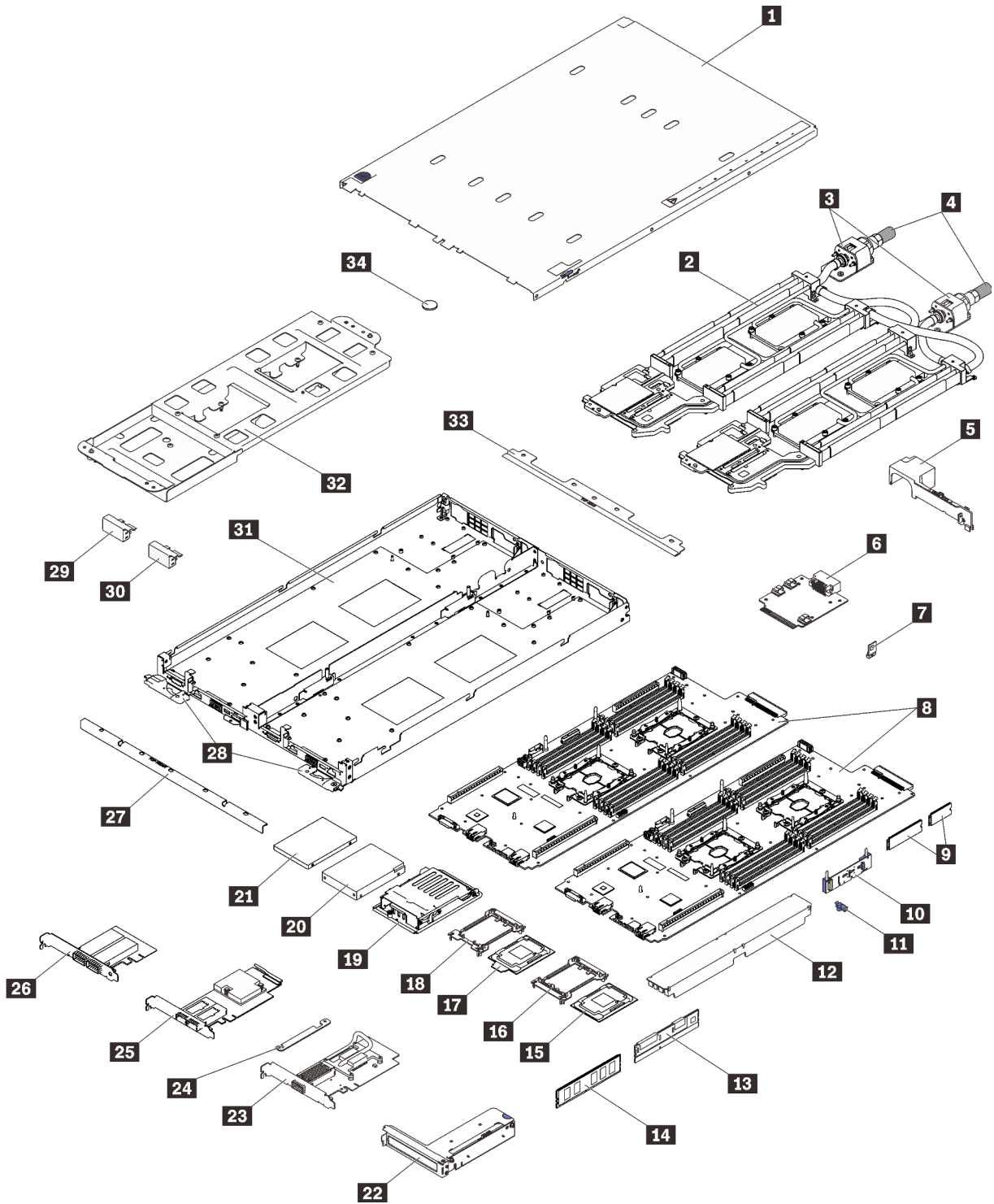


Figure 15. DWC tray components

Table 10. Parts list

Index	Description	Tier 1 CRU	Tier 2 CRU	FRU	Consumable and Structural part
<p>For more information about ordering the parts shown in Figure 15 “DWC tray components” on page 22:</p> <p>http://datacentersupport.lenovo.com/us/en/products/servers/thinksystem/sd650-dwc-dual-node-tray/7x58/parts</p> <p>It is highly recommended that you check the power summary data for your server using Lenovo Capacity Planner before purchasing any new parts.</p>					
1	Tray cover			✓	
2	Water loop			✓	
3	Quick connects			✓	
4	Quick connect plug covers				✓
5	Air baffle				✓
6	Power distribution board			✓	
7	Trusted Cryptographic Module (TCM)			✓	
8	System board			✓	
9	M.2 drive (42 mm and 80 mm)			✓	
10	M.2 backplane			✓	
11	M.2 retainer clip			✓	
12	DIMM cover				✓
13	DCPMM		✓		
14	DIMM		✓		
15	Processor			✓	
16	Processor clip				✓
17	Fabric processor			✓	
18	Fabric processor clip				✓
19	Drive cage			✓	
20	2.5-inch drive (15mm)	✓			
21	2.5-inch drive (7mm)	✓			
22	PCIe riser-card assembly			✓	
23	CX5 EDR adapter			✓	
24	Retaining clamp				✓
25	OPA adapter			✓	
26	IFT adapter			✓	
27	Front cross brace				✓
28	DWC tray release latches			✓	

Table 10. Parts list (continued)

Index	Description	Tier 1 CRU	Tier 2 CRU	FRU	Consumable and Structural part
29	Blank bezel filler without perf holes				✓
30	Blank bezel filler with perf holes				✓
31	DWC tray			✓	
32	Water loop carrier			✓	
33	Rear cross brace				✓
34	CMOS battery (CR2032)				✓

Power cords

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

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

1. Go to:
<http://dcsc.lenovo.com/#/>
2. Click **Preconfigured Model** or **Configure to order**.
3. Enter the machine type and model for your server to display the configurator page.
4. Click **Power** → **Power Cables** to see all line cords.

Notes:

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

Chapter 3. 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 1](#).
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 37](#).
 - 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 16](#) to locate the connectors. See [“Cable the enclosure” on page 76](#) for cabling best practices.
 - d. Power on the solution. See [“Power on nodes” on page 76](#).

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:

“Opening and Using the XClarity Controller Web Interface” section in the XCC documentation version compatible with your server at <https://pubs.lenovo.com/lxcc-overview/>.

- e. Validate that the solution hardware was set up successfully.
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 79](#).
 - b. Update the firmware for the solution, if necessary. See [“Update the firmware” on page 80](#).
 - c. Configure the firmware for the solution. See [“Configure the firmware” on page 83](#).

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 [“Deploy the operating system” on page 90](#).
 - e. Back up the solution configuration. See [“Back up the server configuration” on page 91](#).
 - 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 your safety at work:
 - A complete list of safety information for all products is available at:
https://pubs.lenovo.com/safety_documentation/
 - The following guidelines are available as well: “Handling static-sensitive devices” on page 30 and “Working inside the solution with the power on” on page 30.
- Make sure the components you are installing are supported by your server. For a list of supported optional components for the server, see <https://serverproven.lenovo.com/>.
- When you install a new server, download and apply the latest firmware. This will help ensure that any known issues are addressed, and that your server is ready to work with optimal performance. Go to [ThinkSystem SD650 Neptune® DWC Trays and DW612 Neptune® DWC Enclosure Drivers and Software](#) to download firmware updates for your server.

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

- It is good practice to make sure that the server is working correctly before you install an optional component.
- Keep the working area clean, and place removed components on a flat and smooth surface that does not shake or tilt.
- Do not attempt to lift an object that might be too heavy for you. If you have to lift a heavy object, read the following precautions carefully:
 - Make sure that you can stand steadily without slipping.
 - Distribute the weight of the object equally between your feet.
 - Use a slow lifting force. Never move suddenly or twist when you lift a heavy object.
 - To avoid straining the muscles in your back, lift by standing or by pushing up with your leg muscles.
- Make sure that you have an adequate number of properly grounded electrical outlets for the server, monitor, and other devices.
- Back up all important data before you make changes related to the disk drives.
- Have a small flat-blade screwdriver, a small Phillips screwdriver, and a T8 torx screwdriver available.
- To view the error LEDs on the system board and internal components, leave the power on.
- You do not have to turn off the server to remove or install hot-swap power supplies, hot-swap fans, or hot-plug USB devices. However, you must turn off the server before you perform any steps that involve removing or installing adapter cables, and you must disconnect the power source from the server before you perform any steps that involve removing or installing a riser card.
- Blue on a component indicates touch points, where you can grip to remove a component from or install it in the server, open or close a latch, and so on.
- Terra-cotta on a component or an orange label on or near a component indicates that the component can be hot-swapped if the server and operating system support hot-swap capability, which means that you

can remove or install the component while the server is still running. (Orange can also indicate touch points on hot-swap components.) See the instructions for removing or installing a specific hot-swap component for any additional procedures that you might have to perform before you remove or install the component.

- The Red strip on the drives, adjacent to the release latch, indicates that the drive can be hot-swapped if the server and operating system support hot-swap capability. This means that you can remove or install the drive while the server is still running.

Note: See the system specific instructions for removing or installing a hot-swap drive for any additional procedures that you might need to perform before you remove or install the drive.

- After finishing working on the server, make sure you reinstall all safety shields, guards, labels, and ground wires.

Safety inspection checklist

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

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

CAUTION:

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

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

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

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

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

- a. Go to:
<http://dcsc.lenovo.com/#/>
 - b. Click **Preconfigured Model** or **Configure to order**.
 - c. Enter the machine type and model for your server to display the configurator page.
 - d. Click **Power → Power Cables** to see all line cords.
- Make sure that the insulation is not frayed or worn.
3. Check for any obvious non-Lenovo alterations. Use good judgment as to the safety of any non-Lenovo alterations.
 4. Check inside the solution for any obvious unsafe conditions, such as metal filings, contamination, water or other liquid, or signs of fire or smoke damage.

5. Check for worn, frayed, or pinched cables.
6. Make sure that the power-supply cover fasteners (screws or rivets) have not been removed or tampered with.

System reliability guidelines

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

Make sure the following requirements are met:

- When the solution comes with redundant power, a power supply must be installed in each power-supply bay.
- Adequate space around the solution must be spared to allow solution cooling system to work properly. Leave approximately 50 mm (2.0 in.) of open space around the front and rear of the solution. Do not place any object in front of the fans.
- For proper cooling and airflow, refit the solution cover before you turn the power on. Do not operate the solution for more than 30 minutes with the solution cover removed, for it might damage solution components.
- Cabling instructions that come with optional components must be followed.
- 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.
- 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 node must be strictly followed.

Working inside the solution with the power on

Guidelines to work inside the solution with the power on.

Attention: The solution might stop and data loss 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 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 server.

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.

Memory module installation rules and order

There are a number of criteria that must be followed when selecting and installing memory modules in your server.

DRAM 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:

- [Independent memory mode population sequence](#)
- [Memory mirroring population sequence](#)
- [Memory rank sparing population sequence](#)

For information about memory modes, see [“Memory configuration” on page 84](#)

DRAM DIMM installation order

Notes:

- When adding one or more DIMMs during a memory upgrade, you might need to remove some DIMMs that are already installed to new locations.

Table 11. DRAM DIMM population sequence - Independent memory mode

Independent memory mode population sequence																
Note: ✓: It represents RDIMMs, 3DS RDIMMs or LRDIMMs can be installed on the corresponding DIMM slots.																
Total DIMMs	Processor 1								Processor 2							
	DIMM slot								DIMM slot							
	8	7	6	5	4	3	2	1	16	15	14	13	12	11	10	9
2					✓								✓			
4				✓	✓							✓	✓			
6				✓	✓			✓				✓	✓			✓
8	✓			✓	✓			✓	✓			✓	✓			✓

Table 11. DRAM DIMM population sequence - Independent memory mode (continued)

Independent memory mode population sequence																
Note: ✓: It represents RDIMMs, 3DS RDIMMs or LRDIMMs can be installed on the corresponding DIMM slots.																
Total DIMMs	Processor 1								Processor 2							
	DIMM slot								DIMM slot							
	8	7	6	5	4	3	2	1	16	15	14	13	12	11	10	9
10	✓			✓	✓		✓	✓	✓			✓	✓		✓	✓
12	✓	✓		✓	✓		✓	✓	✓	✓		✓	✓		✓	✓

Table 12. DRAM DIMM population sequence - Memory mirroring mode

Memory mirroring population sequence																
Note: ✓: It represents RDIMMs, 3DS RDIMMs or LRDIMMs can be installed on the corresponding DIMM slots.																
Total DIMMs	Processor 1								Processor 2							
	DIMM slot								DIMM slot							
	8	7	6	5	4	3	2	1	16	15	14	13	12	11	10	9
8	✓			✓	✓			✓	✓			✓	✓			✓
10	✓			✓	✓		✓	✓	✓			✓	✓		✓	✓
12	✓	✓		✓	✓		✓	✓	✓	✓		✓	✓		✓	✓

Table 13. DRAM DIMM population sequence - Memory rank sparing mode

Memory rank sparing population sequence																
Note: ✓: It represents RDIMMs, 3DS RDIMMs or LRDIMMs can be installed on the corresponding DIMM slots.																
Total DIMMs	Processor 1								Processor 2							
	DIMM slot								DIMM slot							
	8	7	6	5	4	3	2	1	16	15	14	13	12	11	10	9
2					✓								✓			
4				✓	✓							✓	✓			
6				✓	✓			✓				✓	✓			✓
8	✓			✓	✓			✓	✓			✓	✓			✓
10	✓			✓	✓		✓	✓	✓			✓	✓		✓	✓
12	✓	✓		✓	✓		✓	✓	✓	✓		✓	✓		✓	✓

DC Persistent Memory Module (DCPMM) installation order

This section contains information of how to install DC Persistent Memory Module (DCPMM) and DRAM DIMMs.

For more information about the processors compatibility, see <https://serverproven.lenovo.com/>.

- Before installing DCPMMs and DRAM DIMMs, refer to “[DC Persistent Memory Module \(DCPMM\) setup](#)” on [page 35](#) and make sure to meet all the requirements.
- To verify if the presently installed processors support DCPMMs, examine the four digits in the processor description. Only the processors with description meeting *both* of the following requirements support DCPMMs.
 - The first digit is **6** or a larger number.
 - The second digit is **2**.

Example: *Intel Xeon 6262V* and *Intel Xeon Platinum 8260M*

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

- Supported memory capacity range varies with the following types of DCPMMs.
 - **Medium memory tier (M):** The processors with **M** after the four digits (for example: *Intel Xeon Platinum 8260M*) support up to 2 TB of memory capacity per processor
 - **No suffix:** Other processors that support DCPMMs (for example: *Intel Xeon Gold 6230*) support up to 1 TB of memory capacity per processor

Table 14. Supported DCPMM capacity in DCPMM population configuration

App direct mode					
Total DCPMMs	Total DIMMs	Processor Family	128 GB DCPMM	256 GB DCPMM	512 GB DCPMM
1	12	M	✓	✓	✓
		No suffix	✓	✓	✓
2	12	M	✓	✓	✓
		No suffix	✓	✓	✓ Note 1
4	12	M	✓	✓	✓
		No suffix	✓	✓ Note 2	
Notes:					
1. 12x128 GB 3DS RDIMM + 2x512 GB DCPMM is not supported.					
2. 12x128 GB 3DS RDIMM + 4x256 GB DCPMM is not supported.					
Memory mode					
Total DCPMMs	Total DIMMs	Processor Family	128 GB DCPMM	256 GB DCPMM	512 GB DCPMM
4	12	M	✓	✓	✓
		No suffix	✓	✓	
Mixed memory mode					
Total DCPMMs	Total DIMMs	Processor Family	128 GB DCPMM	256 GB DCPMM	512 GB DCPMM
4	12	M	✓	✓	✓
		No suffix	✓	✓	

To install DC Persistent Memory Module (DCPMM), refer to the following combinations:

- [DCPMM population sequence - App direct mode](#)
- [DCPMM population sequence - Memory mode](#)
- [DCPMM population sequence - Mix memory mode](#)

DCPMM installation order

Note: Before installing DCPMM, refer to [“Memory configuration” on page 84](#) and [“Configure DC Persistent Memory Module \(DCPMM\)” on page 85](#) for the requirements.

DCPMMs shall only be installed on DIMM3, DIMM6, DIMM11 and DIMM14.

Table 15. DCPMM population sequence - App direct mode

DCPMM population sequence - App direct mode																	
Note: D1: It represents RDIMMs (DIMM density $\geq 16\text{GB}$) can be installed on the corresponding DIMM slots. P: Only DC Persistent Memory Module (DCPMM) can be installed on the corresponding DIMM slots.																	
Operation mode	Con-figuration	Processor 1								Processor 2							
		DIMM slot								DIMM slot							
		8	7	6	5	4	3	2	1	16	15	14	13	12	11	10	9
App direct mode (not interleaved)	1 AEP and 12 DIMMs	D1	D1	P	D1	D1		D1	D1	D1	D1		D1	D1		D1	D1
App direct mode + Mirroring mode (not interleaved)	1 AEP and 12 DIMMs	D1	D1	P	D1	D1		D1	D1	D1	D1		D1	D1		D1	D1
App direct mode (not interleaved)	2 AEPs and 12 DIMMs	D1	D1	P	D1	D1		D1	D1	D1	D1	P	D1	D1		D1	D1
App direct mode + Mirroring mode (not interleaved)	2 AEPs and 12 DIMMs	D1	D1	P	D1	D1		D1	D1	D1	D1	P	D1	D1		D1	D1
App direct mode (interleaved or not interleaved)	4 AEPs and 12 DIMMs	D1	D1	P	D1	D1	P	D1	D1	D1	D1	P	D1	D1	P	D1	D1
App direct mode + Mirroring mode (interleaved or not interleaved)	4 AEPs and 12 DIMMs	D1	D1	P	D1	D1	P	D1	D1	D1	D1	P	D1	D1	P	D1	D1

Table 16. DCPMM population sequence - Memory mode

DCPMM population sequence - Memory mode																	
Note: D2: It represents RDIMMs (DIMM density =16GB or 32GB) can be installed on the corresponding DIMM slots. P: Only DC Persistent Memory Module (DCPMM) can be installed on the corresponding DIMM slots.																	
Operation mode	Con-figuration	Processor 1								Processor 2							
		DIMM slot								DIMM slot							
		8	7	6	5	4	3	2	1	16	15	14	13	12	11	10	9
Memory mode	4 AEPs and 12 DIMMs	D2	D2	P	D2	D2	P	D2	D2	D2	D2	P	D2	D2	P	D2	D2

Table 17. DCPMM population sequence - Mix memory mode

DCPMM population sequence - Mix memory mode																	
Note: D3: It represents RDIMMs (DIMM density ≥16GB, no 3DS LRDIMM) can be installed on the corresponding DIMM slots. P: Only DC Persistent Memory Module (DCPMM) can be installed on the corresponding DIMM slots.																	
Operation mode	Con-figuration	Processor 1								Processor 2							
		DIMM slot								DIMM slot							
		8	7	6	5	4	3	2	1	16	15	14	13	12	11	10	9
Mix memory mode (interleaved or not interleaved)	4 AEPs and 12 DIMMs	D3	D3	P	D3	D3	P	D3	D3	D3	D3	P	D3	D3	P	D3	D3

DC Persistent Memory Module (DCPMM) setup

Follow the instructions in this section to complete required setup before installing DCPMMs for the first time, determine the most suitable configuration, and install memory modules accordingly.

Complete the following steps to finish system setup to support DCPMMs, and install the memory modules according to the designated combination.

1. Update the system firmware to the latest version that supports DCPMMs (see [“Update the firmware” on page 80](#)).
2. Make sure to meet all the following requirements before installing DCPMMs.
 - All the DCPMMs that are installed must be of the same part number.
 - All the DRAM DIMMs that are installed must be of the same type, rank, and capacity with minimum capacity of 16 GB. It is recommended to use Lenovo DRAM DIMMs of the same part number.
3. Refer to [“DC Persistent Memory Module \(DCPMM\) installation order” on page 32](#) to determine the most suitable combination and the following:
 - Number and capacity of the DCPMMs and DRAM DIMMs to install.

- Check if the presently installed processors support the combination. If not, replace the processors with ones that support the combination.
4. Based on the determined DCPMM combination, acquire the DCPMMs, DRAM DIMMs and processors if necessary.
 5. Replace the processors if necessary (see “Processor and heat sink replacement” in *Maintenance Manual*).
 6. Remove all the memory modules that are installed (see “Remove a memory module” in *Maintenance Manual*).
 7. Follow the slot combination in “DC Persistent Memory Module (DCPMM) installation order” on page 32 to install all the DCPMMs and DRAM DIMMs (see “Install a DIMM” on page 47).
 8. Disable security on all the installed DCPMMs (see “Configure DC Persistent Memory Module (DCPMM)” on page 85).
 9. Make sure the DCPMM firmware is the latest version. If not, update it to the latest version (see https://sysmgmt.lenovofiles.com/help/topic/com.lenovo.lxca.doc/update_fw.html).
 10. Configure DCPMMs so that the capacity is available for use (see “Configure DC Persistent Memory Module (DCPMM)” on page 85).

Adding memory modules with DCPMMs

Follow the instructions in this section to add memory modules to the existing configuration with DCPMMs.

If DCPMMs are already installed and configured in the system, complete the following steps to add new memory modules.

1. Update the system firmware to the latest version (see “Update the firmware” on page 80).
2. Consider the following DCPMM requirements before acquiring new DCPMM units.
 - All the DCPMMs that are installed must be of the same part number.
 - All the DRAM DIMMs that are installed must be of the same type, rank, and capacity with minimum capacity of 16 GB. It is recommended to use Lenovo DRAM DIMMs of the same part number.
3. See “DC Persistent Memory Module (DCPMM) installation order” on page 32 to determine the new configuration, and acquire memory modules accordingly.
4. If the DCPMMs are in Memory Mode and will stay in Memory Mode after new units are installed, follow the combination in “DC Persistent Memory Module (DCPMM) installation order” on page 32 to install the new modules in the correct slots. Otherwise, go to the next step.
5. Make sure to back up the stored data.
6. If the App Direct capacity is interleaved:
 - a. Delete all the created namespaces and filesystems in the operating system.
 - b. Perform secure erase on all the DCPMMs that are installed. Go to **Intel Optane DCPMMs → Security → Press to Secure Erase** to perform secure erase.

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

7. Follow the slot combination in “DC Persistent Memory Module (DCPMM) installation order” on page 32 to install all the DCPMMs and DRAM DIMMs (see “Install a DIMM” on page 47).
8. Disable security on all the installed DCPMMs (see “Configure DC Persistent Memory Module (DCPMM)” on page 85).

9. Make sure the DCPMM firmware is the latest version. If not, update it to the latest version (see https://sysmgt.lenovofiles.com/help/topic/com.lenovo.lxca.doc/update_fw.html).
10. Configure DCPMMs so that the capacity is available for use (see “Configure DC Persistent Memory Module (DCPMM)” on page 85).
11. Restore the data that have been backed up.

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 your server. For a list of supported optional components for the server, see <https://serverproven.lenovo.com/>.
- Always download and apply the latest firmware. This will help ensure that any known issues are addressed, and that your server is ready to work with optimal performance. Go to [ThinkSystem SD650 Neptune® DWC Trays and DW612 Neptune® DWC Enclosure Drivers and Software](#) to download firmware updates for your server.
- It is good practice to make sure that the server 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.

Remove a DWC tray from the enclosure

Use this information to remove a DWC tray from the enclosure.

S002



CAUTION:

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

Read the “Installation Guidelines” on page 28 to ensure that you work safely.

Complete the following steps to remove a DWC tray from the enclosure.

- Step 1. Rotate the release latches as shown in the illustration. The DWC tray moves out of the tray bay approximately 0.6 cm (0.25 inch).

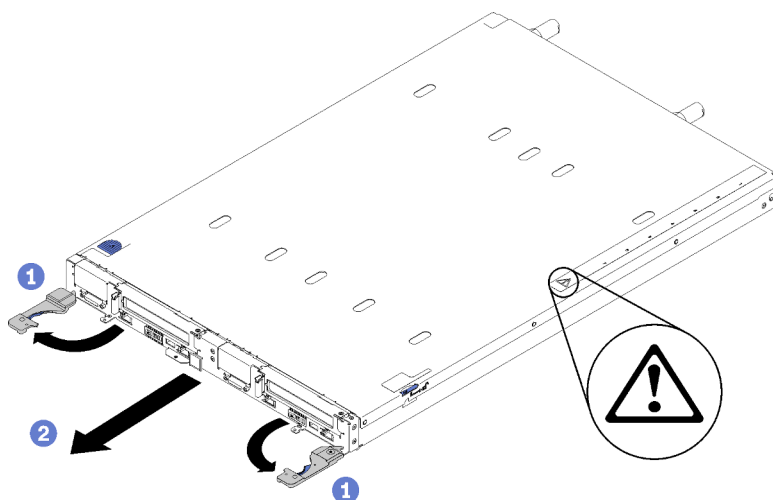


Figure 16. DWC tray removal

Attention:

- To maintain proper system cooling, do not operate the ThinkSystem DW612 Neptune® DWC Enclosure Type 7D1L without a DWC tray or tray bay filler installed in each tray bay.
- When you remove the DWC tray, note the tray bay number. Reinstalling a DWC tray into a different tray bay from the one it was removed from can have unintended consequences. Some configuration information and update options are established according to tray bay number. If you reinstall the DWC tray into a different tray bay, you might have to reconfigure the DWC tray.

- Step 2. Pull the DWC tray out of the DW612 Enclosure until you see the warning icon in the right side of the cover; then, adjust hands and grip tray (~38lb) at sides to carefully pull out of enclosure.
- Step 3. Once the DWC tray has been serviced, place the tray back into the original position as soon as possible.

Demo video

[Watch the procedure on YouTube.](#)

Remove the tray cover

Use this information to remove the tray cover.

Read the [“Installation Guidelines”](#) on page 28 to ensure that you work safely.

Complete the following steps to remove the tray cover.

- Step 1. Press on the release latch and the push point at the same time and slide the cover toward the rear of the DWC tray.

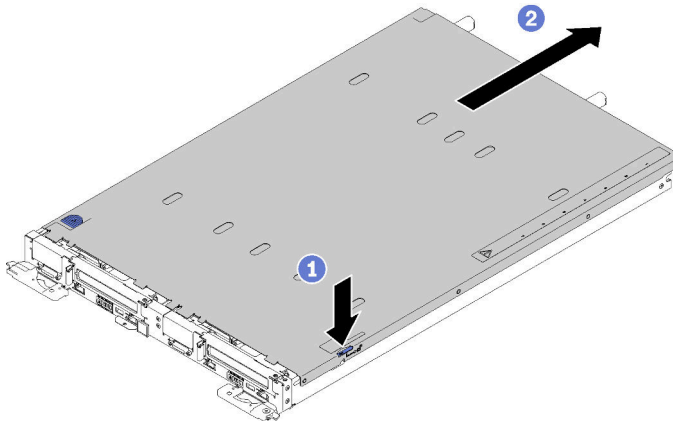


Figure 17. Tray cover removal

Step 2. Lift the cover off the DWC tray and set it aside.

Note: Service label instructions are located on the underside of each tray cover.

Demo video

[Watch the procedure on YouTube.](#)

Remove a DIMM

Use this information to remove a memory module.

See [“Memory module installation rules and order” on page 31](#) for detailed information about memory configuration and setup.

1. Read the [“Installation Guidelines” on page 28](#) to ensure that you work safely.
2. If you are removing a DCPMM in App Direct or Mixed Memory Mode, make sure to:
 - a. Back up the stored data.
 - b. If the App Direct capacity is interleaved:
 - 1) Delete all the created namespaces and filesystems in the operating system.
 - 2) Perform secure erase on all the DCPMMs that are installed. Go to **Intel Optane DCPMMs → Security → Press to Secure Erase** to perform secure erase.

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

If the App Direct capacity is not interleaved:

- 1) Delete the namespace and filesystem of the DCPMM unit to be replaced in the operating system.
- 2) Perform secure erase on the DCPMM unit that is to be replaced. Go to **Intel Optane DCPMMs → Security → Press to Secure Erase** to perform secure erase.

Complete the following steps to remove a DIMM.

Step 1. Remove the DIMM cover.

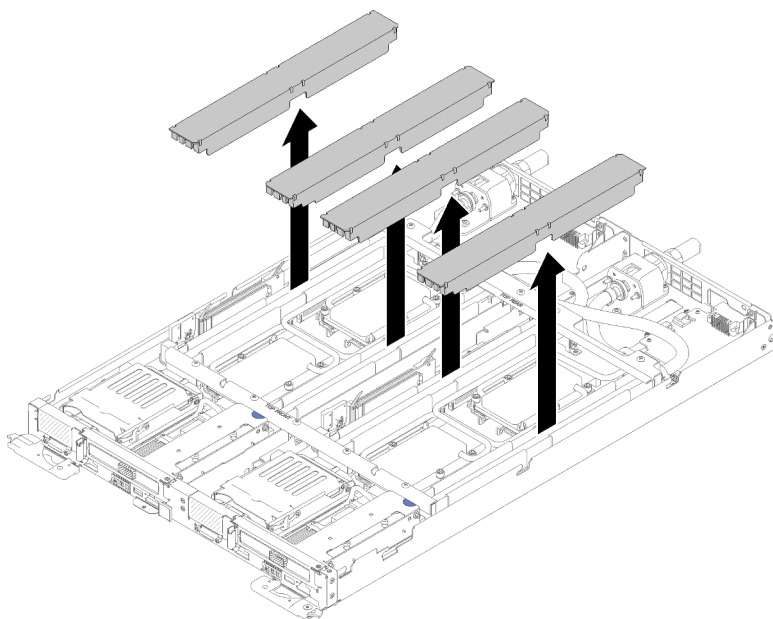


Figure 18. DIMM cover removal

Step 2. Carefully use the DIMM tool to press the retaining clips outward on each end of the DIMM connector.

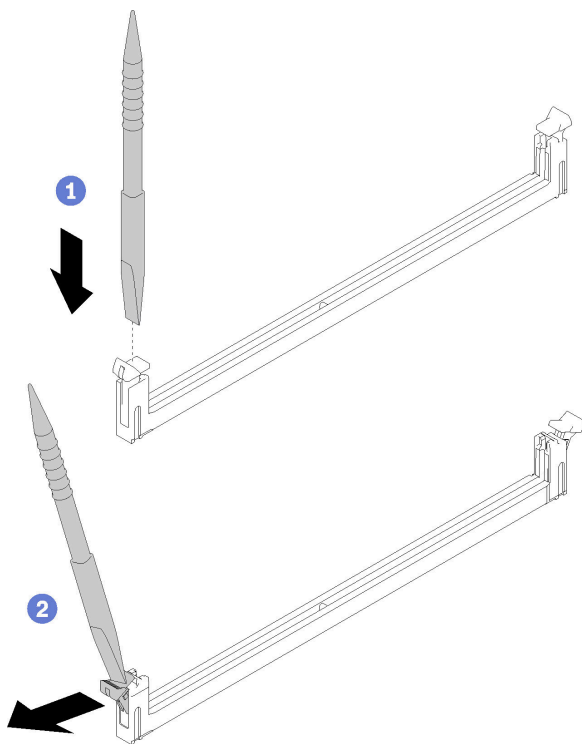


Figure 19. DIMM removal

Attention: To avoid breaking the retaining clips or damaging the DIMM connectors, open and close the clips gently.

Step 3. Carefully remove the DIMM.

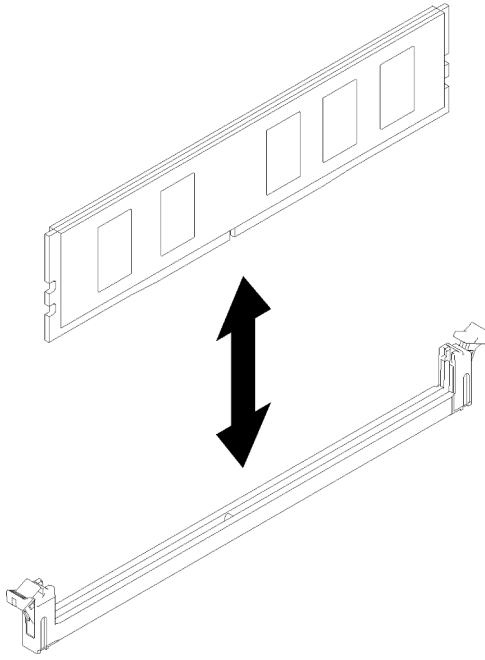


Figure 20. DIMM removal

Demo video

[Watch the procedure on YouTube.](#)

Remove a drive

Use this information to remove a drive.

Read the [“Installation Guidelines” on page 28](#) to ensure that you work safely.

Complete the following steps to remove a drive.

Step 1. Squeeze the spring steel latches on sides while lifting up on the top portion of drive cage.

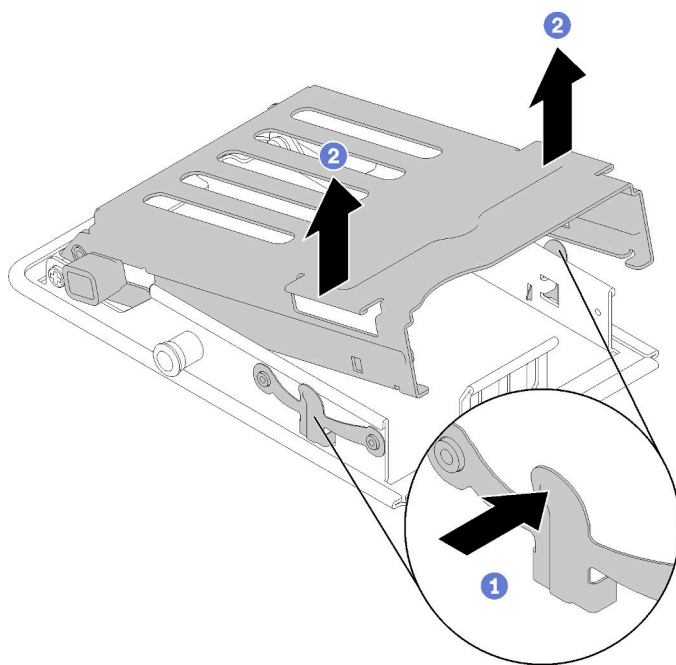


Figure 21. Releasing the drive cage

Step 2. Push the release latch forward to release the drive; then, slide the drive out of the drive cage.

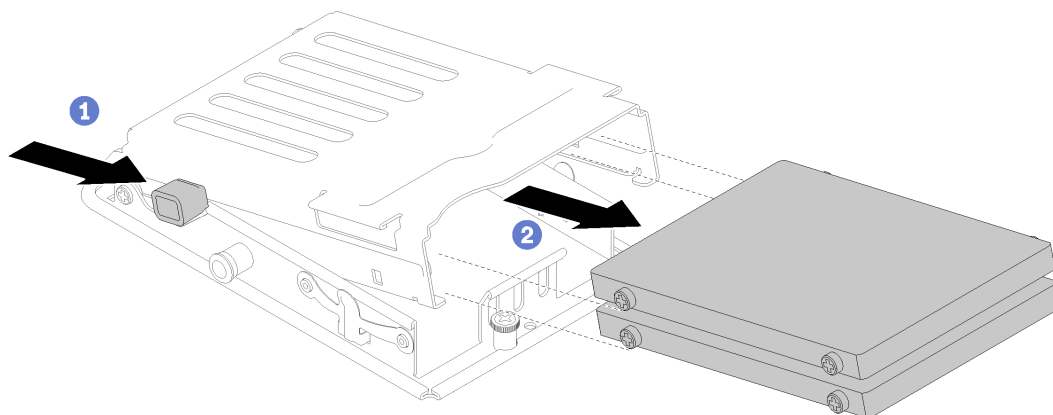


Figure 22. Drive removal

Note: For individuals with large fingers, it may be useful to remove the blank bezel filler to provide more access to drives.

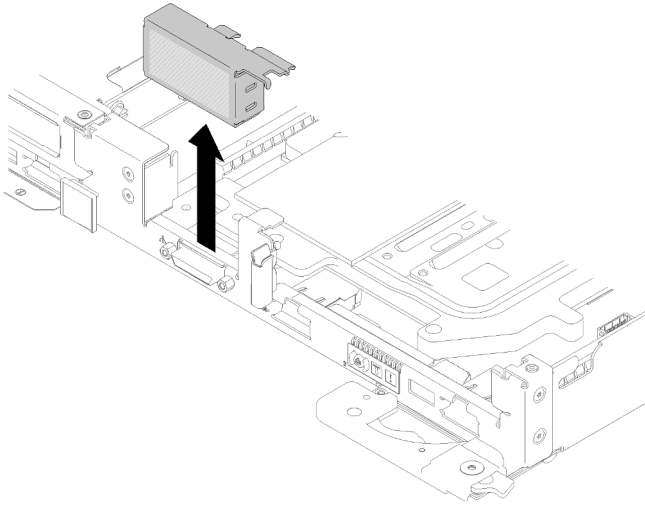


Figure 23. Blank bezel filler removal

Demo video

[Watch the procedure on YouTube.](#)

Remove the M.2 backplane

Use this information to remove the M.2 backplane.

S001



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

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

Read the [“Installation Guidelines” on page 28](#) to ensure that you work safely.

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

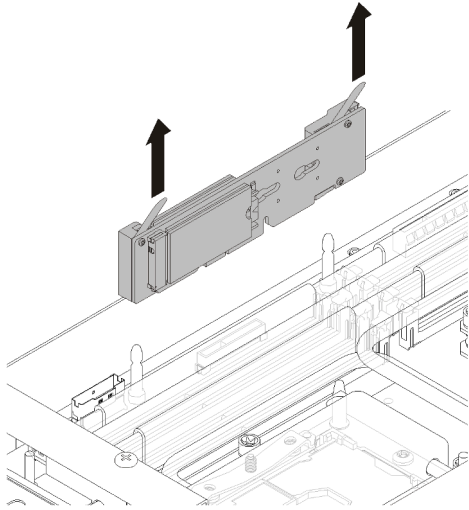


Figure 24. M.2 backplane removal

Step 1. Remove the M.2 backplane from the system board by pulling up on both ends of the backplane at the same time.

Demo video

[Watch the procedure on YouTube.](#)

Remove an adapter

Use this information to remove an adapter.

Read the [“Installation Guidelines” on page 28](#) to ensure that you work safely.

Complete the following steps to remove an adapter.

Step 1. Remove two silver Torx T10 screws; then, remove the retaining clamp.

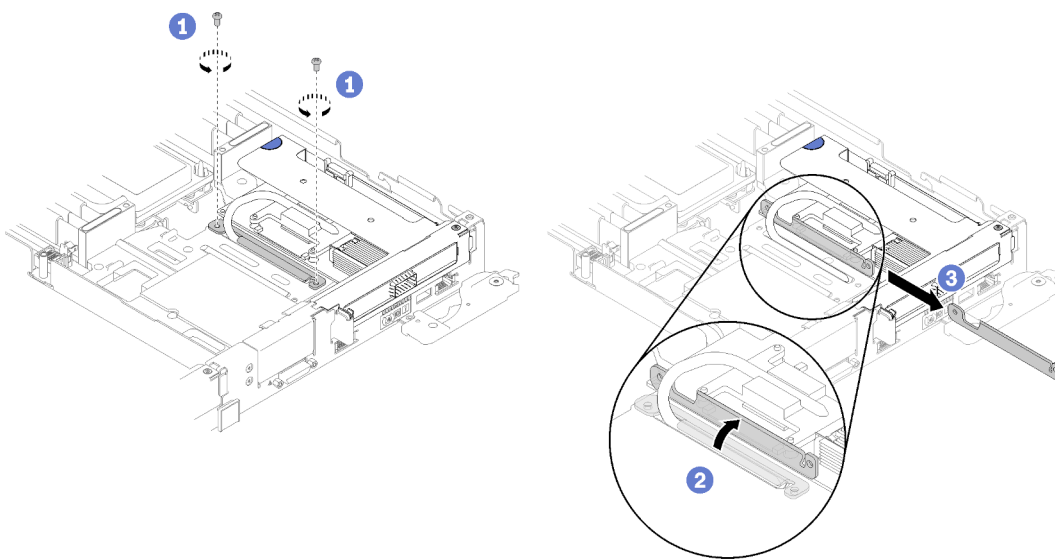


Figure 25. Screws and retaining clamp removal

Step 2. Carefully grasp the PCIe riser-cage assembly by its edges and remove it out of the node.

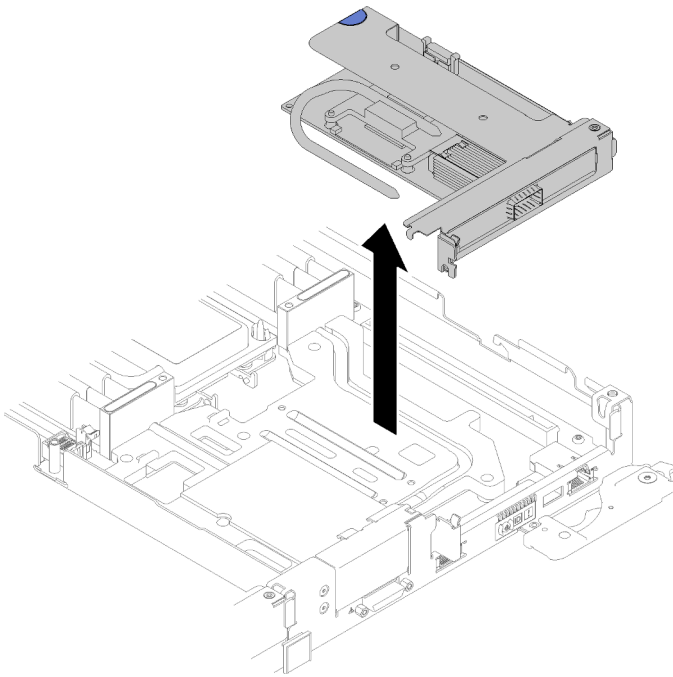


Figure 26. PCIe riser-cage assembly removal

Step 3. Grasp the adapter by its edges and carefully pull it out of the PCIe riser-cage.

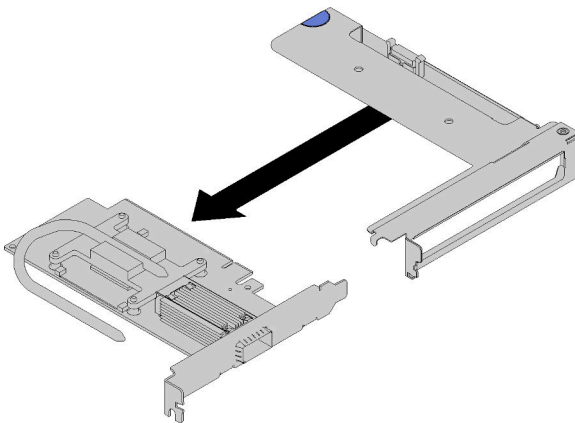


Figure 27. Adapter removal

Demo video

[Watch the procedure on YouTube.](#)

Remove an Internal Faceplate Transition (IFT) adapter

Use this information to remove an IFT adapter.

Read the [“Installation Guidelines” on page 28](#) to ensure that you work safely.

Complete the following steps to remove an IFT adapter.

- Step 1. Rotate the IFT connector release spring up and away from the cable side of the connector; then, disconnect the IFT connector.

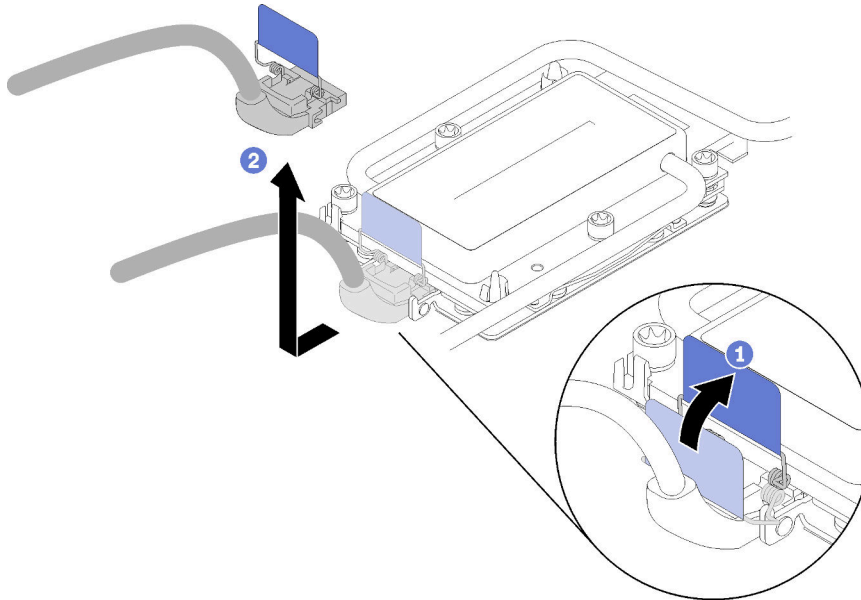


Figure 28. Disconnecting the IFT connector

- Step 2. Disconnect the other connector from the system board.
- Step 3. Carefully grasp the PCIe riser-cage assembly by its edges and remove it out of the node; then, disconnect the connector.

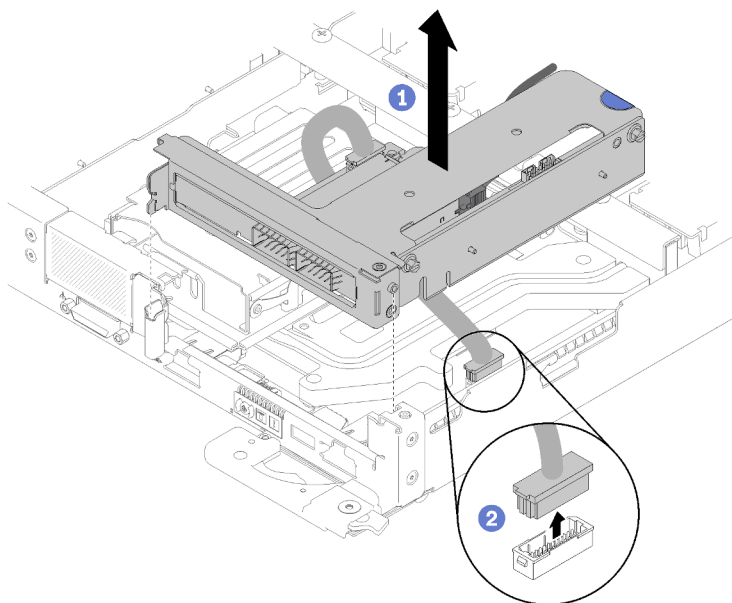


Figure 29. PCIe riser-cage assembly removal

- Step 4. Grasp the adapter by its edges and carefully pull it out of the PCIe riser-cage.

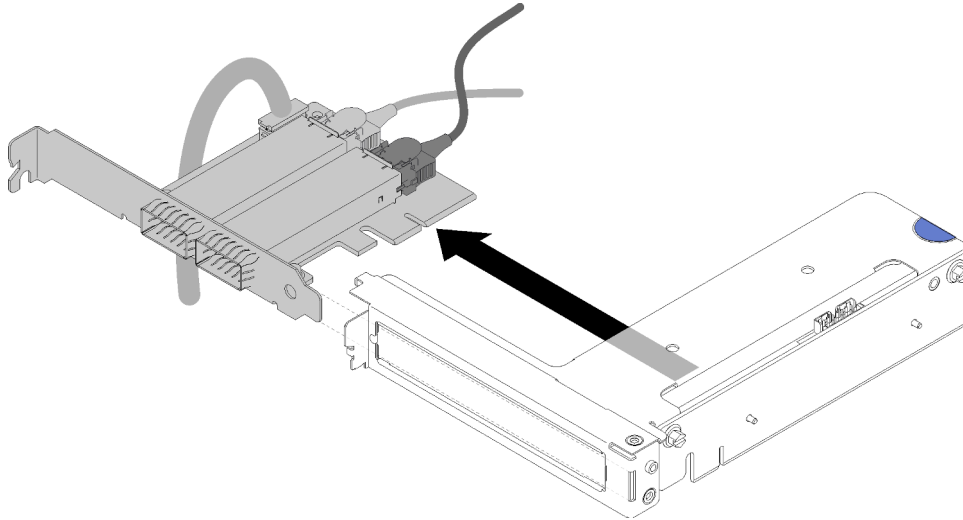


Figure 30. IFT adapter removal

Install a DIMM

Use this information to install a DIMM.

See [“Memory module installation rules and order” on page 31](#) for detailed information about memory configuration and setup.

Before you install a DIMM:

1. Read the [“Installation Guidelines” on page 28](#) to ensure that you work safely.
2. If you are installing DCPMMs for the first time, follow the instructions in [“DC Persistent Memory Module \(DCPMM\) setup” on page 35](#) so that the system supports DCPMMs.

Attention: Memory modules are sensitive to static discharge and require special handling. In addition to the standard guidelines for [“Handling static-sensitive devices” on page 30](#):

- Always wear an electrostatic-discharge strap when removing or installing memory modules. Electrostatic-discharge gloves can also be used.
- Never hold two or more memory modules together so that they touch. Do not stack memory modules directly on top of each other during storage.
- Never touch the gold memory module connector contacts or allow these contacts to touch the outside of the memory-module connector housing.
- Handle memory modules with care: never bend, twist, or drop a memory module.
- Do not use any metal tools (such as jigs or clamps) to handle the memory modules, because the rigid metals may damage the memory modules.
- Do not insert memory modules while holding packages or passive components, which can cause package cracks or detachment of passive components by the high insertion force.

You can find the DIMM tool attached to the air baffle.

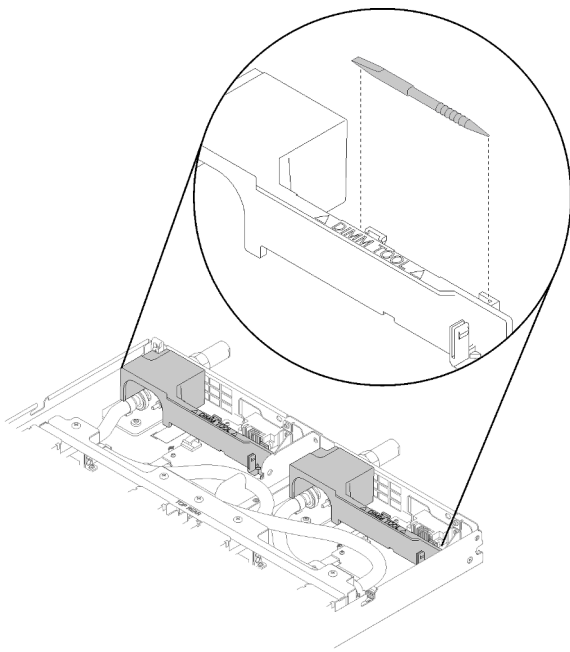


Figure 31. DIMM tool

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

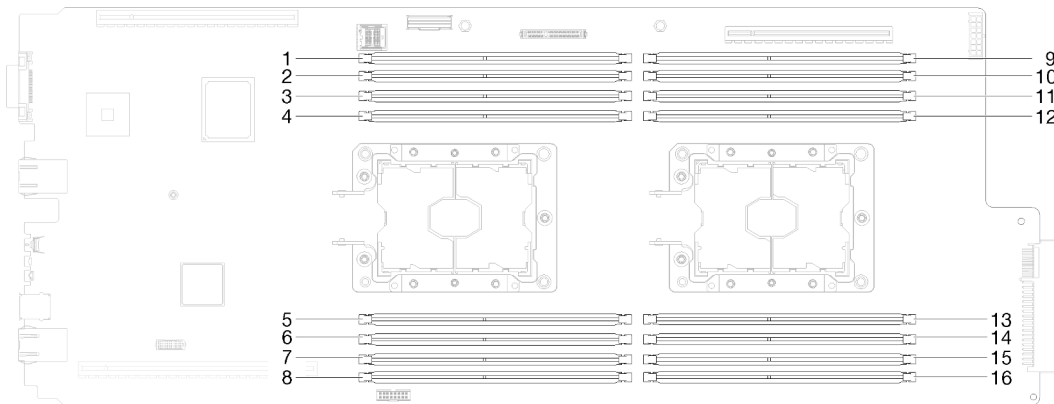


Figure 32. The location of the DIMM connectors on the system board

Complete the following steps to install a DIMM.

Important: Before installing a memory module, make sure that you understand the required installation order, depending on whether you are implementing memory mirroring, memory rank sparing, or independent memory mode. See [“Memory module installation rules and order” on page 31](#) for the required installation order.

Step 1. Remove the DIMM cover.

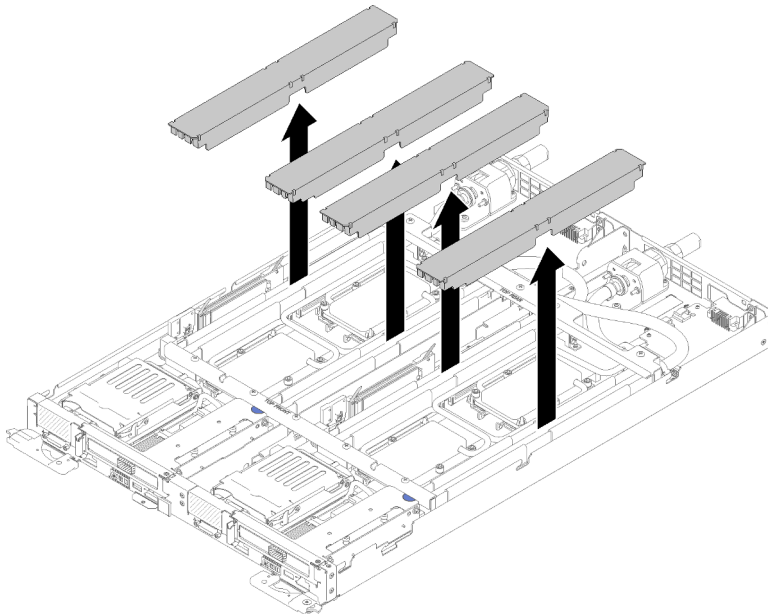


Figure 33. DIMM cover removal

Step 2. Carefully use the DIMM tool to press down the retaining clips on each end of the DIMM connector.

Note: DIMM tool is recommended due to space limitations caused by location of water loop tubes through the memory section.

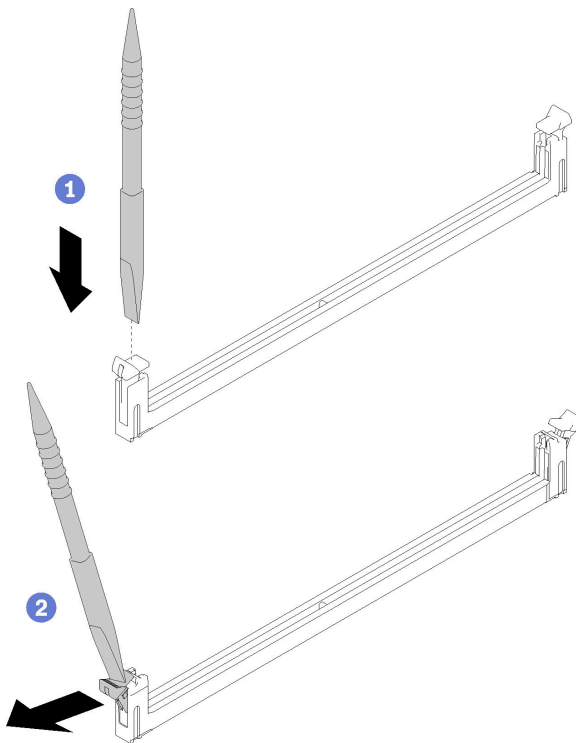


Figure 34. DIMM removal

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.

- Step 3. 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 4. Align the DIMM with the slot, and gently place the DIMM on the slot with both hands.
- Step 5. Firmly press both ends of the DIMM straight down into the slot until the retaining clips snap into the locked position.

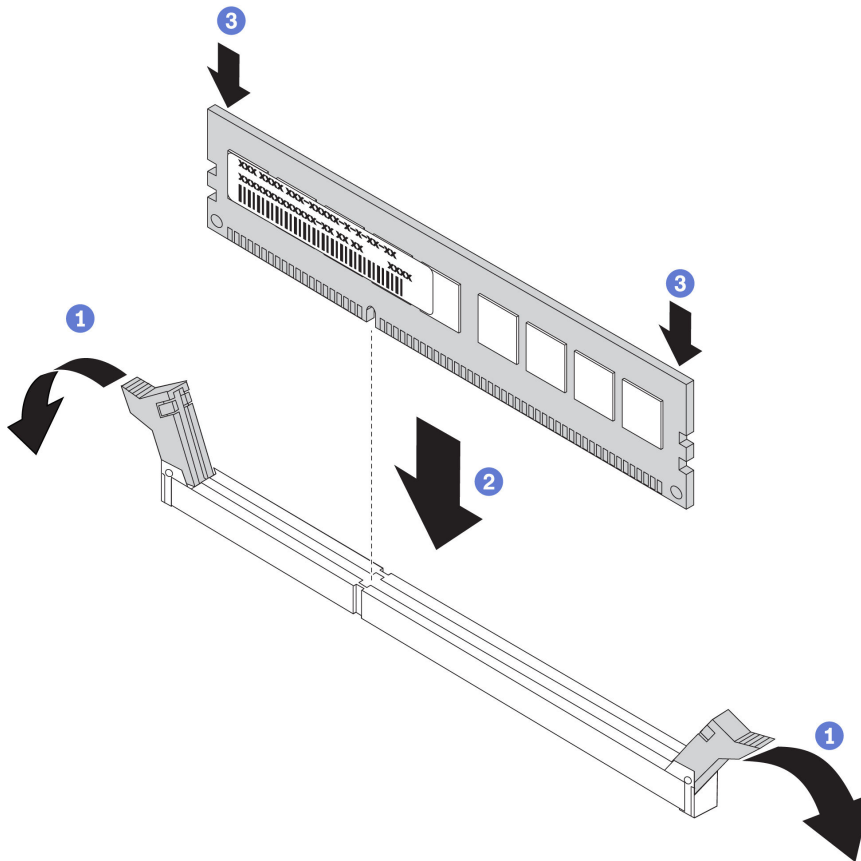


Figure 35. DIMM installation

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. Reinstall the DIMM cover.

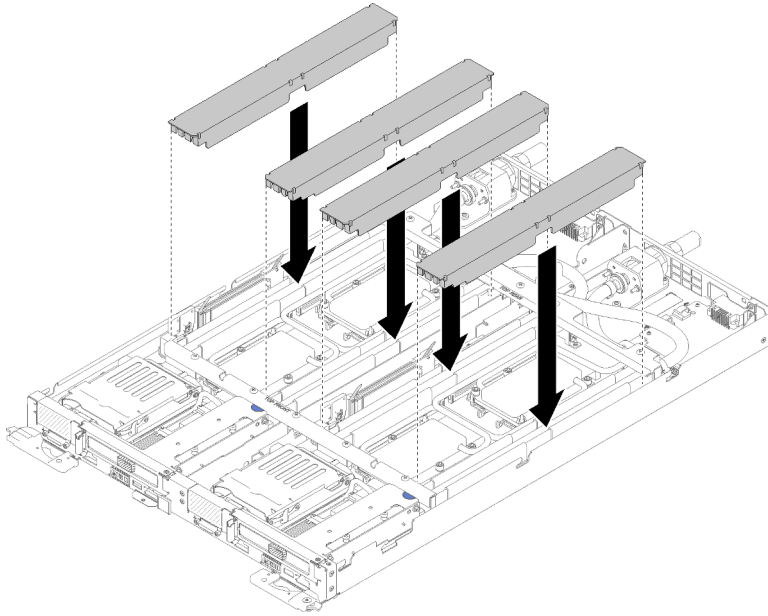


Figure 36. DIMM cover installation

After you install a DIMM, complete the following steps:

1. Reinstall the tray cover (see [“Install the tray cover” on page 63](#)).
2. Reinstall the tray (see [“Install a DWC tray in the enclosure” on page 64](#)).
3. Check the power LED on each node to make sure it changes from fast blink to slow blink to indicate both nodes are ready to be powered on.
4. If you have installed a DCPMM:
 - a. Update the system firmware to the latest version (see [“Update the firmware” on page 80](#)).
 - b. Make sure the firmware of all the DCPMM units is the latest version. If not, update it to the latest version (see https://sysmgt.lenovofiles.com/help/topic/com.lenovo.lxca.doc/update_fw.html).
 - c. Configure DCPMMs and DRAM DIMMs (see [“Configure DC Persistent Memory Module \(DCPMM\)” on page 85](#)).
 - d. Restore the data that have been backed up if necessary.

Demo video

[Watch the procedure on YouTube](#)

Install an M.2 drive into the M.2 backplane

Use this information to install an M.2 drive in the M.2 backplane.

S001





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

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

Before you install an M.2 drive into the M.2 backplane:

1. Read the [“Installation Guidelines” on page 28](#) to ensure that you work safely.

See the following table for supported M.2 drive configurations.

Table 18. M.2 drive configuration

M.2 drive configuration	Support status
Single 32 GB M.2 drive (42 mm long)	Supported
Single 128 GB M.2 drive (80 mm long)	Supported
Dual 32 GB M.2 drives (42 mm long) with RAID backplane	Supported
Dual 128 GB M.2 drives (80mm long) with RAID backplane	Only supported in certain environments. Contact Lenovo Services for additional details.

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

Step 1. Locate the connector on each side of the M.2 backplane.

Notes:

- Some M.2 backplanes support two identical M.2 drives. When two drives are installed, align and support both drives when sliding the retainer forward to secure the drives.

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.

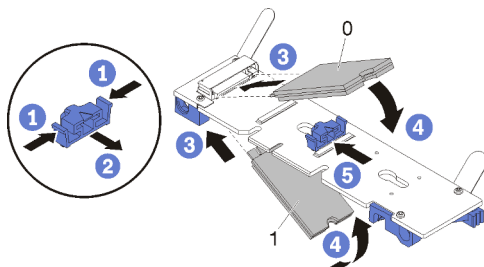


Figure 37. M.2 drive installation

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.

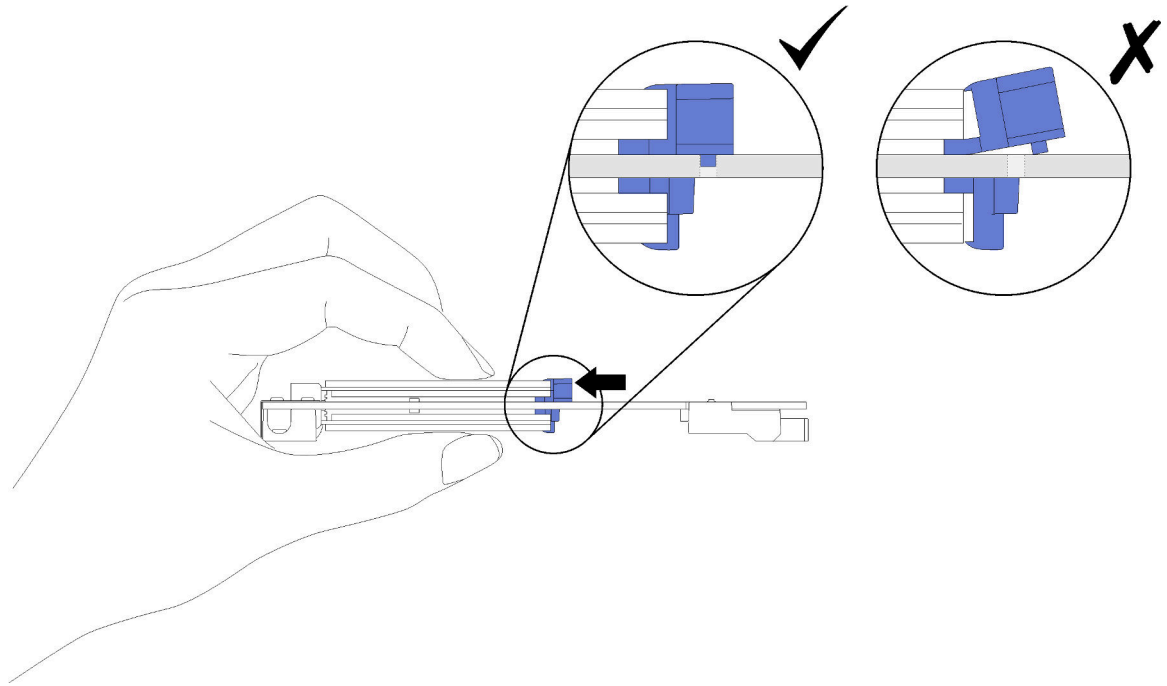


Figure 38. M.2 drive installation

After you install an M.2 drive into the M.2 backplane, complete the following steps:

1. Reinstall the M.2 backplane (see [“Install the M.2 backplane” on page 53](#)).
2. Reinstall the tray cover (see [“Install the tray cover” on page 63](#)).
3. Reinstall the tray (see [“Install a DWC tray in the enclosure” on page 64](#)).
4. Check the power LED on each node to make sure it changes from fast blink to slow blink to indicate both nodes are ready to be powered on.

Demo video

[Watch the procedure on YouTube](#)

Install the M.2 backplane

Use this information to install the M.2 backplane.

S001





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

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

Before you install the M.2 backplane:

1. Read the [“Installation Guidelines” on page 28](#) to ensure that you work safely.

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

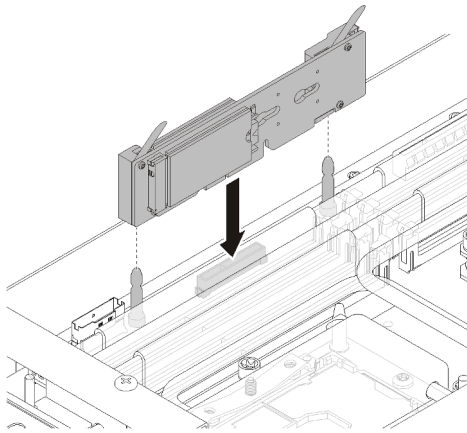


Figure 39. M.2 backplane installation

- 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. Reinstall the tray cover (see [“Install the tray cover” on page 63](#)).
2. Reinstall the tray (see [“Install a DWC tray in the enclosure” on page 64](#)).
3. Check the power LED on each node to make sure it changes from fast blink to slow blink to indicate both nodes are ready to be powered on.

Demo video

[Watch the procedure on YouTube](#)

Install a drive

Use this information to install a drive.

Before you install a drive:

1. Read the [“Installation Guidelines” on page 28](#) to ensure that you work safely.

Complete the following steps to install a drive.

Step 1. Squeeze two release latches to release the drive cage.

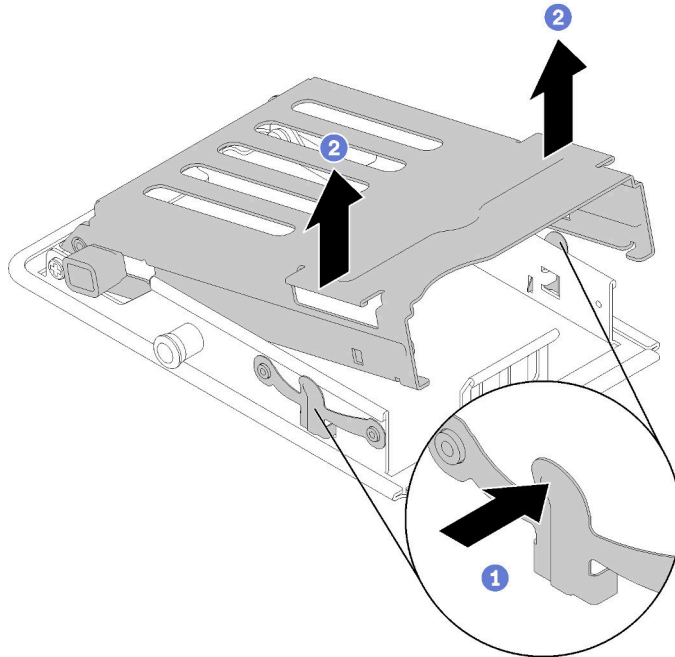


Figure 40. Releasing the drive cage

Step 2. Align the drive with drive cage and carefully slide the drive into the drive cage.

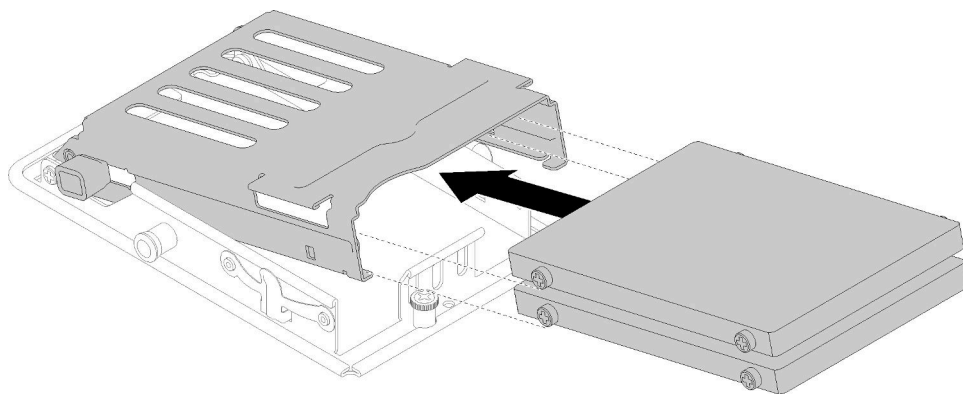


Figure 41. Drive installation

Step 3. Pull the blue retention latch and rotate the drive cage down. Carefully push down on the top of drive cage to make sure it is correctly seated.

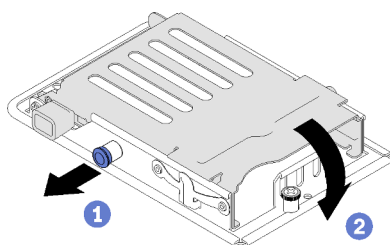


Figure 42. Drive cage installation

After you install a drive, complete the following steps:

1. Reinstall the tray cover (see [“Install the tray cover” on page 63](#)).
2. Reinstall the tray (see [“Install a DWC tray in the enclosure” on page 64](#)).
3. Check the power LED on each node to make sure it changes from fast blink to slow blink to indicate both nodes are ready to be powered on.

Demo video

[Watch the procedure on YouTube](#)

Install an adapter

Use this information to install an adapter.

Before you install an adapter:

1. Read the [“Installation Guidelines” on page 28](#) to ensure that you work safely.

Note: If the ThinkSystem Mellanox ConnectX-6 HDR/200GbE QSFP56 1-port PCIe VPI Adapter (Shared IO) is installed, make sure that you install the adapters correctly as the following illustration.

There are two cables come with the Auxiliary adapter, make sure that you connect these two cables to the Shared IO adapter as the following illustration.

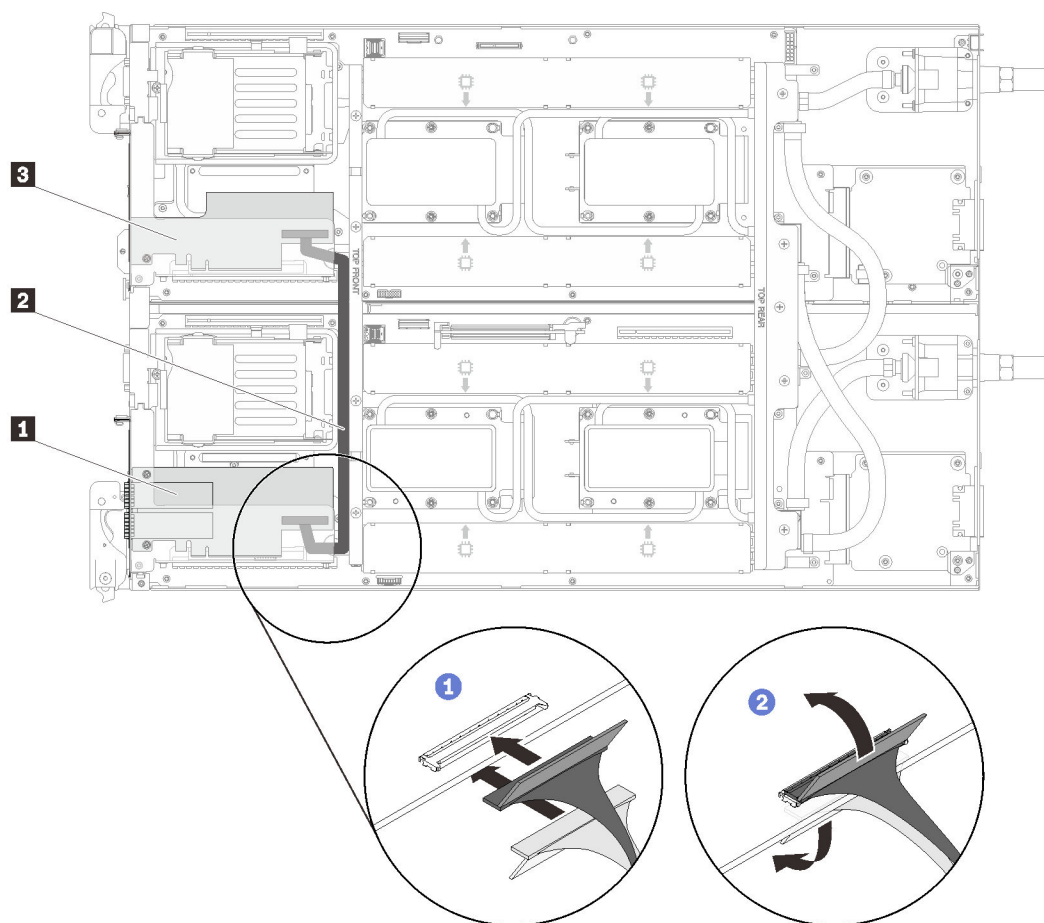


Figure 43. ConnectX-6 adapter (Shared IO)

1 Shared IO adapter	3 Auxiliary adapter
2 Slim-Line 8I SAS cable	

Complete the following steps to remove an adapter.

Step 1. Align the adapter with the PCIe slot on the riser-cage. Then, carefully press the adapter straight into the slot until it is securely seated.

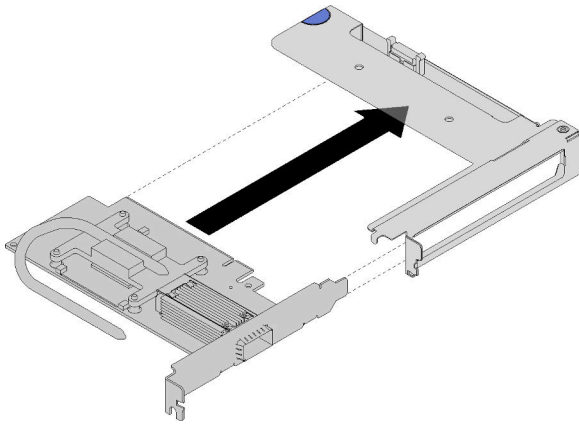


Figure 44. Adapter installation

Step 2. Install the PCIe riser assembly.

- a. Align the heat pipe extending from the PCIe riser assembly with the trough in the conduction plate.
- b. Orient the PCIe riser assembly above the connector.
- c. Press the PCIe riser assembly firmly into the node.

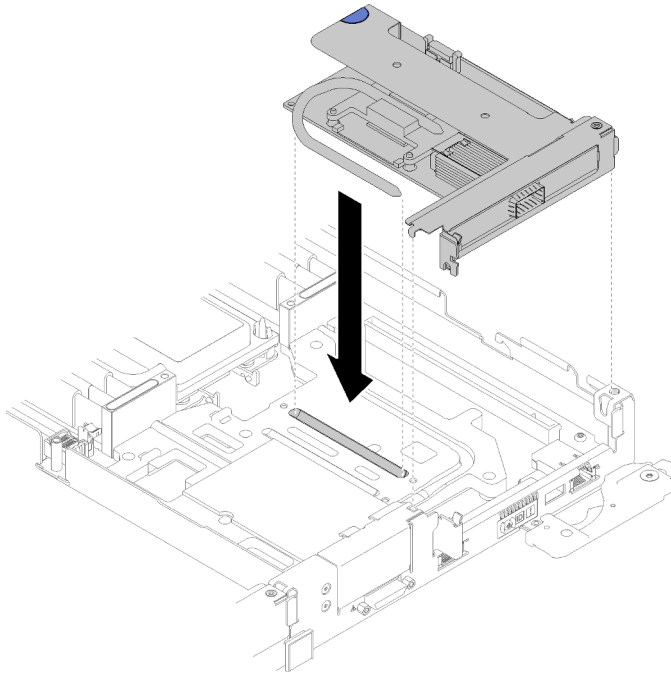


Figure 45. PCIe riser-cage assembly installation

- d. Slide the retaining clamp underneath the heat pipe; then, rotate the clamp over the heat pipe in the trough.
- e. Secure the clamp by inserting and tightening two silver Torx T10 screws.

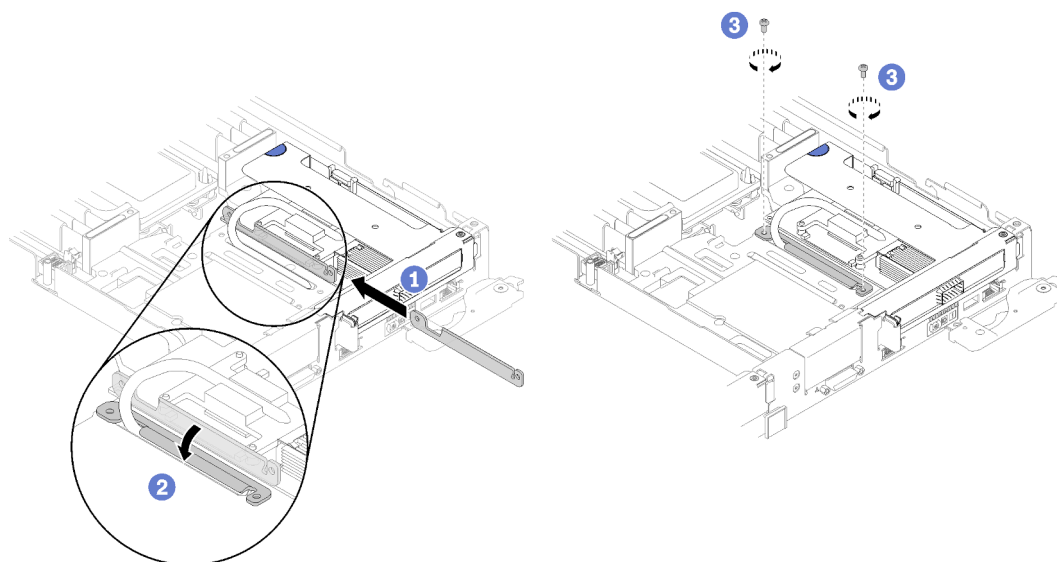


Figure 46. Screws and retaining clamp installation

After you install an adapter, complete the following steps:

1. Reinstall the front cross brace.

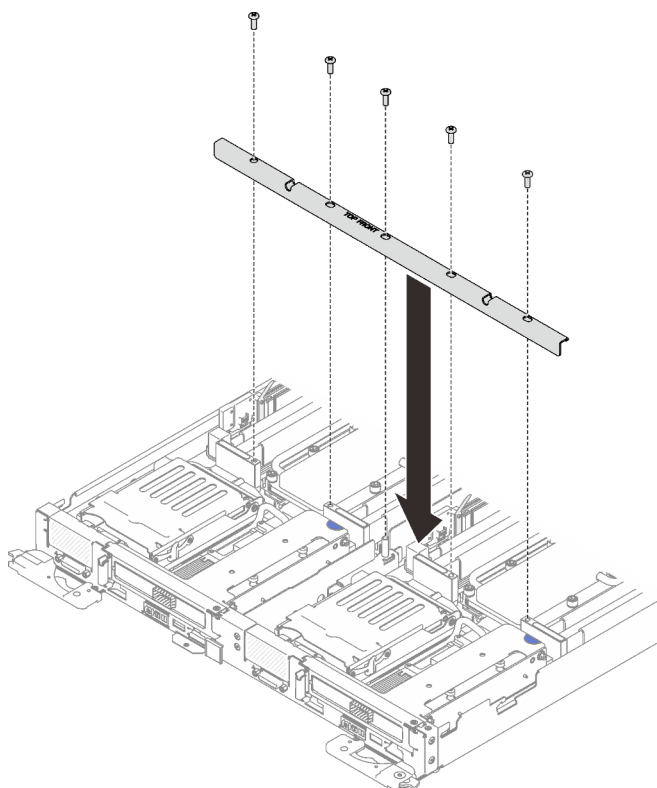


Figure 47. Front cross brace installation

2. Reinstall the tray cover (see [“Install the tray cover”](#) on page 63).
3. Reinstall the tray (see [“Install a DWC tray in the enclosure”](#) on page 64).

4. Check the power LED on each node to make sure it changes from fast blink to slow blink to indicate both nodes are ready to be powered on.

Demo video

[Watch the procedure on YouTube](#)

Install an Internal Faceplate Transition (IFT) adapter

Use this information to install an IFT adapter.

Before you install an IFT adapter:

1. Read the [“Installation Guidelines” on page 28](#) to ensure that you work safely.

Complete the following steps to install an IFT adapter.

Step 1. Connect the IFT cable.

- a. Rotate the IFT connector release spring up and away from the cable side of the connector.
- b. Connect the IFT connector.
- c. Rotate the IFT connector release spring toward the cable side of the connector; then, press it down until it engages the clips on the processor retainer.

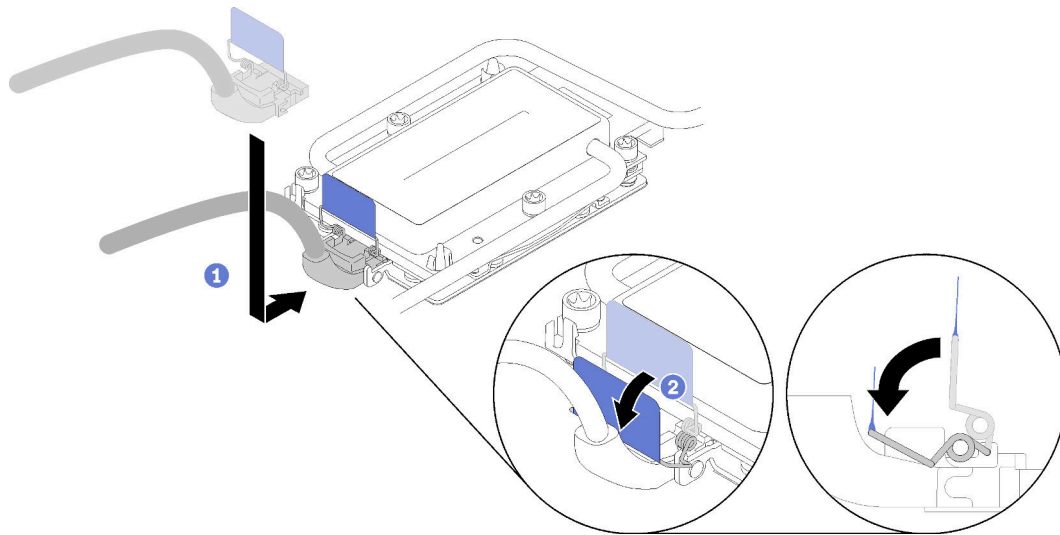


Figure 48. IFT connector connection

Step 2. Connect three connectors as illustrated.

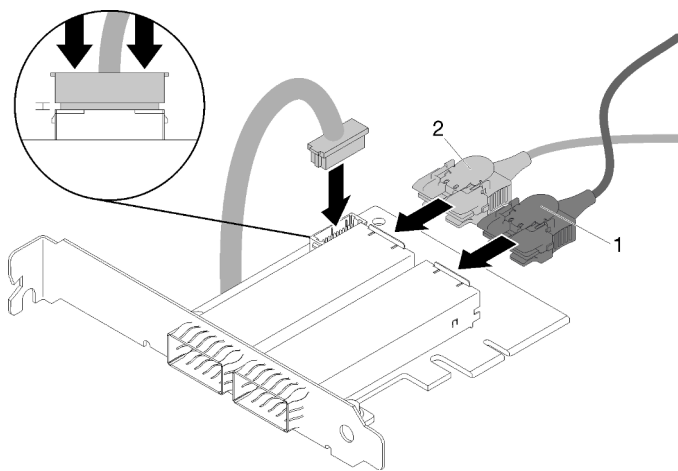


Figure 49. Connector connection

- Step 3. Align the adapter with the PCIe slot on the riser-cage. Then, carefully press the adapter straight into the slot until it is securely seated.

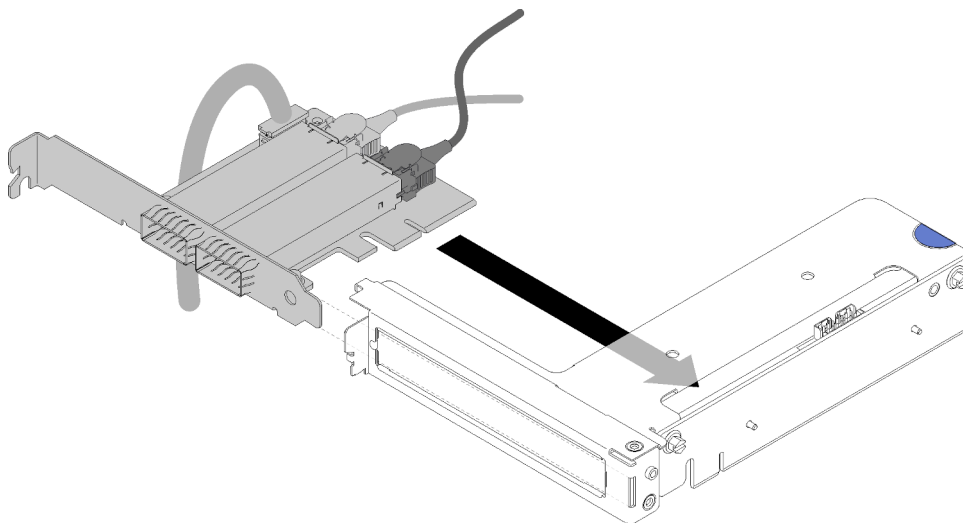


Figure 50. Adapter installation

- Step 4. Connect the connector; then, align the PCI riser-cage assembly with slots and press the PCI riser-cage assembly firmly into the node.

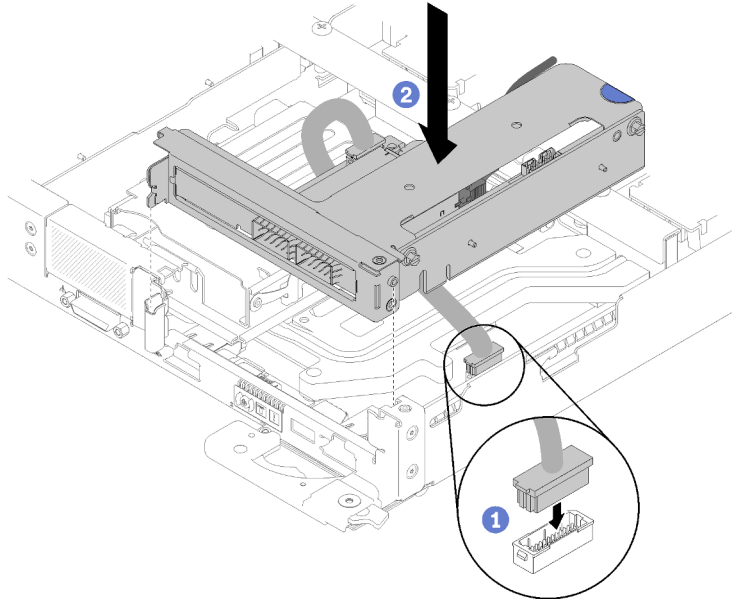


Figure 51. PCIe riser-cage assembly installation

Step 5. Carefully route cables as illustrated.

Note: Ensure the IFT cable is routed in the notch and use the cable tie to collect cables.

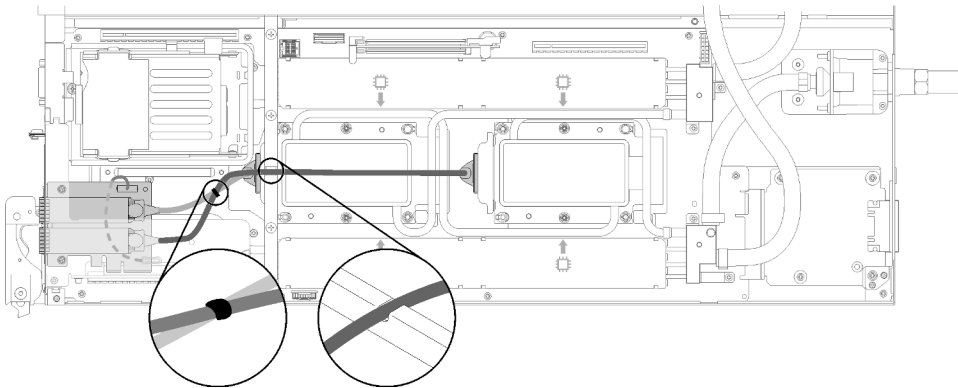


Figure 52. Cable routing

After you install an IFT adapter, complete the following steps:

1. Reinstall the front cross brace.

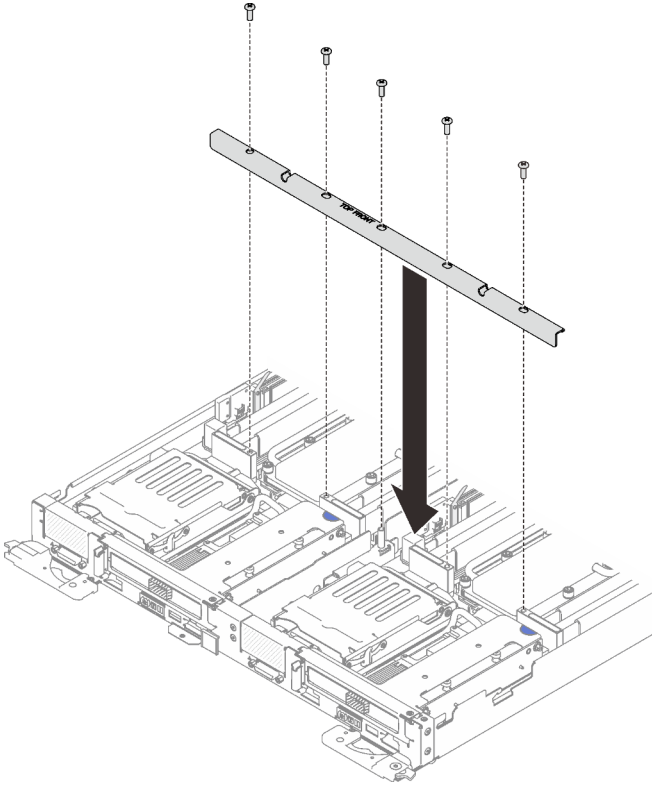


Figure 53. Front cross brace installation

2. Reinstall the tray cover (see [“Install the tray cover” on page 63](#)).
3. Reinstall the tray (see [“Install a DWC tray in the enclosure” on page 64](#)).
4. Check the power LED on each node to make sure it changes from fast blink to slow blink to indicate both nodes are ready to be powered on.

Install the tray cover

Use this information to install the tray cover.

Before you install the tray cover:

1. Read the [“Installation Guidelines” on page 28](#) to ensure that you work safely.
2. Reinstall the blank bezel filler if you have removed it.

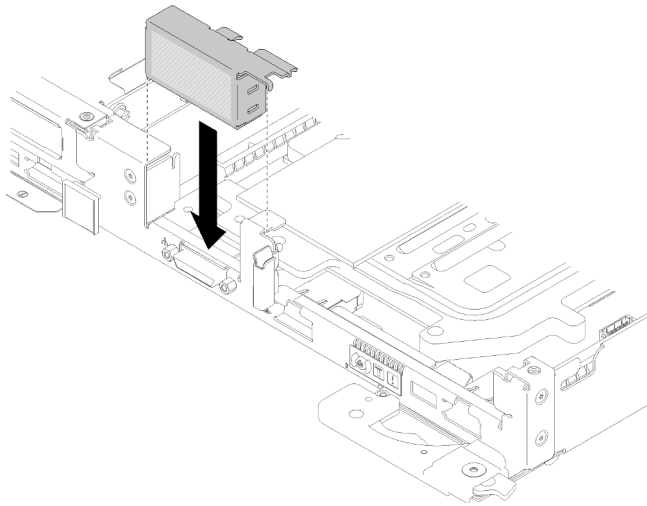


Figure 54. Blank bezel filler installation

Complete the following steps to install the tray cover.

- Step 1. Position the cover on top of the tray.
- Step 2. Slide the cover toward the front of the tray.

Important: Before you slide the cover forward, make sure that all the tabs on the front, rear, and side of the cover engage the enclosure correctly. If all the tabs do not engage the enclosure correctly, it will be very difficult to remove the cover later.

- Step 3. Make sure that the cover correctly engages all the insert tabs on the tray.

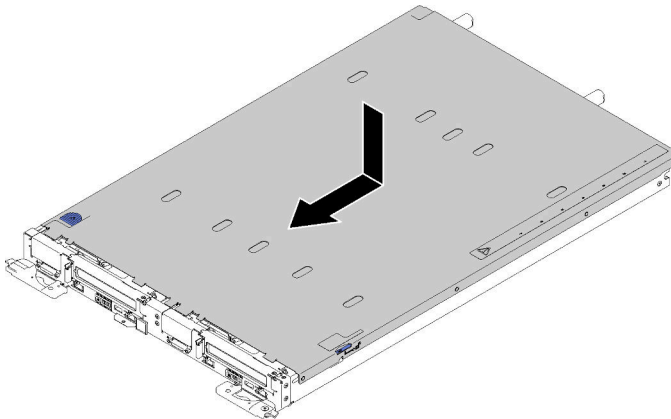


Figure 55. Tray cover installation

After you install the tray cover, complete the following steps:

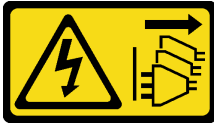
- 1. Reinstall the tray into the enclosure (see [“Install a DWC tray in the enclosure” on page 64](#)).

Demo video

[Watch the procedure on YouTube](#)

Install a DWC tray in the enclosure

Use this information to install a DWC tray in the enclosure.

**CAUTION:**

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

Before you install a DWC tray in the enclosure:

1. Read the [“Installation Guidelines” on page 28](#) to ensure that you work safely.

Complete the following steps to install a DWC tray in the enclosure.

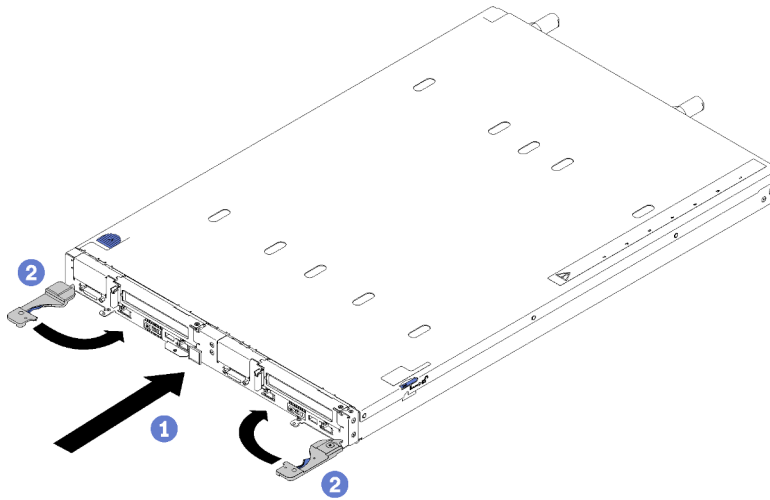


Figure 56. DWC tray installation

Step 1. Select the tray bay.

Attention:

- To maintain proper system cooling, do not operate the ThinkSystem DW612 Neptune® DWC Enclosure Type 7D1L without a DWC tray or tray bay filler installed in each tray bay.
- If you are reinstalling a DWC tray that you removed, you must install it in the same tray bay from which you removed it. Some DWC tray configuration information and update options are established according to tray bay number. Reinstalling a DWC tray into a different tray bay can have unintended consequences. If you reinstall the DWC tray into a different tray bay, you might have to reconfigure the DWC nodes in the tray.

Step 2. Make sure that the front handles on the DWC tray are in the open position.

Step 3. Insert the DWC tray into the tray bay until it stops.

Step 4. Rotate the front handles on the front of the DWC tray to the closed position to secure the tray in the enclosure.

Note: After the DWC tray is installed, the XCC in the DWC tray initializes. This process takes approximately 110 seconds. The power LED flashes rapidly, and the power button on the DWC tray does not respond until this process is complete.

- Step 5. Press the power buttons to turn on both nodes in the DWC tray.
- Step 6. Make sure that the power LED on the node control panel is lit continuously, indicating that the each node is receiving power and is turned on.
- Step 7. If you have other trays to install, do so now.

If this is the initial installation of the DWC tray in the enclosure, you must configure the DWC tray through the Setup utility and install the DWC tray operating system.

If you have changed the configuration of the DWC tray or if you are installing a different DWC tray from the one that you removed, you must configure the DWC tray through the Setup utility, and you might have to install the DWC tray operating system.

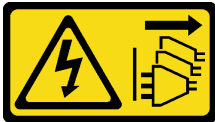
Demo video

[Watch the procedure on YouTube](#)

Install the enclosure in a rack

Use this information to install the enclosure in a rack.

S002



CAUTION:

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

Before you install the enclosure:

1. Read the [“Installation Guidelines” on page 28](#) to ensure that you work safely.
2. Three trained technicians are needed to complete the enclosure installation/removal task.
 - Two technicians hold front and rear handles at both sides of the enclosure.
 - One technician protects cables from damage.
3. To install the rails into a rack, follow the instructions that are provided in the *Rail installation Guide*.
4. Ensure four handles are attached to the enclosure when moving the enclosure.

Note: Make sure all handle posts are secured before lifting.

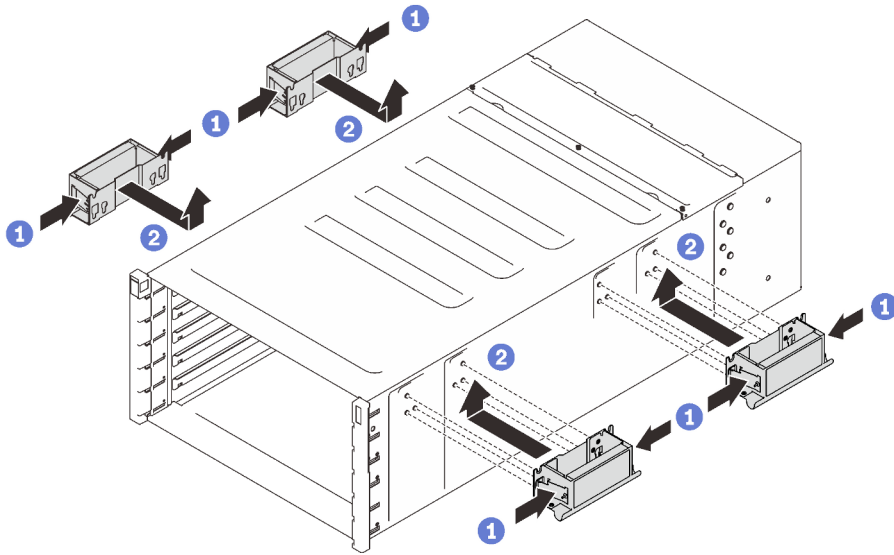


Figure 57. Attaching four handles

Complete the following steps to install the enclosure.

Step 1. Carefully put the enclosure into the rack and slide the enclosure until rear handles are near front rack rails; then, remove rear handles at both sides.

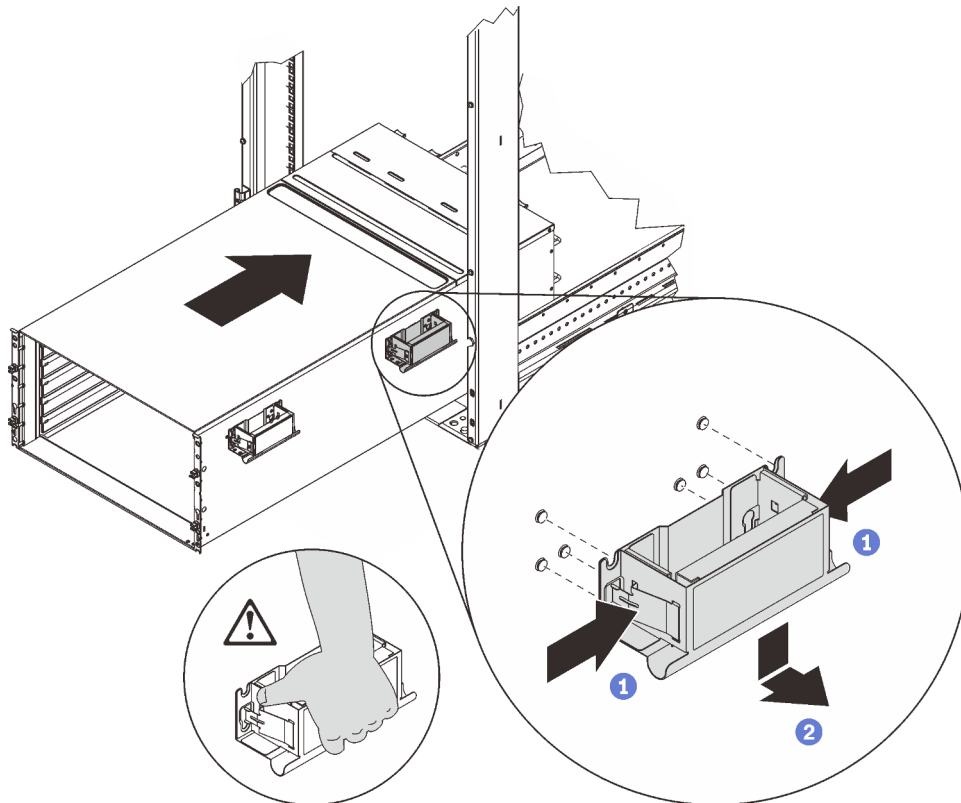


Figure 58. Rear handle removal

Step 2. Slide the enclosure farther into the rack until front handles are near front rack rails; then, remove front handles at both sides.

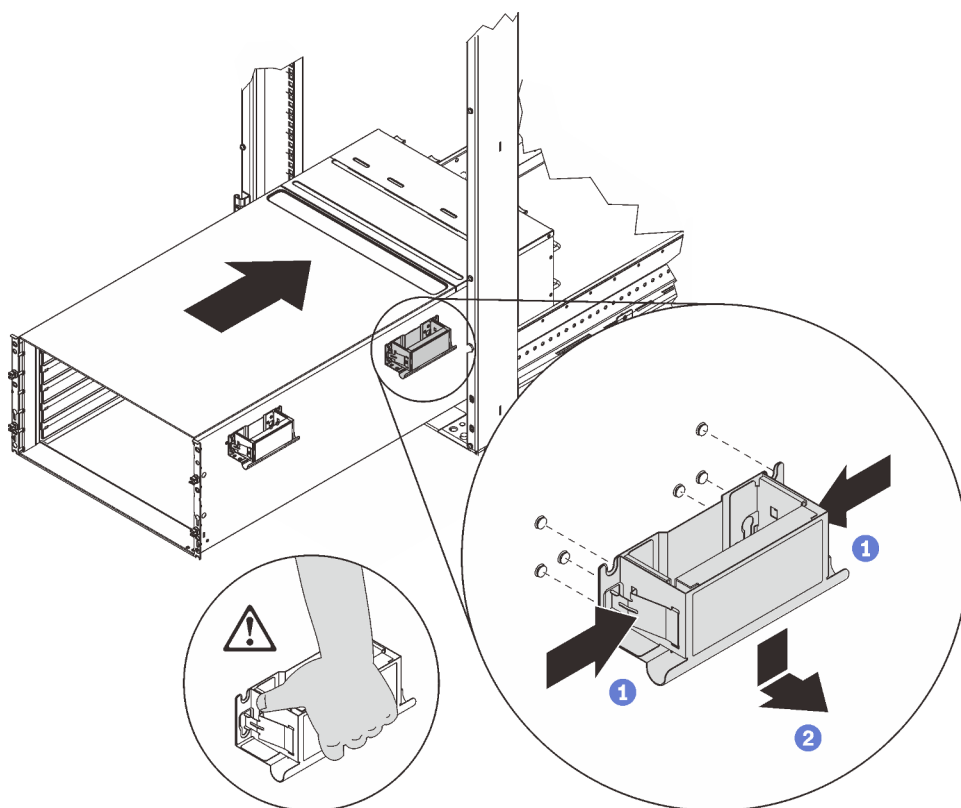


Figure 59. Front handle removal

Step 3. Slide the enclosure all the way back to the rack.

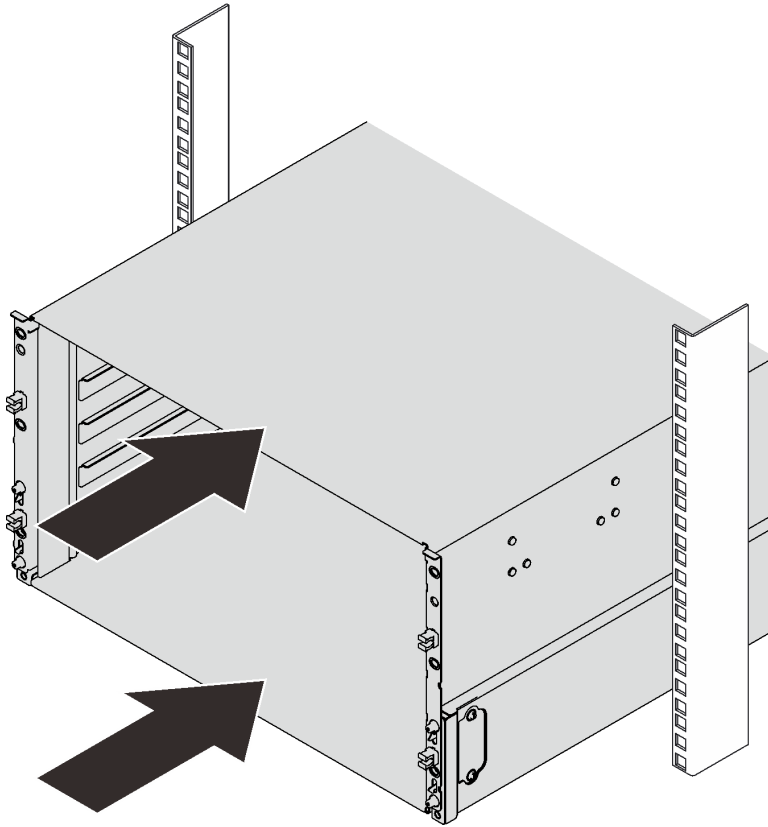


Figure 60. Sliding the rack

Step 4. Reinstall two EIA covers at the front of the enclosure; then, reinstall six screws.

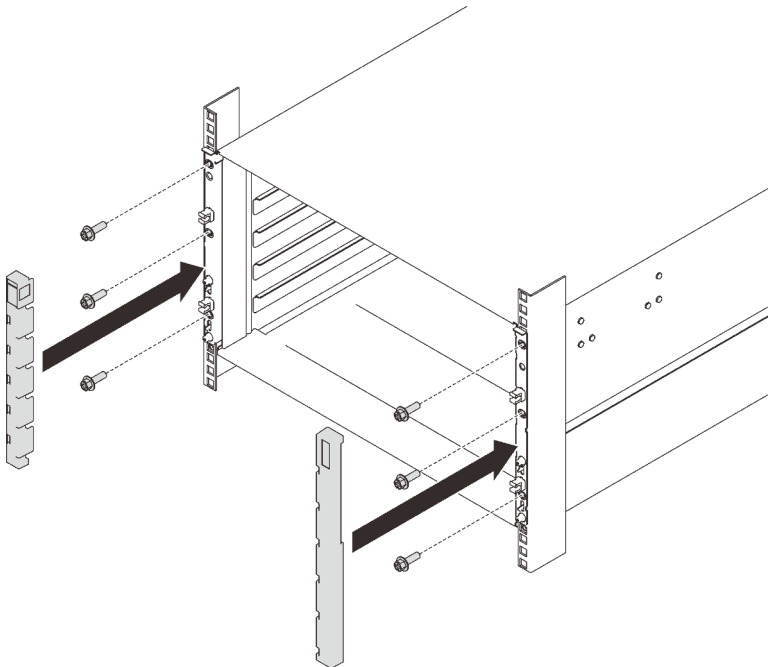


Figure 61. EIA cover installation

Step 5. Reinstall eight screws to secure two support brackets on the rear enclosure.

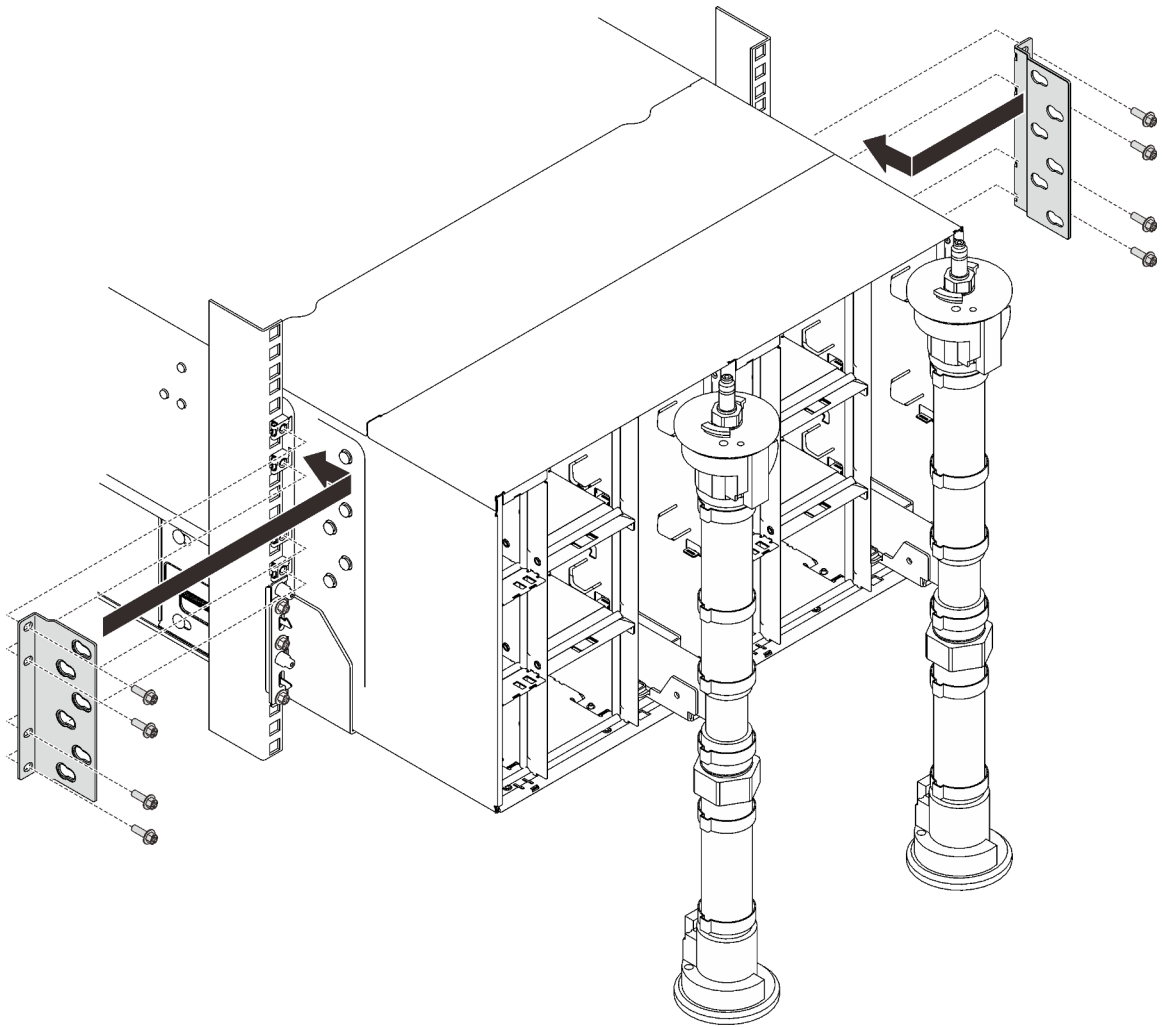


Figure 62. Support bracket installation

Reassemble the enclosure and program the vital product data (VPD) that is stored on the card. Complete the following steps:

1. Reinstall eight screws (using the screwdriver contained in the manifold repair kit) to secure two manifolds.

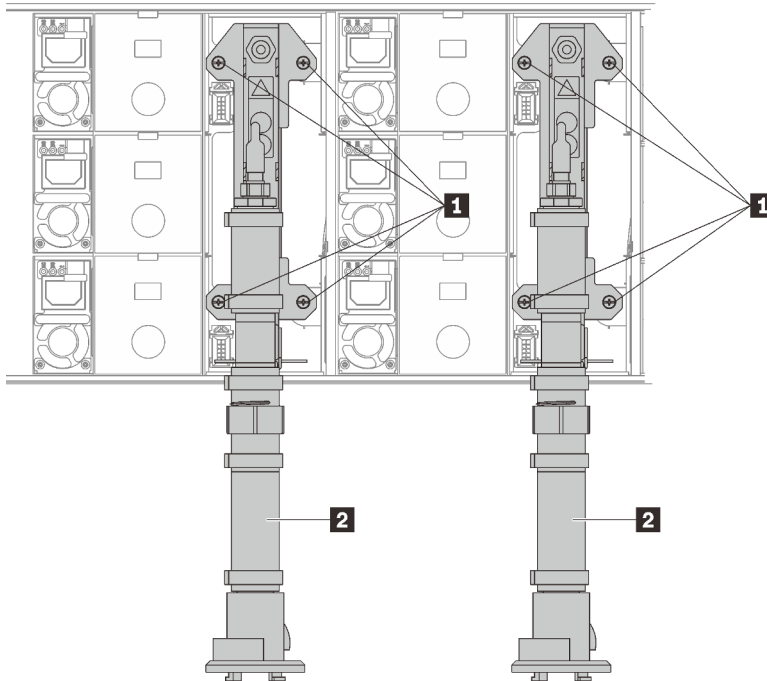


Figure 63. Manifold screw locations

Table 19. Manifold screw locations

1 Screws	2 Manifold
----------	------------

2. Reinstall all power supplies back to the enclosure.

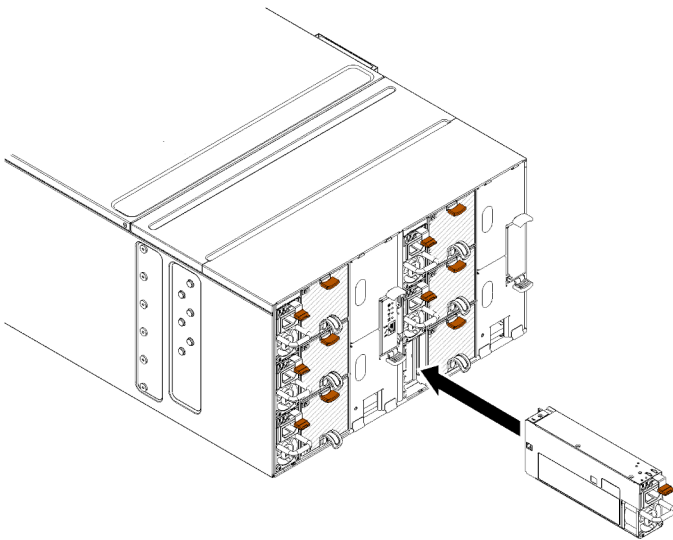


Figure 64. Power supply installation

3. Reinstall the blank filler.

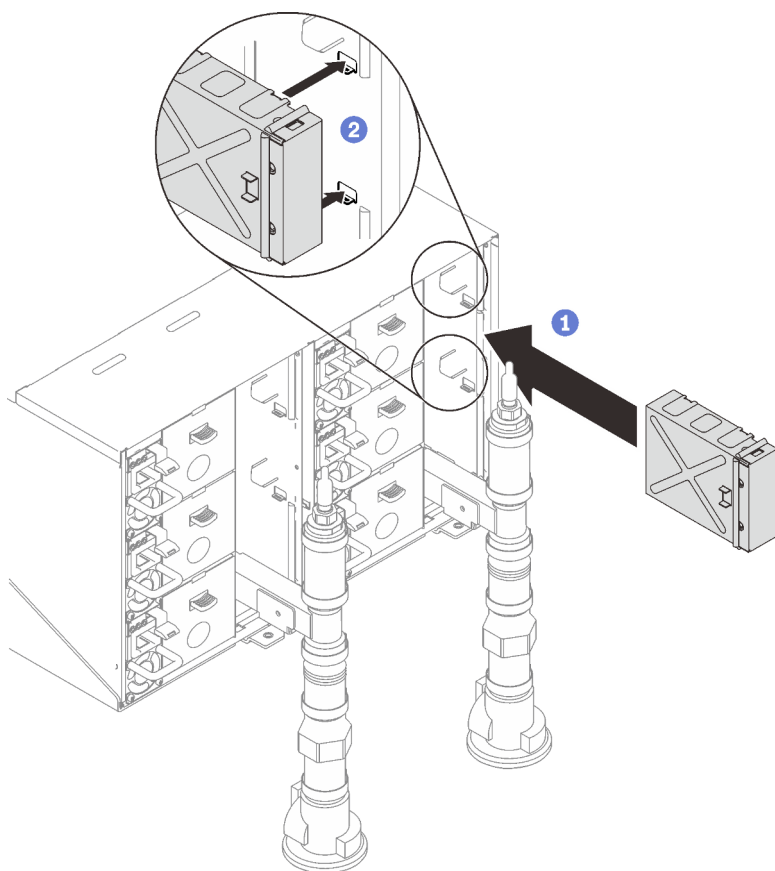


Figure 65. Blank filler installation

4. Reinstall FPC card module support bracket and FPC card module.

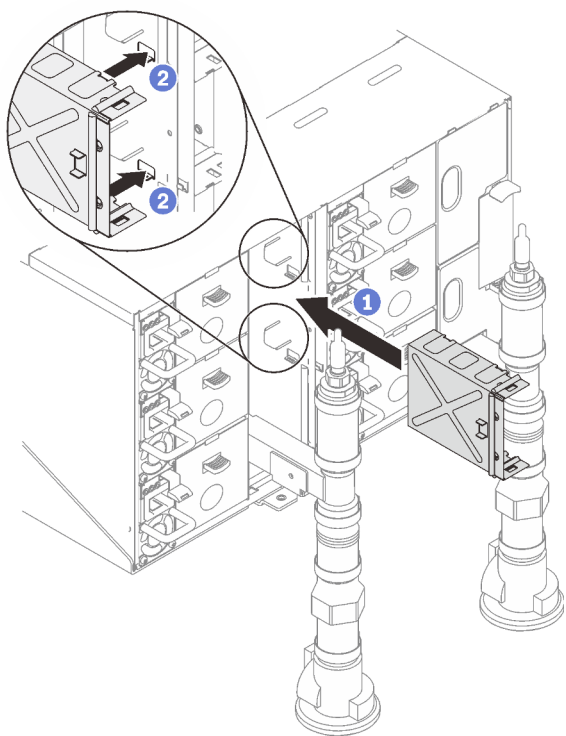


Figure 66. Support bracket installation

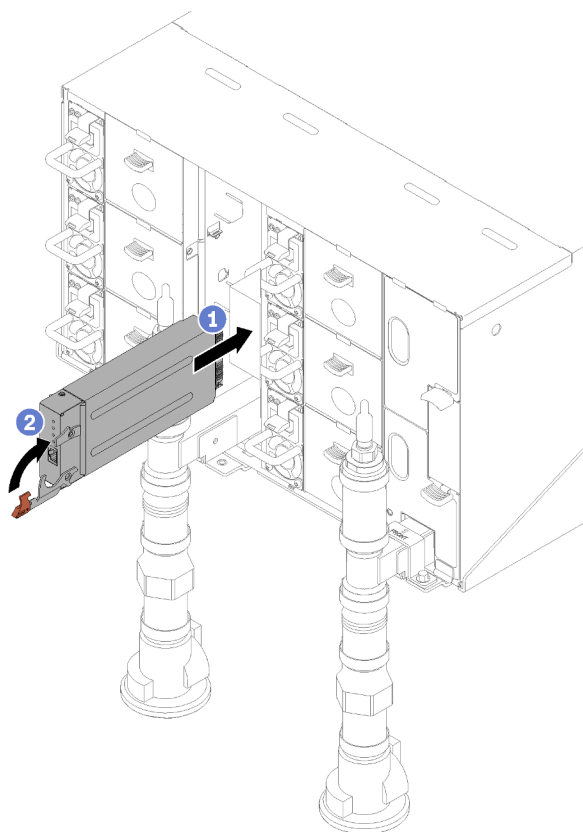


Figure 67. FPC card module installation

5. Reinstall manifold retention brackets that are retaining the manifolds (top enclosure position only).

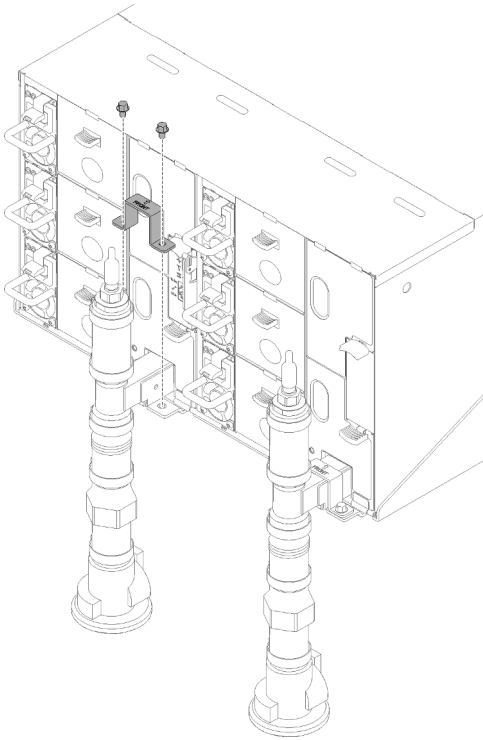


Figure 68. Retention bracket installation

6. Align the drip sensor assembly with the enclosure and slide it into place.

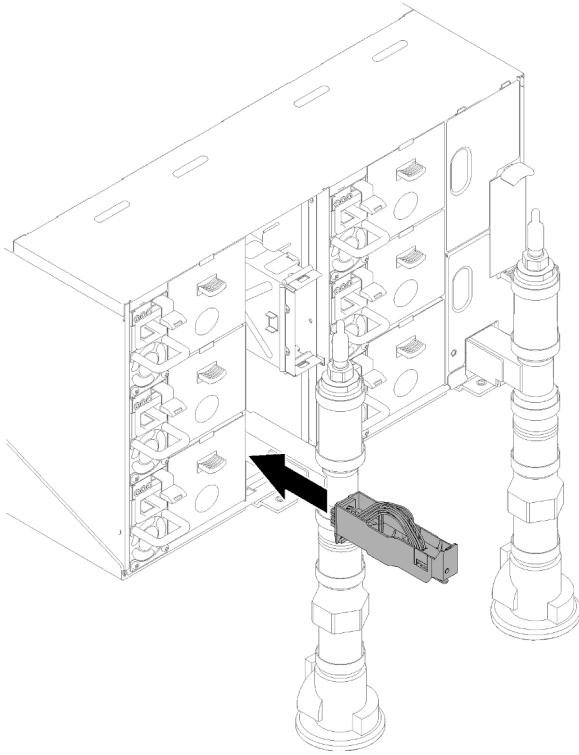


Figure 69. Drip sensor assembly installation

7. Reinstall all EMC shields.

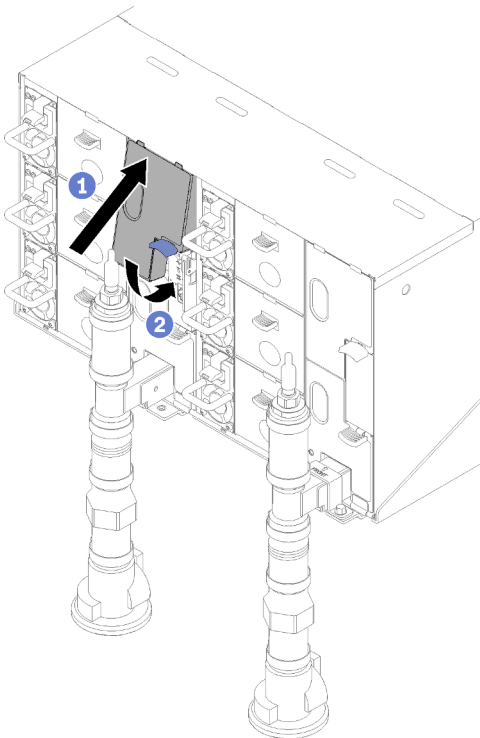


Figure 70. Upper EMC shields installation

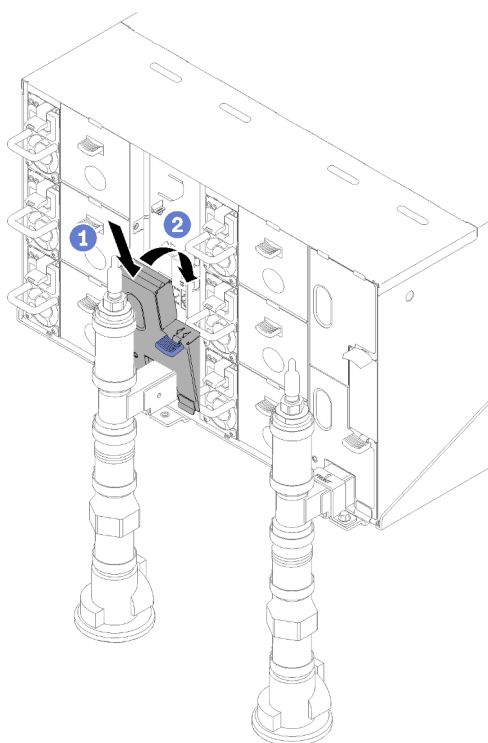


Figure 71. Lower EMC shield installation

8. Connect any cables that you disconnected from the modules in the rear of the enclosure.
9. Connect the enclosure to power (see n1200 Enclosure Installation and Service Guide).
10. Update the solution firmware to the latest level (see n1200 Enclosure Installation and Service Guide).
11. Reinstall the tray (see [“Install a DWC tray in the enclosure” on page 64](#)).
12. Restart any nodes that you shut down. See the documentation that comes with the compute node for detailed instructions.
13. The fan and power controller is powered-on automatically.

Cable the enclosure

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 the enclosure to power.

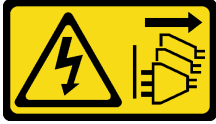
Connect the enclosure to the network.

Connect the enclosure to any external storage devices.

Power on nodes

When a tray is plugged into the enclosure, each node performs a short self-test (power LED flashes quickly - 4 times per second). Once the self test is completed successfully, the node enters a standby state (power LED flashes slowly - once per a second).

S002

**CAUTION:**

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

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

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

For information about powering off nodes, see [“Power off nodes” on page 77](#).

Power off nodes

Each node remains in a standby state when it is connected to a power source, allowing the Lenovo XClarity Controller to respond to remote power-on requests.

To remove all power from the nodes (power status LED off), remove the tray from the enclosure.

Note: This removes power immediately from both nodes.

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

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

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

When in a standby state, the solution can respond to remote power-on requests sent to the Lenovo XClarity Controller. For information about powering on the solution, see [“Power on nodes” on page 76](#).

Chapter 4. System configuration

Complete these procedures to configure your system.

Notes: The minimum supported configuration for this server is as follows:

- One n1200 Enclosure
- One SD650 Dual Node DWC Tray (contains two computer nodes)
- One processor on location 1 on specific node
- One CFF v2 power supply (any type)
- One DIMM (any type) on specific node
- One disk (any type) (If OS is needed for debugging)

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 following methods are available to set the network connection for the Lenovo XClarity Controller if you are not using DHCP:

- If a monitor is attached to the server, you can use Lenovo XClarity Provisioning Manager to set the network connection.

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

1. Start the server.
2. Press the key specified in the on-screen instructions to display the Lenovo XClarity Provisioning Manager interface. (For more information, see the “Startup” section in the LXPM documentation compatible with your server at <https://pubs.lenovo.com/lxpm-overview/>.)
3. Go to **LXPM → UEFI Setup → BMC Settings** to 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.
4. Click **OK** to apply the setting and wait for two to three minutes.
5. Use an IPv4 or IPv6 address to connect Lenovo XClarity Controller.

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

- If no monitor attached to the server, you can set the network connection through the SMM2 interface. Connect an Ethernet cable from your laptop to the Ethernet port on the SMM2, which is located at the rear of 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.

To access the SMM2 interface, the SMM2 network must be enabled. For more information about accessing the SMM2, see: the *SMM2 User's Guide*

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.

- If you are using the Lenovo XClarity Administrator Mobile app from a mobile device, you can connect to the Lenovo XClarity Controller through the Lenovo XClarity Controller micro-USB connector on the front of the server. For the location of the Lenovo XClarity Controller USB connector, see “Front view” on page 15.

To connect using the Lenovo XClarity Administrator Mobile app:

1. Connect the USB cable of your mobile device to the Lenovo XClarity Administrator USB connector on the front panel.
2. On your mobile device, enable USB tethering.
3. On your mobile device, launch the Lenovo XClarity Administrator mobile app.
4. If automatic discovery is disabled, click **Discovery** on the USB Discovery page to connect to the Lenovo XClarity Controller.

For more information about using the Lenovo XClarity Administrator Mobile app, see:

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

- Best practices related to updating firmware is available at the following site:
 - <http://lenovopress.com/LP0656>
- The latest firmware can be found at the following site:
 - <http://datacentersupport.lenovo.com/products/servers/thinksystem/sd650-dwc-dual-node-tray/7x58/downloads>
- You can subscribe to product notification to stay up to date on firmware updates:
 - <https://datacentersupport.lenovo.com/tw/en/solutions/ht509500>

UpdateXpress System Packs (UXSPs)

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.

Update method terminology

- **In-band update.** The installation or update is performed using a tool or application within an operating system that is executing on the server's core CPU.
- **Out-of-band update.** The installation or update is performed by the Lenovo XClarity Controller collecting the update and then directing the update to the target subsystem or device. Out-of-band updates have no dependency on an operating system executing on the core CPU. However, most out-of-band operations do require the server to be in the S0 (Working) power state.
- **On-Target update.** The installation or update is initiated from an Operating System executing on the server's operating system.

- **Off-Target update.** The installation or update is initiated from a computing device interacting directly with the server's Lenovo XClarity Controller.
- **UpdateXpress System Packs (UXSPs).** UXSPs are bundled updates designed and tested to provide the interdependent level of functionality, performance, and compatibility. UXSPs are server machine-type specific and are built (with firmware and device driver updates) to support specific Windows Server, Red Hat Enterprise Linux (RHEL) and SUSE Linux Enterprise Server (SLES) operating system distributions. Machine-type-specific firmware-only UXSPs are also available.

Firmware updating tools

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

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

Tool	Update Methods Supported	Core System Firmware Updates	I/O Devices Firmware Updates	Graphical user interface	Command line interface	Supports UXSPs
Lenovo XClarity Integrator (LXCI) for Microsoft Windows Admin Center	In-band Out-of-band On-Target Off-Target	✓	All I/O devices	✓		✓
Lenovo XClarity Integrator (LXCI) for Microsoft System Center Configuration Manager	In-band On-Target	✓	All I/O devices	✓		✓
Notes: <ol style="list-style-type: none"> 1. For I/O firmware updates. 2. For BMC and UEFI firmware updates. 						

- **Lenovo XClarity Provisioning Manager**

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

Note: By default, the Lenovo XClarity Provisioning Manager Graphical User Interface is displayed when you start the server and press the key specified in the on-screen instructions. If you have changed that default to be the text-based system setup, you can bring up the Graphical User Interface from the text-based system setup interface.

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

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

- **Lenovo XClarity Controller**

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

Notes:

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

For additional information about configuring Ethernet over USB, see:

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

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

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

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

- **Lenovo XClarity Essentials OneCLI**

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

For additional information about using Lenovo XClarity Essentials OneCLI to update firmware, see:

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

- **Lenovo XClarity Essentials UpdateXpress**

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

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

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

- **Lenovo XClarity Essentials Bootable Media Creator**

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

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

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

- **Lenovo XClarity Administrator**

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

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

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

- **Lenovo XClarity Integrator offerings**

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

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

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

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.

Notes: 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 start LXPM. To do this, go to **Lenovo XClarity Provisioning Manager → UEFI Setup → System Settings → <F1>Start Control → Text Setup**. To start the server with Graphic User Interface, select **Auto** or **Tool Suite**.

See the following documentations for more information:

- *Lenovo XClarity Provisioning Manager User Guide*
 - Search for the LXPM documentation version compatible with your server at <https://pubs.lenovo.com/lxpm-overview/>
- *UEFI User Guide*
 - <https://pubs.lenovo.com/uefi-overview/>

- **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:

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

- **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:

“Configuring the Server” section in the XCC documentation compatible with your server at <https://pubs.lenovo.com/lxcc-overview/>

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

For specific information about the required installation order of memory modules in your solution based on the system configuration and memory mode that you are implementing, see [the ThinkSystem SD650 Neptune® DWC Trays and DW612 Neptune® DWC Enclosure Memory Population Reference](#).

Configure DC Persistent Memory Module (DCPMM)

Follow the instructions in this section to configure DCPMMs and DRAM DIMMs.

DCPMM capacity could act as accessible persistent memory for applications or volatile system memory. Based on the approximate percentage of DCPMM capacity invested in volatile system memory, the following three operating modes are available for choice:

- **App Direct Mode** (0% of DCPMM capacity acts as system memory):

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

The total displayed volatile system memory in this mode is the sum of DRAM DIMM capacity.

Notes:

- In App Direct Mode, the DRAM DIMMs that are installed can be configured to mirror mode.
- When only one DCPMM is installed for each processor, only not-interleaved App Direct Mode is supported.

- **Mixed Memory Mode** (1-99% of DCPMM capacity acts as system memory):

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

The total displayed volatile system memory in this mode is the DCPMM capacity that is invested in volatile system memory.

- **Memory Mode** (100% of DCPMM capacity acts as system memory):

In this mode, DCPMMs act as volatile system memory, while DRAM DIMMs act as cache.

The total displayed volatile system memory in this mode is the sum of DCPMM capacity.

DCPMM Management options

DCPMMs can be managed with the following tools:

- **Lenovo XClarity Provisioning Manager (LXPM V3)**

To open LXPM V3, power on the system and press **F1** as soon as the logo screen appears. If a password has been set, enter the password to unlock LXPM V3.

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

For more details, see the “UEFI Setup” section in the Lenovo XClarity Provisioning Manager documentation version compatible with your server at <https://pubs.lenovo.com/lxpm-overview/>.

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

- **Setup Utility**

To enter Setup Utility:

1. Power on the system and press **F1** to open LXPM V3.
2. Go to **UEFI Settings → System Settings**, click on the pull-down menu on the upper right corner of the screen, and select **Text Setup**.
3. Reboot the system, and press **F1** as soon as the logo screen appears.

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

- **Lenovo XClarity Essentials OneCLI**

Some management options are available in commands that are executed in the path of Lenovo XClarity Essentials OneCLI in the operating system. See https://pubs.lenovo.com/lxce-onecli/download_use_onecli to learn how to download and use Lenovo XClarity Essentials OneCLI.

Following are the available management options:

- **Intel Optane DCPMM details**

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

- Firmware version
- Configuration status
- Raw capacity
- Memory capacity
- App Direct capacity
- Unconfigured capacity
- Inaccessible capacity
- Reserved capacity
- Percentage remaining
- Security state

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

```
onecli.exe config show IntelOptaneDCPMM  
--imm USERID:PASSWORD@10.104.195.86
```

Notes:

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

- **Goals**

- **Memory Mode [%]**

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

- **0%:** App Direct Mode
- **1-99%:** Mixed Memory Mode
- **100%:** Memory Mode

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

Notes:

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

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

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

1. Set create goal status.

```
onecli.exe config set IntelOptaneDCPMM.CreateGoal Yes
--imm USERID:PASSWORD@10.104.195.86
```

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

```
onecli.exe config set IntelOptaneDCPMM.MemoryModePercentage 20
--imm USERID:PASSWORD@10.104.195.86
```

Where 20 stands for the percentage of capacity that is invested in system volatile memory.

3. Set the DCPMM mode.

```
onecli.exe config set IntelOptaneDCPMM.PersistentMemoryType "App Direct"
--imm USERID:PASSWORD@10.104.195.86
```

Where *App Direct* stands for the DCPMM mode.

– Persistent Memory Type

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

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

• Regions

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

• Namespaces

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

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

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

- Windows: Use *Pmem* command.
- Linux: Use *ndctl* command.
- VMware: Reboot the system, and VMware will create namespaces automatically.

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

• Security

- Enable Security

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

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

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

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

- Enable security:

1. Enable security.

```
onecli.exe config set IntelOptaneDCPMM.SecurityOperation "Enable Security"
--imm USERID:PASSWORD@10.104.195.86
```

2. Set the security passphrase.

```
onecli.exe config set IntelOptaneDCPMM.SecurityPassphrase "123456"
--imm USERID:PASSWORD@10.104.195.86
```

Where 123456 stands for the passphrase.

3. Reboot the system.

- Disable security:

1. Disable security.

```
onecli.exe config set IntelOptaneDCPMM.SecurityOperation "Disable Security"
--imm USERID:PASSWORD@10.104.195.86
```

2. Enter passphrase.

```
onecli.exe config set IntelOptaneDCPMM.SecurityPassphrase "123456"
--imm USERID:PASSWORD@10.104.195.86
```

3. Reboot the system.

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

Notes:

- Single DCPMM passphrases are not stored in the system, and security of the locked units needs to be disabled before the units are available for access or secure erase.

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

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

– Secure Erase

Note: If the DCPMMs to be secure erased are protected with a passphrase, make sure to disable security and reboot the system before performing secure erase.

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

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

```
onecli.exe config set IntelOptaneDCPMM.SecurityOperation "Secure Erase Without Passphrase"
--imm USERID:PASSWORD@10.104.195.86
```

• DCPMM Configuration

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

There will also be a warning message when the percentage reaches 1% and a selectable percentage (10% by default). When this message appears, it is advised to back up data and run PMem diagnostics (see the “Running diagnostics” section in the Lenovo XClarity Provisioning Manager documentation version compatible with your server at <https://pubs.lenovo.com/lxpm-overview/>). To adjust the selectable percentage that the warning message requires, go to **Intel Optane PMems → PMem Configuration**, and input the percentage.

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

```
onecli.exe config set IntelOptaneDCPMM.PercentageRemainingThresholds 20
--imm USERID:PASSWORD@10.104.195.86
```

Where 20 is the selectable percentage.

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 server'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>

Deploy the operating system

Several options are available to deploy an operating system on the server.

Available operating systems

- Microsoft Windows Server
- VMware ESXi
- Red Hat Enterprise Linux
- SUSE Linux Enterprise Server

Complete list of available operating systems: <https://lenovopress.lenovo.com/osig>.

Tool-based deployment

- **Multi-server**

Available tools:

- Lenovo XClarity Administrator
http://sysmgt.lenovofiles.com/help/topic/com.lenovo.lxca.doc/compute_node_image_deployment.html
- Lenovo XClarity Essentials OneCLI
https://pubs.lenovo.com/lxce-onecli/onecli_r_uxspi_proxy_tool
- Lenovo XClarity Integrator deployment pack for SCCM (for Windows operating system only)
https://pubs.lenovo.com/lxci-deploypack-sccm/dpsccm_c_endtoend_deploy_scenario

- **Single-server**

Available tools:

- Lenovo XClarity Provisioning Manager
“OS Installation” section in the LXPM documentation compatible with your server at <https://pubs.lenovo.com/lxpm-overview/>
- Lenovo XClarity Essentials OneCLI
https://pubs.lenovo.com/lxce-onecli/onecli_r_uxspi_proxy_tool
- Lenovo XClarity Integrator deployment pack for SCCM (for Windows operating system only)
https://pubs.lenovo.com/lxci-deploypack-sccm/dpsccm_c_endtoend_deploy_scenario

Manual deployment

If you cannot access the above tools, follow the instructions below, download the corresponding OS *Installation Guide*, and deploy the operating system manually by referring to the guide.

1. Go to <https://datacentersupport.lenovo.com/solutions/server-os>.
2. Select an operating system from the navigation pane and click **Resources**.

3. Locate the “OS Install Guides” area and click the installation instructions. Then, follow the instructions to complete the operation system deployment task.

Back up the server configuration

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

Make sure that you create backups for the following server 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:

“Backing up the BMC configuration” section in the XCC documentation compatible with your server at <https://pubs.lenovo.com/lxcc-overview/>.

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:

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

- **Operating system**

Use your backup methods to back up the operating system and user data for the server.

Update the Vital Product Data (VPD)

After initial setup of the system, you can update some Vital Product Data (VPD), such as asset tag and Universal Unique Identifier (UUID).

Update the Universal Unique Identifier (UUID)

Optionally, you can update the Universal Unique Identifier (UUID).

There are two methods available to update the UUID:

- From Lenovo XClarity Provisioning Manager

To update the UUID from Lenovo XClarity Provisioning Manager:

1. Start the server and press the key according to the on-screen instructions. (For more information, see the “Startup” section in the LXPM documentation compatible with your server at <https://pubs.lenovo.com/lxpm-overview/>.) The Lenovo XClarity Provisioning Manager interface is displayed by default.
2. If the power-on Administrator password is required, enter the password.
3. From the System Summary page, click **Update VPD**.
4. Update the UUID.

- From Lenovo XClarity Essentials OneCLI

Lenovo XClarity Essentials OneCLI sets the UUID in the Lenovo XClarity Controller. Select one of the following methods to access the Lenovo XClarity Controller and set the UUID:

- Operate from the target system, such as LAN or keyboard console style (KCS) access
- Remote access to the target system (TCP/IP based)

To update the UUID from Lenovo XClarity Essentials OneCLI:

1. Download and install Lenovo XClarity Essentials OneCLI.

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

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

2. Copy and unpack the OneCLI package, which also includes other required files, to the server. Make sure that you unpack the OneCLI and the required files to the same directory.
3. After you have Lenovo XClarity Essentials OneCLI in place, type the following command to set the UUID:

```
onecli config set SYSTEM_PROD_DATA.SysInfoUUID <uuid_value> [access_method]
```

Where:

<uuid_value>

Up to 16-byte hexadecimal value assigned by you.

[access_method]

The access method that you select to use from the following methods:

- Online authenticated LAN access, type the command:

```
[--bmc-username xcc_user_id --bmc-password xcc_password]
```

Where:

xcc_user_id

The BMC/IMM/XCC account name (1 of 12 accounts). The default value is USERID.

xcc_password

The BMC/IMM/XCC account password (1 of 12 accounts).

Example command is as follows:

```
onecli config set SYSTEM_PROD_DATA.SysInfoUUID <uuid_value> --bmc-username xcc_user_id  
--bmc-password xcc_password
```

- Online KCS access (unauthenticated and user restricted):

You do not need to specify a value for *access_method* when you use this access method.

Example command is as follows:

```
onecli config set SYSTEM_PROD_DATA.SysInfoUUID <uuid_value>
```

Note: The KCS access method uses the IPMI/KCS interface, which requires that the IPMI driver be installed.

- Remote LAN access, type the command:

```
[--bmc xcc_user_id:xcc_password@xcc_external_ip]
```

Where:

xcc_external_ip

The BMC/IMM/XCC external IP address. There is no default value. This parameter is required.

xcc_user_id

The BMC/IMM/XCC account name (1 of 12 accounts). The default value is USERID.

xcc_password

The BMC/IMM/XCC account password (1 of 12 accounts).

Note: BMC, IMM, or XCC external IP address, account name, and password are all valid for this command.

Example command is as follows:

```
onecli config set SYSTEM_PROD_DATA.SysInfoUUID <uuid_value>
--bmc xcc_user_id:xcc_password@xcc_external_ip
```

4. Restart the Lenovo XClarity Controller.
5. Restart the server.

Update the asset tag

Optionally, you can update the asset tag.

There are two methods available to update the asset tag:

- From Lenovo XClarity Provisioning Manager

To update the asset tag from Lenovo XClarity Provisioning Manager:

1. Start the server and press F1 to display the Lenovo XClarity Provisioning Manager interface.
2. If the power-on Administrator password is required, enter the password.
3. From the System Summary page, click **Update VPD**.
4. Update the asset tag information.

- From Lenovo XClarity Essentials OneCLI

Lenovo XClarity Essentials OneCLI sets the asset tag in the Lenovo XClarity Controller. Select one of the following methods to access the Lenovo XClarity Controller and set the asset tag:

- Operate from the target system, such as LAN or keyboard console style (KCS) access
- Remote access to the target system (TCP/IP based)

To update the asset tag from Lenovo XClarity Essentials OneCLI:

1. Download and install Lenovo XClarity Essentials OneCLI.

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

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

2. Copy and unpack the OneCLI package, which also includes other required files, to the server. Make sure that you unpack the OneCLI and the required files to the same directory.
3. After you have Lenovo XClarity Essentials OneCLI in place, type the following command to set the DMI:

```
onecli config set SYSTEM_PROD_DATA.SysEncloseAssetTag <asset_tag> [access_method]
```

Where:

<asset_tag>

The server asset tag number. Type asset aaaaaaaaaaaaaaaaaaaaaaaaaaaaaa, where aaaaaaaaaaaaaaaaaaaaaaaaaaaaaa is the asset tag number.

[access_method]

The access method that you select to use from the following methods:

- Online authenticated LAN access, type the command:

```
[--bmc-username xcc_user_id --bmc-password xcc_password]
```

Where:

xcc_user_id

The BMC/IMM/XCC account name (1 of 12 accounts). The default value is USERID.

xcc_password

The BMC/IMM/XCC account password (1 of 12 accounts).

Example command is as follows:

```
onecli config set SYSTEM_PROD_DATA.SysEncloseAssetTag <asset_tag> --bmc-username xcc_user_id  
--bmc-password xcc_password
```

- Online KCS access (unauthenticated and user restricted):

You do not need to specify a value for *access_method* when you use this access method.

Example command is as follows:

```
onecli config set SYSTEM_PROD_DATA.SysEncloseAssetTag <asset_tag>
```

Note: The KCS access method uses the IPMI/KCS interface, which requires that the IPMI driver be installed.

- Remote LAN access, type the command:
[**--bmc** xcc_user_id:xcc_password@xcc_external_ip]

Where:

xcc_external_ip

The BMC/IMM/XCC IP address. There is no default value. This parameter is required.

xcc_user_id

The BMC/IMM/XCC account (1 of 12 accounts). The default value is USERID.

xcc_password

The BMC/IMM/XCC account password (1 of 12 accounts).

Note: BMC, IMM, or XCC internal LAN/USB IP address, account name, and password are all valid for this command.

Example command is as follows:

```
onecli config set SYSTEM_PROD_DATA.SysEncloseAssetTag <asset_tag>  
--bmc xcc_user_id:xcc_password@xcc_external_ip
```

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

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” on page 95
- “The solution immediately displays the POST Event Viewer when it is turned on” on page 95
- “Embedded hypervisor is not in the boot list” on page 95
- “Solution cannot recognize a hard drive” on page 96
- “Displayed system memory less than installed physical memory” on page 96
- “A Lenovo optional device that was just installed does not work.” on page 97
- “Voltage planar fault is displayed in the event log” on page 97

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 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 <https://serverproven.lenovo.com/>.

3. (Trained technician only) Make sure that processor 1 is seated correctly
4. (Trained technician only) Remove processor 2 and restart the solution.
5. Replace the following components one at a time, in the order shown, restarting the solution each time:
 - a. (Trained technician only) Processor
 - b. (Trained technician only) System board

Embedded hypervisor is not in the boot list

Complete the following steps until the problem is resolved:

1. Make sure that the optional embedded hypervisor flash device is selected on the boot manager <F12> Select Boot Device at startup.
2. See the documentation that comes with the optional embedded hypervisor flash device to validate that the device is configured correctly.
3. Make sure that other software works on the solution.

Solution cannot recognize a hard drive

Complete the following steps until the problem is solved.

1. Verify that the drive is supported for the solution. See <https://serverproven.lenovo.com/> for a list of supported hard drives.
2. Make sure that the drive is seated in the drive bay properly and that there is no physical damage to the drive connectors.
3. Run the diagnostics tests for the SAS/SATA adapter and hard disk drives. When you start a solution and press the key according to the on-screen instructions, the LXPM interface is displayed by default. (For more information, see the “Startup” section in the LXPM documentation compatible with your solution at <https://pubs.lenovo.com/lxpm-overview/>.) You can perform hard drive diagnostics from this interface. From the Diagnostic page, click **Run Diagnostic → Disk Drive Test**.

Based on those tests:

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

Displayed system memory less than installed physical memory

Complete the following steps until the problem is solved:

Note: Each time you install or remove a memory module, you must disconnect the solution from the power source; then, wait 10 seconds before restarting the solution.

1. Make sure that:
 - No error LEDs are lit on the operator information panel.
 - Memory mirrored channel does not account for the discrepancy.
 - The memory modules are seated correctly.
 - You have installed the correct type of memory module (see “Specifications” on page 3 for requirements).
 - If you changed the memory, you updated the memory configuration in the Setup utility.
 - All banks of memory are enabled. The solution might have automatically disabled a memory bank when it detected a problem, or a memory bank might have been manually disabled.
 - There is no memory mismatch when the solution is at the minimum memory configuration.
 - When DCPMMs are installed:
 - a. If the memory is set in App Direct or Mixed Memory Mode, all the saved data have been backed up, and created namespaces are deleted before any DCPMM is replaced.
 - b. Refer to “DC Persistent Memory Module (DCPMM) setup” on page 35 and see if the displayed memory fits the mode description.
 - c. If DCPMMs are recently set in Memory Mode, turn it back to App Direct Mode and examine if there is namespace that has not been deleted (see “DC Persistent Memory Module (DCPMM) setup” on page 35).
 - d. Go to the Setup Utility, select **System Configuration and Boot Management → Intel Optane DCPMMs → Security**, and make sure all the DCPMM units are unlocked.
2. Reseat the memory modules, and then restart the solution.
3. Check the POST error log:

- If a memory module was disabled by a systems-management interrupt (SMI), replace the memory module.
 - If a memory module was disabled by the user or by POST, reseal the memory module; then, run the Setup utility and enable the memory module.
4. Run memory diagnostics. When you start a solution and press the key according to the on-screen instructions, the LXPM interface is displayed by default. (For more information, see the “Startup” section in the LXPM documentation compatible with your solution at <https://pubs.lenovo.com/lxpm-overview/>.) You can perform memory diagnostics with this interface. From the Diagnostic page, go to **Diagnostics → Run Diagnostic → Memory test** or **DCPMM test**.

When DCPMMs are installed, run diagnostics based on the current DCPMM mode:

- App Direct Mode
 - Run **DCPMM Test** for DCPMMs.
 - Run **Memory Test** for DRAM DIMMs.
- Memory Mode and Mixed Memory Mode
 - Run **DCPMM Test** for App Direct capacity of DCPMMs.
 - Run **Memory Test** for memory capacity of DCPMMs.

Note: DRAM DIMMs in these two modes act as cache, and are not applicable to memory diagnostics.

5. Reverse the modules between the channels (of the same processor), and then restart the solution. If the problem is related to a memory module, replace the failing memory module.
- Note:** When DCPMMs are installed, only adopt this method in Memory Mode.
6. Re-enable all memory modules using the Setup Utility, and restart the system.
 7. (Trained technician only) Install the failing memory module into a memory module connector for processor 2 (if installed) to verify that the problem is not the processor or the memory module connector.
 8. (Trained technician only) Replace the node.

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

1. Make sure that:
 - The device is supported for the solution (see <https://serverproven.lenovo.com/>).
 - You followed the installation instructions that came with the device and the device is installed correctly.
 - You have not loosened any other installed devices or cables.
 - You updated the configuration information in the Setup utility. Whenever memory or any other device is changed, you must update the configuration.
2. Reseat the device that you just installed.
3. 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 3 for the minimally required number of processors and DIMMs.
2. Restart the system.
 - If the system restarts, add each of the items that you removed one at a time, restarting the system each time, until the error occurs. Replace the item for which the error occurs.
 - If the system does not restart, replace 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: IBM is Lenovo's preferred service provider for ThinkSystem.

Before you call

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

Attempt to resolve the problem yourself

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

You can find the product documentation for your ThinkSystem products at <https://pubs.lenovo.com/>

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

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

Gathering information needed to call Support

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

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

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

As an alternative to calling Lenovo Support, you can go to <https://support.lenovo.com/servicerequest> to submit an Electronic Service Request. Submitting an Electronic Service Request will start the process of determining a solution to your problem by making the pertinent information available to the service technicians. The Lenovo service technicians can start working on your solution as soon as you have completed and submitted an Electronic Service Request.

Collecting service data

To clearly identify the root cause of a server issue or at the request of Lenovo Support, you might need collect service data that can be used for further analysis. Service data includes information such as event logs and hardware inventory.

Service data can be collected through the following tools:

- **Lenovo XClarity Provisioning Manager**

Use the Collect Service Data function of Lenovo XClarity Provisioning Manager to collect system service data. You can collect existing system log data or run a new diagnostic to collect new data.

- **Lenovo XClarity Controller**

You can use the Lenovo XClarity Controller web interface or the CLI to collect service data for the server. The file can be saved and sent to Lenovo Support.

- For more information about using the web interface to collect service data, see the “Downloading service data” section in the XCC documentation version compatible with your server at <https://pubs.lenovo.com/lxcc-overview/>.
- For more information about using the CLI to collect service data, see the “ffdc command” section in the XCC documentation version compatible with your server at <https://pubs.lenovo.com/lxcc-overview/>.

- **Lenovo XClarity Administrator**

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

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

- **Lenovo XClarity Essentials OneCLI**

Lenovo XClarity Essentials OneCLI has inventory application to collect service data. It can run both in-band and out-of-band. When running in-band within the host operating system on the server, OneCLI can collect information about the operating system, such as the operating system event log, in addition to the hardware service data.

To obtain service data, you can run the `getinfor` command. For more information about running the `getinfor`, see https://pubs.lenovo.com/lxce-onecli/onecli_r_getinfor_command.

Contacting Support

You can contact Support to obtain help for your issue.

You can receive hardware service through a Lenovo Authorized Service Provider. To locate a service provider authorized by Lenovo to provide warranty service, go to <https://datacentersupport.lenovo.com/serviceprovider> and use filter searching for different countries. For Lenovo support telephone numbers, see <https://datacentersupport.lenovo.com/supportphonelist> for your region support details.

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Part Number: SP47A36229

Printed in China

(1P) P/N: SP47A36229

