



ThinkSystem SN850 Compute Node Setup Guide



Machine Type: 7X15

Note

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

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

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

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

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Safety

Before installing this product, read the Safety Information.

قبل تركيب هذا المنتج، يجب قراءة الملاحظات الأمنية

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

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

安裝本產品之前，請先閱讀「安全資訊」。

Prije instalacije ovog produkta obavezno pročitajte Sigurnosne Upute.

Před instalací tohoto produktu si přečtěte příručku bezpečnostních instrukcí.

Læs sikkerhedsforskrifterne, før du installerer dette produkt.

Lees voordat u dit product installeert eerst de veiligheidsvoorschriften.

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

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

Vor der Installation dieses Produkts die Sicherheitshinweise lesen.

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

לפני שתתקינו מוצר זה, קראו את הוראות הבטיחות.

A termék telepítése előtt olvassa el a Biztonsági előírásokat!

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

製品の設置の前に、安全情報をお読みください。

본 제품을 설치하기 전에 안전 정보를 읽으십시오.

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



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

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

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

Перед установкой продукта прочтите инструкции по технике безопасности.

Pred inštaláciou tohto zariadenia si pečítajte Bezpečnostné predpisy.

Pred namestitvijo tega proizvoda preberite Varnostne informacije.

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

Läs säkerhetsinformationen innan du installerar den här produkten.

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

Bu ürünü kurmadan önce güvenlik bilgilerini okuyun.

مەزكۇر مەھسۇلاتنى ئورنىتىشتىن بۇرۇن بىخەتەرلىك ئۇچۇرلىرىنى ئوقۇپ چىقىڭ.

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

Safety inspection checklist

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

Notes:

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

CAUTION:

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

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

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

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

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

- a. Go to:

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

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

Chapter 1. Introduction

Each ThinkSystem SN850 compute node supports up to four 2.5-inch hot-swap Serial Attached SCSI (SAS), Serial ATA (SATA) or Non-Volatile Memory express (NVMe) hard disk drives.

When you receive your ThinkSystem SN850, refer to the *ThinkSystem SN850 Compute Node Setup Guide* to set up the compute node, install optional devices, and perform the initial configuration of the compute node. Meanwhile, the *ThinkSystem SN850 Compute Node Maintenance Manual* contains information to help you solve problems that might occur in your ThinkSystem SN850. It describes the diagnostic tools that come with the compute node, error codes and suggested actions, and instructions for replacing failing components.

The compute node 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>

Notes:

- The first generation Chassis Management Module (CMM1; 68Y7030) is not supported by the ThinkSystem SN850 compute node.
- The second generation Chassis Management Module (CMM2; 00FJ669) must be at firmware level 1.6.1 or above to support the ThinkSystem SN850 compute node. This applies to both CMMs that are installed in the chassis.
- The illustrations in this document might differ slightly from your model.

Identifying your compute node

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

Record information about the compute node in the following table.

Table 1. Record of the system information

| Product name | Machine Type (s) | Model number | Serial number |
|-------------------|------------------|--------------|---------------|
| ThinkSystem SN850 | Type 7X15 | | |

The model number and serial number are on the ID label on the front of the compute node and the chassis, as shown in the following illustration.

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

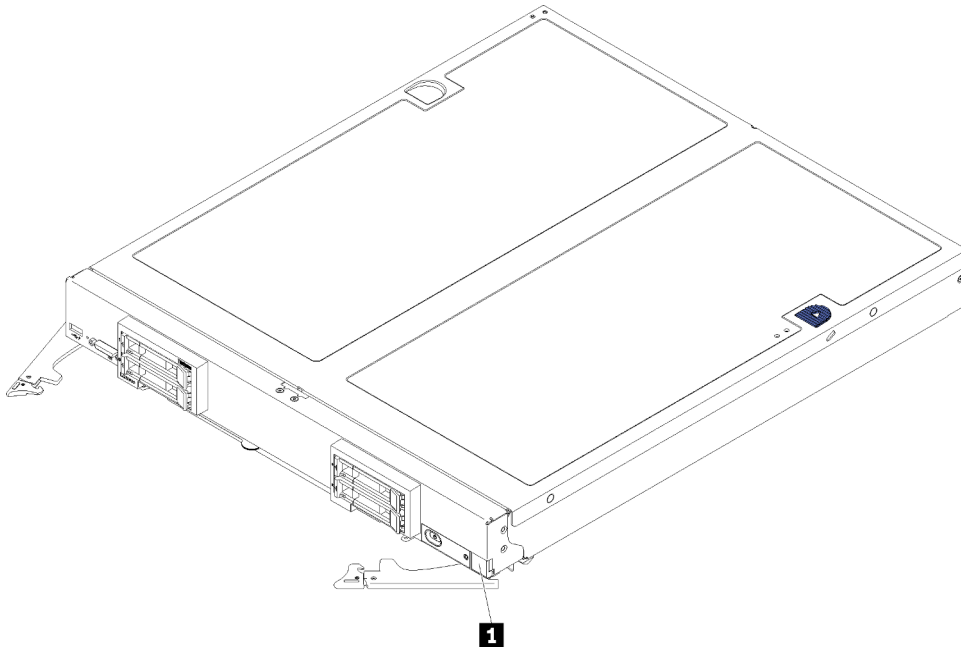


Figure 1. ID label on the front of the node

Table 2. ID label on the front of the node

| |
|------------|
| 1 ID label |
|------------|

Customer information tabs

The customer information tabs contain system-related information such as firmware level, administrator accounts and so forth.

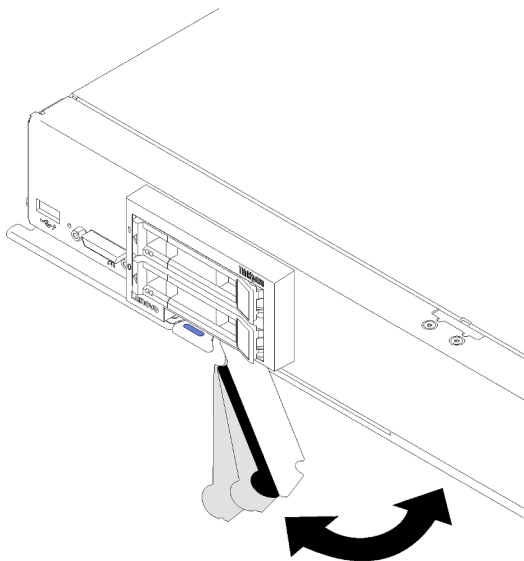


Figure 2. Location of customer information tabs

The system service label, which is on the cover of the compute node, provides a quick response (QR) code for mobile access to service information. You can scan the QR code using a QR code reader and scanner

with a mobile device and get quick access to the Lenovo Service Information website. The Lenovo Service Information website provides additional information for parts installation and replacement videos, and error codes for server support.

The following illustration shows the QR code (<https://support.lenovo.com/p/servers/sn850>):



Figure 3. QR code

Compute node package contents

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

The compute node package includes the following items:

- Compute node
- Printed documentation

Features

Performance, ease of use, reliability, and expansion capabilities were key considerations in the design of the compute node. 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 compute node implements the following features and technologies:

- **UEFI-compliant server firmware**

LenovoLenovo 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.

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

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

- **Large system-memory compatibility**

The compute node supports 48 connectors of industry-standard double-data-rate 4 DIMM (DDR4), registered DIMM (RDIMM) or load-reduced DIMM (LRDIMM), 3DS RDIMM, and DC Persistent Memory Module.

- **Flexible network support**

The compute node has connectors on the system board for optional expansion adapters for adding network communication capabilities to the compute node. You can install up to four I/O expansion adapters for network support. This provides the flexibility to install expansion adapters that support a variety of network communication technologies.

- **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 server provides a QR code on the system service label, which is on the cover of the server, 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 and replacement videos, and error codes for server support.

- **RAID support**

The RAID adapter provides hardware redundant array of independent disks (RAID) support to create configurations. There are two types of optional RAID adapter. Basic RAID adapter (without flash power module) supports RAID 0, 1, 5, and 10, advanced RAID adapter (with flash power module) supports RAID 0, 1, 5, 6, and 10. Software RAID supports RAID 0, 1, 5, and 10.

- **Power throttling**

By enforcing a power policy known as power-domain oversubscription, the Flex System chassis can share the power load between two or more power supply modules to ensure sufficient power for each device in the Flex System chassis. This policy is enforced when the initial power is applied to the Flex System chassis or when a compute node is inserted into the Flex System chassis.

The following settings for this policy are available:

- Basic power management
- Power module redundancy
- Power module redundancy with compute node throttling allowed

You can configure and monitor the power environment by using the Chassis Management Module. For more information, see the Flex System Chassis Management Module: Command-Line Interface Reference Guide at https://pubs.lenovo.com/cmm2/dw1kt_cmm2_cli_book.pdf.

- **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.

- **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/>.

- **Systems-management support**

The compute node XClarity Controller provides a web interface for remote systems-management support. You can use the interface to view system status and to control systems-management functions and baseboard management settings.

The XClarity Controller communicates with the Lenovo Flex System Chassis Management Module (CMM) and the Lenovo XClarity Administrator application (if installed).

- The CMM is a hot-swap module that provides systems-management functions for all components in an Flex System chassis. It controls a serial port for remote connection and a 1 Gbps Ethernet remote-management connection. For more information, see the Flex System Chassis Management Module: Command-Line Interface Reference Guide at https://pubs.lenovo.com/cmm2/dw1kt_cmm2_cli_book.pdf.
- The Lenovo XClarity Administrator is a virtual appliance that you can use to manage Flex System chassis in a secure environment. The Lenovo XClarity Administrator provides a central interface to perform the following functions for all managed endpoints:
 - User management
 - Hardware monitoring and management
 - Configuration management
 - Operating system deployment
 - Firmware management

For more information, see <https://datacentersupport.lenovo.com/products/solutions-and-software/software/lenovo-xclarity/solutions/ht115665>.

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

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

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

Specifications

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

Table 3. Server Specifications

| Specification | Description |
|------------------------------------|--|
| Size | <ul style="list-style-type: none"> • Height: 55.5 mm (2.2 in) • Depth: 492.7 mm (19.4 in) • Width: 435.3 mm (17.1 in) • Weight: <ul style="list-style-type: none"> – Minimum: 9.3 kg (20.6 lb) – Maximum: 12.3 kg (27.0 lb) |
| Processor (depending on the model) | <p>Support up to four multi-core Intel® Xeon processors. Use the Setup utility to determine the type and speed of the processors in the compute node. For a list of supported processors, see: https://serverproven.lenovo.com/.</p> <p>Notes: When install the processor models in below, make sure the server environment is not higher than 30°C. Fan error or performance reduction might occur when server is operating in the environment higher than 30°C.</p> <ul style="list-style-type: none"> • Intel Xeon Gold 6126T 12C 125W 2.6GHz Processor • Intel Xeon Gold 6144 8C 150W 3.5GHz Processor • Intel Xeon Gold 6146 12C 165W 3.2GHz Processor • Intel Xeon Platinum 8160T 24C 150W 2.1GHz Processor • Intel Xeon Platinum 6244 8C 150W 3.6GHz Processor |
| Memory | <p>See “Memory module installation order” in <i>Memory Population Reference</i> for detailed information about memory configuration and setup.</p> <ul style="list-style-type: none"> • Minimum: 16 GB • Maximum: <ul style="list-style-type: none"> – 13.8 TB with DC Persistent Memory Module (DCPMM) in Memory Mode • Type: <ul style="list-style-type: none"> – Error correcting code (ECC), Low-profile (LP) double-data rate (DDR4) RDIMM, LRDIMM, and 3DS RDIMM (mixing is not supported) – DC Persistent Memory Module (DCPMM) • Supports (depending on the model): <ul style="list-style-type: none"> – 8 GB, 16 GB, 32 GB, and 64 GB RDIMM – 64 GB LRDIMM – 128 GB 3DS RDIMM – 128 GB, 256 GB, and 512 GB DCPMM • Slots: 48 dual inline memory module (DIMM) connectors that support up to: <ul style="list-style-type: none"> – 48 DRAM DIMMs – 24 DRAM DIMMs and 24 DCPMMs <p>Note: List of supported memory module is different for 1st generation (Skylake) and 2nd generation (Cascade Lake) Intel Xeon processors. Make sure to install compatible memory modules to avoid system error. For a list of supported DIMMs, see: https://serverproven.lenovo.com/.</p> |
| Drive | Support up to four 2.5-inch hot-swap SAS/SATA/NVMe hard disk drive/solid-state drive bays. |
| Drive backplane | <ul style="list-style-type: none"> • SATA backplane • SAS/SATA backplane • NVMe/SATA backplane |

Table 3. Server Specifications (continued)

| Specification | Description |
|--|--|
| RAID support | <ul style="list-style-type: none"> • Software RAID supports for RAID levels 0, 1, 5, and 10 • Hardware RAID supports: <ul style="list-style-type: none"> – Basic RAID adapter (without flash power module) supports: RAID levels 0, 1, 5, and 10 – Advance RAID adapter (with flash power module) supports: RAID levels 0, 1, 5, 6, and 10 |
| Integrated functions | <ul style="list-style-type: none"> • One baseboard management controller (BMC) with integrated VGA controller • Light path diagnostics • One external USB 3.2 Gen 1 port • Serial over LAN (SOL) • Wake on LAN (WOL) |
| Minimum configuration for debugging | <ul style="list-style-type: none"> • Two processors in processor sockets 1 and 2 • One memory DIMM in slot 5 |
| Predictive Failure Analysis (PFA) alerts | <ul style="list-style-type: none"> • Processor • Memory • Drive |
| Security | Fully compliant with NIST 800-131A. The security cryptography mode set by the managing device (CMM and Lenovo XClarity Administrator) determines the security mode in which the compute node operates. |
| Operating systems | <p>Supported and certified operating systems:</p> <ul style="list-style-type: none"> • Microsoft Windows Server • VMware ESXi • Red Hat Enterprise Linux • SUSE Linux Enterprise Server <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 79. |

Table 3. Server Specifications (continued)

| Specification | Description |
|--|--|
| Environment | <p>The ThinkSystem SN850 compute node complies with ASHRAE Class A2 specifications. Depending on the hardware configuration, some models comply with ASHRAE Class A3 specifications. System performance may be impacted when operating temperature is outside ASHRAE A2 specification or fan failed condition. The ThinkSystem SN850 compute node is supported in the following environment:</p> <ul style="list-style-type: none"> • Air temperature: <ul style="list-style-type: none"> – Operating: <ul style="list-style-type: none"> – ASHRAE Class A2: 10°C to 35°C (50°F to 95°F); decrease the maximum ambient temperature by 1°C for every 300 m (984 ft) increase in altitude above 900 m (2,953 ft) – ASHRAE Class A3: 5°C to 40°C (41°F to 104°F); decrease the maximum ambient temperature by 1°C for every 175 m (574 ft) increase in altitude above 900 m (2,953 ft) – Compute node off: 5°C to 45°C (41°F to 113°F) – Shipment/Storage: -40°C to 60°C (-40°F to 140°F) • Maximum altitude: 3,050 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% to 80%, maximum dew point: 21°C (70°F) – ASHRAE Class A3: 8% to 85%, maximum dew point: 24°C (75°F) – Shipment/Storage: 8% to 90% • Particulate contamination <p>Attention: Airborne particulates and reactive gases acting alone or in combination with other environmental factors such as humidity or temperature might pose a risk to the server. For information about the limits for particulates and gases, see “Particulate contamination” in <i>ThinkSystem SN850 Compute Node Maintenance Manual</i>.</p> <p>Note: The server is designed for standard data center environment and recommended to be placed in industrial data center.</p> |
| Acoustical noise emissions | <p>Notes:</p> <ul style="list-style-type: none"> • 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. |
| <ol style="list-style-type: none"> 1. Chassis is powered on. 2. A3 - Derate maximum allowable temperature 1°C/175 m above 950 m. 3. The minimum humidity level for class A3 is the higher (more moisture) of the -12°C dew point and the 8% relative humidity. These intersect at approximately 25°C. Below this intersection (<25°C), the dew point (-12°C) represents the minimum moisture level; above the intersection, relative humidity (8%) is the minimum. 4. Moisture levels lower than 0.5°C dew point, but not lower -10°C dew point or 8% relative humidity, can be accepted if appropriate control measures are implemented to limit the generation of static electricity on personnel and equipment in the data center. All personnel and mobile furnishings and equipment must be connected to ground via an appropriate static control system. The following items are considered the minimum requirements: <ol style="list-style-type: none"> a. Conductive materials (conductive flooring, conductive footwear on all personnel who go into the datacenter; all mobile furnishings and equipment will be made of conductive or static dissipative materials). | |

Table 3. Server Specifications (continued)

| Specification | Description |
|---------------|---|
| | <ul style="list-style-type: none"> b. During maintenance on any hardware, a properly functioning wrist strap must be used by any personnel who contacts IT equipment. 5. 5°C/hr for data centers employing tape drives and 20°C/hr for data centers employing disk drives. 6. Chassis is removed from original shipping container and is installed but not in use, for example, during repair, maintenance, or upgrade. 7. The equipment acclimation period is 1 hour per 20°C of temperature change from the shipping environment to the operating environment. 8. Condensation, but not rain, is acceptable. |

Particulate contamination

Attention: Airborne particulates (including metal flakes or particles) and reactive gases acting alone or in combination with other environmental factors such as humidity or temperature might pose a risk to the device that is described in this document.

Risks that are posed by the presence of excessive particulate levels or concentrations of harmful gases include damage that might cause the device to malfunction or cease functioning altogether. This specification sets forth limits for particulates and gases that are intended to avoid such damage. The limits must not be viewed or used as definitive limits, because numerous other factors, such as temperature or moisture content of the air, can influence the impact of particulates or environmental corrosives and gaseous contaminant transfer. In the absence of specific limits that are set forth in this document, you must implement practices that maintain particulate and gas levels that are consistent with the protection of human health and safety. If Lenovo determines that the levels of particulates or gases in your environment have caused damage to the device, Lenovo may condition provision of repair or replacement of devices or parts on implementation of appropriate remedial measures to mitigate such environmental contamination. Implementation of such remedial measures is a customer responsibility.

Table 4. Limits for particulates and gases

| Contaminant | Limits |
|-----------------------|--|
| Reactive gases | <p>Severity level G1 as per ANSI/ISA 71.04-1985¹:</p> <ul style="list-style-type: none"> • The copper reactivity level shall be less than 200 Å/month (Å/month \approx 0.0035 $\mu\text{g}/\text{cm}^2\text{-hour}$ weight gain).² • The silver reactivity level shall be less than 200 Å/month (Å/month \approx 0.0035 $\mu\text{g}/\text{cm}^2\text{-hour}$ weight gain).³ • The reactive monitoring of gaseous corrosivity must be conducted approximately 5 cm (2 in.) in front of the rack on the air inlet side at one-quarter and three-quarter frame height off the floor or where the air velocity is much higher. |
| Airborne particulates | <p>Data centers must meet the cleanliness level of ISO 14644-1 class 8.</p> <p>For data centers without airside economizer, the ISO 14644-1 class 8 cleanliness might be met by choosing one of the following filtration methods:</p> <ul style="list-style-type: none"> • The room air might be continuously filtered with MERV 8 filters. • Air entering a data center might be filtered with MERV 11 or preferably MERV 13 filters. <p>For data centers with airside economizers, the choice of filters to achieve ISO class 8 cleanliness depends on the specific conditions present at that data center.</p> <ul style="list-style-type: none"> • The deliquescent relative humidity of the particulate contamination should be more than 60% RH.⁴ • Data centers must be free of zinc whiskers.⁵ |

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

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

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

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

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

Management options

The XClarity portfolio and other system management offerings 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"> • GUI application • Mobile application • Web interface • 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"> • GUI application • Web 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"> • GUI application • Web 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 | Event/alert monitoring | Inventory/logs | Power mgmt | Power planning |
| 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. Compute node components

Front view

Use this information to view the power features and functions of the controls and indicators on the front of the compute node.

Compute node controls, connectors, and LEDs

Use this information for details about the controls, connectors, and LEDs.

The following illustration identifies the buttons, connectors, and LEDs on the control panel.

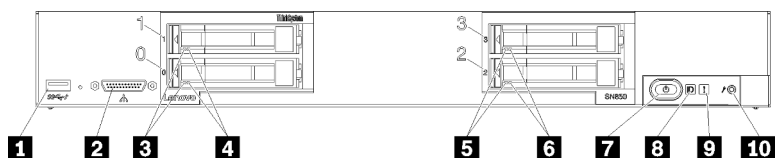


Figure 4. Compute node control panel buttons, connectors, and LEDs

Table 5. Compute node control panel buttons, connectors, and LEDs

| | |
|-------------------------------------|------------------------------------|
| 1 USB 3.2 Gen 1 connector | 6 Drive status LED (yellow) |
| 2 KVM connector | 7 Power button/LED (green) |
| 3 Drive activity LED (green) | 8 Identification LED (blue) |
| 4 Drive status LED (yellow) | 9 Fault LED (yellow) |
| 5 Drive activity LED (green) | 10 USB management button |

1 USB connector

Connect a USB device to this USB 3.2 Gen 1 connector.

It is best practice to connect a USB device to the front of only one compute node at a time in each Flex System chassis.

2 KVM connector

Connect the KVM cable to this connector (see “KVM cable” on page 22 for more information).

It is best practice to connect the KVM cable to only one compute node at a time in each Flex System chassis.

3 **5** Drive activity LED (green)

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

- When this LED is flashing, it indicates that the drive is actively reading or writing data.
- For all types of drive, this LED is solid on when the drive is powered but not active.
- The drive activity LED might be in a different location on the front of the drive, depending on the drive type that is installed.

4 6 Drive status LED (yellow)

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

- When the yellow LED is lit continuously, it indicates that an error has occurred with the associated drive. The LED turns off only after the error is corrected. You can check the CMM event log to determine the source of the condition.
- When the yellow LED flashes slowly (one time per second), it indicates that the associated drive is being rebuilt.
- When the yellow LED flashes rapidly (four times per second), it indicates that the associated drive is being located.
- The drive status LED might be in a different location on the front of the drive, depending on the drive type that is installed.

7 Power button/LED (green)

When the compute node is connected to power through the Flex System chassis, press this button to turn on or turn off the compute node.

For more information about the CMM **power** command, see [Flex System Chassis Management Module: Command-Line Interface Reference Guide at https://pubs.lenovo.com/cmm2/cli_command_power](https://pubs.lenovo.com/cmm2/cli_command_power).

Note: The power button works only if local power control is enabled for the compute node. Local power control is enabled and disabled through the CMM **power** command and the CMM web interface.

After the compute node is removed from the chassis, press and hold this button to activate the system-board LEDs and light path diagnostics. See the *ThinkSystem SN850 Maintenance Manual Viewing the light path diagnostics LEDs* for more information.

This button is also the power LED. This green LED indicates the power status of the compute node:

- **Flashing rapidly:** The LED flashes rapidly (four times per second) for one of the following reasons:
 - The compute node has been installed in a powered chassis. When you install the compute node, the LED flashes rapidly while the XClarity Controller in the compute node is initializing and synchronizing with the Chassis Management Module. The time required for a compute node to initialize varies by system configuration.
 - Power permissions have not been assigned to the compute node through the Chassis Management Module.
 - The Flex System chassis does not have enough power to turn on the compute node.
 - The XClarity Controller in the compute node is not communicating with the Chassis Management Module.

The power LED blink rate slows when the compute node is ready to be turned on.

- **Flashing slowly:** The LED flashes slowly (one time per second) means the compute node is connected to power through the Flex System chassis and is ready to be turned on.
- **Lit continuously:** The compute node is connected to power through the Flex System chassis and is turned on.

When the compute node is on, pressing this button causes an orderly shutdown of the compute node so that it can be removed safely from the chassis. This includes shutting down the operating system (if possible) and removing power from the compute node.

Attention: If an operating system is running, you might have to press the button for approximately 4 seconds to initiate the shutdown. This forces the operating system to shut down immediately. Data loss is possible.

8 Identification LED (blue)

The system administrator can remotely light this blue LED to aid in visually locating the compute node. When this LED is lit, the identification LED on the Flex System chassis is also lit. The identification LED can be lit and turned off through the CMM **led** command, the CMM web interface and the Lenovo XClarity Administrator application (if installed).

- There are four states of identification LED:

Table 6. Identification LED state

| LED state | Operation required for this state | Description |
|--|--|--|
| Off | This is the default state, no operation required | Compute node is in the normal state. |
| Solid On | <ul style="list-style-type: none"> – Press USB management button – Use CMM or Lenovo XClarity Controller | <p>Compute node is in locally manual operation status.</p> <p>To return LED to Off state, press USB management button again or change state through CMM or Lenovo XClarity Controller.</p> |
| Blinking (blink one time per second) | Use CMM or Lenovo XClarity Controller | <p>Compute node is in the locally manual operation status (same as solid On state).</p> <p>To return LED to Off state, press USB management button again or change state through CMM or Lenovo XClarity Controller.</p> |
| Slow blinking (blink one time every two seconds) | <ul style="list-style-type: none"> – Press USB management button for 3 seconds – Use CMM or Lenovo XClarity Controller | <p>Compute node is in the status, where USB port is connected to the Lenovo XClarity Controller. In this state, you can access the Lenovo XClarity Controller directly via a mobile device connected to the USB connector of the compute node.</p> <p>To return LED to Off state, press USB management button again or change state through CMM or Lenovo XClarity Controller.</p> |

- For more information about the CMM **led** command, see the [Flex System Chassis Management Module: Command-Line Interface Reference Guide](https://pubs.lenovo.com/cmm2/cli_command_led) at https://pubs.lenovo.com/cmm2/cli_command_led.
- From the CMM web interface, select **Compute Nodes** from the **Chassis Management** menu. For more information, see [the "Flex System Chassis Management Module: User's Guide" at https://pubs.lenovo.com/cmm2/cmm_user_guide](https://pubs.lenovo.com/cmm2/cmm_user_guide). All fields and options are described in the CMM web interface online help.
- For more information about the Lenovo XClarity Administrator application, see <https://datacentersupport.lenovo.com/products/solutions-and-software/software/lenovo-xclarity/solutions/ht115665>.

9 Fault LED (yellow)

When this yellow LED is lit, it indicates that a system error has occurred in the compute node. In addition, the fault LED on the chassis system LED panel is lit. You can check the CMM event log and the light path diagnostics LEDs to determine the source of the condition. See “Light path diagnostics LEDs” on page 18 for more information about the LEDs on the compute node.

The fault LED turns off only after the error is corrected. When the fault LED turns off, you should also clear the XClarity Controller event log. Use the Setup utility to clear the XClarity Controller event log.

10 USB management button

Press the button and held for 3 seconds;to switch the USB 3.2 Gen 1 port between default mode and Lenovo XClarity Controller management mode.

Notes:

- It is best practice to connect a USB device to the front of only one compute node at a time in each Lenovo Flex System chassis.
- When enabling the USB port for system management, do not insert USB 3.2 Gen 1 devices.

Light path diagnostics

Light path diagnostics is a system of LEDs above the control panel and on various internal components of the compute node. When an error occurs, LEDs can be lit throughout the compute node to help identify the source of the error.

Light path diagnostics LEDs

Use this information to diagnose possible errors that are indicated by the light path diagnostics LEDs.

The following illustration shows the LEDs on the light path diagnostics panel.

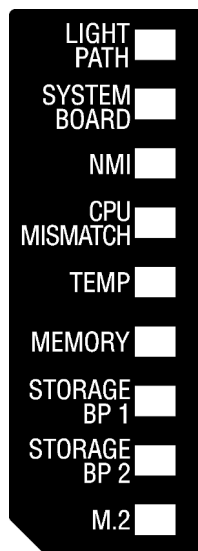


Figure 5. LEDs on the light path diagnostics panel

See the *ThinkSystem SN850 Maintenance Manual Viewing the light path diagnostics LEDs* for information about lighting up the LEDs.

Additional information about error conditions is in the CMM event log.

The following table describes the LEDs on the light path diagnostics panel.

Table 7. LEDs on the light path diagnostics panel

| Lit light path diagnostics LED | Description |
|--------------------------------|---|
| None | The compute node is not sufficiently charged to display the LEDs on the system board. |
| Light path | The power source for the light path diagnostics LEDs is charged. |
| System board | The system board has failed. |
| NMI | A nonmaskable interrupt has occurred, or the NMI button was pressed. |
| CPU mismatch | The processors are mismatched. |
| Temp | The system temperature has exceeded a threshold level. |
| Memory | A memory error has occurred. |
| Storage BP 1 and 2 | A drive backplane or its drives error has occurred. |
| M.2 | A M.2 drive error has occurred. |

System-board layout

Use this information to locate the connectors, LEDs, and switches on the system board.

System-board connectors

Use this information to locate compute node system-board components and connectors for optional devices.

The following illustration shows the system-board components, including connectors for user-installable optional devices, in the compute node.

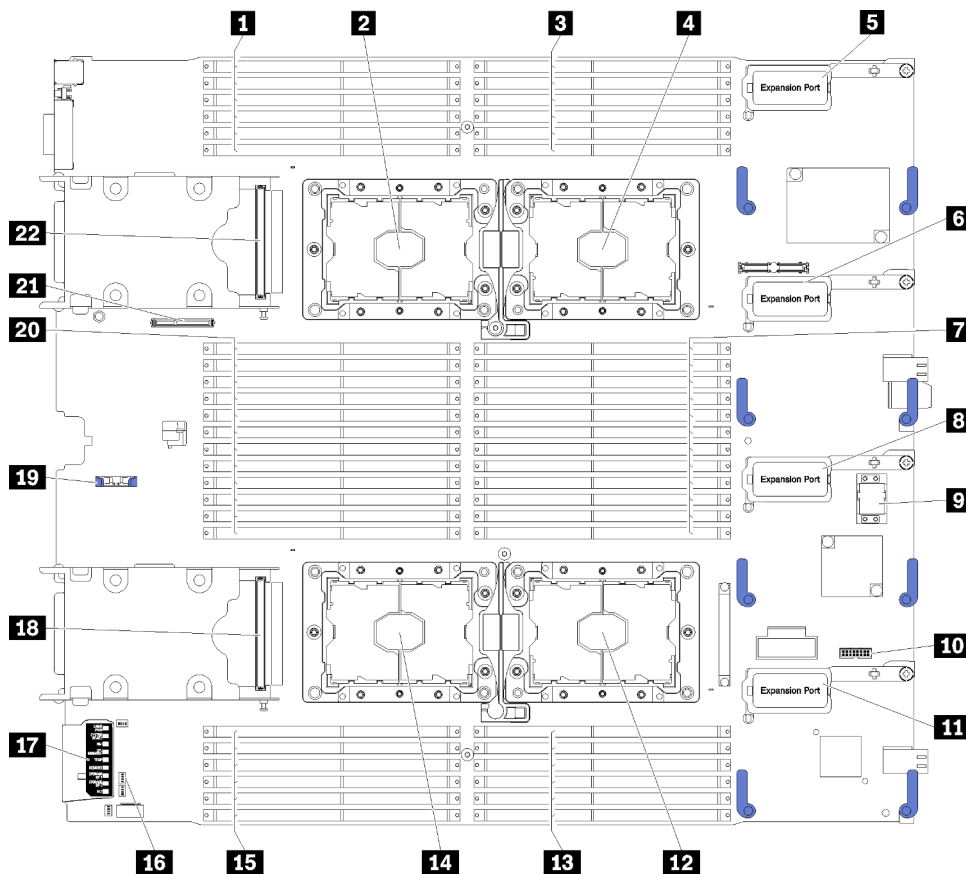


Figure 6. System board connectors

Table 8. System board connectors

| | |
|-------------------------------------|--|
| 1 DIMM slot 25 – 30 | 12 Processor socket 2 |
| 2 Processor socket 3 | 13 DIMM slot 19 – 24 |
| 3 DIMM slot 1 – 6 | 14 Processor socket 4 |
| 4 Processor socket 1 | 15 DIMM slot 43 – 48 |
| 5 I/O expansion 1 connector | 16 Switch blocks |
| 6 I/O expansion 2 connector | 17 Light path diagnostics |
| 7 DIMM slot 7 – 18 | 18 2.5-inch drive backplane connector |
| 8 I/O expansion 3 connector | 19 CMOS battery slot |
| 9 Fabric connector slot | 20 DIMM slot 31 – 42 |
| 10 TCM connector | 21 M.2 backplane connector |
| 11 I/O expansion 4 connector | 22 2.5-inch drive backplane connector |

System-board switches

Use this information to locate the system-board switches.

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

The following illustration shows the location of the switch blocks on the system board.

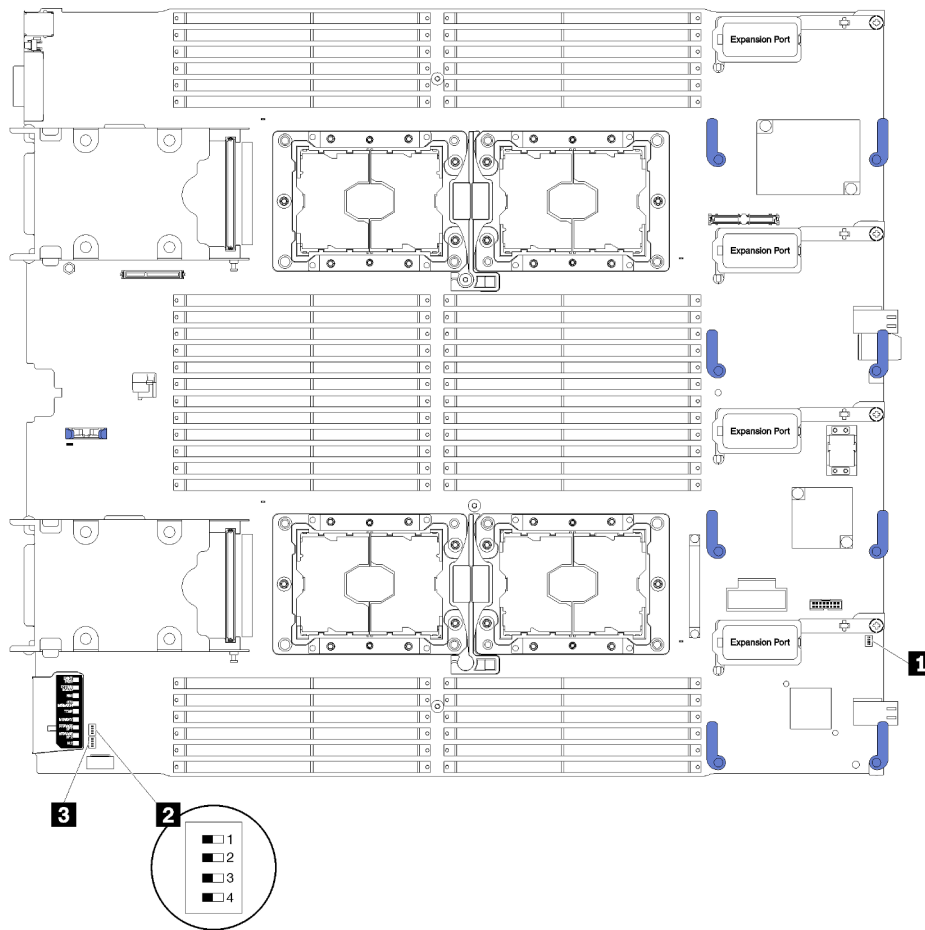


Figure 7. Switch blocks

Table 9. System-board switches

| | |
|---------------------------|---------------------------|
| 1 SW1 switch block | 3 SW2 switch block |
| 2 SW5 switch block | |

Important:

- Any system-board switches or jumpers that are not described in this section are reserved.
- Before you change any switch settings or move any jumpers, power off the compute node. Review the information in https://pubs.lenovo.com/safety_documentation/, “Installation Guidelines” on page 28, “Handling static-sensitive devices” on page 31, and “Power off the compute node” on page 65.

Switch and jumper functions are as follows:

- All jumpers on the system board are reserved and should be removed.
- All switches should be in the Off position.
- The following table describes the functions of the switches on switch block SW5.

Table 10. System-board switch block

| Switch number | Description | Definition |
|---------------|---|---|
| SW5-1 | Password override | The default position is Off. Changing this switch to the On position overrides the power-on password. |
| SW5-2 | Trusted Platform Module (TPM) physical presence | The default position is Off. Changing this switch to the On position indicates a physical presence to the TPM. |
| SW5-3 | CMOS memory | The default position is Off. Changing this switch to the On position indicates to clear CMOS memory. After clearing the CMOS memory, change the switch back to Off position to turn on the compute node (see “Power on the compute node” on page 65 for instructions). |
| SW5-4 | Reserved | The default position is Off. |

KVM cable

Use this information for details about the KVM cable.

Use the KVM cable to connect external I/O devices to the compute node. The KVM cable connects through the KVM connector (see “Compute node controls, connectors, and LEDs” on page 15). The KVM cable has connectors for a display device (video), two USB 2.0 connectors for a USB keyboard and mouse, and a serial interface connector.

The following illustration identifies the connectors and components on the KVM cable.

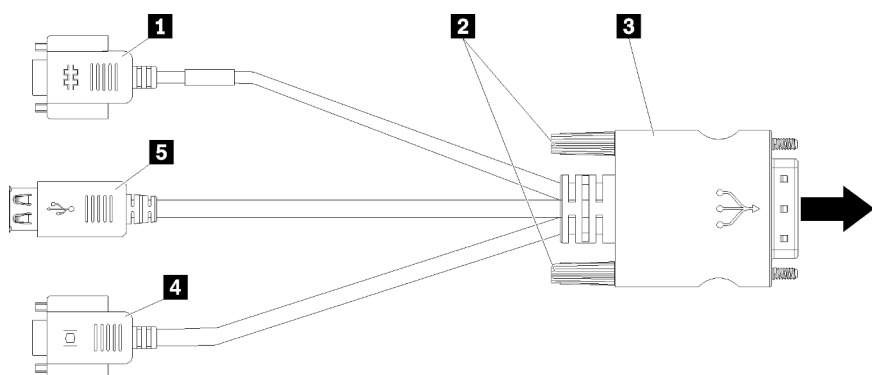


Figure 8. Connectors and components on the KVM cable

Table 11. Connectors and components on the KVM cable

| | |
|---------------------------|---------------------------------|
| 1 Serial connector | 4 Video connector (blue) |
| 2 Captive screws | 5 USB 2.0 ports (2) |
| 3 to KVM connector | |

Parts list

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

For more information about ordering the parts shown in Figure 9 “Compute node components” on page 23:

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

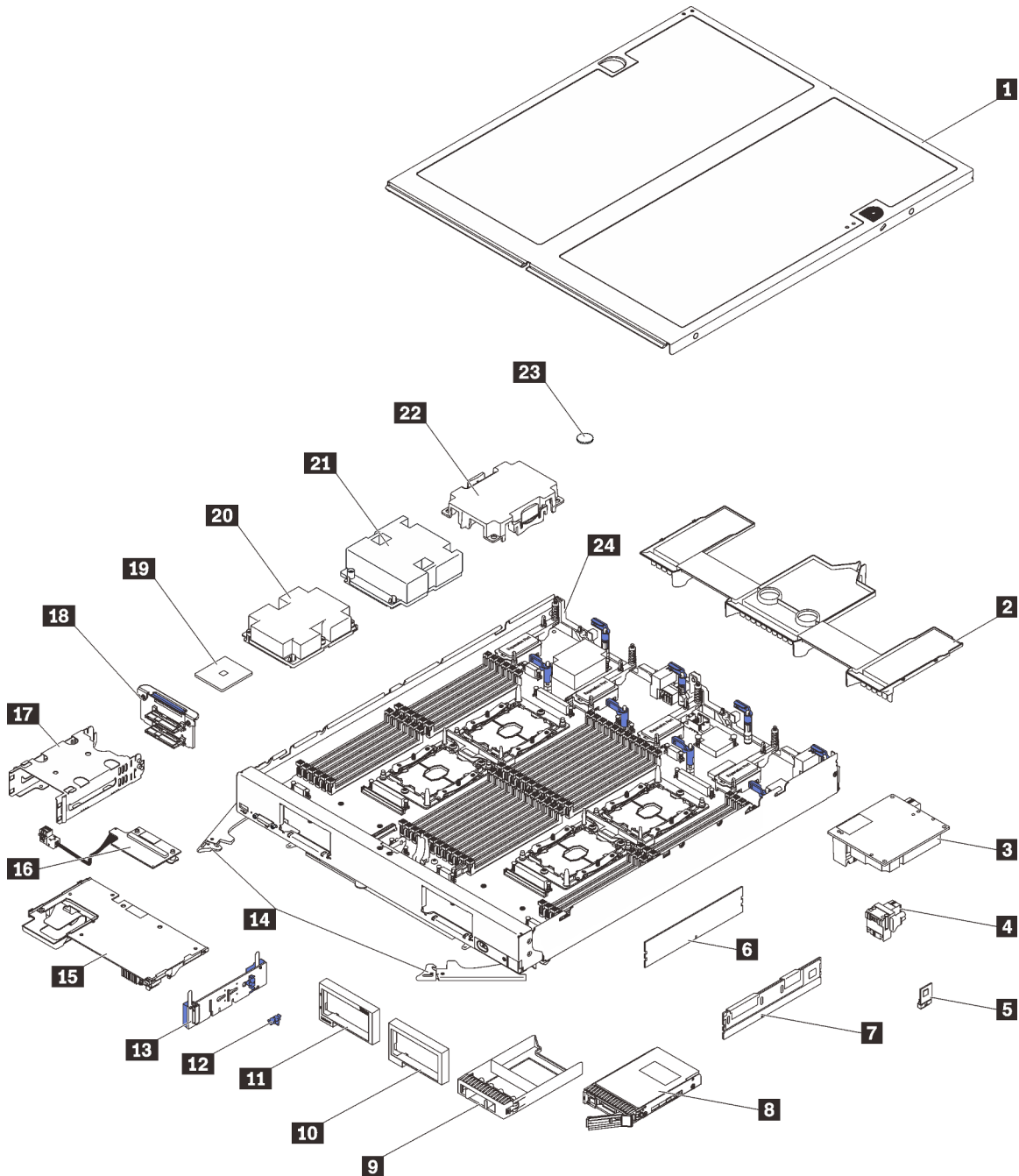


Figure 9. Compute node components

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 compute node.
- **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 12. Compute node components

| Index | Description | Tier 1 CRU | Tier 2 CRU | FRU | Consumable and Structural part |
|---|---------------------------------------|------------|------------|-----|--------------------------------|
| For more information about ordering the parts shown in Figure 9 “Compute node components” on page 23: https://datacentersupport.lenovo.com/products/servers/thinksystem/sn850/7x15/parts | | | | | |
| It is highly recommended that you check the power summary data for your server using Lenovo Capacity Planner before purchasing any new parts. | | | | | |
| 1 | Compute node cover | | | | ✓ |
| 2 | Air baffle | | | | ✓ |
| 3 | I/O expansion adapter | ✓ | | | |
| 4 | Fabric connector | | ✓ | | |
| 5 | Trusted Cryptographic Module (TCM) | | | ✓ | |
| 6 | DIMM | ✓ | | | |
| 7 | DC Persistent Memory Module (DCPMM) | ✓ | | | |
| 8 | 2.5-inch drive | ✓ | | | |
| 9 | Drive bay filler | | | | ✓ |
| 10 | Bezel (right) | | | | ✓ |
| 11 | Bezel (left) | | | | ✓ |
| 12 | M.2 backplane retainer clip | ✓ | | | |
| 13 | M.2 backplane | ✓ | | | |
| 14 | Front handles | | | | ✓ |
| 15 | RAID adapter | ✓ | | | |
| 16 | Interposer card | ✓ | | | |
| 17 | Storage cage | | | | ✓ |
| 18 | 2.5-inch drive backplane | ✓ | | | |
| 19 | Processor | | | ✓ | |
| 20 | Heat sink assembly for Processor 3, 4 | | | ✓ | |
| 21 | Heat sink assembly for Processor 1, 2 | | | ✓ | |
| 22 | Heat sink filler | | | | ✓ |

Table 12. Compute node components (continued)

| | | | | | |
|-----------|-----------------------|--|--|---|---|
| 23 | CMOS battery (CR2032) | | | | ✓ |
| 24 | System board | | | ✓ | |

Chapter 3. Compute node hardware setup

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

Compute node setup checklist

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

The compute node setup procedure varies depending on the configuration of the compute node when it was delivered. In some cases, the compute node is fully configured and you just need to connect the compute node to the network and an ac power source, and then you can power on the compute node. In other cases, the compute node 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 compute node:

1. Unpack the compute node package. See “Compute node package contents” on page 3.
2. Set up the compute node hardware.
 - a. Install the required compute node components. See the related topics in “Install compute node hardware options” on page 31.
 - b. Install the compute node into the chassis.
 - c. Make sure the chassis is connected to power.
 - d. Connect the management controller to the network.
 - e. Power on the compute node.

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

- f. Validate that the compute node hardware was set up successfully. See Validate compute node setup.
3. Configure the system.
 - a. Connect the Lenovo XClarity Controller to the management network. See Set the network connection for the Lenovo XClarity Controller.
 - b. Update the firmware for the compute node, if necessary. See “Update the firmware” on page 69.
 - c. Configure the firmware for the compute node. See “Configure the firmware” on page 72.

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 79.
 - e. Back up the compute node configuration. See “Back up the compute node configuration” on page 80.

- f. Install the applications and programs for which the compute node is intended to be used.

Notes:

- The first generation Chassis Management Module (CMM1; 68Y7030) is not supported by the ThinkSystem SN850 compute node.
- The second generation Chassis Management Module (CMM2; 00FJ669) must be at firmware level 1.6.1 or above to support the ThinkSystem SN850 compute node. This applies to both CMMs that are installed in the chassis.

Installation Guidelines

Use the installation guidelines to install components in your server.

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 31 and “Working inside the compute node with the power on” on page 30.
- Make sure the components you are installing are supported by your compute node. For a list of supported optional components for the compute node, see <https://serverproven.lenovo.com/>.
- When you install a new compute node, download and apply the latest firmware. This will help ensure that any known issues are addressed, and that your compute node is ready to work with optimal performance. Go to [ThinkSystem SN850 Drivers and Software](#) to download firmware updates for your compute node.

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.

- Before you remove a compute node from the Flex System chassis, you must shut down the operating system and turn off the compute node. You do not have to shut down the chassis itself.
- It is good practice to make sure that the compute node 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 compute node, 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 compute node to remove or install hot-swap power supplies, hot-swap fans, or hot-plug USB devices. However, you must turn off the compute node before you perform any steps that involve removing or installing adapter cables, and you must disconnect the power source from the compute node 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 compute node, open or close a latch, and so on.
- Terra-cotta on a component or a terra-cotta 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. (Terra-cotta can also indicate touch points on hot-swap components.) See the instructions for removing or installing a specific hot-swap component for any additional procedures that you might have to perform before you remove or install the component.
- The Red strip on the drives, adjacent to the release latch, indicates that the drive can be hot-swapped if the compute node and operating system support hot-swap capability. This means that you can remove or install the drive while the compute node 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 compute node, 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.

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 solution:

- a. Go to:

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

- b. In the Customize a Model pane:

- 1) Click **Select Options/Parts for a Model**.
- 2) Enter the machine type and model for your solution.
- c. Click the Power tab to see all line cords.
 - Make sure that the insulation is not frayed or worn.
3. Check for any obvious non-Lenovo alterations. Use good judgment as to the safety of any non-Lenovo alterations.
4. Check inside the 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:

- To ensure proper cooling, the Flex System chassis is not operated without a compute node or node bay filler in each node bay.
- When the compute node comes with redundant power, a power supply must be installed in each power-supply bay.
- Adequate space around the compute node must be spared to allow compute node cooling system to work properly. Leave approximately 50 mm (2.0 in.) of open space around the front and rear of the compute node. Do not place any object in front of the fans.
- For proper cooling and airflow, refit the compute node cover before you turn the power on. Do not operate the compute node for more than 30 minutes with the compute node cover removed, for it might damage compute node components.
- Cabling instructions that come with optional components must be followed.
- A failed fan must be replaced within 48 hours after malfunction.
- A removed hot-swap fan must be replaced within 30 seconds after removal.
- A removed hot-swap drive must be replaced within two minutes after removal.
- A removed hot-swap power supply must be replaced within two minutes after removal.
- Every air baffle that comes with the compute node must be installed when the compute node starts (some servers might come with more than one air baffle). Operating the compute node with a missing air baffle might damage the processor.
- All processor sockets must contain either a socket cover or a processor with heat sink.
- When more than one processor is installed, fan population rules for each compute node must be strictly followed.

Working inside the compute node with the power on

Guidelines to work inside the compute node with the power on.

Attention: The server might stop and data loss might occur when internal server components are exposed to static electricity. To avoid this potential problem, always use an electrostatic-discharge wrist strap or other grounding systems when working inside the server with the power on.

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

- Prevent your necktie, scarf, badge rope, or hair from dangling into the server.
- Remove jewelry, such as bracelets, necklaces, rings, cuff links, and wrist watches.
- Remove items from your shirt pocket, such as pens and pencils, in case they fall into the server as you lean over it.
- Avoid dropping any metallic objects, such as paper clips, hairpins, and screws, into the server.

Handling static-sensitive devices

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 compute node 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 compute node 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 compute node 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 compute node 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 untrained technician to prevent possible damages.

Install compute node 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 compute node. For a list of supported optional components for the compute node, 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 compute node is ready to work with optimal performance. Go to [ThinkSystem SN850 Drivers and Software](#) to download firmware updates for your compute node.
- It is good practice to make sure that the compute node 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 the compute node cover

Use this information to remove the compute node cover.

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

- **S012**



CAUTION:
Hot surface nearby.

- **S014**



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

- **S021**



CAUTION:
Hazardous energy is present when the blade is connected to the power source. Always replace the blade cover before installing the blade.

- **S033**



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

1. Read "Installation Guidelines" on page 28 to ensure that you work safely.
2. Carefully lay the compute node on a flat, static-protective surface, orienting the compute node with the bezel pointing toward you.

To remove the compute node cover, complete the following steps:

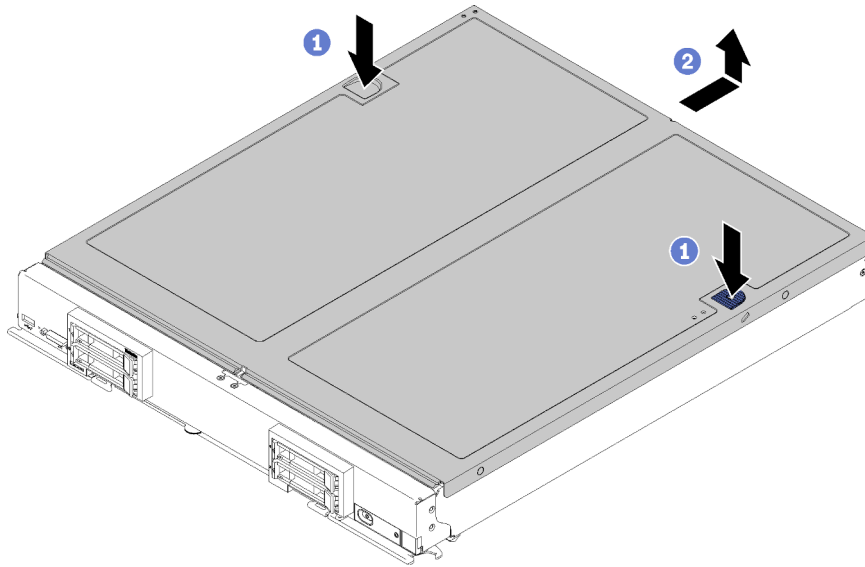


Figure 10. Compute node cover removal

- Step 1. Press on the release button and the push point at the same time and slide the cover toward the rear of the compute node.
- Step 2. Lift the compute node cover away from the compute node.
- Step 3. Lay the compute node cover flat or store it for future use.

Demo video

Watch the procedure on YouTube

Remove the air baffle

Use this information to remove the air baffle.

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

S012



CAUTION: **Hot surface nearby.**

Before removing the air baffle:

1. Read “Installation Guidelines” on page 28 to ensure that you work safely.
2. Carefully lay the compute node on a flat, static-protective surface, orienting the compute node with the bezel pointing toward you.
3. Remove the compute node cover (see “Remove the compute node cover” on page 32 for instructions).

To remove the air baffle, complete the following steps:

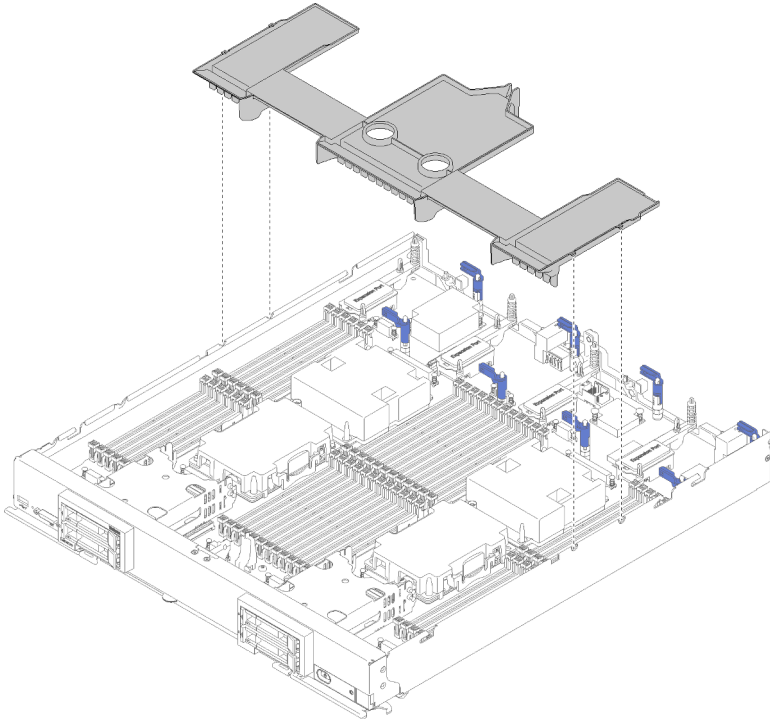


Figure 11. Air baffle removal

Step 1. Lift the air baffle up and set it aside.

Attention: For proper cooling and airflow, reinstall the air baffle before you insert the compute node into the chassis. Operating the compute node with the air baffle removed might damage compute node components.

After removing the air baffle, begin installing any options that you have purchased.

Demo video

Watch the procedure on YouTube

Install a 2.5-inch drive backplane

Use this information to install a drive backplane option.

Before you install a drive backplane, complete the following steps:

1. Read “Installation Guidelines” on page 28 to ensure that you work safely.
2. Carefully lay the compute node on a flat, static-protective surface, orienting the compute node with the bezel pointing toward you.
3. Remove the compute node cover (see “Remove the compute node cover” on page 32 for instructions).

Notes: Several different types of drive backplanes can be installed in the compute node. All are removed and installed in a similar manner.

- SATA backplane
- NVMe/(SATA) backplane
- SAS/SATA backplane

To install a 2.5-inch drive backplane, complete the following steps:

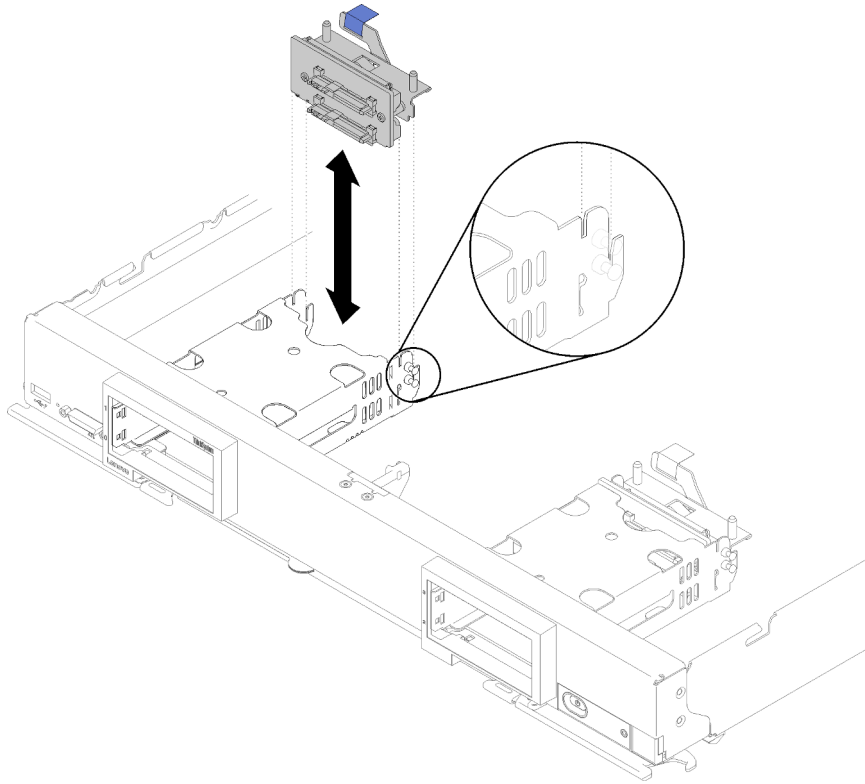


Figure 12. 2.5-inch drive backplane installation

Step 1. Align the backplane with the storage cage and the connector on the system board and press the backplane into position until it is fully seated in the connector.

Note: All drive backplanes use the same connector on the system board; however, there are two alignment slots in the storage cage to accommodate different backplane types. Make sure that you align the backplane and system board connectors when inserting the backplane in the storage cage.

Step 2. Insert the hot-swap drives and drive bay fillers.

After you install the drive backplane, complete the following steps:

- Install any removed storage drives and drive bay fillers (see “Install a 2.5-inch hot-swap drive” on page 35).

Note: Install storage drives in the same bay locations as from which they were removed.

Demo video

Watch the procedure on YouTube

Install a 2.5-inch hot-swap drive

Use this information to install a 2.5-inch hot-swap hard disk or solid-state drive option.

Before you install a 2.5-inch hot-swap drive, complete the following steps:

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

- Carefully lay the compute node on a flat, static-protective surface, orienting the compute node with the bezel pointing toward you.

The compute node has four drive bays for installing hot-swap drives. One drive might already be installed in the compute node. If the compute node is equipped with one drive, you can install up to three additional drives.

See “RAID configuration” on page 78 RAID configuration for instructions.

To install a 2.5-inch hot-swap drive, complete the following steps:

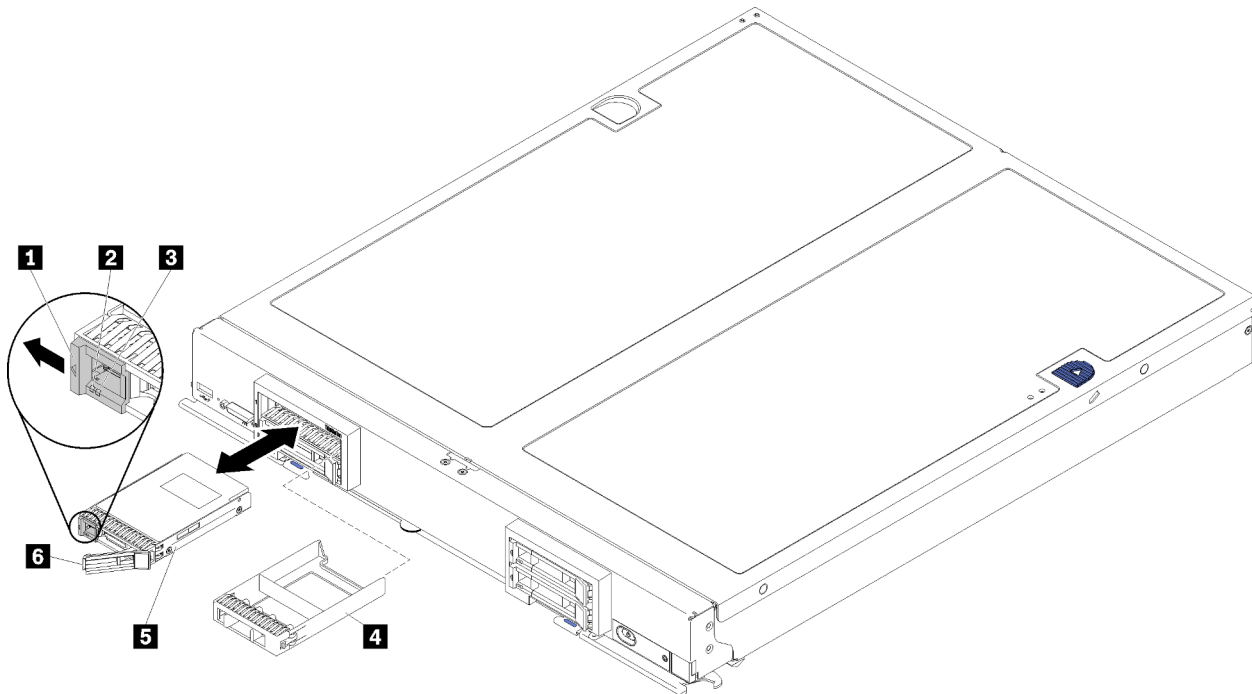


Figure 13. 2.5-inch hot-swap drive installation

Table 13. 2.5-inch hot-swap drive and related components

| | |
|-------------------------------------|---------------------------|
| 1 Release latch | 4 Drive bay filler |
| 2 Drive activity LED (green) | 5 Drive |
| 3 Drive status LED (yellow) | 6 Release handle |

- Identify the drive bay in which you plan to install the hot-swap drive.
- If a drive bay filler is installed, pinch the grip point and pull it away from the compute node.
- Touch the static-protective package that contains the hot-swap drive or solid-state drive to any *unpainted* metal surface on the Flex System chassis or any *unpainted* metal surface on any other grounded rack component; then, remove the drive from the package.
- Open the release handle on the drives into the bay until the release handle catches on the bezel, then rotate the handle to fully seat the drive.
- Lock the drives into place by closing the release handle until it clicks.
- Check the drive activity LEDs to make sure that the drive is operating correctly.

Demo video

Watch the procedure on YouTube

Install a DIMM

Use this information to install a DIMM.

See “Memory module installation order” in *Memory Population Reference* for detailed information about memory configuration and setup.

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 31:

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

Before installing a DIMM, 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 *ThinkSystem SN850 Compute Node Memory Population Reference* for the required installation order.

If you are installing an optional processor, install it before installing DIMMs. See “Install a processor-heat-sink module” on page 47.

Before you install a DIMM, complete the following steps:

1. Read “Installation Guidelines” on page 28 to ensure that you work safely.
2. Carefully lay the compute node on a flat, static-protective surface, orienting the compute node with the bezel pointing toward you.
3. Remove the compute node cover (see “Remove the compute node cover” on page 32 for instructions).
4. If you are installing DCPMMs for the first time, follow the instructions in “DC Persistent Memory Module (DCPMM) setup” on page 40 so that the system supports DCPMMs.

To install a DIMM, complete the following steps:

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 31:

- 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.
- Remove or install DIMMs for one processor at a time.
- Do not mix RDIMMs and LR-DIMMs in the same compute node.
- DIMMs are static-sensitive devices. The package must be grounded before it is opened.

Step 1. Remove the air baffle (see “Remove the air baffle” on page 33 for instructions).

Step 2. Locate the DIMM connectors (see “System-board connectors” on page 19 for instructions). Determine which DIMM connector you want to install the DIMM.

Step 3. Touch the static-protective package that contains the DIMM to any *unpainted* metal surface on the Flex System chassis or any *unpainted* metal surface on any other grounded rack component in the rack in which you are installing the DIMM for at least 2 seconds; then, remove the DIMM from its package.

Step 4. Make sure that both retaining clips on the DIMM connector are in the open position.

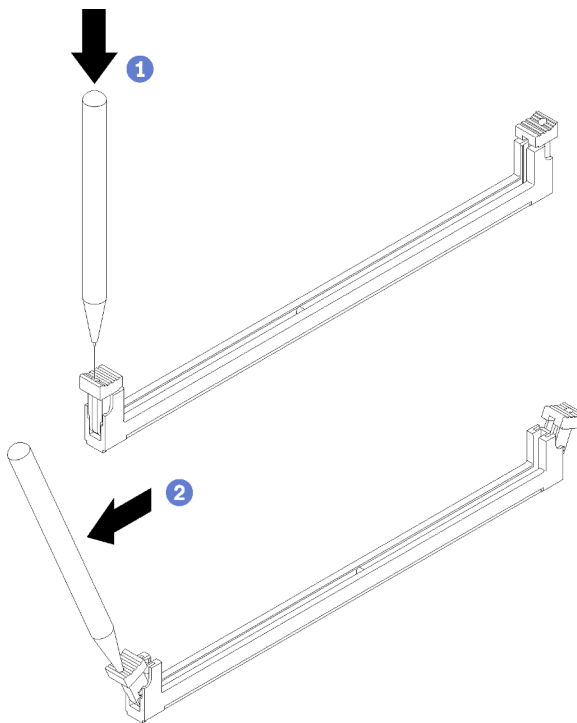


Figure 14. Opening DIMM latch

Notes:

- If necessary due to space constraints, you can use a pointed tool to open the retaining clips. Place the tip of the tool in the recess on the top of the retaining clip; then, carefully rotate the retaining clip away from the DIMM connector.
- Make sure you use firm and solid pointed tool to open the retaining clips. Do not use pencil. In case there are any fragments of the tool fall into the compute node, caused unnecessary damage.
- The retaining clips for adjacent DIMM connectors of processor and processor cannot be opened at the same time. Remove or install the DIMMs for each processor one at a time.

Attention: To avoid breaking the retaining clips or damaging the DIMM connector, handle the clips gently.

- Step 5. Turn the DIMM so that the DIMM keys align correctly with the DIMM connector on the system board, and gently place the DIMM on the connector with both hands.
- Step 6. Firmly press both ends of the DIMM straight down into the DIMM connector until the retaining clips snap into the locked position.

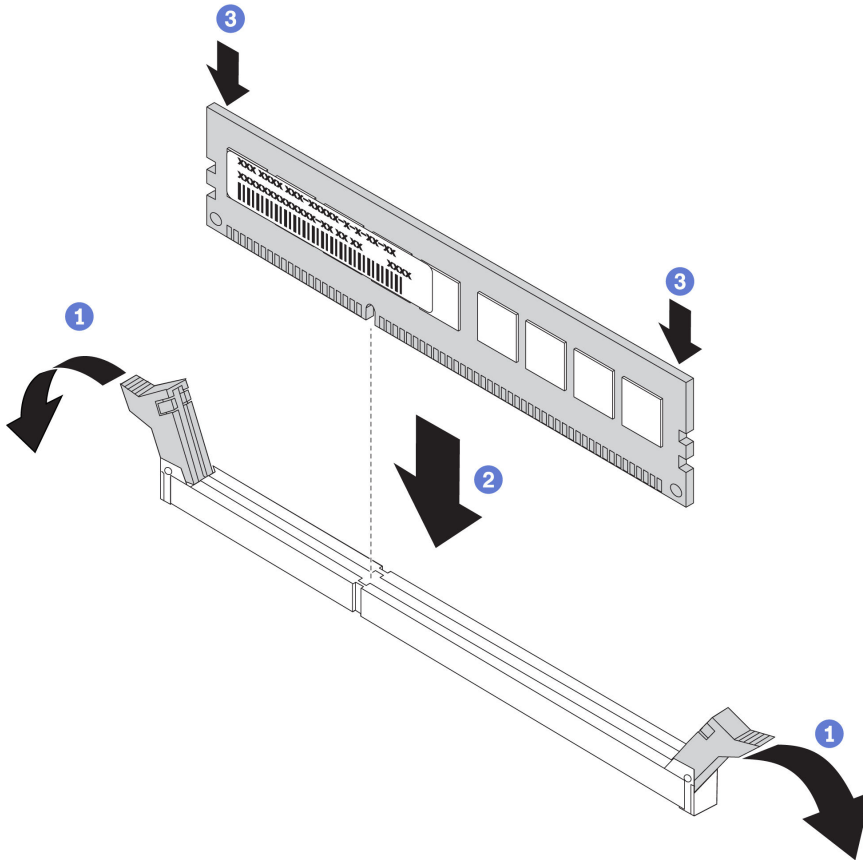


Figure 15. DIMM installation

- Step 7. Make sure that the small tabs on the retaining clips engage the notches on the DIMM. If there is a gap between the DIMM and the retaining clips, the DIMM has not been correctly installed. Press the DIMM firmly into the connector, and then press the retaining clips toward the DIMM until the tabs are fully seated. When the DIMM is correctly installed, the retaining clips are parallel to the sides of the DIMM.

Note: Retaining clips on the DIMM connectors must be in the closed position to install the air baffles correctly.

Attention: To maintain proper system cooling, do not operate the compute node without an air baffle installed over the DIMM connectors.

If you have installed a DCPMM:

1. Update the system firmware to the latest version (see “Update the firmware” on page 69).
2. Make sure the firmware of all the DCPMM units 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).

3. Restore the data that have been backed up if necessary.

Demo video

Watch the procedure on YouTube

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 69).
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 40 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 40 to install all the DCPMMs and DRAM DIMMs (see “Install a DIMM” on page 37).
8. 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).

Notes:

- When adding more DCPMM to the existing configuration, make sure to update all the DCPMM firmware to the latest level.
- The system currently supports only Memory Mode with DCPMM. Any operation that changes the system to other modes with DCPMM could cause data lost or damage in certain circumstances.

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 40 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 **5** or a larger number.
 - The second digit is **2**.

Example: *Intel Xeon 5215L* 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.
 - **Large memory tier (L):** The processors with **L** after the four digits (for example: *Intel Xeon 5215L*) support up to 4.5 TB of memory capacity per processor
 - **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
 - **Other:** Other processors that support DCPMMs (for example: *Intel Xeon Gold 5222*) support up to 1 TB of memory capacity per processor

Install an I/O expansion adapter

Use this information to install an I/O expansion adapter option.

Before you install an I/O expansion adapter, complete the following steps:

1. Read “Installation Guidelines” on page 28 to ensure that you work safely.
2. Carefully lay the compute node on a flat, static-protective surface, orienting the compute node with the bezel pointing toward you.
3. Remove the compute node cover (see “Remove the compute node cover” on page 32 for instructions).

This component can be installed as an optional device or as a CRU. The installation procedure is the same for the optional device and the CRU.

Attention: When installing an I/O adapter in one of the I/O expansion connectors, make sure the numbers in the Hexagon and Pentagon on the I/O expansion connector (see the service labeling on top of the compute node cover for details) corresponds to the particular shape and numbering of the I/O module bay on the Flex chassis (see the bay labeling along the top and bottom edges of the chassis rear for details). If the correlation is incorrect, communication with the chassis may fail.

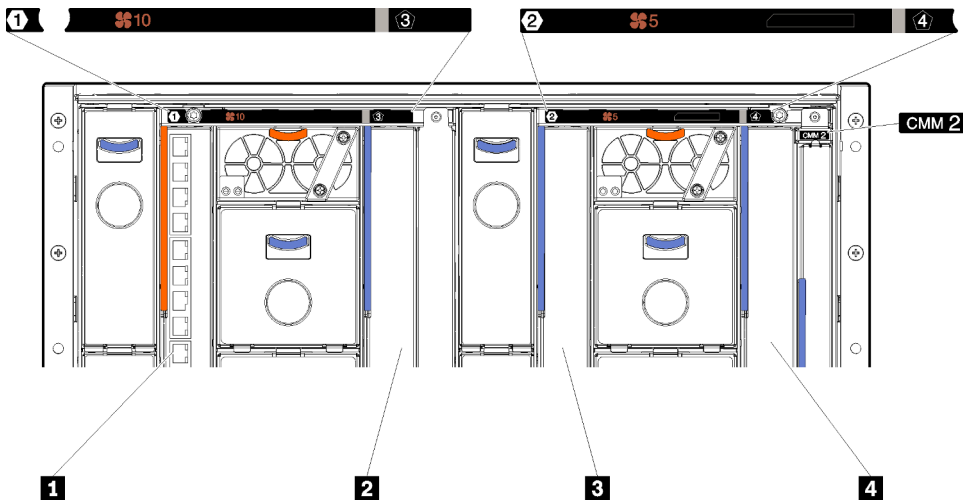


Figure 16. Number of I/O module bay

Table 14. Number of I/O module bay

| | |
|---------------------------|---------------------------|
| 1 I/O module bay 1 | 3 I/O module bay 2 |
| 2 I/O module bay 3 | 4 I/O module bay 4 |

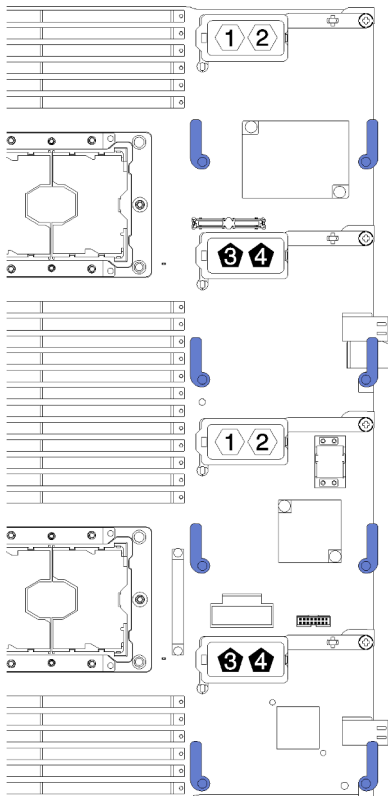


Figure 17. I/O expansion adapter

To install an I/O expansion adapter, complete the following steps:

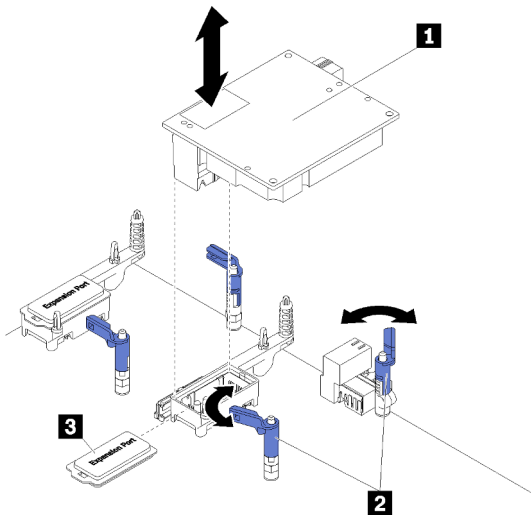


Figure 18. I/O expansion adapter installation

Table 15. I/O expansion adapter and related components

| | |
|--------------------------------|--------------------------|
| 1 I/O expansion adapter | 3 Expansion cover |
| 2 Retention clips | |

- Step 1. Locate the I/O expansion connectors (see “System-board connectors” on page 19 for instructions).
- Step 2. Remove the expansion cover from the connector, if one is present.
- Step 3. Touch the static-protective package that contains the expansion adapter to any *unpainted* metal surface on the Flex System chassis or any *unpainted* metal surface on any other grounded rack component; then, remove the expansion adapter from the package.
- Step 4. Open the retention clips.
- Step 5. Orient the connector on the expansion adapter with the I/O expansion connector and alignment pins on the system board; then, press the adapter into the I/O expansion connector.
- Step 6. Firmly press on the indicated locations to seat the expansion adapter in the connector and over the alignment pins.
- Step 7. Close the retention clips.

After you install the I/O expansion adapter, complete the following steps:

1. See the documentation that comes with the I/O expansion adapter for device-driver and configuration information to complete the installation.

Demo video

Watch the procedure on YouTube

Install an M.2 drive

Use this information to install an M.2 drive option.

Before you install an M.2 drive in the M.2 backplane, complete the following steps:

1. Read “Installation Guidelines” on page 28 to ensure that you work safely.
2. Carefully lay the compute node on a flat, static-protective surface, orienting the compute node with the bezel pointing toward you.

3. Remove the compute node cover (see “Remove the compute node cover” on page 32 for instructions).
4. Touch the static-protective package that contains the M.2 drive to any *unpainted* metal surface on the chassis or any *unpainted* metal surface on any other grounded rack component; then, remove the M.2 drive from the package.
5. Make sure the retainer on the M.2 backplane is in the correct keyhole to accommodate the particular size of the M.2 drive you wish to install (see “Adjust the position of the retainer on the M.2 backplane” on page 45).

To install an M.2 drive in the M.2 backplane, complete the following steps:

Notes:

- Some M.2 backplanes support two identical M.2 drives. When two drives are installed, align and support both drives when sliding the retainer forward to secure the drives.
- Install the M.2 drive in slot 0 first.

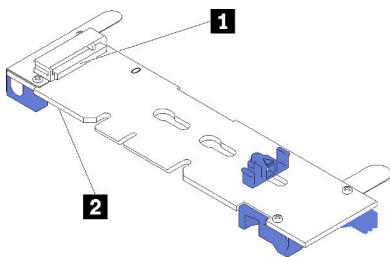


Figure 19. M.2 drive slot

Table 16. M.2 drive slot

| | |
|----------|----------|
| 1 Slot 0 | 2 Slot 1 |
|----------|----------|

Step 1. 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.

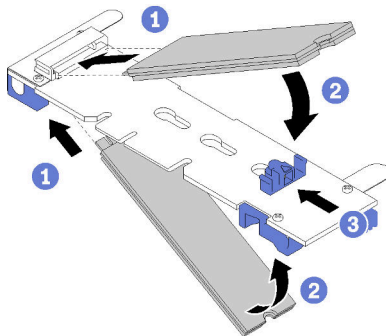


Figure 20. M.2 drive installation

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.

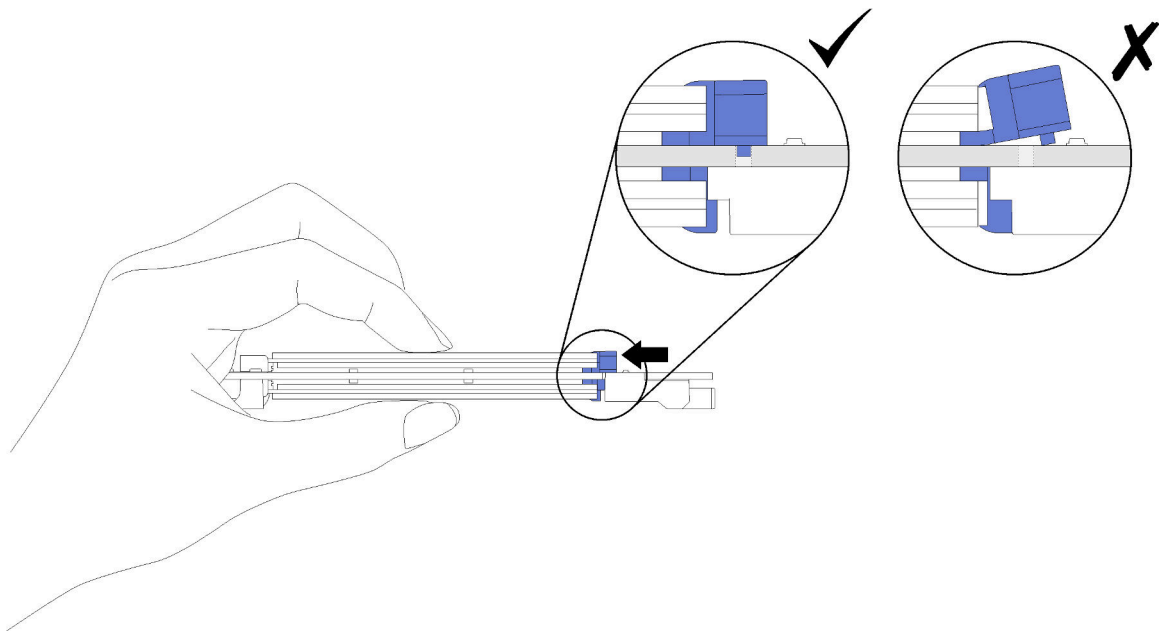


Figure 21. M.2 drive installation

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

1. Install the M.2 backplane (see “Install the M.2 backplane” on page 46).

Demo video

Watch the procedure on YouTube

Adjust the position of the retainer on the M.2 backplane

Use this information to adjust the position of the retainer on the M.2 backplane.

Before you adjust the position of the retainer on the M.2 backplane, complete the following step:

Read to ensure that you work safely.

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

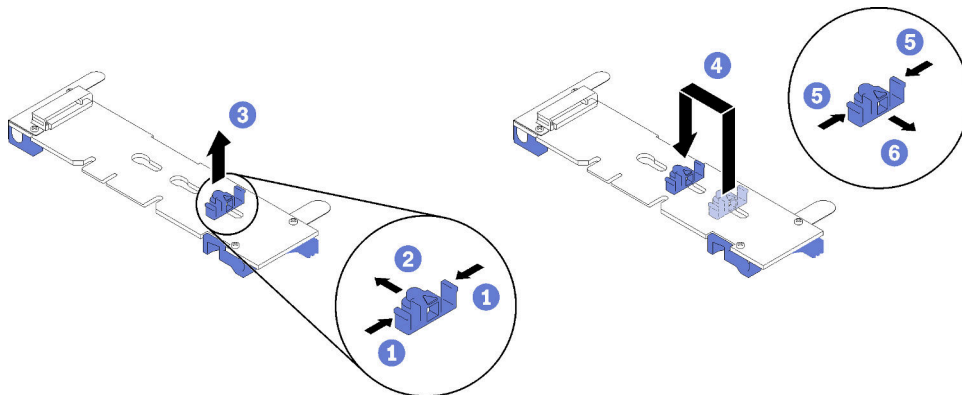


Figure 22. M.2 retainer adjustment

- Step 1. Locate the correct keyhole that the retainer should be installed to accommodate the particular size of the M.2 drive you wish to install.
- Step 2. Press both sides of the retainer and move it forward until it is in the large opening of the keyhole; then, remove it from the backplane.
- Step 3. Insert the retainer into the correct keyhole and slide it backwards until the nubs are in the holes.

Demo video

Watch the procedure on YouTube

Install the M.2 backplane

Use this information to install the M.2 backplane.

Before you install the M.2 backplane, complete the following steps:

1. Read “Installation Guidelines” on page 28 to ensure that you work safely.
2. Carefully lay the compute node on a flat, static-protective surface, orienting the compute node with the bezel pointing toward you.
3. Remove the compute node cover (see “Remove the compute node cover” on page 32 for instructions).

To install the M.2 backplane, complete the following steps:

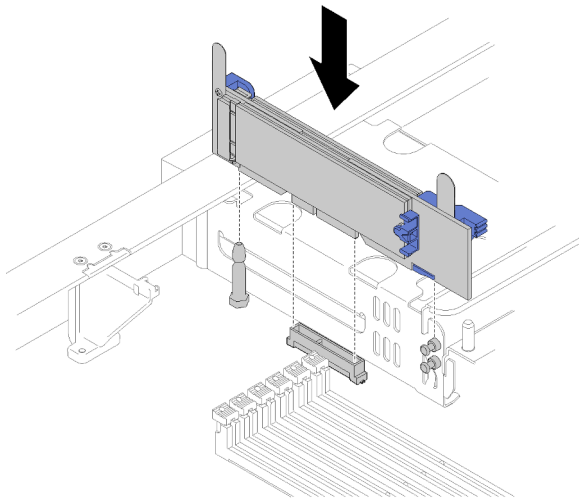


Figure 23. M.2 backplane installation

- Step 1. Align the openings on the M.2 backplane with the guide pin on the system board and T-head pins on the storage cage; then, insert the backplane in the system board connector. Press down on the M.2 backplane to fully seated.

Demo video

Watch the procedure on YouTube

Install a processor-heat-sink module

Processors are in the compute system boards that are accessed from the front of the server. The processor and heat sink are removed together as part of a processor-heat-sink-module (PHM) assembly. PHM installation requires a Torx T30 driver.

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

Attention:

- Each processor socket must always contain a cover or a PHM. When removing or installing a PHM, protect empty processor sockets with a cover.
- Do not touch the processor socket or processor contacts. Processor-socket contacts are very fragile and easily damaged. Contaminants on the processor contacts, such as oil from your skin, can cause connection failures.
- Remove and install only one PHM at a time. If the system board supports multiple processors, install the PHMs starting with the first processor socket.
- Do not allow the thermal grease on the processor or heat sink to come in contact with anything. Contact with any surface can compromise the thermal grease, rendering it ineffective. Thermal grease can damage components, such as electrical connectors in the processor socket. Do not remove the grease cover from a heat sink until you are instructed to do so.
- To ensure the best performance, check the manufacturing date on the new heat sink and make sure it does not exceed two years. Otherwise, wipe off the existing thermal grease and apply the new grease onto it for optimal thermal performance.
- Processors are static-sensitive components, handle them with extra care. See Handling static-sensitive devices for more information.

Notes:

- For ThinkSystem SN850 Xeon SP Gen2, new processor package contains only one processor in each package. Make sure you purchase adequate processor packages according to the system configurations.
- PHMs are keyed for the socket where they can be installed and for their orientation in the socket.
- See <https://serverproven.lenovo.com/> for a list of processors supported for your processor. All processors on the system board must have the same speed, number of cores, and frequency.
- Before you install a new PHM or replacement processor, update your system firmware to the latest level. See “Update the firmware” on page 69 .
- Installing an additional PHM can change the memory requirements for your system. See *ThinkSystem SN850 Compute Node Memory Population Reference* for a table of processor-to-memory relationships.
- Optional devices available for your system might have specific processor requirements. See the documentation that comes with the optional device for information.

Before installing a PHM:

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

1. Read “Installation Guidelines” on page 28 to ensure that you work safely.
2. Remove the compute node cover (see “Remove the compute node cover” on page 32 for instructions).
3. Remove the air baffle (see “Remove the air baffle” on page 33 for instructions).

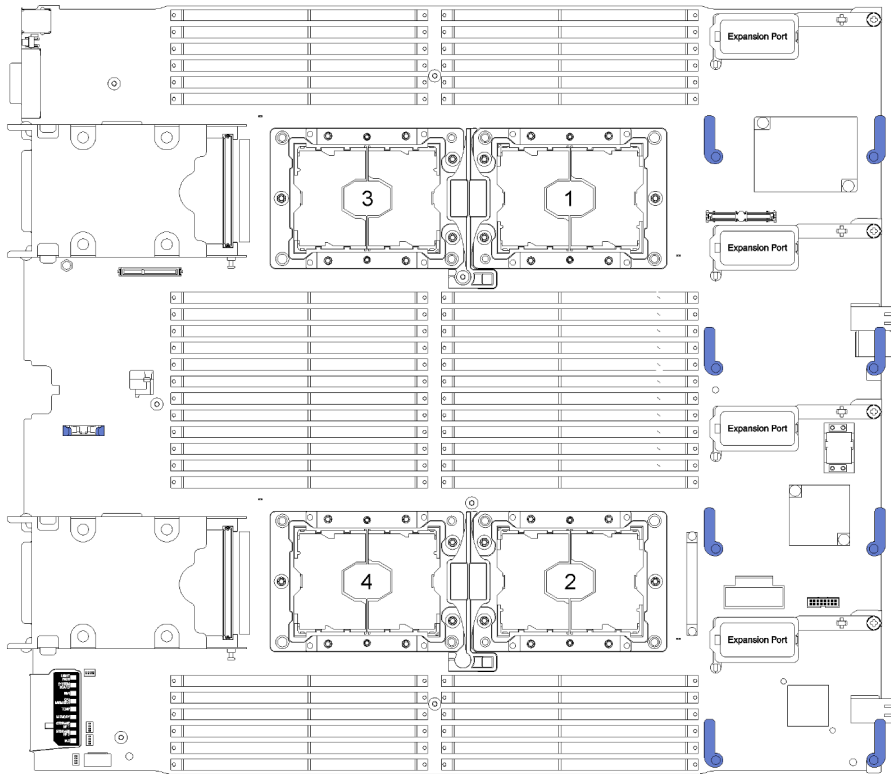


Figure 24. Processor locations on system board

Complete the following steps to install a PHM.

- Step 1. Remove the processor socket cover, if one is installed on the processor socket, by placing your fingers in the half-circles at each end of the cover and lifting it from the system board.
- Step 2. Install the processor-heat-sink module on the system board.

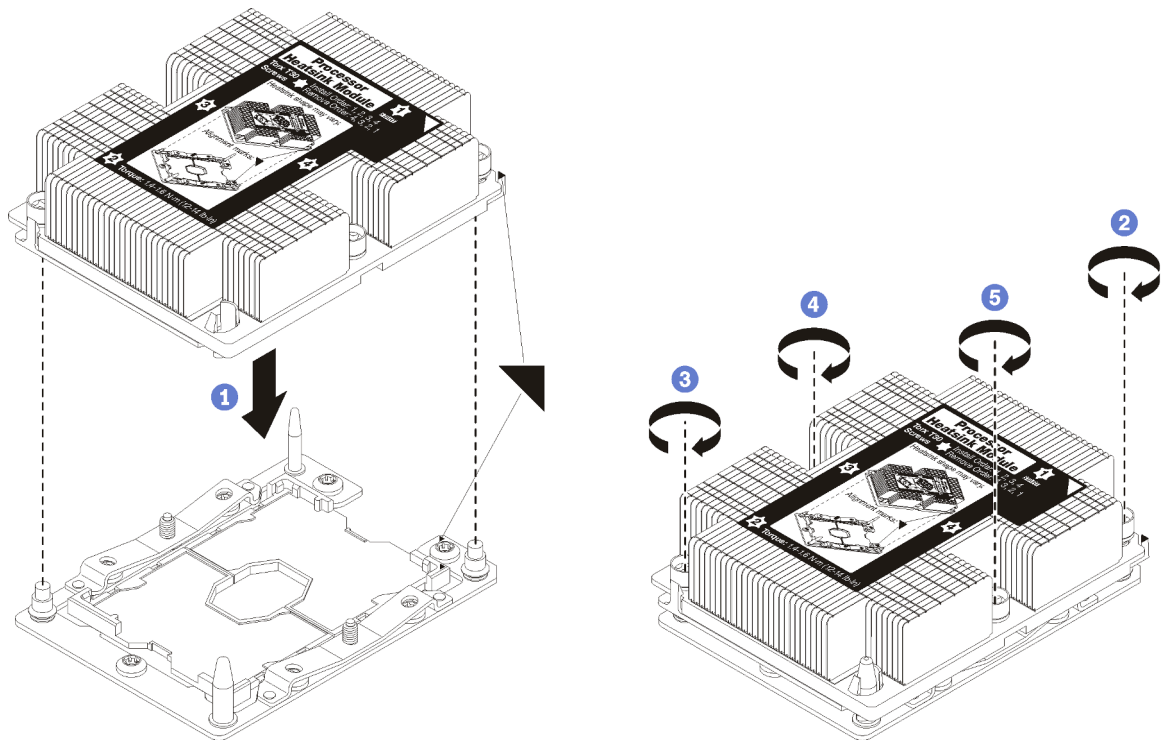


Figure 25. Installing a PHM

- a. Align the triangular marks and guide pins on the processor socket with the PHM; then, insert the PHM into the processor socket.

Attention: To prevent damage to components, make sure that you follow the indicated tightening sequence.

- b. Fully tighten the Torx T30 captive fasteners *in the installation sequence shown* on the heat-sink label. Tighten the screws until they stop; then, visually inspect to make sure that there is no gap between the screw shoulder beneath the heat sink and the processor socket. (For reference, the torque required for the nuts to fully tighten is 1.4 –1.6 newton-meters, 12 –14 inch-pounds).

After installing the PHM option:

- If there are DIMMs to install, install them. See “Install a DIMM” on page 37 for instructions.

Demo video

Watch the procedure on YouTube

Install the interposer card

Use this information to install a interposer card option.

Before you install a interposer card, complete the following steps:

1. Read “Installation Guidelines” on page 28 to ensure that you work safely.
2. Carefully lay the compute node on a flat, static-protective surface, orienting the compute node with the bezel pointing toward you.
3. Remove the compute node cover (see “Remove the compute node cover” on page 32 for instructions).

To install the interposer card, complete the following steps:

- Step 1. If a drive backplane is installed in the compute node that is incompatible with the interposer card, remove it (see “Remove the 2.5-inch drive backplane” on page 57 for instructions).
- Step 2. If you are installing both the interposer card and drive backplane, first install the drive backplane in the compute node (see “Install a 2.5-inch drive backplane” on page 34 for instructions). The drive backplane goes in the rear alignment slots on the drive cage.

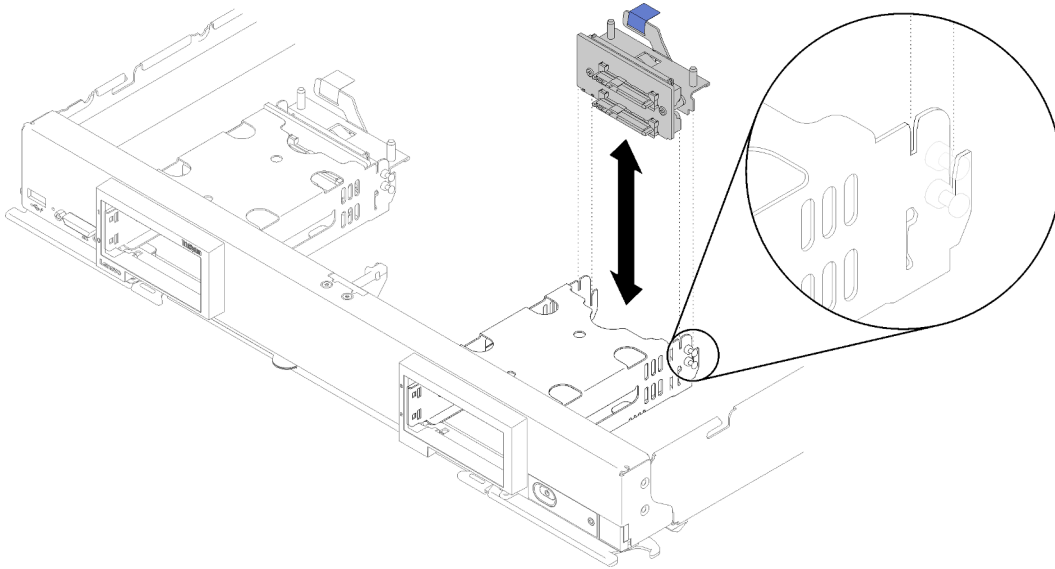


Figure 26. Drive backplane installation with backplane alignment slots

- Step 3. Touch the static-protective package that contains the interposer card to an *unpainted* metal surface on any grounded rack component; then, remove the interposer card from the package.
- Step 4. Locate the interposer card connector on the top of drive backplane.
- Step 5. Orient the connector on the interposer card with the connector on drive backplane.

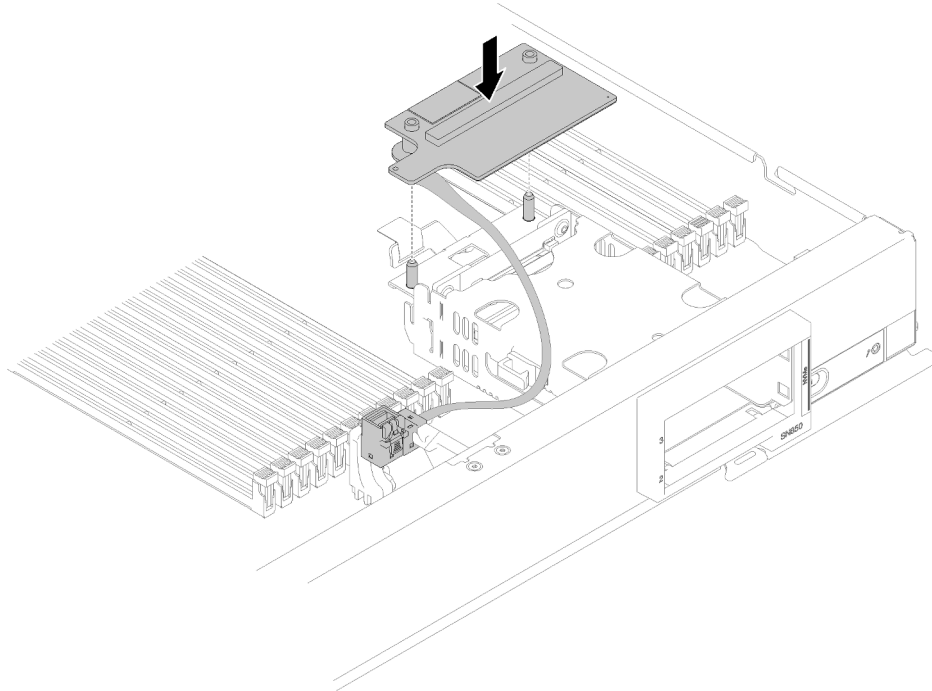


Figure 27. Interposer card installation

Step 6. Firmly press on the foam to seat the interposer card into the connector.

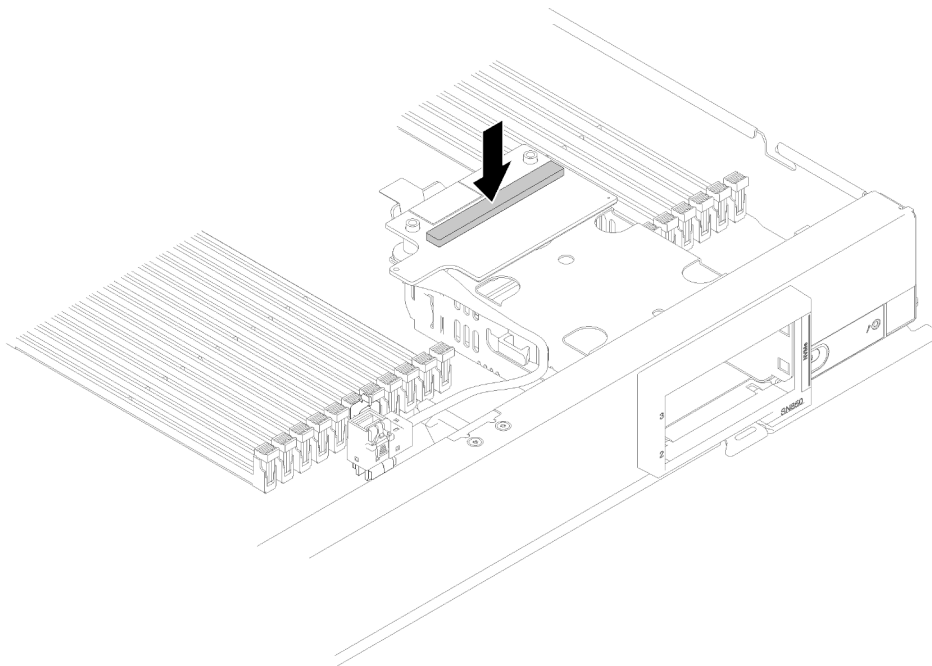


Figure 28. Pressing the foam

Step 7. Remove the RAID adapter (see “Remove the RAID adapter” on page 58 for instructions). Connect the cable to the connector on the underside of the RAID adapter.

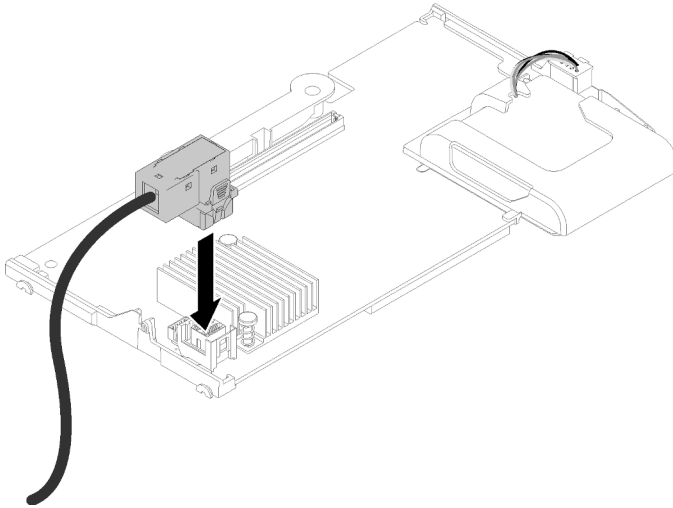


Figure 29. Connecting the cable to RAID adapter

- Step 8. Reinstall the RAID adapter (see “Install a RAID adapter” on page 52 for instructions).
- Step 9. Route the cable in front of DIMM slots by inserting into clip mounted on side of storage cage.

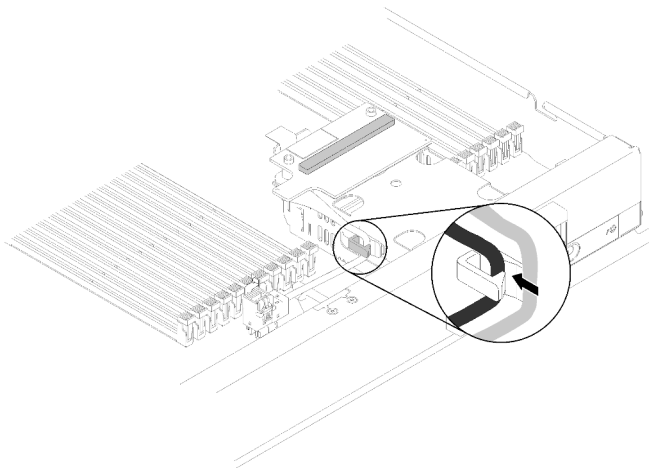


Figure 30. Routing the cable

After you install the interposer card, complete the following steps:

- 1. For configure the RAID array, see “RAID configuration” on page 78 for instructions.

Demo video

Watch the procedure on YouTube

Install a RAID adapter

Use this information to install a RAID adapter option.

Before you install a RAID adapter, complete the following steps:

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

2. Carefully lay the compute node on a flat, static-protective surface, orienting the compute node with the bezel pointing toward you.
3. Remove the compute node cover (see “Remove the compute node cover” on page 32 for instructions).

To install the RAID adapter, complete the following steps:

- Step 1. Touch the static-protective package that contains the RAID adapter to an *unpainted* metal surface on any grounded rack component; then, remove the adapter from the package.

Note: For the ThinkSystem RAID 930-4i-2GB 4 Drive Adapter Kit, make sure that the flash power module is installed before installing the adapter in the compute node (see “Install the flash power module” on page 56 for instructions).

- Step 2. If interposer card is installed in the compute node, remove the cable from the clip on the side of the storage cage. This provides more space for connecting the cable to RAID adapter in the next step.
- Step 3. Carefully turn the RAID adapter over in your hand to access the underside; then, connect the cable from interposer card to RAID adapter. The connector is keyed. Press the cable into the connector until the connector snaps in place.

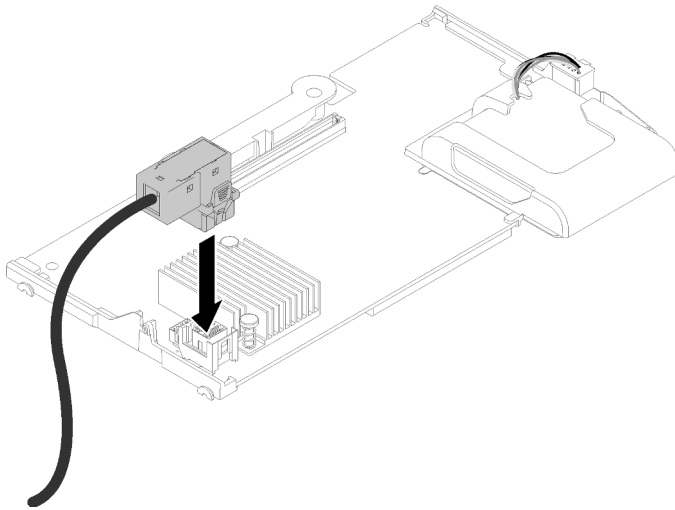


Figure 31. Connecting cable to RAID adapter

- Step 4. Locate the RAID adapter connector on the drive backplane.
- Step 5. Two consecutive sub-steps to orient the RAID adapter with the connector:
- a. Angle RAID adapter as shown and slide flash power module under top side of compute node front panel.
 - b. Carefully orient the connector on the underside of the RAID adapter with the connector on the top side of the drive backplane; then, insert the plastic post into the RAID adapter supporter.

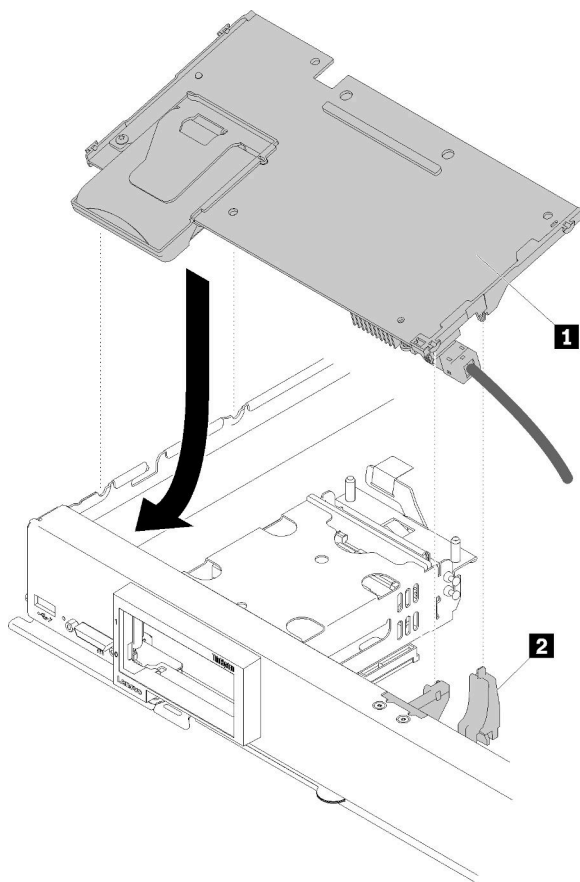


Figure 32. RAID adapter installation

Table 17. RAID adapter and related component

| | |
|----------------|--------------------------|
| 1 RAID adapter | 2 RAID adapter supporter |
|----------------|--------------------------|

Note: If the RAID adapter supporter is damaged, you need to order a miscellaneous kit to have a new one.

Step 6. Firmly press on the foam to seat the RAID adapter into the connector.

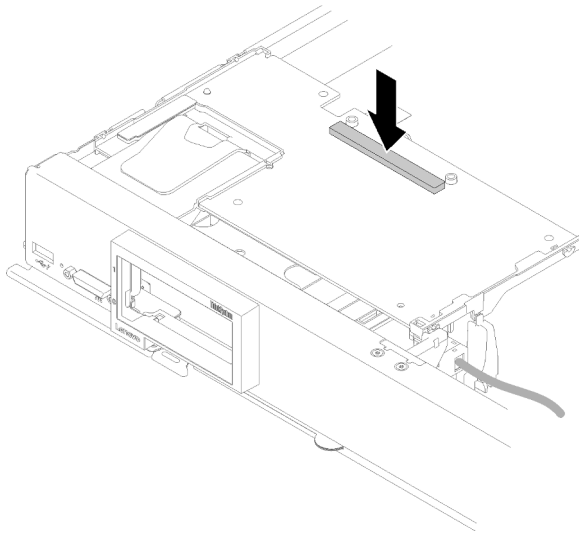


Figure 33. Pressing the foam

Step 7. Route cable back into the cable clip if the cable was removed earlier.

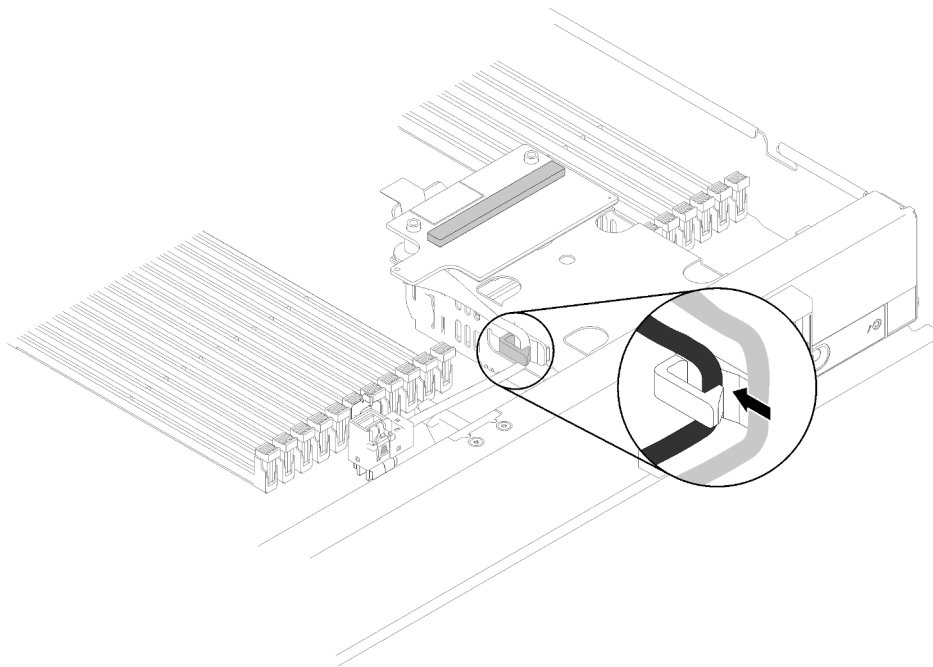


Figure 34. Routing the cable back into clip

After you install the RAID adapter, complete the following steps:

1. Install any removed storage drives and hard disk drive bay fillers (see “Install a 2.5-inch hot-swap drive” on page 35).

Note: Install storage drives in the same bay locations as from which they were removed.

2. Configure the RAID array after power on the compute node (see “RAID configuration” on page 78).

Demo video

Watch the procedure on YouTube

Install the flash power module

Use this information to install the flash power module.

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

- **S004**



CAUTION:

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

Do not:

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

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

- **S005**



CAUTION:

The battery is a lithium ion battery. To avoid possible explosion, do not burn the battery. Exchange it only with the approved part. Recycle or discard the battery as instructed by local regulations.

Before you install the flash power module, complete the following steps:

1. Read “Installation Guidelines” on page 28 to ensure that you work safely.
2. Carefully lay the compute node on a flat, static-protective surface, orienting the compute node with the bezel pointing toward you.

Note: This section only applies to the RAID adapter that comes with a flash power module.

To install the flash power module, complete the following steps:

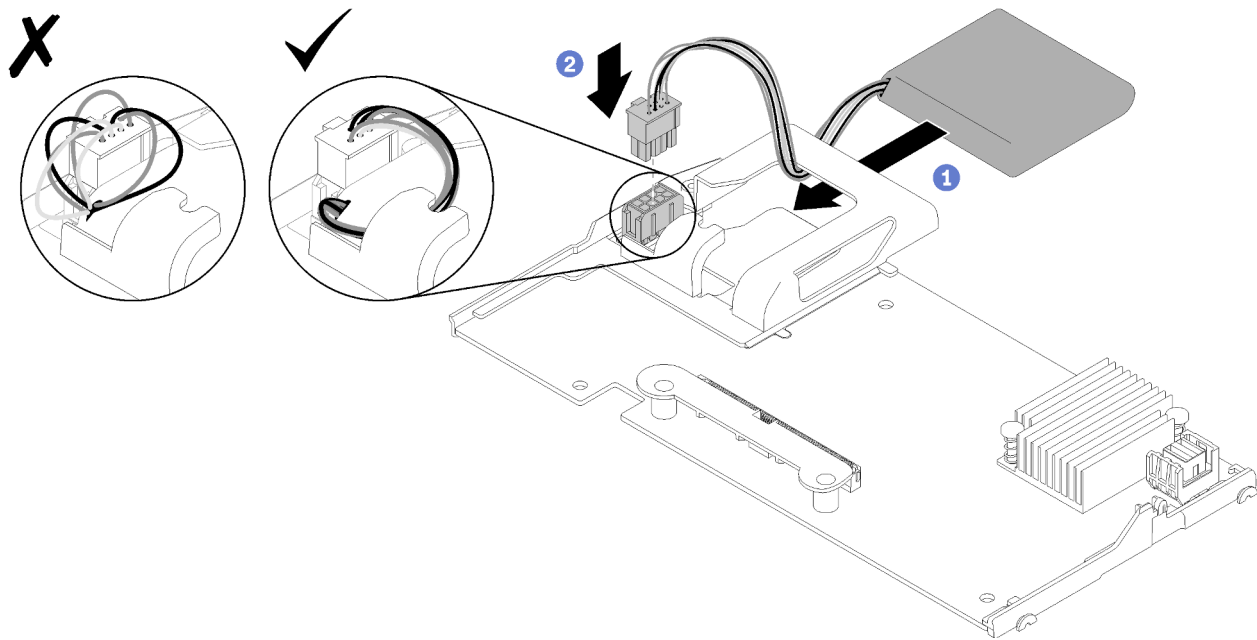


Figure 35. Flash power module installation

- Step 1. Orient the flash power module with the cable side facing the RAID adapter; then, feed the cable up through the flash power module holder.
- Step 2. Slide the flash power module into the holder.
- Step 3. Connect the flash power module cable to its connector on the RAID adapter. The connector is keyed. Press the cable into the connector until the connector retaining clip snaps in place.
- Step 4. Route the flash power module cable through the notch in the holder; then, press the flash power module forward to seat it in the holder.

Attention: It is important to route the flash power module cable through the notch in holder to prevent the cable from catching on the DIMM connector latches when the RAID adapter is installed in a compute node.

- Step 5. Install the RAID adapter in the compute node. (see “Install a RAID adapter” on page 52 for instructions).

After you install the flash power module, complete the following steps:

1. Install the RAID adapter in the compute node. (see “Install a RAID adapter” on page 52).

Demo video

Watch the procedure on YouTube

Remove the 2.5-inch drive backplane

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

Before you remove the 2.5-inch drive backplane, complete the following steps:

1. Read “Installation Guidelines” on page 28 to ensure that you work safely.
2. Carefully lay the compute node on a flat, static-protective surface, orienting the compute node with the bezel pointing toward you.
3. Remove the compute node cover (see “Remove the compute node cover” on page 32 for instructions).

Notes:

- Several different types of 2.5-inch drive backplanes can be installed in the compute node. For example, some 2.5-inch drive backplanes come with a lever, while others don't (please refer to the illustrations below). All are removed and installed in a similar manner.
- See the documentation that comes with an optional drive backplane for device-specific information and information about removing other components that might be included as part of the option.
- If necessary, remove the RAID adapter to more easily access the drive backplane (see "Remove the RAID adapter" on page 58).

To remove a 2.5-inch drive backplane, complete the following steps:

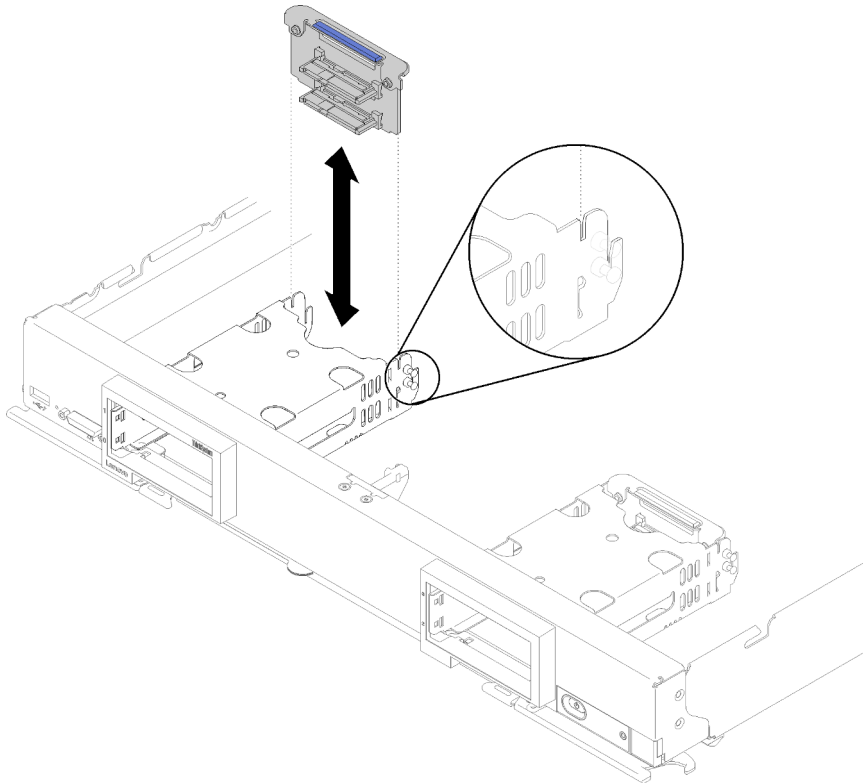


Figure 36. 2.5-inch drive backplane removal

- Step 1. Remove any drive bay fillers; then, press the release latch and pull out the drives to disengage the drive connectors from the backplane. There is no need to remove the drives completely.
- Step 2. Lift the drive backplane out of the compute node.

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

Demo video

Watch the procedure on YouTube

Remove the RAID adapter

If needed, use this information to remove the RAID adapter.

Before you remove the RAID adapter, complete the following steps:

1. Read “Installation Guidelines” on page 28 to ensure that you work safely.
2. Carefully lay the compute node on a flat, static-protective surface, orienting the compute node with the bezel pointing toward you.
3. Remove the compute node cover (see “Remove the compute node cover” on page 32 for instructions).

The RAID adapter uses a specific drive backplane.

- If you need to remove the RAID adapter to access components on the system board (for example DIMM sockets 13-24), there is no need to remove the backplane.
- If you are removing only the RAID adapter to replace it, there is no need to remove the backplane.

To remove a RAID adapter, complete the following steps:

- Step 1. Locate the RAID adapter and interposer card in the compute node. If interposer card is installed in the compute node, remove the cable from the cable clip. This provides more space for pulling out RAID adapter later.
- Step 2. Rotate the lever on the drive backplane to disengage the RAID adapter from the backplane connector.
- Step 3. Slightly rotate the rear edge of the RAID adapter upward; then, remove it at angle as shown. Be cautious of the flash power module as it sits under the overhang of the compute node front panel.

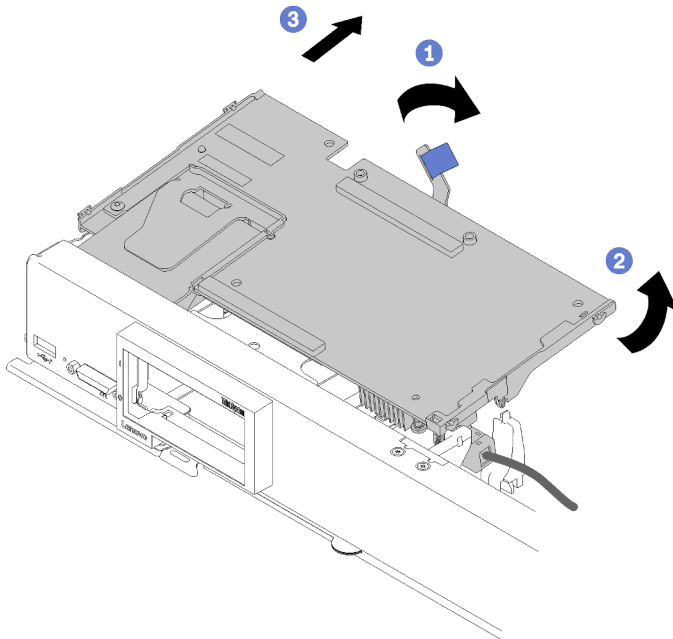


Figure 37. RAID adapter removal

- Step 4. With cable connected to the RAID adapter, carefully turn the RAID adapter over in your hand to access the underside.
- Step 5. Disconnect the cable by pressing the latch and pull the cable out of the RAID adapter.

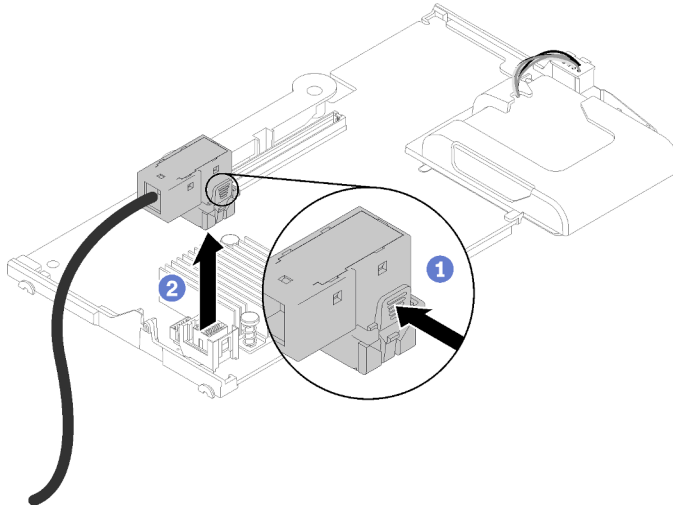


Figure 38. Disconnecting cable from RAID adapter

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

Demo video

Watch the procedure on YouTube

Install the air baffle

Use this information to install the air baffle.

1. Read “Installation Guidelines” on page 28 to ensure that you work safely.
2. Carefully lay the compute node on a flat, static-protective surface, orienting the compute node with the bezel pointing toward you.
3. Remove the compute node cover (see “Remove the compute node cover” on page 32 for instructions).

To install the air baffle, complete the following steps:

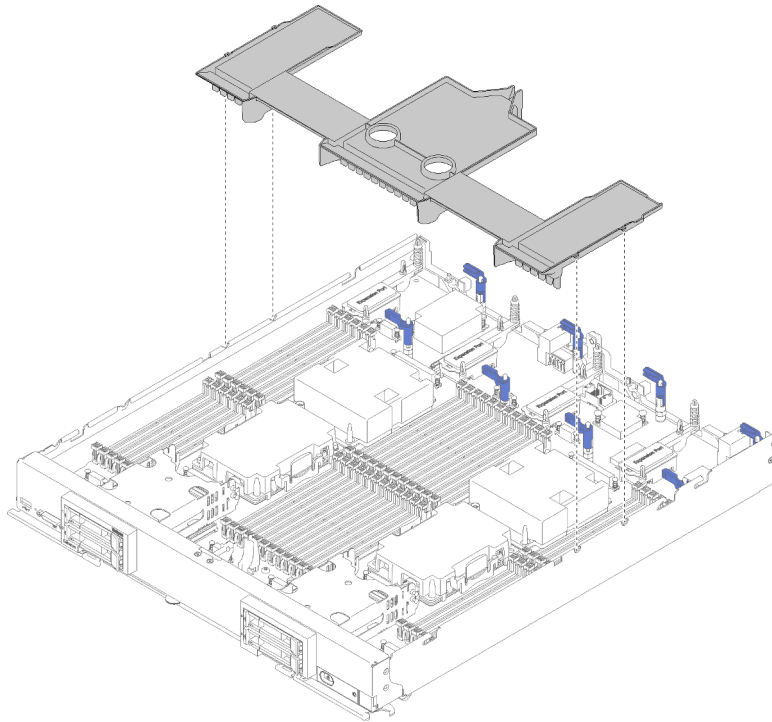


Figure 39. Air baffle installation

Step 1. Align the air baffle pins with the pin holes on both sides of the chassis; then, lower the air baffle into the compute node to match the pin holes on system board.

Note: Close the latch on each end of the DIMM connector before attempting to installing the air baffle. Air baffle fits in space between front and rear DIMM connectors. Attempting to install air baffle while DIMM latch is open could result in damage to the latch or the air baffle.

After you install the air baffle, complete the following steps:

1. Install the compute node cover (see “Install the compute node cover” on page 61 for instructions).
2. Install the compute node into the chassis (see “Install a compute node ” on page 64 for instructions).

Demo video

Watch the procedure on YouTube

Install the compute node cover

Use this information to install the compute node cover.

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

S014



CAUTION:

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

S021



CAUTION:

Hazardous energy is present when the blade is connected to the power source. Always replace the blade cover before installing the blade.

S033



CAUTION:

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

Before installing the compute node cover:

1. Read "Installation Guidelines" on page 28 to ensure that you work safely.
2. Carefully lay the compute node on a flat, static-protective surface, orienting the compute node with the bezel pointing toward you.

Attention: You cannot insert the compute node into the Flex System chassis until the cover is installed and closed. Do not attempt to override this protection.

To install the compute node cover, complete the following steps:

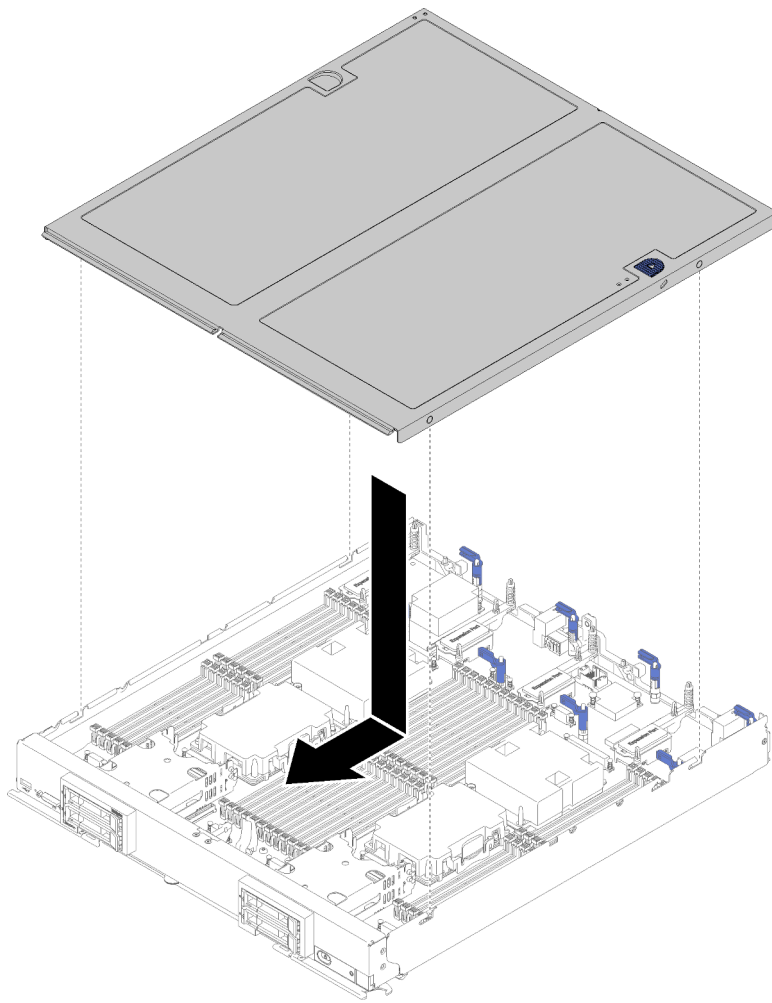


Figure 40. Compute node cover installation

- Step 1. Carefully lay the compute node on a flat, static-protective surface, orienting the compute node with the bezel pointing toward you.
- Step 2. Orient the compute node cover so that the posts on the inside of the cover slide into the slots on the compute node.

Note: Before you close the compute node cover, make sure that the air baffle and all components are installed and seated correctly and that you have not left loose tools or parts inside the compute node. Retention clips that secure the I/O expansion adapters must be in the closed position to install the compute node cover.

- Step 3. Hold the front of the compute node and slide the compute node cover forward to the closed position, until it clicks into place.

1. Install the compute node into the chassis (see “Install a compute node ” on page 64 for instructions).

Demo video

Watch the procedure on YouTube

Install a compute node

Use this information to install a compute node.

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

S021



CAUTION:

Hazardous energy is present when the blade is connected to the power source. Always replace the blade cover before installing the blade.

Before you install a compute node:

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

To install a compute node, complete the following steps:

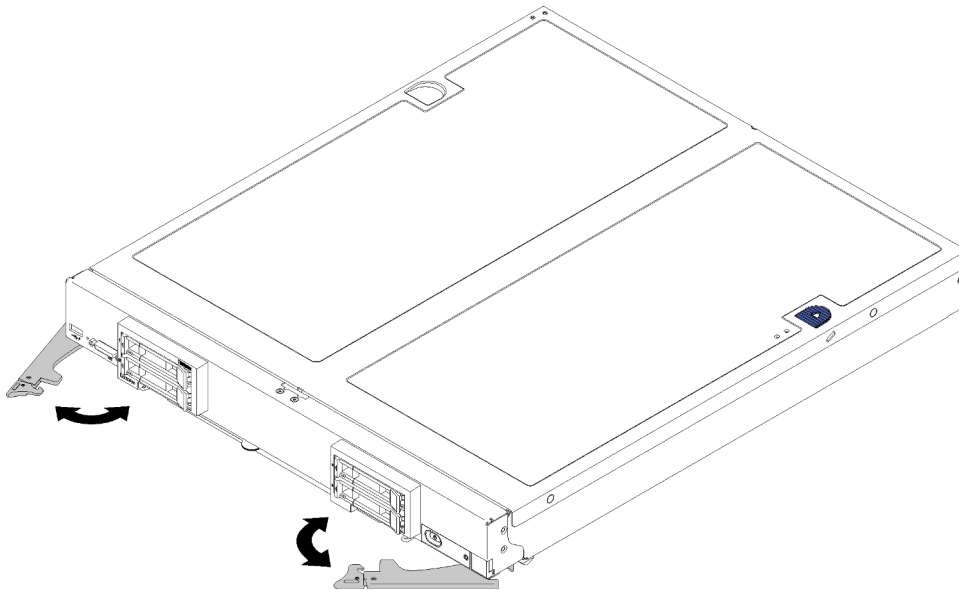


Figure 41. Compute node installation

Step 1. Select the node bay.

Notes:

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

- To maintain proper system cooling, do not operate the Flex System chassis without a compute node, or node bay filler in each node bay.

Step 2. Make sure that:

- Air baffle is installed in the compute node
- Compute node cover is in place and secure
- Both front handles are in the fully open position

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

Step 4. Rotate both handles inward to push the compute node until the spring loaded releases snaps into place.

Note: After the compute node is installed, the Lenovo XClarity Controller in the compute node initializes and synchronizes with the CMM. The time required for a compute node to initialize varies by system configuration. The power LED flashes rapidly when processing; the power button on the compute node does not respond until the power LED flashes slowly, indicating that the initialization process is complete.

Step 5. If you have other compute nodes to install, do so now.

If this is the initial installation of the compute node, you must configure the compute node through the Setup utility and install the compute node operating system. See Chapter 4 “System configuration” on page 67 for details.

If you have changed the configuration of the compute node or if you are installing a different compute node from the one that you removed, you must configure the compute node through the Setup utility, and you might have to install the compute node operating system. See “Deploy the operating system” on page 79 for details.

Power on the compute node

Use this information for details about power on the compute node.

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

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

For information about powering off the compute node, see “Power off the compute node” on page 65.

Validate compute node setup

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

Power off the compute node

Use this information for details about turning off the compute node.

When you power off the compute node, it is still connected to power through the Flex System chassis. The compute node can respond to requests from the XClarity Controller, such as a remote request to turn on the compute node. To remove all power from the compute node, you must remove it from the Flex System chassis.

Before you power off the compute node, shut down the operating system. See the operating-system documentation for information about shutting down the operating system.

The compute node can be powered off in any of the following ways:

- You can press the power button on the compute node. This starts an orderly shutdown of the operating system, if this feature is supported by the operating system.
- If the operating system stops functioning, you can press and hold the power button for more than four seconds to power off the compute node.

Attention: Pressing the power button for 4 seconds forces the operating system to shut down immediately. Data loss is possible.

- You can power off the compute node through the CMM **power** command, the CMM web interface and the Lenovo XClarity Administrator application (if installed).
 - For more information about the CMM **power** command, see the [Flex System Chassis Management Module: Command-Line Interface Reference Guide at https://pubs.lenovo.com/cmm2/cli_command_power](https://pubs.lenovo.com/cmm2/cli_command_power).
 - For more information about the Lenovo XClarity Administrator application, see <https://datacentersupport.lenovo.com/products/solutions-and-software/software/lenovo-xclarity/solutions/ht115665>.

Chapter 4. System configuration

Complete these procedures to configure your system.

Notes: The minimum configuration for debugging this compute node is as follows:

- Two processors in processor sockets 1 and 2
- One memory DIMM in slot 5

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/>.)

Note: If the text-based interface for UEFI Setup opens instead of the Lenovo XClarity Provisioning Manager, select **Launch Graphical System Setup** on the UEFI page to connect the server to the Lenovo XClarity Provisioning Manager.

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 Lenovo XClarity Controller interface. Connect an Ethernet cable from your laptop to Lenovo XClarity Controller connector, which is located at the rear of the server. For the location of the Lenovo XClarity Controller connector, see rear view 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.

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 no monitor is attached to the server, you can set the network connection through the Chassis Management Module 2 management network connector.
 1. Make sure that the subnet of your computer is set to the same value as the CMM 2 (the default CMM 2 subnet is 255.255.255.0). The IP address of the CMM 2 must also be in the same local domain as the client computer. To connect to the CMM 2 for the first time, you might have to change the Internet Protocol properties on the client computer.
 2. Connect an Ethernet cable from your laptop to the management port on the CMM 2.
 3. Open a web browser on the client computer, and direct it to the CMM 2 IP address. For the first connection to the CMM 2, use the default IP address of the CMM 2; if a new IP address has been assigned to the CMM 2, use that one instead.

Note: The manufacturing default static IPv4 IP address is 192.168.70.100, the default IPv4 subnet address is 255.255.255.0, and the default host name is MMxxxxxxxxxxxx, where xxxxxxxxxxxx is the burned-in MAC address. The MAC address is on a label on the CMM 2, below the reset button (see CMM 2 controls and indicators for the reset button location). See IPv6 addressing for initial connection for information about determining IPv6 addressing for the initial connection.

4. After logging in to the CMM 2, click **Chassis Management → Compute Nodes** to set the IP address of the compute node.
- 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 USB connector on the front of the server. For the location of the Lenovo XClarity Controller USB connector, see the front view of the server.

Note: The Lenovo XClarity Controller USB connector mode must be set to manage the Lenovo XClarity Controller (instead of normal USB mode). To switch from normal mode to Lenovo XClarity Controller management mode, hold the blue ID button on the front panel for at least 3 seconds until its LED flashes slowly (once every couple of seconds).

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

- If you are using the Lenovo XClarity Administrator Mobile app from a mobile device, you can connect to the Lenovo XClarity Controller through the USB connector on the front of the server. For the location of the Lenovo XClarity Controller USB connector, see “Compute node controls, connectors, and LEDs” on page 15.

Note: The Lenovo XClarity Controller USB connector mode must be set to manage the Lenovo XClarity Controller (instead of normal USB mode). To switch from normal mode to Lenovo XClarity Controller management mode, press and hold the USB management button on the front of the server for at least 3 seconds until the ID LED flashes slowly (blink one time every two seconds).

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/sn850/7X15/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 | √ | | |
| Lenovo XClarity Integrator (LXCI) for Microsoft Windows Admin Center | In-band Out-of-band On-Target Off-Target | √ | All I/O devices | √ | | √ |
| Lenovo XClarity Integrator (LXCI) for Microsoft System Center Configuration Manager | In-band On-Target | √ | All I/O devices | √ | | √ |
| Notes: | | | | | | |
| 1. For I/O firmware updates. | | | | | | |
| 2. For BMC and UEFI firmware updates. | | | | | | |

- **Lenovo XClarity Provisioning Manager**

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

Note: By default, the Lenovo XClarity Provisioning Manager Graphical User Interface is displayed when you 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/Invo-xpress>

- **Lenovo XClarity Essentials Bootable Media Creator**

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

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

<https://datacentersupport.lenovo.com/solutions/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 actual 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 processors.

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 server based on the system configuration and memory mode that you are implementing, see [the ThinkSystem SN850 Memory Population Reference](#).

Configure Persistent Memory Module (PMem)

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

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

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

In this mode, PMems 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 PMem is installed for each processor, only not-interleaved App Direct Mode is supported.

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

In this mode, some percentage of PMem capacity is directly accessible to specific applications (App Direct), while the rest serves as system memory. The App Direct part of PMem is displayed as persistent memory, while the rest of PMem 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 PMem capacity that is invested in volatile system memory.

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

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

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

PMem Management options

PMems can be managed with the following tools:

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

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

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

For more details, see 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 the key specified in the on-screen instructions 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 the key specified in the on-screen instructions to open LXPM.*
2. Go to **UEFI Settings → System Settings**, click on the pull-down menu on the upper right corner of the screen, and select **Text Setup**.
3. Reboot the system, and press the key specified in the on-screen instructions as soon as the logo screen appears.*

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

- **Lenovo XClarity Essentials OneCLI**

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

Note: For more information, see the “Startup” section in the LXPM documentation compatible with your server at <https://pubs.lenovo.com/lxpm-overview/>.

Following are the available management options:

- **Intel Optane PMem details**

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

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

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

```
onecli.exe config show IntelOptanePMEM  
--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 PMem capacity that is invested in system memory, and hence decide the PMem 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. Back up all the data and delete all the created namespaces. Go to **Namespaces → View/Modify/Delete Namespaces** to delete the created namespaces.
 2. Perform secure erase on all the installed PMems. Go to **Security → Press to Secure Erase** to perform secure erase.
- Make sure the capacity of installed PMems and DRAM DIMMs meets system requirements for the new mode (see “PMem and DRAM DIMM installation order” in *Memory Population Reference*).
- After the system is rebooted and the input goal value is applied, the displayed value in **System Configuration and Boot Management → Intel Optane PMems → Goals** will go back to the following default selectable options:
 - **Scope:** [Platform]
 - **Memory Mode [%]:** 0

- **Persistent Memory Type:** [App Direct]

These values are selectable options for PMem settings, and do not represent the current PMem status.

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

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

1. Set create goal status.

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

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

```
onecli.exe config set IntelOptanePMEM.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 PMem mode.

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

Where *App Direct* stands for the PMem mode.

- **Persistent Memory Type**

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

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

- **Regions**

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

- **Namespaces**

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

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

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

- Windows: Use *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, PMem security is disabled. Before enabling security, make sure all the country or local legal requirements regarding data encryption and trade compliance are met. Violation could cause legal issues.

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

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

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

- Enable security:

1. Enable security.

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

2. Set the security passphrase.

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

2. Enter passphrase.

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

3. Reboot the system.

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

Notes:

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

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

- Secure Erase

Notes:

- Password is required to perform Secure Erase when security enabled.

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

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

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

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

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

- **PMem Configuration**

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

There will also be a warning message when the percentage reaches 1% and a selectable percentage (10% by default). When this message appears, it is advised to back up data and run PMem diagnostics (see 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 IntelOptanePMEM.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 compute node configuration

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

Make sure that you create backups for the following compute node 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 own operating-system and user-data backup methods to back up the operating system and user data for the compute node.

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 createuuid SYSTEM_PROD_DATA.SysInfoUUID [access_method]
```

Where:

[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 createuuid SYSTEM_PROD_DATA.SysInfoUUID --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 createuuid SYSTEM_PROD_DATA.SysInfoUUID
```

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 createuuid SYSTEM_PROD_DATA.SysInfoUUID --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 the key specified in the on-screen instructions to display the Lenovo XClarity Provisioning Manager interface.
2. If the power-on Administrator password is required, enter the password.
3. From the System Summary page, click **Update VPD**.
4. Update the 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 aaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaa, where aaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaa 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/xcc-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 server.

- “Single compute node does not power on” on page 85
- “The compute node immediately displays the POST Event Viewer when it is turned on” on page 85
- “Embedded hypervisor is not in the boot list” on page 86
- “Server cannot recognize a hard drive” on page 86
- “Displayed system memory less than installed physical memory” on page 87
- “A Lenovo optional device that was just installed does not work.” on page 88
- “Voltage planar fault is displayed in the event log” on page 88

Single compute node does not power on

Complete the following steps until the problem is resolved:

1. If you recently installed, moved, or serviced the compute node, reseal the compute node in the bay. If the compute node was not recently installed, moved, or serviced, perform a virtual reseal through the CMM **service** command. For more information about the CMM **service** command, see the ["Flex System Chassis Management Module: Command-Line Interface Reference Guide" at https://pubs.lenovo.com/cmm2/cli_command_service](https://pubs.lenovo.com/cmm2/cli_command_service).
2. Check the event log on the CMM 2 for any events that are related to the compute node and solve them.
3. Make sure that the CMM 2 can recognize the compute node. Log in to the CMM 2 user interface and verify that the compute node appears in the chassis view. If the CMM 2 cannot recognize the compute node, remove it, and inspect the compute node and the back of the node bay to make sure that there is no physical damage to the connectors.
4. Make sure that the power policy that is implemented on the CMM 2 is sufficient to enable the compute node to power on. You can view the power policy using the CMM 2 **pmpolicy** command or the CMM 2 web interface.
 - For more information about the CMM 2 **pmpolicy** command, see the ["Flex System Chassis Management Module: Command-Line Interface Reference Guide" at https://pubs.lenovo.com/cmm2/cli_command_pmpolicy](https://pubs.lenovo.com/cmm2/cli_command_pmpolicy).
 - From the CMM 2 web interface, select **Power Modules and Management** from the Chassis Management menu. For more information, see the [the "Flex System Chassis Management Module: User's Guide" at https://pubs.lenovo.com/cmm2/cmm_user_guide](https://pubs.lenovo.com/cmm2/cmm_user_guide). All fields and options are described in the CMM 2 web interface online help.

The compute node 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 compute node 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 compute node, see <https://serverproven.lenovo.com/>.

3. (Trained technician only) Make sure that processor 1 and 2 are seated correctly

4. (Trained technician only) Remove processor 3 and 4 and restart the compute node.
5. Replace the following components one at a time, in the order shown, restarting the compute node 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 solved.

1. If the compute node has been installed, moved, or serviced recently, or if this is the first time the embedded hypervisor is being used, make sure that the device is connected properly and that there is no physical damage to the connectors.
2. See the documentation that comes with the optional embedded hypervisor flash device for setup and configuration information.
3. Check <https://serverproven.lenovo.com/> to validate that the embedded hypervisor device is supported for the compute node.
4. Make sure that the embedded hypervisor device is listed in the list of available boot options. From the management controller user interface, click **Compute node Configuration → Boot Options**.

For information about accessing the management controller user interface, see the “Opening and Using the XClarity Controller Web Interface” section in the XCC documentation version compatible with your server at <https://pubs.lenovo.com/lxcc-overview/>.

5. Check <http://datacentersupport.lenovo.com> for any tech tips (service bulletins) related to the embedded hypervisor and the compute node.
6. Make sure that other software works on the compute node to ensure that it is working properly.

Server cannot recognize a hard drive

Complete the following steps until the problem is solved.

1. Observe the associated yellow hard disk drive status LED. If the LED is lit, it indicates a drive fault.
2. If the status LED is lit, remove the drive from the bay, wait 45 seconds, and reinsert the drive, making sure that the drive assembly connects to the hard disk drive backplane.
3. Observe the associated green hard disk drive activity LED and the yellow status LED and perform corresponding operations in different situations:
 - If the green activity LED is flashing and the yellow status LED is not lit, the drive is recognized by the controller and is working correctly. Run the diagnostics tests for the hard disk drives. When you start a server and press the key according to the on-screen instructions, the LXPM is displayed by default. (For more information, see the “Startup” section in the LXPM documentation compatible with your server at <https://pubs.lenovo.com/lxpm-overview/>.) You can perform hard drive diagnostics from this interface. From the Diagnostic page, click **Run Diagnostic → HDD test/Disk Drive Test**.
 - If the green activity LED is flashing and the yellow status LED is flashing slowly, the drive is recognized by the controller and is rebuilding.
 - If neither LED is lit or flashing, check whether the hard disk drive backplane is correctly seated. For details, go to step 4.
 - If the green activity LED is flashing and the yellow status LED is lit, replace the drive. If the activity of the LEDs remains the same, go to step Hard disk drive problems. If the activity of the LEDs changes, return to step 1.
4. Make sure that the hard disk drive backplane is correctly seated. When it is correctly seated, the drive assemblies correctly connect to the backplane without bowing or causing movement of the backplane.
5. Reseat the backplane power cable and repeat steps 1 through 3.

6. Reseat the backplane signal cable and repeat steps 1 through 3.
7. Suspect the backplane signal cable or the backplane:
 - Replace the affected backplane signal cable.
 - Replace the affected backplane.
8. Run the diagnostics tests for the hard disk drives. When you start a server and press the key according to the on-screen instructions, the LXPM is displayed by default. (For more information, see the “Startup” section in the LXPM documentation compatible with your server at <https://pubs.lenovo.com/lxpm-overview/>.) You can perform hard drive diagnostics from this interface. From the Diagnostic page, click **Run Diagnostic → HDD test/Disk Drive Test.**

Based on those tests:

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

Displayed system memory less than installed physical memory

Complete the following steps until the problem is solved.

1. Make sure that:
 - a. You have installed the correct type of memory (see “Install a DIMM” on page 37 for instructions).
 - b. Memory mirroring or memory sparing mode does not account for the discrepancy.

To determine the status of a DIMM, restart the server and press the key according to the on-screen instructions to display the LXPM interface. Then, click **System settings → Memory**.

2. If new memory has recently been installed, make sure that no configuration events are reported in the event log. If there are any events, resolve them.

Note: DIMMs are verified as authentic Lenovo or IBM modules by the UEFI software. If any non-authentic DIMMs are detected, an informational message appears in the system event log and memory performance might be limited. Non-authentic DIMMs are not covered by your Lenovo warranty.

3. If the compute node was recently installed, moved, or serviced, make sure that the DIMMs are correctly seated in the connectors (see “Install a DIMM” on page 37 for instructions).
4. Make sure that all DIMMs are enabled. The compute node might have automatically disabled a DIMM when it detected a problem, or a DIMM might have been manually disabled.

To determine the status of a DIMM, restart the server and press the key according to the on-screen instructions to display the LXPM interface. Then, click **System settings → Memory**.

5. Run memory diagnostics. When you start a server and press the key according to the on-screen instructions, the LXPM interface is displayed by default. You can perform memory diagnostics from this interface. From the Diagnostic page, click **Run Diagnostic → Memory test**.
6. Remove DIMMs until the compute node is showing the correct amount of memory. Install one DIMM at a time until you can determine which DIMM is not working properly. Remove that DIMM and replace it with a good DIMM (see “Install a DIMM” on page 37 for instructions).

Note: After you install or remove a DIMM, you must change and save the new configuration information by using the Setup utility. When you turn on the compute node, a message indicates that the memory configuration has changed. Press the key according to the on-screen instructions to display the LXPM interface. Then, save the configuration.

7. If the problem remains, contact Lenovo Support.

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

1. Make sure that:
 - The device is supported for the server (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 system setup. When you start a server and press the key according to the on-screen instructions to display the Setup Utility. (For more information, see the “Startup” section in the LXPM documentation compatible with your server at <https://pubs.lenovo.com/lxpm-overview/>.) Whenever memory or any other device is changed, you must update the configuration.
2. Reseat the device that you have just installed.
3. Replace the device that you have just installed.
4. Reseat the cable connection and check there is no physical damage to the cable.
5. If there is any cable damages, then replace the cable.

Voltage planar fault is displayed in the event log

Complete the following steps until the problem is solved.

1. Revert the system to the minimum configuration. See “Specifications” on page 6 for the minimally required number of processors and DIMMs.
2. Restart the system.
 - If the system restarts, add each of the removed items one at a time and restart the system each time until the error occurs. Replace the item for which the error occurs.
 - If the system does not restart, suspect the system board.

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/>.

- **Chassis Management Module 2 (CMM 2)**

Use the Download Service Data function of the CMM 2 to collect service data for compute nodes.

For more information about downloading service data from the CMM 2, see https://pubs.lenovo.com/cmm2/cmm_ui_service_and_support.

- **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/supportphonenumberlist> for your region support details.

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