

# Dell PowerEdge FM120x4 Owner's Manual

Regulatory Model: E02B  
Regulatory Type: E02B002



# Notes, cautions, and warnings

 **NOTE:** A NOTE indicates important information that helps you make better use of your computer.

 **CAUTION:** A CAUTION indicates either potential damage to hardware or loss of data and tells you how to avoid the problem.

 **WARNING:** A WARNING indicates a potential for property damage, personal injury, or death.

**Copyright © 2015 Dell Inc. All rights reserved.** This product is protected by U.S. and international copyright and intellectual property laws. Dell™ and the Dell logo are trademarks of Dell Inc. in the United States and/or other jurisdictions. All other marks and names mentioned herein may be trademarks of their respective companies.

2015 - 09

Rev. A02

# Contents

<b>1 About your system.....</b>	<b>7</b>
Terms used in the document.....	7
Front-panel features and indicators.....	8
Hard-drive/SSD indicator patterns.....	9
Node status indicators.....	10
Using USB diskette or USB DVD/CD drives.....	11
Documentation matrix.....	12
Accessing system information by using QRL.....	12
<b>2 Performing initial system configuration.....</b>	<b>14</b>
Setting up your system.....	14
Setting up and configuring the iDRAC IP address.....	14
Logging in to iDRAC.....	15
Installing the operating system.....	15
Managing your system remotely.....	15
Downloading drivers and firmware.....	15
<b>3 Pre-operating system management applications.....</b>	<b>16</b>
Navigation keys.....	16
About system setup.....	17
Entering System Setup.....	17
System Setup main screen.....	17
System BIOS screen.....	17
System Information screen.....	18
Memory Settings screen.....	18
Processor Settings screen.....	19
SATA Settings screen.....	19
Boot Settings screen.....	19
Integrated Devices screen.....	20
Serial Communications screen.....	20
System Profile Settings screen.....	21
System Security screen.....	22
Miscellaneous Settings screen.....	22
About Boot Manager.....	23
Entering the UEFI Boot Manager.....	23
Boot Manager screen.....	23
UEFI Boot menu.....	23
About Dell Lifecycle Controller.....	24

Changing the boot order.....	24
Choosing the system boot mode.....	24
Assigning a system or setup password.....	24
Using your system password to secure your system.....	25
Deleting or changing an existing system and/or setup password.....	26
Operating with a setup password enabled.....	26
Embedded system management.....	27
iDRAC Settings utility.....	27
Entering the iDRAC Settings utility.....	27
Processor core licensing.....	27
Networking configurations.....	28
Standard configuration.....	28
Network adapter isolation configuration.....	29
Isolated networks configuration.....	29
Enhanced network adapter isolation configuration.....	30

#### **4 Installing sled components..... 33**

Recommended tools.....	33
Removing the sled.....	33
Installing the sled.....	34
Inside the sled.....	35
Cable cover.....	36
Removing the cable cover.....	36
Installing the cable cover.....	37
Cooling shroud.....	38
Removing the cooling shroud.....	38
Installing the cooling shroud.....	39
System memory.....	39
General memory module installation guidelines.....	40
Sample memory configurations.....	41
Removing memory modules.....	41
Installing memory modules.....	42
Hard drives/SSDs.....	44
Hard drive/SSD to node assignment.....	44
Removing a hard drive/SSD.....	45
Installing a hard drive/SSD.....	46
Shutdown procedure for servicing a hard drive/SSD.....	46
Configuring the boot drive.....	47
Removing a 2.5 inch hard drive/SSD from a hard-drive/SSD carrier.....	47
Installing a 2.5 inch hard drive/SSD in a hard-drive/SSD carrier.....	47
Removing a 1.8 inch SSD from the SSD carrier.....	48
Installing a 1.8 inch SSD in the SSD carrier.....	48

Hard-drive/SSD backplane.....	48
Removing the hard-drive/SSD backplane.....	49
Installing the hard-drive/SSD backplane.....	50
SSD cage assembly.....	50
Removing the SSD cage assembly.....	50
Installing the SSD cage assembly.....	51
Easy restore module.....	51
Replacing the easy restore module.....	51
System battery.....	52
Replacing the system battery.....	52
System board.....	54
Removing the system board.....	54
Installing the system board.....	55
Control panel.....	56
Removing the control panel.....	56
Installing the control panel.....	57
<b>5 Troubleshooting your system.....</b>	<b>59</b>
Safety first—for you and your system.....	59
Troubleshooting system memory.....	59
Troubleshooting hard drives.....	60
Troubleshooting USB devices.....	60
Troubleshooting the system board.....	61
Troubleshooting the system battery.....	61
System messages.....	62
Warning messages.....	62
Diagnostic messages.....	62
Alert messages.....	62
<b>6 Using system diagnostics.....</b>	<b>63</b>
Dell Embedded System Diagnostics.....	63
When to use the Embedded System Diagnostics.....	63
Running the Embedded System Diagnostics.....	63
Running Embedded System Diagnostics from an external media.....	63
System diagnostics controls.....	64
<b>7 Jumpers and connectors.....</b>	<b>65</b>
System board jumper settings.....	65
System board connectors.....	66
Disabling a forgotten password.....	67
<b>8 Technical specifications.....</b>	<b>68</b>

Dimensions and weight.....	68
Processor specifications.....	68
Memory specifications.....	68
Drive specifications.....	68
Connectors specifications.....	69
Video specifications.....	69
Battery specifications.....	69
Expanded operating temperature.....	69
Environmental specifications.....	70
<b>9 Getting help.....</b>	<b>73</b>
Contacting Dell.....	73
Accessing system information by using QRL.....	73
Locating your system Service Tag.....	74

# About your system

This document provides information on the Dell PowerEdge FM120x4 systems, installed in the Dell PowerEdge FX2 enclosure. For information on the enclosure components, including shared resources like the power supplies, Chassis Management Controller (CMC), cooling fans, and I/O modules, see the *Dell PowerEdge FX2 and FX2s Enclosure Owner's Manual* at [Dell.com/poweredgemanuals](http://Dell.com/poweredgemanuals).

## Terms used in the document

**Table 1. Terms and description**

<b>Term</b>	<b>Description</b>
Enclosure	Refers to the PowerEdge FX2 enclosure.
Sled or system	Refers to the PowerEdge FM120x4 system.
Nodes	Refer to the four compute nodes (Intel Atom C2000 processors) in the FM120x4 sled. Each node functions as an independent server and can be remotely managed through individual iDRACs.
Hard-drive/SSD bay	Refers to the slots on the sled front panel in which the hard drives/SSDs are installed.
Warm swap	A component is considered warm swap if the node associated with the component must be turned off before adding or replacing the component. However, the sled and the rest of the nodes remain powered on.
Hot swap	A component is considered hot swap if it can be removed or installed while the nodes and the sled are powered on.

## Front-panel features and indicators

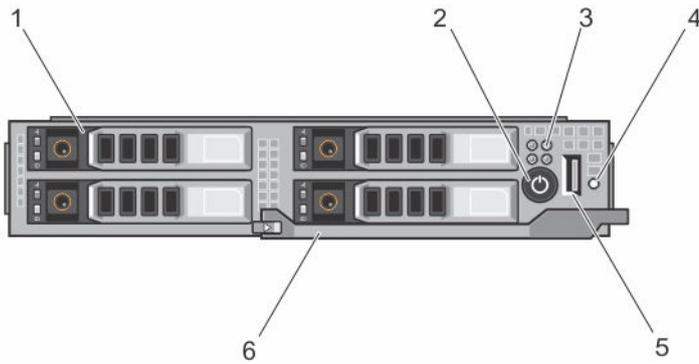


Figure 1. Front-panel features and indicators — 2.5 inch hard-drive/SSD system

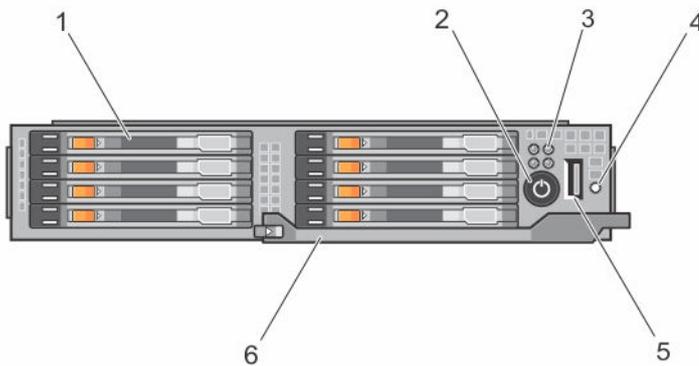


Figure 2. Front-panel features and indicators — 1.8 inch SSD system

Table 2. Front-panel features and indicators

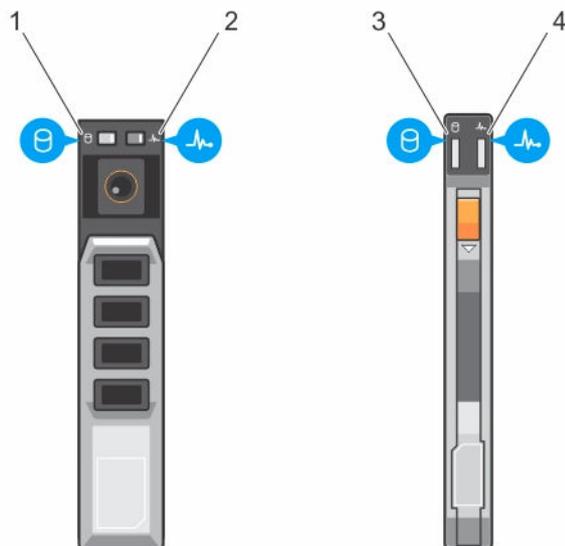
Item	Indicator, Button, or Connector	Icon	Description
1	Hard drives/SSDs		<b>2.5 inch hard-drive/SSD system</b> Four 2.5 inch warm-swap SATA hard drives or SATA SSDs.

Item	Indicator, Button, or Connector	Icon	Description
			<b>1.8 inch SSD system</b> Eight 1.8 inch hot-swap SATA SSDs.
2	Sled power-on indicator, power button		The power-on indicator lights when the sled power is on. The power button controls the power supply output to the system.
3	Node status indicators		Provide information about the status of the four nodes in the sled.
4	USB select button		Allows you to assign the USB port to a particular node in the sled.
5	USB connector		Allows a USB device to be connected to the system.
6	Sled handle		Used to slide the sled out of the enclosure.

## Hard-drive/SSD indicator patterns

The hard-drive/SSD indicators display different patterns as drive events occur in the system.

 **NOTE:** The sled must have a hard drive/SSD or a hard-drive/SSD blank installed in each drive bay.



**Figure 3. Hard-drive/SSD indicators**

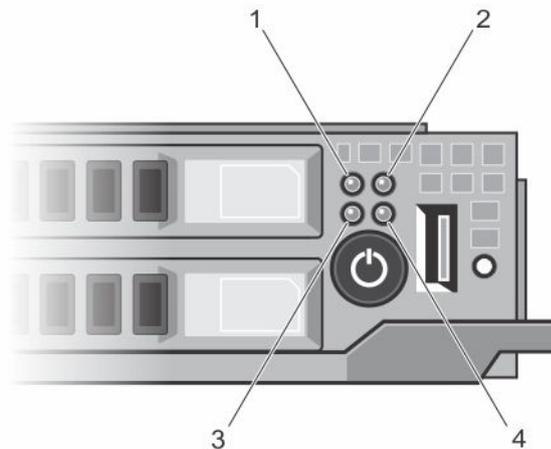
- |    |  |    |  |
|----|--|----|--|
| 1. | drive activity indicator (green) – 2.5 inch hard drive/SSD | 2. | drive status indicator (green and amber) – 2.5 inch hard drive/SSD |
| 3. | drive activity indicator (green) – 1.8 inch SSD            | 4. | drive status indicator (green and amber) – 1.8 inch SSD            |

**NOTE:** If the drive is in Advanced Host Controller Interface (AHCI) mode, the status LED (on the right side) does not function and remains off.

**Table 3. Hard-drive/SSD indicator patterns**

Drive-Status Indicator Pattern	Condition
Blinks green two times per second	Identifying drive or preparing for removal
Off	Drive ready for insertion or removal
	<b>NOTE:</b> The drive status indicator remains off until all drives are initialized after system power is applied. Drives are not ready for insertion or removal during this time.
Blinks green, amber, and turns off	Drive predicted failure
Blinks amber four times per second	Drive failed
Blinks green slowly	Drive rebuilding
Steady green	Drive online
Blinks green three seconds, amber three seconds, and turns off six seconds	Rebuild aborted

## Node status indicators



**Figure 4. Node status indicators**

- |                            |                            |
|----------------------------|----------------------------|
| 1. node A status indicator | 2. node B status indicator |
| 3. node C status indicator | 4. node D status indicator |

There is an indicator for each of the four nodes, on the front panel of the sled. The node status indicators provide the following information.

Indicator Pattern	Description
<b>Off</b>	The node is powered off.
<b>Solid blue</b>	The node is powered on.
<b>Blinking blue</b>	The node is identified.   <b>NOTE:</b> When a node is identified, the status indicator of the hard drive(s)/SSD(s) associated with the node blinks, and the activity indicator of the hard drive(s)/SSD(s) is off for the duration of the node identification blink pattern.
<b>Rapid blinking blue</b>	The indicator blinks blue rapidly, when KVM or USB is selected on the node.   <b>NOTE:</b> When the USB select button on the sled is pressed, the status indicators of the unselected nodes do not blink for the duration of the selected node status indicator blink.
<b>Blue fade on/fade off</b>	The node is requesting power on from the CMC.   <b>NOTE:</b> When any node in the sled is in this state, the sled power indicator also blinks along with the node indicator, at the same speed.
<b>Amber</b>	The node is in a fault condition.   <b>NOTE:</b> The indicator blinks amber if in fault condition, even when the node is powered off.

## Using USB diskette or USB DVD/CD drives

The sled has a USB port on the front, which allows you to connect a USB diskette drive, USB DVD/CD drive, keyboard, or mouse. The sled USB port is shared between the four nodes in the system. The USB drives can be used to configure the sled.

 **NOTE:** Your sled supports only Dell-branded USB 2.0 drives.

 **NOTE:** To designate the drive as the boot drive, connect the USB drive, restart the system, then enter the System Setup and set the drive as first in the boot sequence. The USB device is displayed in the boot order setup screen only if it is attached to the system before you run the System Setup. You can also select the boot device by pressing F11 during system start-up and selecting a boot device for the current boot sequence.

The USB select button on the sled front panel allows selection of the shared USB port between the four nodes. When a node is selected for connection to the sled USB port by pressing the USB select button, the node status indicator of the selected node blinks rapid blue. If the USB select button is pressed again while a node indicator is blinking rapid blue, the next node is selected for connection to the USB port. The status indicator of the newly selected node blinks rapid blue.

 **NOTE:** Node A is the default node for USB port connection.

## Documentation matrix

The documentation matrix provides information on documents that you can refer to for setting up and managing your system.

**Table 4. Documentation matrix**

To...	See the...
Install your system into a rack	Rack documentation included with your rack solution
Set up your system and know the system technical specifications	<i>Getting Started With Your System</i> that shipped with your system or see <a href="https://www.dell.com/poweredge/manuals">Dell.com/poweredgemanuals</a>
Install the operating system	Operating system documentation at <a href="https://www.dell.com/operatingsystemmanuals">Dell.com/operatingsystemmanuals</a>
Get an overview of the Dell Systems Management offerings	Dell OpenManage Systems Management Overview Guide at <a href="https://www.dell.com/openmanagemanuals">Dell.com/openmanagemanuals</a> > <b>OpenManage software</b>
Configure and log in to iDRAC, set up managed and management system, know the iDRAC features, and troubleshoot by using iDRAC	Integrated Dell Remote Access Controller User's Guide at <a href="https://www.dell.com/idracmanuals">Dell.com/idracmanuals</a>
Know about the RACADM subcommands and supported RACADM interfaces	RACADM Command Line Reference Guide for iDRAC at <a href="https://www.dell.com/idracmanuals">Dell.com/idracmanuals</a>
Launch, enable, and disable Dell Lifecycle Controller, know the features, use and troubleshoot Dell Lifecycle Controller	Dell Lifecycle Controller User's Guide at <a href="https://www.dell.com/idracmanuals">Dell.com/idracmanuals</a>
Use Dell Lifecycle Controller Remote Services	Dell Lifecycle Controller Remote Services Quick Start Guide at <a href="https://www.dell.com/idracmanuals">Dell.com/idracmanuals</a>
Set up, use, and troubleshoot OpenManage Server Administrator	Dell OpenManage Server Administrator User's Guide at <a href="https://www.dell.com/openmanagemanuals">Dell.com/openmanagemanuals</a> > <b>OpenManage Server Administrator</b>
Install, use, and troubleshoot OpenManage Essentials	Dell OpenManage Essentials User's Guide at <a href="https://www.dell.com/openmanagemanuals">Dell.com/openmanagemanuals</a> > <b>OpenManage Essentials</b>
Know the features of the storage controller cards, deploy the cards, and manage the storage subsystem	Storage controller documentation at <a href="https://www.dell.com/storagecontrollermanuals">Dell.com/storagecontrollermanuals</a>
Check the event and error messages generated by the system firmware and agents that monitor system components	Dell Event and Error Messages Reference Guide at <a href="https://www.dell.com/openmanagemanuals">Dell.com/openmanagemanuals</a> > <b>OpenManage software</b>

## Accessing system information by using QRL

You can use the Quick Resource Locator (QRL) to get immediate access to the information about your system.

Ensure that your smartphone or tablet has the QR code scanner installed.

The QRL includes the following information about your system:

- How-to videos
  - Reference materials, including the Owner's Manual, LCD diagnostics, and mechanical overview
  - Your system service tag to quickly access your specific hardware configuration and warranty information
  - A direct link to Dell to contact technical support and sales teams
1. Go to **Dell.com/QRL** and navigate to your specific product or
  2. Use your smartphone or tablet to scan the model-specific Quick Resource (QR) code located in the following image or on your Dell PowerEdge system:



# Performing initial system configuration

After you receive your PowerEdge system, you must set up your system in the enclosure, install the operating system if it is not pre-installed, and set up and configure the system iDRAC IP address.

## Setting up your system

1. Unpack the sled.
2. Remove the I/O connector cover from the sled connectors.

 **CAUTION:** While installing the sled, ensure that it is properly aligned with the slot on the enclosure to prevent damage to the sled connectors.

3. Install the sled in the enclosure.
4. Turn on the enclosure.

 **NOTE:** Wait for the chassis to initialize before you press the power button.

5. Turn on the sled by pressing the power button on the sled.  
Alternatively, you can also turn on the sled by using:
  - The sled iDRAC. For more information, see [Logging in to iDRAC](#).
  - The enclosure Chassis Management Controller (CMC), after the sled iDRAC is configured on the CMC. For more information, see the CMC User's Guide at [Dell.com/esmmanuals](https://www.dell.com/esmmanuals).

## Setting up and configuring the iDRAC IP address

You can set up the iDRAC IP address using one of the following interfaces:

- iDRAC Settings utility
- Dell Lifecycle Controller
- Dell Deployment Toolkit
- CMC Web interface

You can configure iDRAC using one of the following interfaces:

- iDRAC Web interface
- RACADM
- Remote services
- IPMI tool

For more information on setting up and configuring iDRAC, see the iDRAC User's Guide at [Dell.com/esmmanuals](https://www.dell.com/esmmanuals).

## Logging in to iDRAC

You can log in to iDRAC as an iDRAC user, a Microsoft Active Directory user, or a Lightweight Directory Access Protocol (LDAP) user. You can also log in using Single Sign-On or Smart Card. The default user name is `root` and password is `calvin`. For more information on logging in to iDRAC and iDRAC licenses, see the iDRAC User's Guide at [Dell.com/esmmanuals](http://Dell.com/esmmanuals).

You can also access iDRAC using RACADM. For more information, see the *RACADM Reference Guide for iDRAC and CMC* available at [Dell.com/esmmanuals](http://Dell.com/esmmanuals).

## Installing the operating system

You can install the supported operating system on the sled by using the following methods:

- Dell Systems Management Tools and Documentation media. See the operating system documentation at [Dell.com/operatingsystemmanuals](http://Dell.com/operatingsystemmanuals).
- Dell Lifecycle Controller. See the Lifecycle Controller documentation at [Dell.com/esmmanuals](http://Dell.com/esmmanuals).
- Dell OpenManage Deployment Toolkit. See the OpenManage documentation at [Dell.com/openmanagemanuals](http://Dell.com/openmanagemanuals).

For information on the list of operating systems supported on your system, see the operating system's support matrix at [Dell.com/ossupport](http://Dell.com/ossupport).

## Managing your system remotely

To perform out-of-band systems management by using iDRAC, you must configure iDRAC for remote accessibility, set up the management station and managed system, and configure the supported Web browsers. For more information, see the iDRAC User's Guide at [Dell.com/esmmanuals](http://Dell.com/esmmanuals).

You can also remotely monitor and manage the sleds from a single workstation, using the Dell OpenManage Server Administrator (OMSA) software and OpenManage Essentials (OME) systems management console. For more information, see [Dell.com/openmanagemanuals](http://Dell.com/openmanagemanuals).

## Downloading drivers and firmware

It is recommended that you download and install the latest BIOS, drivers, and systems management firmware on your system.

Ensure that you clear the web browser cache.

1. Go to [Dell.com/support/drivers](http://Dell.com/support/drivers).
2. In the **Product Selection** section, enter the Service Tag of your system in the **Service Tag or Express Service Code** field.
  -  **NOTE:** If you do not have the Service Tag, select **Automatically detect my Service Tag** for me to enable the system to automatically detect your service tag, or select your product from the **Product Selection** page.
3. Click **Get drivers and downloads**.

The drivers that are applicable to your selection are displayed.
4. Download the drivers that you need to a USB drive, CD, or DVD.

# Pre-operating system management applications

The pre-operating system management applications for your system help you manage different settings and features without booting to the operating system.

Your system has the following pre-operating system management applications:

- System Setup
- Boot Manager
- Dell Lifecycle Controller
- Preboot Execution Environment (PXE)

## Navigation keys

The navigation keys can help you quickly access the pre-operating system management applications.

Key	Description
F2	Enables you to enter <b>System Setup</b> .
F10	Enables you to enter system services and starts <b>Lifecycle Controller</b> .
F11	Enables you to enter <b>Boot Manager</b> .
F12	Enables you to enter <b>PXE Boot</b> .
Page Up	Enables you to move to the previous screen.
Page Down	Enables you to move to the next screen.
Up arrow	Enables you to move to the previous field.
Down arrow	Enables you to move to the next field.
Enter	Enables you to type a value in the selected field (if applicable).
Spacebar	Enables you to expand or collapse a drop-down list, if applicable.
Tab	Enables you to move to the next menu item.
	 <b>NOTE:</b> This feature is applicable only for the standard graphic browser.
Esc	Enables you to move to the previous page until you view the main screen. Pressing Esc in the main screen exits <b>System BIOS, iDRAC Settings, Device Settings, or Service Tag Settings</b> , and proceeds with system boot.
F1	Displays the system setup help.

## About system setup

By using the **System Setup** screen, you can configure the BIOS settings, iDRAC settings, and device settings of your system.

 **NOTE:** Help text for the selected field is displayed in the graphical browser by default. To view the help text in the text browser, press F1.

You can access system setup in two ways:

- Standard graphical browser — The browser is enabled by default.
- Text Browser — The browser is enabled by using Console Redirection.

### Entering System Setup

1. Turn on or restart your system.
2. Press F2 immediately after you see the following message:

F2 = System Setup

If your operating system begins to load before you press F2, allow the system to finish booting, and then restart your system and try again.

### System Setup main screen

 **NOTE:** Press Alt+F to reset the BIOS or UEFI settings to their default settings.

Menu Item	Description
System BIOS	This option is used to view and configure BIOS settings.
iDRAC Settings	This option is used to view and configure iDRAC settings.
Device Settings	This option is used to view and configure device settings.

### System BIOS screen

 **NOTE:** The options for System Setup change based on the system configuration.

 **NOTE:** System Setup defaults are listed under their respective options in the following sections, where applicable.

Menu Item	Description
System Information	Displays information about the system, such as the system model name, BIOS version, Service Tag, and so on.
Memory Settings	Displays information and options related to installed memory.
Processor Settings	Displays information and options related to the processor such as speed, cache size, and so on.
SATA Settings	Displays options to enable or disable the integrated SATA controller and ports.
Boot Settings	Displays options to specify the boot mode (BIOS or UEFI). Enables you to modify UEFI and BIOS boot settings.

<b>Menu Item</b>	<b>Description</b>
<b>Integrated Devices</b>	Displays options to enable or disable integrated device controllers and ports, and to specify related features and options.
<b>Serial Communication</b>	Displays options to enable or disable the serial ports and specify related features and options.
<b>System Profile Settings</b>	Displays options to change the processor power management settings, memory frequency, and so on.
<b>System Security</b>	Displays options to configure the system security settings like, system password, setup password, TPM security, and so on. It also enables or disables support for local BIOS update and the power button on the system.
<b>Miscellaneous Settings</b>	Displays options to change the system date, time, and so on.

## **System Information screen**

<b>Menu Item</b>	<b>Description</b>
<b>System Model Name</b>	Displays the system model name.
<b>System BIOS Version</b>	Displays the BIOS version installed on the system.
<b>System Service Tag</b>	Displays the system Service Tag.
<b>System Manufacturer</b>	Displays the name of system manufacturer.
<b>System Manufacturer Contact Information</b>	Displays the contact information of the system manufacturer.
<b>System CPLD Version</b>	Displays the system CPLD version.

## **Memory Settings screen**

<b>Menu Item</b>	<b>Description</b>
<b>System Memory Size</b>	Displays the amount of memory installed in the system.
<b>System Memory Type</b>	Displays the type of memory installed in the system.
<b>System Memory Speed</b>	Displays the system memory speed.
<b>System Memory Voltage</b>	Displays the system memory voltage.

Menu Item	Description
Video Memory	Displays the amount of video memory.
System Memory Testing	Specifies whether system memory tests are run during system boot. Options are <b>Enabled</b> and <b>Disabled</b> . By default, the <b>System Memory Testing</b> option is set to <b>Disabled</b> .

## Processor Settings screen

Menu Item	Description
Virtualization Technology	Allows you enable or disable the additional hardware capabilities provided for virtualization. By default, the <b>Virtualization Technology</b> option is set to <b>Enabled</b> .
Execute Disable	Allows you to enable or disable execute disable memory protection technology. By default, the <b>Execute Disable</b> option is set to <b>Enabled</b> .
Number of Cores per Processor	Allows you to control the number of enabled cores in each processor. By default, the <b>Number of Cores per Processor</b> option is set to <b>All</b> .   <b>NOTE:</b> The number of available cores varies, based on the core license. For more information, see <a href="#">Processor Core Licensing</a> .
Processor 64-bit Support	Specifies if the processor(s) support 64-bit extensions.
Processor Core Speed	Displays the maximum core frequency of the processor.
Processor X Family- Model- Stepping	Displays the family and model number of each processor. A submenu displays the brand name, core speed, the amount of cache memory, and the number of cores of the processor(s).

## SATA Settings screen

Menu Item	Description
Embedded SATA	Allows the embedded SATA to be set to Off, ATA, AHCI, or RAID modes. By default, Embedded SATA is set to <b>AHCI</b> .
Port A	Auto enables BIOS support for the device attached to SATA port A. Off disables BIOS support for the device. By default, Port A is set to <b>Auto</b> .
Port B	Auto enables BIOS support for the device attached to SATA port B. Off disables BIOS support for the device. By default, Port B is set to <b>Auto</b> .

## Boot Settings screen

Menu Item	Description
Boot Mode	Allows you to set the boot mode of the system.   <b>CAUTION: Switching the boot mode may prevent the system from booting if the operating system is not installed in the same boot mode.</b>

Menu Item	Description
	<p>If the operating system supports UEFI, you can set this option to UEFI. Setting this field to BIOS allows compatibility with non-UEFI operating systems. By default, the <b>Boot Mode</b> option is set to <b>BIOS</b>.</p> <p> <b>NOTE:</b> Setting this field to UEFI disables BIOS Boot Settings menu. Setting this field to BIOS disables the UEFI Boot Settings menu.</p>
<b>Boot Sequence Retry</b>	<p>Allows you to enable or disable the boot sequence retry feature. If this field is enabled and the system fails to boot, the system reattempts the boot sequence after 30 seconds. By default, the <b>Boot Sequence Retry</b> option is set to <b>Disabled</b>.</p>
<b>BIOS Boot Settings</b>	<p>Allows you to enable or disable BIOS Boot options.</p> <p> <b>NOTE:</b> This option is enabled only if the boot mode is BIOS.</p>
<b>UEFI Boot Settings</b>	<p>Allows you to enable or disable UEFI Boot options. The Boot options include <b>IPv4 PXE</b> and <b>IPv6 PXE</b>. By default, the <b>UEFI PXE boot protocol</b> is set to <b>IPv4</b>.</p> <p> <b>NOTE:</b> This option is enabled only if the boot mode is UEFI.</p>

## Integrated Devices screen

Menu Item	Description
<b>User Accessible USB Ports</b>	<p>Allows you to set the user accessible ports. Selecting <b>All Ports Off</b> disables all USB ports. By default, the <b>User Accessible USB Ports</b> option is set to <b>All Ports On</b>.</p>
<b>Embedded NIC1 and NIC2</b>	<p>Allows you to enable or disable the Operating System interface of the embedded NIC1 and NIC2 controller. By default, the <b>Embedded NIC1 and NIC2</b> option is set to <b>Enabled</b>.</p>
<b>OS Watchdog Timer</b>	<p>Allows you to enable or disable the OS watchdog timer. When this field is enabled, the operating system initializes the timer and the OS watchdog timer helps in recovering the operating system. By default, the <b>OS Watchdog Timer</b> option is set to <b>Disabled</b>.</p>

## Serial Communications screen

Menu Item	Description
<b>Serial Communication</b>	<p>Allows you to enable the <b>COM port</b> or <b>Console Redirection</b> options.</p>
<b>Serial Port Address</b>	<p>Allows you to set the port address for serial devices. By default, the <b>Serial Port Address</b> option is set to <b>COM1</b>.</p> <p> <b>NOTE:</b> Only Serial Device 2 can be used for Serial Over LAN (SOL). To use console redirection by SOL, configure the same port address for console redirection and the serial device.</p>
<b>Failsafe Baud Rate</b>	<p>Displays the failsafe baud rate for console redirection. The BIOS attempts to determine the baud rate automatically. This failsafe baud rate is used only if the</p>

Menu Item	Description
	attempt fails and the value must not be changed. By default, the <b>Failsafe Baud Rate</b> option is set to <b>11520</b> .
<b>Remote Terminal Type</b>	Allows you to set the remote console terminal type. By default, the <b>Remote Terminal Type</b> option is set to <b>VT 100/VT220</b> .
<b>Redirection After Boot</b>	Allows you to enable or disable to the BIOS console redirection when the operating system is loaded. By default, the <b>Redirection After Boot</b> option is set to <b>Enabled</b> .

## System Profile Settings screen

Menu Item	Description
<b>System Profile</b>	Allows you to set the system profile. If you set the <b>System Profile</b> option to a mode other than <b>Custom</b> , the BIOS automatically sets the rest of the options. You can only change the rest of the options if the mode is set to <b>Custom</b> . By default, the <b>System Profile</b> option is set to <b>Performance Per Watt Optimized (DAPC)</b> . DAPC is Dell Active Power Controller.   <b>NOTE:</b> The following parameters are available only when the <b>System Profile</b> is set to <b>Custom</b> .
<b>CPU Power Management</b>	Allows you to set the CPU power management. By default, the <b>CPU Power Management</b> option is set to <b>System DBPM (DAPC)</b> . DBPM is Demand-Based Power Management.
<b>Memory Frequency</b>	Allows you to set the memory frequency. By default, the <b>Memory Frequency</b> option is set to <b>Maximum Performance</b> .
<b>Turbo Boost</b>	Allows you to enable or disable the processor to operate in turbo boost mode. By default, the <b>Turbo Boost</b> option is set to <b>Enabled</b> .
<b>C States</b>	Allows you to enable or disable the processor to operate in all available power states. By default, the <b>C States</b> option is set to <b>Enabled</b> .
<b>Monitor/Mwait</b>	Allows you to enable Monitor/Mwait instructions in the processor. By default, the Monitor/Mwait option is set to <b>Enabled</b> for all system profiles, except <b>Custom</b> .   <b>NOTE:</b> This option can be disabled only if the <b>C States</b> option in <b>Custom</b> mode is disabled.   <b>NOTE:</b> When <b>C States</b> is enabled in <b>Custom</b> mode, changing the Monitor/Mwait setting does not impact system power/performance.
<b>Memory Patrol Scrub</b>	Allows you to set the memory patrol scrub frequency. By default, the <b>Memory Patrol Scrub</b> option is set to <b>Standard</b> .
<b>Memory Refresh Rate</b>	Allows you to set the memory refresh rate. By default, the <b>Memory Refresh Rate</b> option is set to <b>1x</b> .
<b>Memory Operating Voltage</b>	Allows you to set the DIMM voltage selection. When set to <b>Auto</b> , the system automatically sets the system voltage to the optimal setting based on the DIMM

Menu Item	Description
	capacity and the number of DIMMs installed. By default, the <b>Memory Operating Voltage</b> option is set to <b>Auto</b> .
<b>Collaborative CPU Performance Control</b>	When set to enabled, the CPU power management is controlled by the OS DBPM and the System DBPM (DAPC). By default, the option is set to <b>Disabled</b> .

## System Security screen

Menu Item	Description
<b>Intel AES-NI</b>	The <b>Intel AES-In</b> option improves the speed of applications by performing encryption and decryption using the Advanced Encryption Standard set and is set to <b>Enabled</b> by default.
<b>System Password</b>	Allows you to set the system password. This option is read-only if the password jumper is not installed in the system.
<b>Setup Password</b>	Allows you to set the setup password. This option is read-only if the password jumper is not installed in the system.
<b>Password Status</b>	Allows you to lock the system password. By default, the <b>Password Status</b> option is set to <b>Unlocked</b> .
<b>AC Power Recovery</b>	Allows you to set how the system reacts after AC power is restored to the system. By default, the <b>AC Power Recovery</b> option is set to <b>Last</b> .

## Miscellaneous Settings screen

Menu Item	Description
<b>System Time</b>	Allows you to set the time on the system.
<b>System Date</b>	Allows you to set the date on the system.
<b>Asset Tag</b>	Displays the asset tag and allows you to modify it for security and tracking purposes.
<b>Keyboard NumLock</b>	Allows you to set whether the system boots with the NumLock enabled or disabled. By default the <b>Keyboard NumLock</b> is set to <b>On</b> .   <b>NOTE:</b> This field does not apply to 84-key keyboards.
<b>Report Keyboard Errors</b>	Allows you to set whether keyboard-related error messages are reported during system boot. By default, the <b>Report Keyboard Errors</b> field is set to <b>Report</b> .
<b>F1/F2 Prompt on Error</b>	Allows you to enable or disable the F1/F2 prompt on error. By default, <b>F1/F2 Prompt on Error</b> is set to <b>Enabled</b> .

# About Boot Manager

Boot manager enables you to add, delete, and arrange boot options. You can also access System Setup and boot options without restarting the system.

## Entering the UEFI Boot Manager

 **NOTE:** Operating systems must be 64-bit UEFI-compatible (for example, Microsoft Windows Server 2008 x64 version) to be installed from the UEFI boot mode. DOS and 32-bit operating systems can only be installed from the BIOS boot mode.

The Boot Manager enables you to:

- Add, delete, and arrange boot options
- Access System Setup and BIOS-level boot options without rebooting

To enter the Boot Manager:

1. Turn on or restart your system.
2. Press F11 after you see the following message:

F11 = UEFI Boot Manager

If your operating system begins to load before you press F11, allow the system to finish booting, and then restart your system and try again.

## Boot Manager screen

Menu Item	Description
<b>Continue Normal Boot</b>	The system attempts to boot to devices starting with the first item in the boot order. If the boot attempt fails, the system continues with the next item in the boot order until the boot is successful or no more boot options are found.
<b>BIOS Boot Menu</b>	Displays the list of available BIOS boot options (marked with asterisks). Select the boot option you wish to use and press Enter.
<b>UEFI Boot Menu</b>	Displays the list of available UEFI boot options (marked with asterisks). Select the boot option you wish to use and press Enter. The UEFI Boot Menu enables you to <b>Add Boot Option, Delete Boot Option, or Boot From File.</b>
<b>Driver Health Menu</b>	Displays a list of the drivers installed on the system and their health status.
<b>Launch System Setup</b>	Enables you to access the System Setup.
<b>System Utilities</b>	Enables you to access the BIOS Update File Explorer, run the Dell Diagnostics program, and reboot the system.

## UEFI Boot menu

Menu Item	Description
<b>Boot From File</b>	Sets a one-time boot option not included in the boot option list.

Menu Item	Description
Select UEFI Boot Option	Displays the list of available UEFI boot options (marked with asterisks), select the boot option you wish to use and press Enter.
Add Boot Option	Adds a new boot option.
Delete Boot Option	Deletes an existing boot option.

## About Dell Lifecycle Controller

Dell Lifecycle Controller enables you to perform tasks such as configuring BIOS and hardware settings, deploying an operating system, updating drivers, changing RAID settings, and saving hardware profiles. For more information about Dell Lifecycle Controller, see the documentation at [Dell.com/idracmanuals](http://Dell.com/idracmanuals).

## Changing the boot order

You may have to change the boot order if you want to boot from a USB key or an optical drive. The following instructions may vary if you have selected **BIOS** for **Boot Mode**.

1. On the **System Setup Main Menu** screen, click **System BIOS** → **Boot Settings**.
2. Click **Boot Option Settings** → **Boot Sequence**.
3. Use the arrow keys to select a boot device, and use the plus (+) and minus (-) sign keys to move the device down or up in the order.
4. Click **Exit**, and then click **Yes** to save the settings on exit.

## Choosing the system boot mode

System Setup enables you to specify the boot mode for installing your operating system:

- BIOS boot mode (the default) is the standard BIOS-level boot interface.
- UEFI boot mode is an enhanced 64-bit boot interface based on Unified Extensible Firmware Interface (UEFI) specifications that overlays the system BIOS.

You must select the boot mode in the **Boot Mode** field of the **Boot Settings Screen** of System Setup. Once you specify the boot mode, the system boots in the specified boot mode and you then proceed to install your operating system from that mode. Thereafter, you must boot the system in the same boot mode (BIOS or UEFI) to access the installed operating system. Trying to boot the operating system from the other boot mode will cause the system to halt at startup.

 **NOTE:** Operating systems must be UEFI-compatible to be installed from the UEFI boot mode. DOS and 32-bit operating systems do not support UEFI and can only be installed from the BIOS boot mode.

 **NOTE:** For the latest information on supported operating systems, see [Dell.com/ossupport](http://Dell.com/ossupport).

## Assigning a system or setup password

 **NOTE:** The password jumper enables or disables the System Password and Setup Password features. For more information on the password jumper settings, see System Board Jumper Settings.

You can assign a new **System Password** and/or **Setup Password** or change an existing **System Password** and/or **Setup Password** only when the password jumper setting is enabled and **Password Status** is **Unlocked**. If the Password Status is **Locked**, you cannot change the System Password and/or Setup Password.

If the password jumper setting is disabled, the existing System Password and Setup Password is deleted and you need not provide the system password to log on to the system.

To assign a system or setup password:

1. To enter System Setup, press F2 immediately after a power-on or reboot.
2. In the **System Setup Main Menu**, select **System BIOS** and press Enter.  
The **System BIOS** screen is displayed.
3. In the **System BIOS** screen, select **System Security** and press Enter.  
The **System Security** screen is displayed.
4. In the **System Security** screen, verify that **Password Status** is **Unlocked**.
5. Select **System Password**, enter your system password, and press Enter or Tab.  
Use the following guidelines to assign the system password:
  - A password can have up to 32 characters.
  - The password can contain the numbers 0 through 9.
  - Only lower case letters are valid, upper case letters are not allowed.
  - The following special characters are allowed: space, ("), (+), (.), (-), (.), (/), (:), (D), (\), (I), (').

A message prompts you to reenter the system password.

6. Reenter the system password that you entered earlier and click **OK**.
7. Select **Setup Password**, enter your system password and press Enter or Tab.  
A message prompts you to re-enter the setup password.
8. Reenter the setup password that you entered earlier and click **OK**.
9. Press Esc to save the changes.

 **NOTE:** Password protection does not take effect until the system reboots.

## Using your system password to secure your system

 **NOTE:** If you have assigned a setup password, the system accepts your setup password as an alternate system password.

1. Turn on or reboot your system.
2. Type your password and press Enter.

When **Password Status** is **Locked**, type the password and press Enter when prompted at reboot.

If an incorrect system password is entered, the system displays a message and prompts you to re-enter your password. You have three attempts to enter the correct password. After the third unsuccessful attempt, the system displays an error message that the system has halted and must be powered down.

Even after you shut down and restart the system, the error message is displayed until the correct password is entered.

 **NOTE:** You can use the **Password Status** option in conjunction with the **System Password** and **Setup Password** options to protect your system from unauthorized changes.

## Deleting or changing an existing system and/or setup password

Ensure that the Password jumper is set to enabled and the **Password Status** is **Unlocked** before attempting to delete or change the existing System and/or Setup password. You cannot delete or change an existing System or Setup password if the **Password Status** is **Locked**.

To delete or change the existing System and/or Setup password:

1. To enter System Setup, press F2 immediately after a power-on or reboot.
2. In the **System Setup Main Menu**, select **System BIOS** and press Enter.  
The **System BIOS** screen is displayed.
3. In the **System BIOS Screen**, select **System Security** and press Enter.  
The **System Security** screen is displayed.
4. In the **System Security** screen, verify that **Password Status** is **Unlocked**.
5. Select **System Password**, alter or delete the existing system password and press Enter or Tab.
6. Select **Setup Password**, alter or delete the existing setup password and press Enter or Tab.

 **NOTE:** If you change the System and/or Setup password a message prompts you to re-enter the new password. If you delete the System and/or Setup password, a message prompts you to confirm the deletion.

7. Press Esc to save the changes.

 **NOTE:** You can disable password security while logging on to the system. To disable the password security, turn on or reboot your system, type your password and press Ctrl+Enter.

## Operating with a setup password enabled

If **Setup Password** is set to **Enabled**, enter the correct setup password before modifying most of the System Setup options.

If you do not enter the correct password in three attempts, the system displays the message

```
Incorrect Password! Number of unsuccessful password attempts: <x> System  
Halted! Must power down.
```

Even after you shut down and restart the system, the error message is displayed until the correct password is entered. The following options are exceptions:

- If **System Password** is not set to **Enabled** and is not locked through the **Password Status** option, you can assign a system password.
- You cannot disable or change an existing system password.

 **NOTE:** You can use the **Password Status** option in conjunction with the **Setup Password** option to protect the system password from unauthorized changes.

## Embedded system management

The Dell Lifecycle Controller provides advanced embedded systems management throughout the server lifecycle. The Lifecycle Controller can be started during the boot sequence and can function independently of the operating system.

 **NOTE:** Certain platform configurations may not support the full set of features provided by the Lifecycle Controller.

For more information about setting up the Lifecycle Controller, configuring hardware and firmware, and deploying the operating system, see the Lifecycle Controller documentation at [Dell.com/esmmanuals](https://Dell.com/esmmanuals).

## iDRAC Settings utility

The iDRAC Settings utility is an interface to setup and configure the iDRAC parameters using UEFI. You can enable or disable various iDRAC parameters using the iDRAC7 Settings Utility, for example:

 **NOTE:** Some of the features mentioned in the list may require the iDRAC 7 Enterprise License upgrade.

- Configure, enable, or disable the iDRAC local area network through the dedicated iDRAC Enterprise card port or the embedded NIC
- Enable or disable IPMI over LAN
- Enable a LAN Platform Event Trap (PET) destination
- Attach or detach the Virtual Media devices

For more information on using iDRAC7, see the iDRAC7 User's Guide, at [Dell.com/esmmanuals](https://Dell.com/esmmanuals).

### Entering the iDRAC Settings utility

1. Turn on or restart the managed system.
2. Press F2 during Power-on Self-test (POST).
3. In the **System Setup Main Menu** page, click **iDRAC Settings**.

The iDRAC Settings page is displayed.

## Processor core licensing

There are three processor core configurations for each of the four node processors supported on your system:

- 2.4GHz 2 core
- 2.4GHz 4 core
- 2.4GHz 8 core

The default license is for the 2-core 2.4 GHz configuration. The core license for the 4-core and 8-core processor configurations are available on factory shipped systems.

Depending on the processor core license on your system, the system BIOS displays the maximum number of cores per processor on your system. For instance, if you have a license for an 8-core processor configuration, the system BIOS displays the maximum cores per processor as 8.

## Networking configurations

The LAN On Motherboard (LOM) network provides Ethernet connectivity from the I/O modules on the FX2 enclosure to the sleds in the enclosure. The network traffic from the nodes in an FM120x4 sled to the I/O modules on the FX2 enclosure is routed through a network switch that is embedded on the sled system board. Each FM120x4 sled in the enclosure maps to two ports on each I/O module. For more information, see the *Dell PowerEdge FX2 and FX2s Enclosure Owner's Manual* at [Dell.com/poweredgemanuals](http://Dell.com/poweredgemanuals).

There are four networking configurations supported on the FM120x4 system. You can select the network configuration from the CMC web interface. All FM120x4 sleds in the FX2 enclosure have the same network configuration. For more information on the networking configurations supported on your system, see [Dell.com/poweredgemanuals](http://Dell.com/poweredgemanuals).

### Standard configuration

In this configuration, the uplink ports from the embedded network switch on a sled and the four uplink ports on the enclosure I/O modules to which the sled maps are configured in a single trunk group or Link Aggregation (LAG). The ports on the external switches to which the enclosure I/O modules connect must be configured into a single trunk configuration or LAG. Alternatively, spanning tree must be run on the external rack switches to disable three of the four uplink ports.

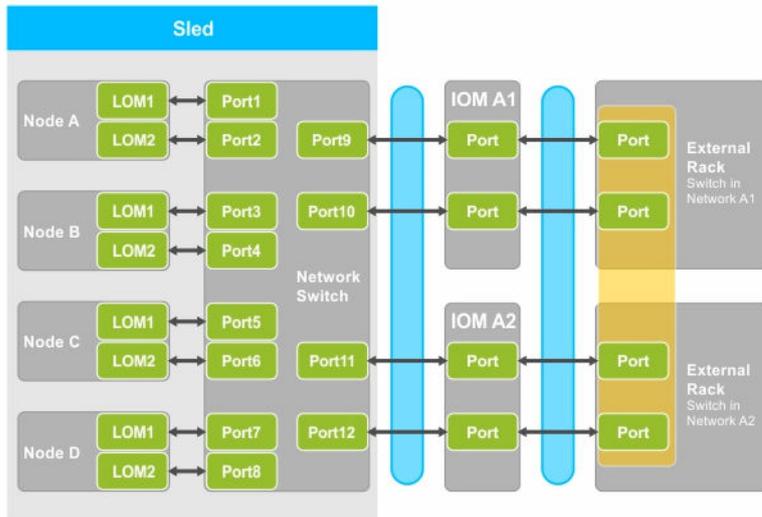


Figure 5. Standard configuration

Table 5. Standard configuration icon description

Icon	Description
↔	Network path
■	Single trunk configuration or LAG

Icon	Description
■	Static LAG

**NOTE:** The image shows two external rack switches. However, the standard configuration also supports uplinks of all four ports to a single external rack switch.

## Network adapter isolation configuration

In this configuration, the individual node network adapters are isolated from the other nodes in the sled. Any inter-node network traffic is routed to the external switches before being directed back to the destination nodes. The external ports on the embedded network switch (or switches) are configured into a single trunk or LAG for throughput and redundancy. The external rack switches are on the same network in this configuration.

**NOTE:** The network adapter isolation configuration also supports uplinks of all four ports to a single external rack switch.

This configuration enhances security, as security features like firewalls are installed in the external rack switches, and is useful in multi-tenant configurations.

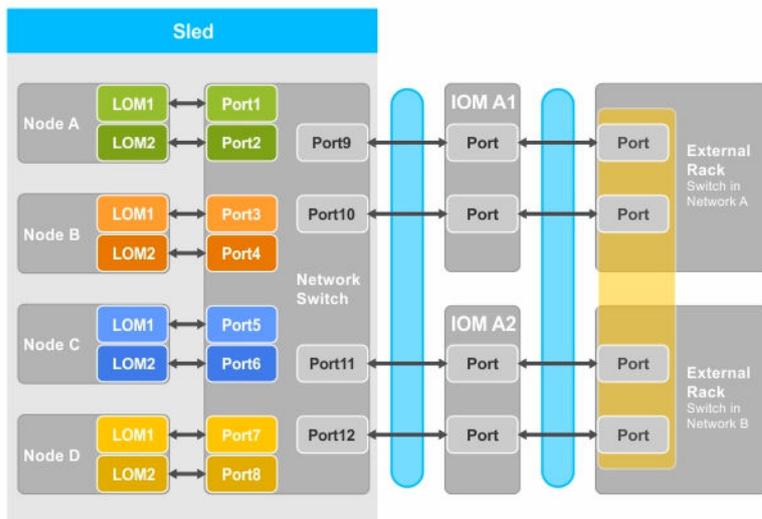


Figure 6. Network adapter isolation configuration

Table 6. Network adapter isolation configuration icon description

Icon	Description
↔	Network path
■	Single trunk configuration or LAG

## Isolated networks configuration

In this configuration, each of the two LOMs on a node is mapped to separate I/O modules and external rack switches, to provide maximum redundancy. The two external switches are on separate networks in this configuration.

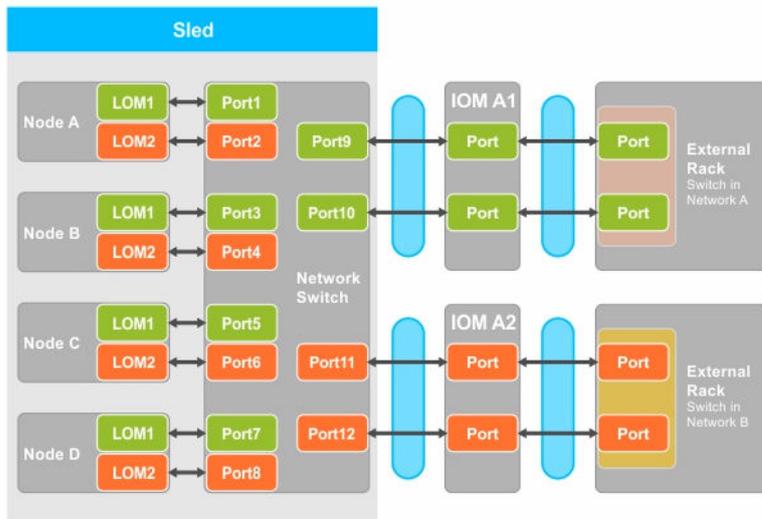


Figure 7. Isolated networks configuration

Table 7. Isolated networks configuration icon description

Icon	Description
↔	Network path
■	Trunk configuration or LAG
■	Local Area Network 1
■	Local Area Network 2

## Enhanced network adapter isolation configuration

In this configuration, the individual node network adapters are isolated from other nodes in the sled, with a dedicated IOM port mapped to LAN on motherboard (LOM) on each nodes. The LOM1 on each node is operational, and it is recommended that the LOM2 must be disabled in the operating system. This configuration functions when the TOR connections for each node within a sled are on the network layer 2 domain.

This configuration enhances security, as security features like firewalls are installed in the external rack switches, and is useful in multi-tenant configurations.

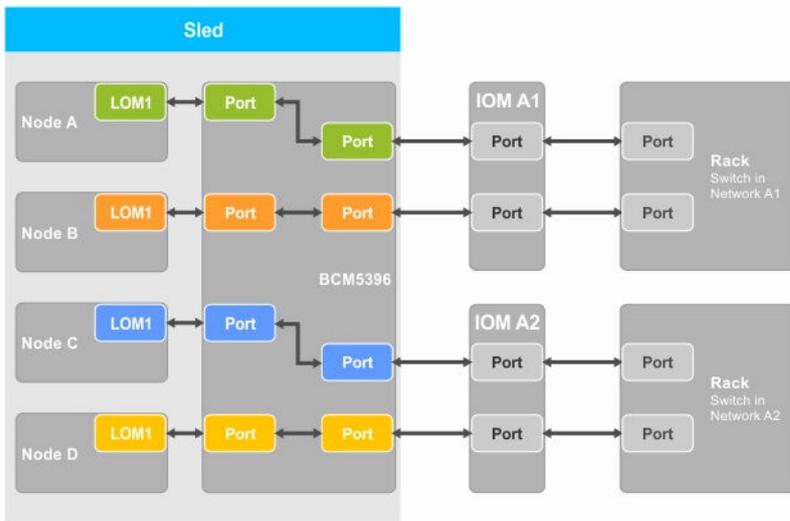


Figure 8. Enhanced network adapter isolation configuration

Table 8. Enhanced network adapter isolation configuration icon description

Icon	Description
↔	Network path

### Node to I/O module port mapping for the enhanced network isolation configuration

In this configuration, each of the four nodes on an FM120x4 system is mapped to a single port on the I/O module. The network traffic from the nodes in the compute sled to the I/O modules in the enclosure is routed through a network switch that is embedded on the compute sled system board.

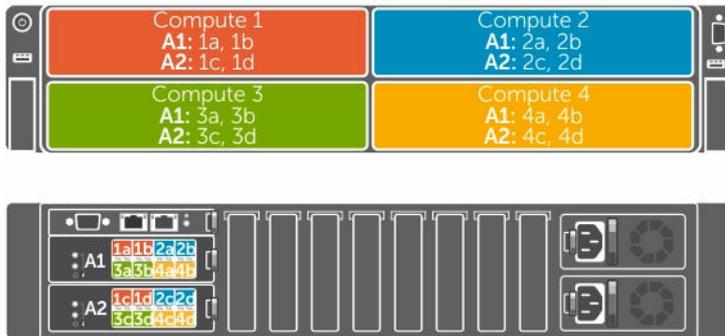


Figure 9. Node to I/O module port mapping for the enhanced network isolation configuration

Table 9. I/O module port mapping – FM120x4

FM120x4	IO Module A1 (Top)	IO Module A2 (Bottom)
1	1a, 1b	1c, 1d
2	2a, 2b	2c, 2d

<b>FM120x4</b>	<b>IO Module A1 (Top)</b>	<b>IO Module A2 (Bottom)</b>
3	3a, 2b	3c, 3d
4	4a, 4b	4c, 4d

# Installing sled components

This section provides information on removing and installing the sled components. For information on removing and installing the enclosure components, see the *Dell PowerEdge FX2 and FX2s Enclosure Owner's Manual* at [Dell.com/poweredgemanuals](http://Dell.com/poweredgemanuals).

 **NOTE:** The term nodes in this section refer to the four compute nodes (Intel Atom C2000 processors) in the FM120x4 sled. For more information, see [Terms Used In The Document](#).

## Recommended tools

You may need the following items to perform the procedures in this section:

- #1 and #2 Phillips screwdrivers
- T10 Torx driver
- Wrist grounding strap

 **CAUTION:** Many repairs may only be done by a certified service technician. You should only perform troubleshooting and simple repairs as authorized in your product documentation, or as directed by the online or telephone service and support team. Damage due to servicing that is not authorized by Dell is not covered by your warranty. Read and follow the safety instructions that came with the product.

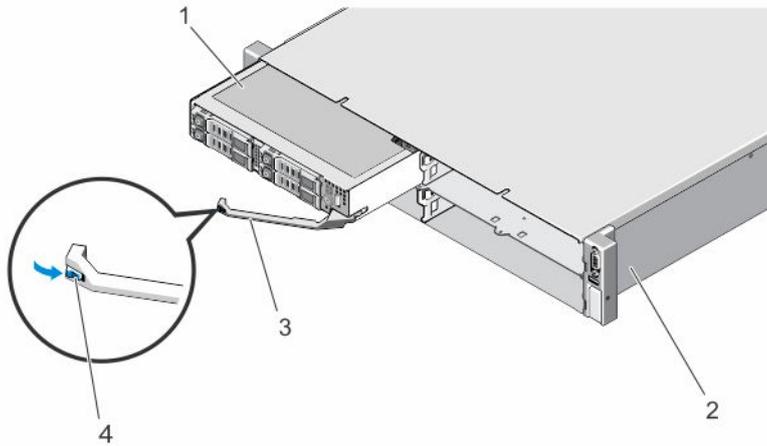
## Removing the sled

1. Turn off the nodes using the operating system commands, or the iDRAC, or the CMC.  
The sled is powered off when all the nodes are turned off. When the sled power is off, its front-panel power indicator is off.
2. Turn off the sled using the CMC, and ensure that the sled power is off.
3. Press the release button on the sled handle.  
The sled handle moves to open position.
4. Rotate the sled handle away from the sled to disengage the sled connectors from the enclosure midplane.
5. Slide the sled out of the enclosure.

 **CAUTION:** To protect the I/O connector pins, install the I/O connector cover every time a sled is removed from the enclosure.

6. Install the I/O connector cover over the I/O connector.

 **CAUTION:** If you are permanently removing the sled, install a sled blank. Operating the system for extended periods of time without a sled blank installed can cause the enclosure to overheat.



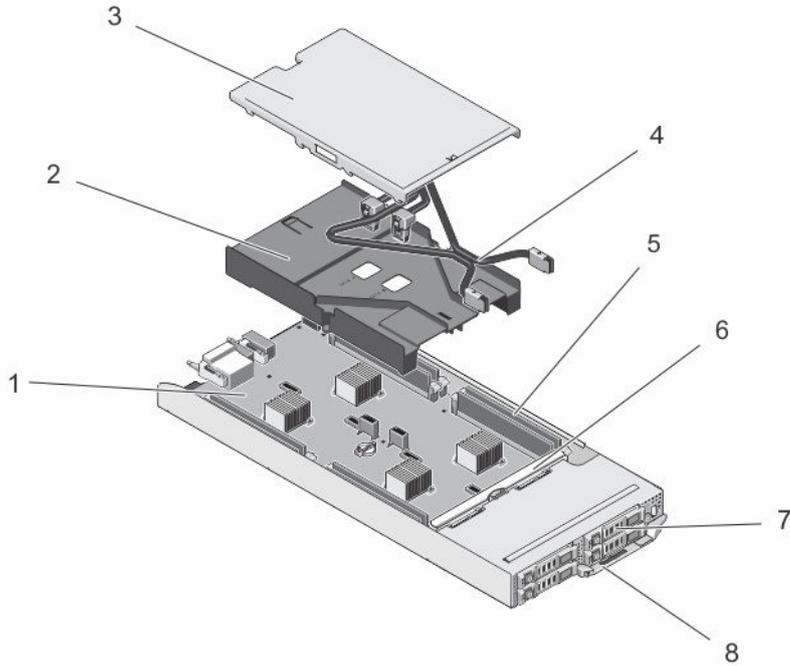
**Figure 10. Removing and installing a sled**

- |                |                                      |
|----------------|--------------------------------------|
| 1. sled        | 2. FX2 enclosure                     |
| 3. sled handle | 4. release button on the sled handle |

## Installing the sled

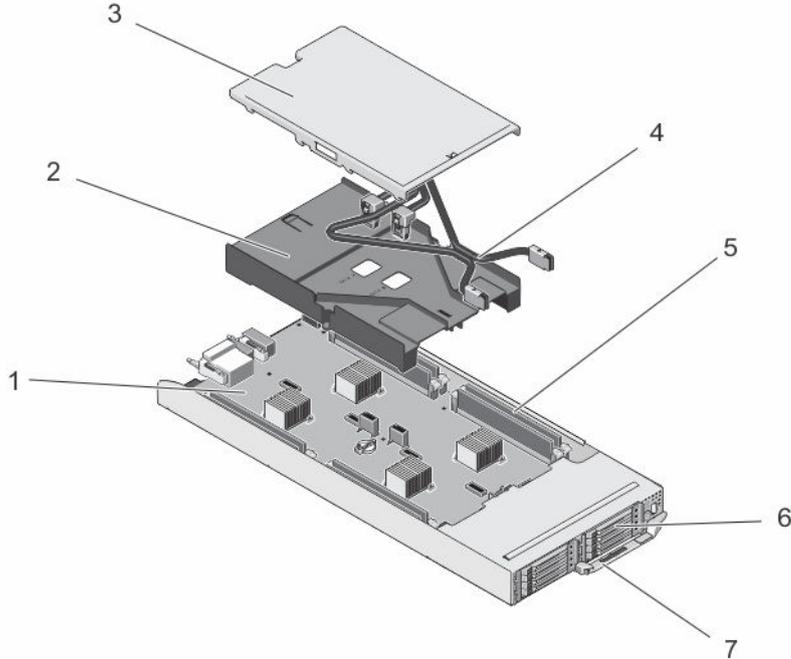
1. If you are installing a new sled, remove the I/O connector cover from the I/O connectors and save for future use.
2. Align the sled with the sled bay on the enclosure and slide the sled into the enclosure until the sled connectors engage with the enclosure midplane.  
The sled handle rotates toward the enclosure as the sled slides into the enclosure.
3. Press the sled handle to closed position until the release button clicks into place.
4. Turn on the sled.

## Inside the sled



**Figure 11. Inside the sled — 2.5 inch hard-drive/SSD system**

- |                         |                             |
|-------------------------|-----------------------------|
| 1. system board         | 2. cooling shroud           |
| 3. cable cover          | 4. SATA cables (2)          |
| 5. DIMMs (8)            | 6. hard-drive/SSD backplane |
| 7. hard drives/SSDs (4) | 8. sled handle              |



**Figure 12. Inside the sled — 1.8 inch SSD system**

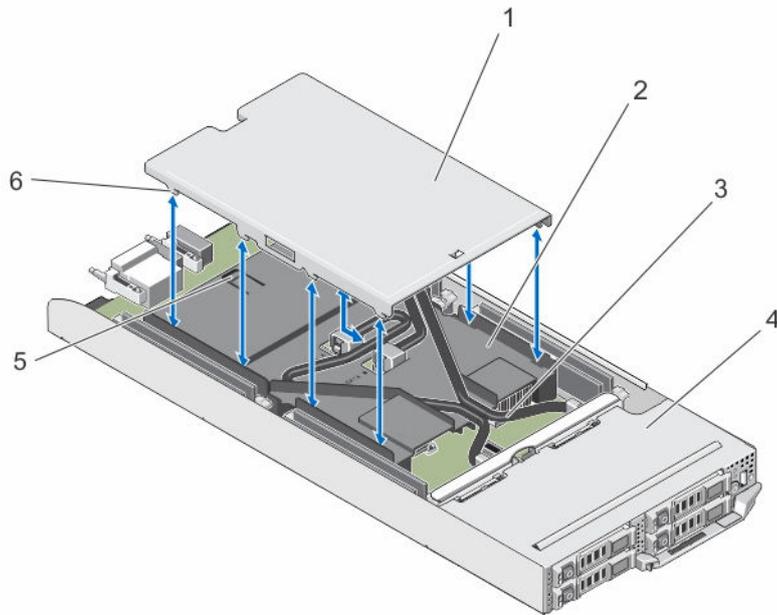
- |                 |                    |
|-----------------|--------------------|
| 1. system board | 2. cooling shroud  |
| 3. cable cover  | 4. SATA cables (2) |
| 5. DIMMs (8)    | 6. SSDs (8)        |
| 7. sled handle  |                    |

## Cable cover

### Removing the cable cover

**⚠ CAUTION:** Many repairs may only be done by a certified service technician. You should only perform troubleshooting and simple repairs as authorized in your product documentation, or as directed by the online or telephone service and support team. Damage due to servicing that is not authorized by Dell is not covered by your warranty. Read and follow the safety instructions that came with the product.

1. Turn off the nodes using the operating system commands, or the iDRAC, or the CMC.  
The sled is powered off when all the nodes are turned off.
2. Remove the sled from the enclosure.
3. Press the release latch on the cooling shroud, at the back of the cable cover, to disengage the cover from the shroud.
4. Slide the cable cover toward the back of the sled.
5. Holding the cable cover by the edges, lift it up from the cooling shroud.



**Figure 13. Removing and installing the cable cover**

- |                    |                        |
|--------------------|------------------------|
| 1. cable cover     | 2. cooling shroud      |
| 3. SATA cables (2) | 4. sled                |
| 5. release latch   | 6. tabs on cable cover |

## Installing the cable cover

**CAUTION:** Many repairs may only be done by a certified service technician. You should only perform troubleshooting and simple repairs as authorized in your product documentation, or as directed by the online or telephone service and support team. Damage due to servicing that is not authorized by Dell is not covered by your warranty. Read and follow the safety instructions that came with the product.

1. Align the tabs on the cable cover with the slots on the cooling shroud.

**NOTE:** Ensure that the cables are routed properly on the cooling shroud before installing the cable cover.

2. Lower the cable cover on to the cooling shroud until the tabs on the cable cover engage with the slots on the shroud.
3. Slide the cable cover toward the front of the sled, until it engages with the release latch on the cooling shroud and is firmly seated.

# Cooling shroud

## Removing the cooling shroud

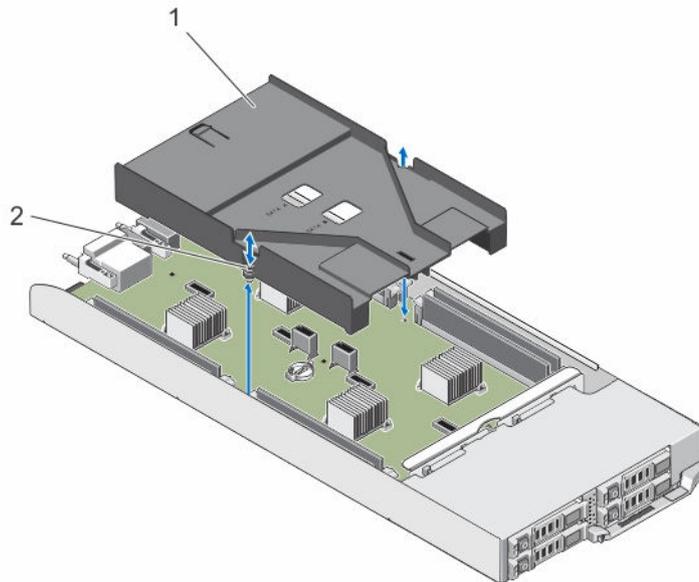
**⚠ CAUTION:** Many repairs may only be done by a certified service technician. You should only perform troubleshooting and simple repairs as authorized in your product documentation, or as directed by the online or telephone service and support team. Damage due to servicing that is not authorized by Dell is not covered by your warranty. Read and follow the safety instructions that came with the product.

**⚠ CAUTION:** Never operate your system with the cooling shroud removed. The system may get overheated quickly, resulting in shutdown of the system and loss of data.

1. Turn off the nodes using the operating system commands, or the iDRAC, or the CMC.  
The sled is powered off when all the nodes are turned off.
2. Remove the sled from the enclosure.
3. Remove the cable cover from the cooling shroud.
4. Disconnect the SATA cables from the connectors on the system board.

**🔍 NOTE:** Note the routing of the SATA cables on the cooling shroud as you remove them from the system board. You must route these cables properly when you replace them, to install the cable cover.

5. Loosen the two screws securing the cooling shroud to the chassis.
6. Lift the cooling shroud away from the chassis.



**Figure 14. Removing and installing the cooling shroud**

1. cooling shroud

2. screws (2)

## Installing the cooling shroud

 **CAUTION:** Many repairs may only be done by a certified service technician. You should only perform troubleshooting and simple repairs as authorized in your product documentation, or as directed by the online or telephone service and support team. Damage due to servicing that is not authorized by Dell is not covered by your warranty. Read and follow the safety instructions that came with the product.

1. Lower the cooling shroud into the sled chassis and align the screw holes on the cooling shroud with the screw holes on the sled chassis.
2. Tighten the two screws to secure the shroud to the chassis.
3. Route the SATA cables on the cooling shroud, and connect the SATA cables to the system board connectors.
4. Install the cable cover on the cooling shroud.
5. Install the sled in the enclosure.
6. Turn on the sled.

## System memory

Your system supports unregistered ECC DIMMs (ECC UDIMMs). It supports 1.35 V DDR3L voltage specifications. The memory bus operating frequency is 1600 MT/s.

 **NOTE:** MT/s indicates DIMM speed in MegaTransfers per second.

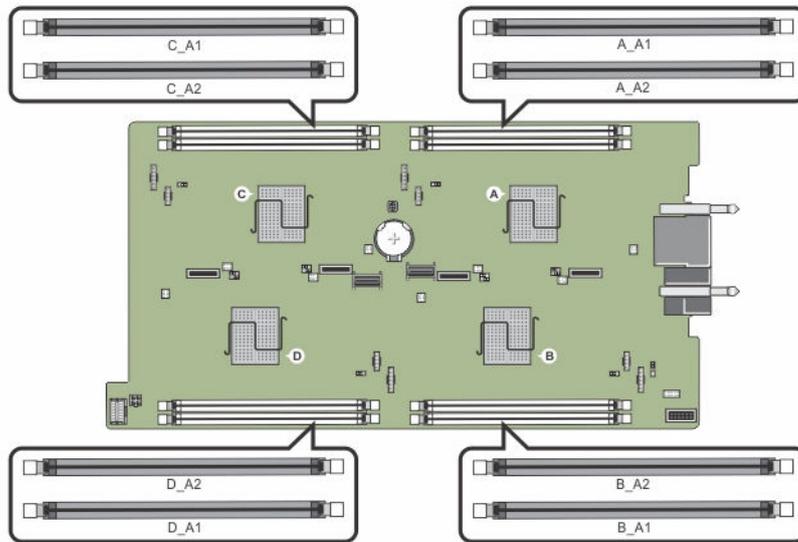
The following table shows the memory populations and operating frequencies for the supported configurations.

**Table 10. Memory populations and operating frequencies for the supported configurations**

DIMM Type	DIMMs Populated Per Channel	Operating Frequency (in MT/s)	Maximum DIMM Rank Per Channel
UDIMM	1	1600	Single rank
UDIMM	1	1600	Dual rank

The system contains eight memory sockets split into four sets of two sockets, one set per node. Each two-socket set is organized into two channels.

 **NOTE:** DIMMs in sockets A\_A1 and A\_A2 are assigned to node A, B\_A1 and B\_A2 are assigned to node B, C\_A1 and C\_A2 are assigned to node C, and D\_A1 and D\_A2 are assigned to node D.



**Figure 15. Memory socket locations**

Memory channels are organized as follows:

- |               |  |
|---------------|--|
| <b>Node A</b> | channel 1: memory socket A_A1<br>channel 2: memory socket A_A2 |
| <b>Node B</b> | channel 1: memory socket B_A1<br>channel 2: memory socket B_A2 |
| <b>Node C</b> | channel 1: memory socket C_A1<br>channel 2: memory socket C_A2 |
| <b>Node D</b> | channel 1: memory socket D_A1<br>channel 2: memory socket D_A2 |

### General memory module installation guidelines

Your system supports Flexible Memory Configuration, enabling the system to be configured and run in any valid chipset architectural configuration. The following are the recommended guidelines for optimal performance:

- Memory modules must be of the same type and capacity for all the nodes.
- At least one memory module must be populated for each node.
- The memory configuration for each node must be identical. For example, if you populate socket A\_A1 for node A, then populate socket B\_A1 for node B, socket C\_A1 for node C, and socket D\_A1 for node D.
- Mixing of memory modules is not supported.

## Sample memory configurations

The following table shows sample memory configurations that follow the appropriate memory guidelines stated in this section.

 **NOTE:** 1R and 2R in the following table indicate single- and dual-rank UDIMMs respectively.

**Table 11. Memory configurations**

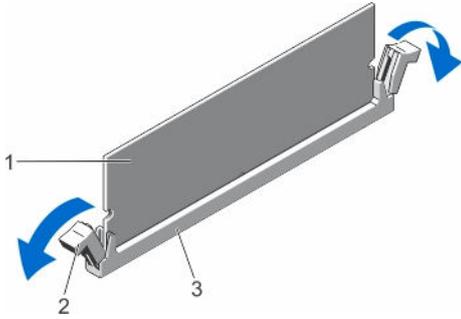
Sled Capacity (in GB)	DIMM Size (in GB)	Number of DIMMs	Organization and Speed	DIMM Slot Population
16	4	4	1R x8, 1600 MT/s	A_A1, B_A1, C_A1, D_A1
24	4	6	1R x8, 1600 MT/s	A_A1, A_A2, B_A1, B_A2, C_A1, D_A1
32	4	8	1R x8, 1600 MT/s	A_A1, A_A2, B_A1, B_A2, C_A1, C_A2, D_A1, D_A2
32	8	4	2R x8, 1600 MT/s	A_A1, B_A1, C_A1, D_A1
48	8	6	2R x8, 1600 MT/s	A_A1, A_A2, B_A1, B_A2, C_A1, D_A1
64	8	8	2R x8, 1600 MT/s	A_A1, A_A2, B_A1, B_A2, C_A1, C_A2, D_A1, D_A2

## Removing memory modules

 **WARNING:** The memory modules are hot to touch for some time after the system has been powered down. Allow the memory modules to cool before handling them. Handle the memory modules by the card edges and avoid touching the components or metallic contacts on the memory module.

 **CAUTION:** Many repairs may only be done by a certified service technician. You should only perform troubleshooting and simple repairs as authorized in your product documentation, or as directed by the online or telephone service and support team. Damage due to servicing that is not authorized by Dell is not covered by your warranty. Read and follow the safety instructions that came with the product.

1. Turn off the nodes using the operating system commands, or the iDRAC, or the CMC.  
The sled is powered off when all the nodes are turned off.
2. Remove the sled from the enclosure.
3. Locate the appropriate memory module socket(s).
4. To release the memory-module from the socket, simultaneously press the ejectors on both ends of the memory module socket.

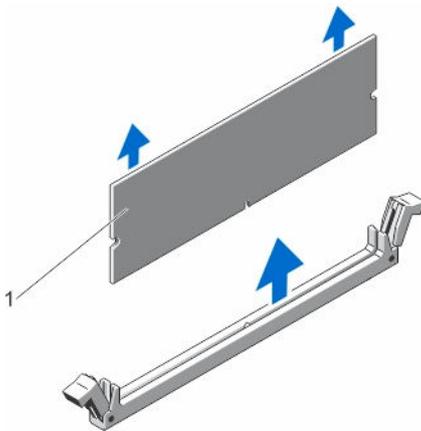


**Figure 16. Ejecting the memory module**

- 1. memory module
- 2. memory-module socket ejectors (2)
- 3. memory-module socket

**⚠ CAUTION:** Handle each memory module only by the card edges, making sure not to touch the middle of the memory module or metallic contacts.

5. Remove the memory module from the socket.



**Figure 17. Removing the memory module**

- 1. memory module

6. Install the sled in the enclosure.
7. Turn on the sled.

## Installing memory modules

**⚠ WARNING:** The memory modules are hot to touch for some time after the system has been powered down. Allow the memory modules to cool before handling them. Handle the memory modules by the card edges and avoid touching the components or metallic contacts on the memory module.

**⚠ CAUTION:** Many repairs may only be done by a certified service technician. You should only perform troubleshooting and simple repairs as authorized in your product documentation, or as directed by the online or telephone service and support team. Damage due to servicing that is not authorized by Dell is not covered by your warranty. Read and follow the safety instructions that came with the product.

1. Turn off the nodes using the operating system commands, or the iDRAC, or the CMC.

The sled is powered off when all the nodes are turned off.

2. Remove the sled from the enclosure.
3. Locate the appropriate memory module socket(s).
4. Press the ejectors on the memory module socket outward to allow the memory module to be inserted into the socket.

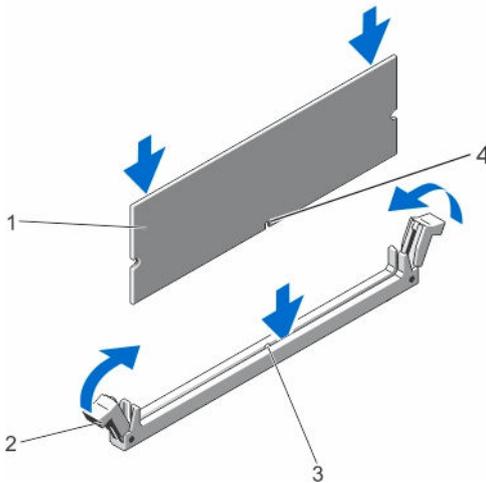
**CAUTION:** Handle each memory module only on either card edge, making sure not to touch the middle of the memory module.

5. Align the edge connector on the memory module with the alignment key on the memory module socket, and insert the memory module in the socket.

**NOTE:** The memory module socket has an alignment key that allows you to install the memory module in the socket in only one orientation.

**CAUTION:** To prevent damage to the memory-module socket during installation, apply pressure at both ends of the memory module evenly. Do not apply pressure to the center of the memory module.

6. Press down on the memory module with your thumbs to lock the memory module into the socket.



**Figure 18. Installing the memory module**

- |                                       |                                |
|---------------------------------------|--------------------------------|
| 1. memory module                      | 2. memory-module ejectors      |
| 3. memory-module socket alignment key | 4. memory-module alignment key |

**NOTE:** When the memory module is properly seated in the socket, the ejectors on the memory module socket align with the ejectors on the other sockets that have memory modules installed.

7. Repeat step 4 through step 7 of this procedure to install the remaining memory modules.
8. Install the sled in the enclosure.
9. Turn on the sled.

10. (Optional) Press F2 to enter the System Setup, and check the **System Memory** setting.

The system should have already changed the value to reflect the newly installed memory.

**NOTE:** If the value is incorrect, one or more of the memory modules may not be installed properly. Check to ensure that the memory modules are firmly seated in their sockets.

11. Run the system memory test in the system diagnostics.

## Hard drives/SSDs

Depending on the configuration, your system supports four 2.5 inch SATA hard drives/SSDs, or eight 1.8 inch SATA SSDs. All drives connect to the system board through the hard-drive/SSD backplane. The hard drives/SSDs are supplied in special hot-swap drive carriers that fit in the drive bays.

### Hard drive/SSD to node assignment

The hard drives/SSDs are not shared resources between the nodes in the system. Each hard drive/SSD is assigned to a specific node. Depending on the configuration, the hard drives/SSDs are assigned to the nodes in the following order.

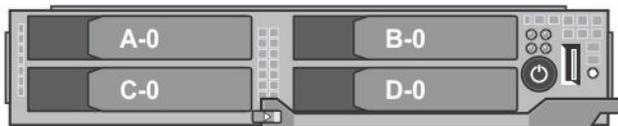


Figure 19. Hard-drive/SSD bay numbering — 2.5 inch hard-drive/SSD system

Table 12. Hard drive/SSD to node assignment — 2.5 inch hard-drive/SSD configuration

Hard-Drive/SSD Bay	Node
A-0	A
B-0	B
C-0	C
D-0	D



Figure 20. SSD bay numbering — 1.8 inch SSD system

Table 13. Hard drive/SSD to node assignment — 1.8 inch SSD configuration

Hard-Drive/SSD Bay	Node
A-0	A
A-1	A
B-0	B
B-1	B

Hard-Drive/SSD Bay	Node
C-0	C
C-1	C
D-0	D
D-1	D

## Removing a hard drive/SSD

**NOTE:** The 2.5 inch hard-drive/SSD configuration supports four warm-swap hard-drives/SSDs. Each hard-drive/SSD is assigned to a specific node, and the node to which it is assigned must be turned off before servicing the hard-drive/SSD.

**NOTE:** The 1.8 inch SSDs are hot-swap. Not all operating systems support hot-swap drive installation. See the documentation supplied with your operating system.

1. To remove a 2.5 inch hard-drive/SSD, turn off the node to which the hard-drive is assigned, using the iDRAC.
2. Take the hard drive/SSD offline and wait until the hard-drive/SSD indicators on the drive carrier are off.

The drive is ready for removal.

**NOTE:** See your operating system documentation for more information on taking the drive offline.

3. Open the hard-drive/SSD carrier handle to release the drive.
4. Slide the hard drive/SSD out until it is free of the drive bay.  
If you are permanently removing the hard drive/SSD, install a drive blank.

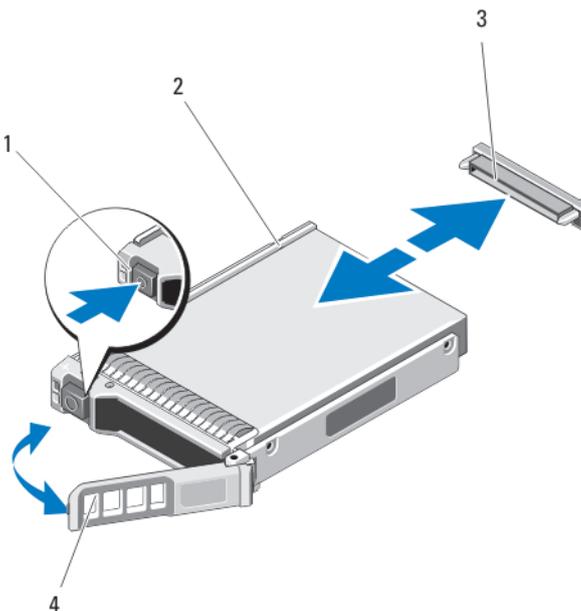
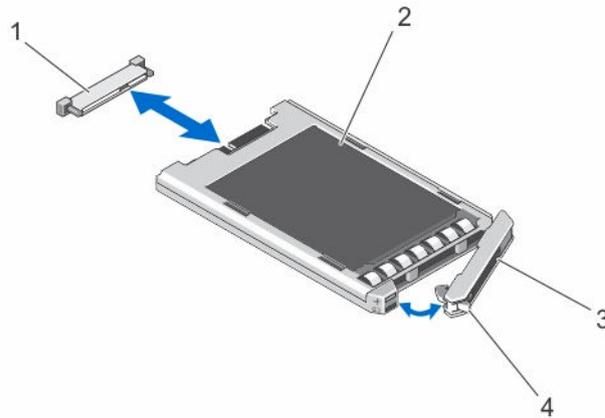


Figure 21. Removing and installing a 2.5 inch hard drive/SSD

1. release button

2. hard drive/SSD

3. hard-drive/SSD connector (on backplane)
4. hard-drive/SSD carrier handle



**Figure 22. Removing and installing a 1.8 inch SSD**

1. SSD connector (on backplane)
2. SSD
3. SSD carrier handle
4. release button

## Installing a hard drive/SSD

**CAUTION:** When a replacement hot-swap hard drive/SSD is installed and the sled is powered on, the drive automatically begins to rebuild. Make absolutely sure that the replacement hard drive/SSD is blank or contains data that you wish to have over-written. Any data on the replacement hard drive/SSD is immediately lost after the drive is installed.

**NOTE:** Not all operating systems support hot-swap drive installation. See the documentation supplied with your operating system.

**NOTE:** The 2.5 inch hard-drive/SSD configuration supports four warm-swap hard-drives/SSDs. Each hard-drive/SSD is assigned to a specific node, and the node to which it is assigned must be turned off before servicing the hard-drive/SSD.

1. Open the hard-drive/SSD carrier handle.
2. Insert the hard-drive/SSD carrier into the drive bay. Carefully align the channel on the hard-drive/SSD carrier with the appropriate drive slot on the sled.
3. Push the drive carrier into the drive bay.
4. Rotate the carrier handle to the closed position while pushing the carrier into the slot until it locks into place.
5. For the 2.5 inch hard-drive/SSD configuration, turn on the node to which the hard-drive/SSD is assigned, using the iDRAC.

The status LED indicator displays a steady green light if the drive is installed correctly. The drive carrier LED green indicator flashes as the drive rebuilds.

## Shutdown procedure for servicing a hard drive/SSD

**NOTE:** This section is applicable only when you have to turn off the sled to service a hard drive/SSD. In many situations, the hard drive/SSD can be serviced while the sled is powered on.

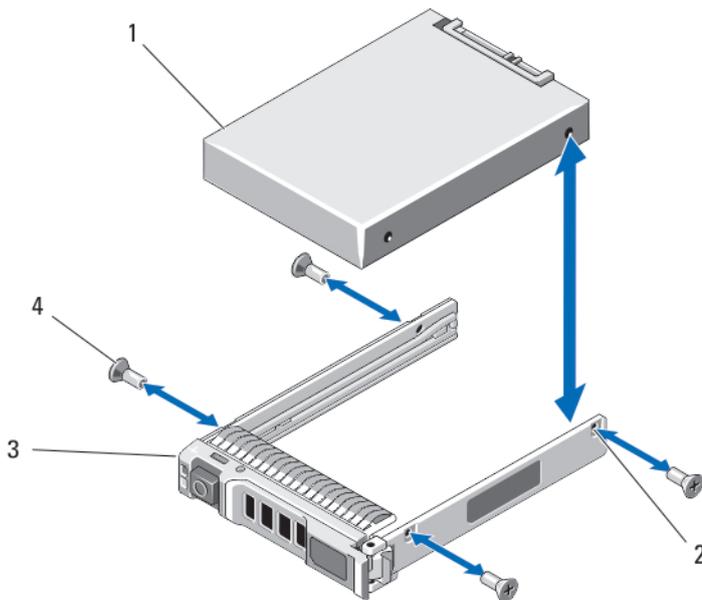
**CAUTION:** If you need to turn off the sled to service a hard drive/SSD, wait 30 seconds after the sled's power indicator turns off before removing the hard drive/SSD. Otherwise, the hard drive/SSD may not be recognized after it is reinstalled and the sled is powered on again.

## Configuring the boot drive

The drive or device from which the system boots is determined by the boot order specified in the System Setup.

## Removing a 2.5 inch hard drive/SSD from a hard-drive/SSD carrier

1. Remove the four screws from the slide rails on the hard-drive/SSD carrier.
2. Lift the hard drive/SSD out of the hard-drive/SSD carrier.



**Figure 23. Removing and installing a 2.5 inch hard drive/SSD in a hard-drive/SSD carrier**

- |                           |                    |
|---------------------------|--------------------|
| 1. hard drive/SSD         | 2. screw holes (4) |
| 3. hard-drive/SSD carrier | 4. screws (4)      |

## Installing a 2.5 inch hard drive/SSD in a hard-drive/SSD carrier

1. Insert the hard drive/SSD into the hard-drive/SSD carrier with the connector end of the drive at the back of the carrier.
2. From the back of the carrier, slide the drive into the carrier.
3. Align the screw holes on the hard drive/SSD with the holes on the hard-drive/SSD carrier.

**CAUTION:** To avoid damaging the drive or the carrier, do not overtighten the screws.

4. Install the four screws to secure the hard drive/SSD to the hard-drive/SSD carrier.

## Removing a 1.8 inch SSD from the SSD carrier

**△ CAUTION: To avoid damaging the SSD or the SSD carrier, do not use excessive force while removing the SSD from the SSD carrier.**

1. Pull outward on the edges of the SSD carrier in the direction of the arrows marked on the SSD carrier and disengage the SSD from the carrier.
2. Slide the SSD out of the SSD carrier.

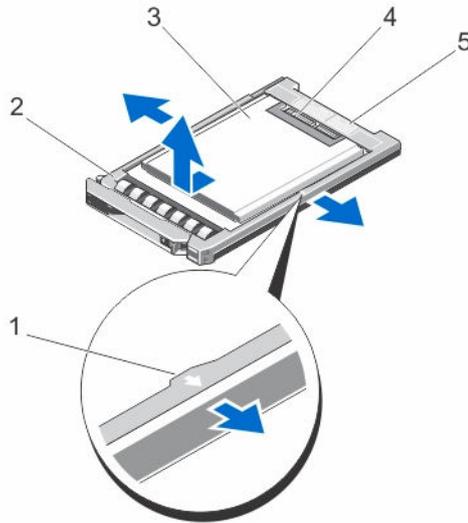


Figure 24. Removing and installing a 1.8 inch SSD into an SSD carrier

- |                              |                   |
|------------------------------|-------------------|
| 1. arrows (2)                | 2. SSD carrier    |
| 3. SSD                       | 4. SSD connectors |
| 5. connector alignment label |                   |

## Installing a 1.8 inch SSD in the SSD carrier

1. Align the SSD with the SSD carrier so that the connectors on the SSD face up and match the connector alignment label on the SSD carrier.

**△ CAUTION: To avoid damaging the SSD or the SSD carrier, do not use excessive force while installing the SSD in the SSD carrier.**

2. Slide the SSD into the SSD carrier until it is secured inside the SSD carrier.

## Hard-drive/SSD backplane

The 2.5 inch hard-drive/SSD system supports one hard-drive/SSD backplane. The following procedure is applicable to the 2.5 inch hard-drive/SSD configuration.

## Removing the hard-drive/SSD backplane

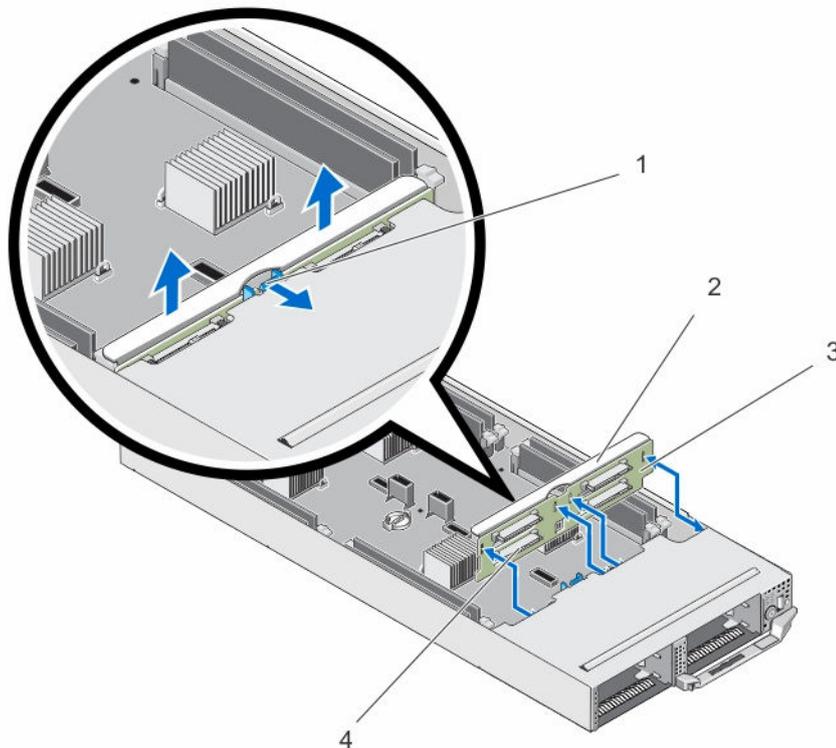
**△ CAUTION:** Many repairs may only be done by a certified service technician. You should only perform troubleshooting and simple repairs as authorized in your product documentation, or as directed by the online or telephone service and support team. Damage due to servicing that is not authorized by Dell is not covered by your warranty. Read and follow the safety instructions that came with the product.

1. Turn off the nodes using the operating system commands, or the iDRAC, or the CMC.  
The sled is powered off when all the nodes are turned off.
2. Remove the sled from the enclosure.

**△ CAUTION:** Note the number of each hard drive/SSD and temporarily label them before removal so that you can replace them in the same locations.

**△ CAUTION:** To prevent damage to the hard drives/SSDs and the hard-drive/SSD backplane, remove the hard drives/SSDs from the sled before removing the hard-drive/SSD backplane.

3. Remove the hard drive(s)/SSD(s).
4. Disconnect the power cable and SATA cables from the hard-drive/SSD backplane.
5. Pressing the release tab, hold the backplane bracket and lift the backplane away from the sled.



**Figure 25. Removing and installing the hard-drive/SSD backplane**

- |                             |                                     |
|-----------------------------|-------------------------------------|
| 1. release tab              | 2. hard-drive/SSD backplane bracket |
| 3. hard-drive/SSD backplane | 4. hard-drive/SSD connectors (4)    |

## Installing the hard-drive/SSD backplane

1. Align the slots on the hard-drive/SSD backplane with the hooks on the chassis.
2. Lower the backplane into the chassis until it is firmly seated and the release tab clicks into place.
3. Connect the power cable and SATA cables to the backplane.
4. Install the hard drives/SSDs in their original locations.
5. Install the sled in the enclosure.
6. Turn on the sled.

## SSD cage assembly

The eight 1.8 inch SSD system supports two SSD backplanes in two SSD cage assemblies.

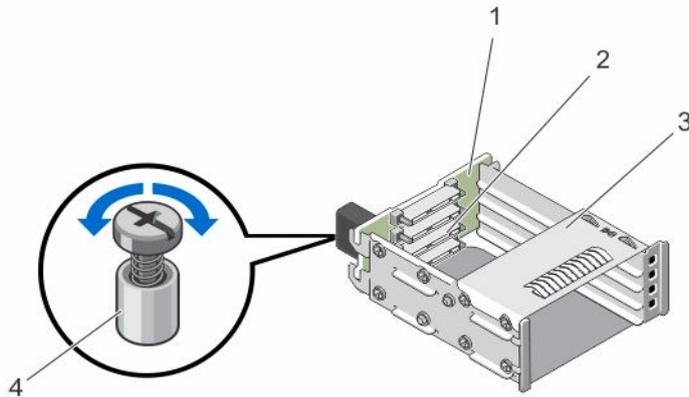
Each SSD cage assembly includes:

- an SSD cage that supports four 1.8 inch SSDs
- one SSD backplane

## Removing the SSD cage assembly

 **CAUTION: Many repairs may only be done by a certified service technician. You should only perform troubleshooting and simple repairs as authorized in your product documentation, or as directed by the online or telephone service and support team. Damage due to servicing that is not authorized by Dell is not covered by your warranty. Read and follow the safety instructions that came with the product.**

1. Turn off the nodes using the operating system commands, or the iDRAC, or the CMC.  
The sled is powered off when all the nodes are turned off.
2. Remove the sled from the enclosure.
3. Remove the SSDs.
4. Remove the SATA and power cables from the SSD backplane of the cage assembly.
5. Loosen the spring-loaded screw that secures the SSD cage assembly to the sled chassis.
6. Slide the SSD cage assembly out of the sled.



**Figure 26. Removing and installing the SSD cage assembly**

- |                  |                        |
|------------------|------------------------|
| 1. SSD backplane | 2. SSD connectors (4)  |
| 3. SSD cage      | 4. spring-loaded screw |

## Installing the SSD cage assembly

**⚠ CAUTION:** Many repairs may only be done by a certified service technician. You should only perform troubleshooting and simple repairs as authorized in your product documentation, or as directed by the online or telephone service and support team. Damage due to servicing that is not authorized by Dell is not covered by your warranty. Read and follow the safety instructions that came with the product.

1. Align the SSD cage assembly with the slot in the sled.
2. Slide the SSD cage assembly into the chassis until it is firmly seated and the spring-loaded screw on the cage aligns with the screw hole on the chassis.
3. Tighten the spring-loaded screw to secure the SSD cage assembly to the chassis.
4. Connect the SATA and power cables to the SSD backplane connectors.
5. Install the SSDs.
6. Install the sled in the enclosure.
7. Turn on the sled.

## Easy restore module

If you do not have a system service tag after system board replacement, the easy restore module (ERM) allows you to restore the service tag, license (including iDRAC and processor core license), UEFI configuration, and the configuration data for each node in the sled. All data is backed up in the ERM automatically. If BIOS detects a new system board and the service tag in the ERM, BIOS prompts you to restore the backup information.

## Replacing the easy restore module

1. Turn off the nodes using the operating system commands, or the iDRAC, or the CMC.

The sled is powered off when all the nodes are turned off.

2. Remove the sled from the enclosure.
3. Remove the cable cover.
4. Remove the cooling shroud.
5. Holding the easy restore module (ERM) by the edges, lift it up from the connector on the system board.
6. To install a new ERM, hold the ERM with the connector side facing the connector on the system board.
7. Insert the ERM connector firmly into the connector on the system board, until the ERM is fully seated.
8. Install the cooling shroud.
9. Install the cable cover.
10. Install the sled in the enclosure.
11. Turn on the sled.

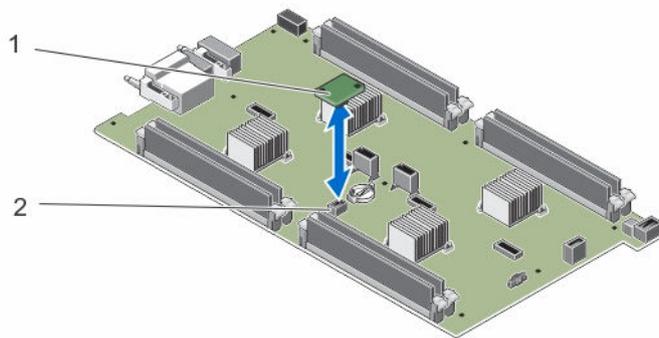


Figure 27. Replacing the ERM

1. ERM
2. ERM connector on system board

## System battery

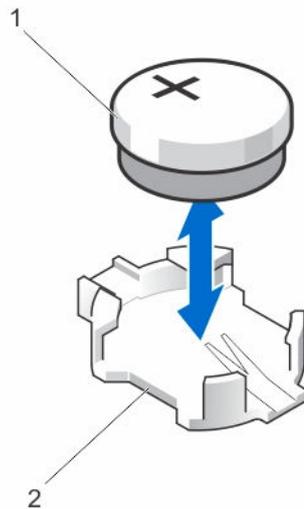
### Replacing the system battery

**⚠ WARNING:** There is a danger of a new battery exploding if it is incorrectly installed. Replace the battery only with the same or equivalent type recommended by the manufacturer. Discard used batteries according to the manufacturer's instructions. See the safety instructions that came with your system for additional information.

**⚠ CAUTION:** Many repairs may only be done by a certified service technician. You should only perform troubleshooting and simple repairs as authorized in your product documentation, or as directed by the online or telephone service and support team. Damage due to servicing that is not authorized by Dell is not covered by your warranty. Read and follow the safety instructions that came with the product.

1. Turn off the nodes using the operating system commands, or the iDRAC, or the CMC.  
The sled is powered off when all the nodes are turned off.
2. Remove the sled from the enclosure.

3. Remove the cable cover.
4. Remove the cooling shroud.
5. Locate the battery socket.
6. To remove the battery, hold the battery by the edges and lift it out of the securing tabs of the connector.
7. To install a new system battery, hold the battery with the "+" facing up and slide it under the securing tabs of the connector.
8. Press the battery straight down into the connector until it snaps into place.
9. Install the cooling shroud.
10. Install the cable cover.
11. Install the sled in the enclosure.
12. Turn on the sled.
13. Enter the System Setup to confirm that the battery is operating properly.
14. Enter the correct time and date in the System Setup **Time** and **Date** fields.
15. Exit the System Setup.
16. Repeat steps 14 to 16 for each node.
17. To test the newly installed battery, remove the sled for at least an hour.
18. After an hour, reinstall the sled.
19. Enter the System Setup and if the time and date are still incorrect, see [Getting Help](#).



**Figure 28. Replacing the system battery**

1. positive side of battery connector

2. negative side of battery connector

# System board

## Removing the system board

 **CAUTION:** Many repairs may only be done by a certified service technician. You should only perform troubleshooting and simple repairs as authorized in your product documentation, or as directed by the online or telephone service and support team. Damage due to servicing that is not authorized by Dell is not covered by your warranty. Read and follow the safety instructions that came with the product.

 **CAUTION:** Exercise care when removing and installing the system board in the sled, to prevent any damage to the system board.

1. Turn off the nodes using the operating system commands, or the iDRAC, or the CMC.  
The sled is powered off when all the nodes are turned off.
2. Remove the sled from the enclosure.
3. Install an I/O connector cover on the I/O connector(s) at the back of the board.

 **WARNING:** The processor and heat sink can become extremely hot. Be sure the processor has had sufficient time to cool before handling.

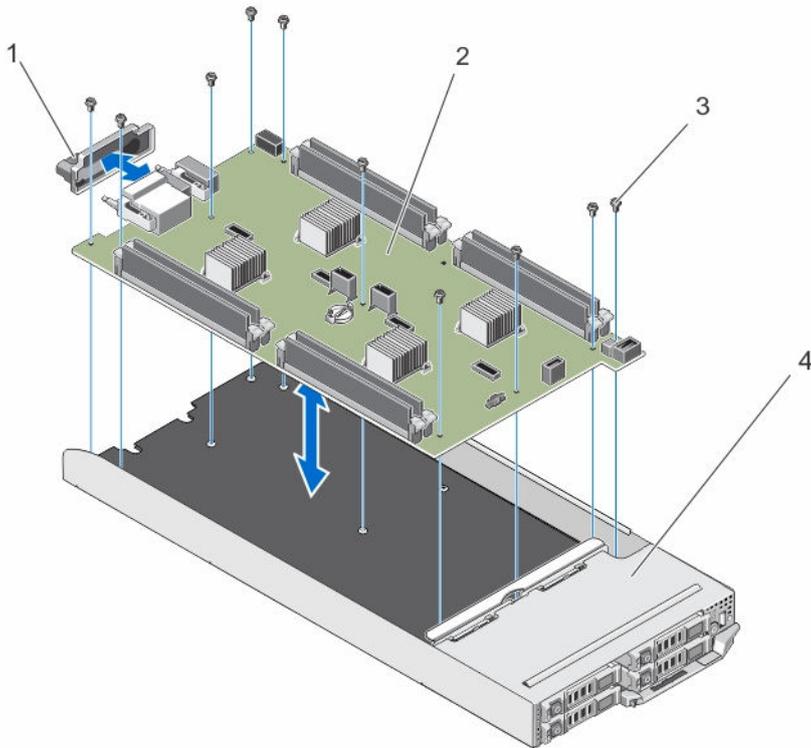
 **WARNING:** The memory modules are hot to the touch for some time after the system has been powered down. Allow time for the memory modules to cool before handling them. Handle the memory modules by the card edges and avoid touching the components.

 **NOTE:** If you are removing more than one hard drive/SSD, label them so you can replace them in their original locations.

4. Remove the following:
  - a. hard drives/SSDs
  - b. hard-drive/SSD backplane
  - c. memory modules
  - d. cable cover
  - e. cooling shroud
  - f. Easy Restore Module

 **CAUTION:** Do not lift the system board by holding a memory module, processor, or other components.

5. Disconnect all cables from the system board.
6. Remove the screws securing the system board to the chassis.
7. Holding it by the edges, lift the system board out of the chassis.
8. Ensure that the I/O connector cover is still in place on the I/O connector at the back of the board.



**Figure 29. Removing and installing the system board**

- |                        |                 |
|------------------------|-----------------|
| 1. I/O connector cover | 2. system board |
| 3. screws (10)         | 4. sled         |

## Installing the system board

**⚠ CAUTION:** Many repairs may only be done by a certified service technician. You should only perform troubleshooting and simple repairs as authorized in your product documentation, or as directed by the online or telephone service and support team. Damage due to servicing that is not authorized by Dell is not covered by your warranty. Read and follow the safety instructions that came with the product.

**⚠ CAUTION:** Exercise care when removing and installing the system board in the sled, to prevent any damage to the system board.

1. Unpack the new system board assembly.
2. Position the system board so that the I/O connectors on the system board are toward the back of the system.
3. Align the screw holes on the system board with the screw holes on the chassis.
4. Lower the system board into the chassis until it is firmly seated.
5. Install the screws to secure the system board to the chassis.
6. Replace the following:
  - a. Easy Restore Module
  - b. cooling shroud
  - c. cable cover
  - d. memory modules

- e. hard-drive/SSD backplane
- f. hard drives/SSDs
7. Remove the I/O connector cover from the back of the sled.
8. Install the sled in the enclosure.
9. Turn on the sled.

If BIOS detects a new system board and the service tag in the ERM, BIOS displays the service tag, the status of the license, and the UEFI Diagnostics version for each node in the sled.
-  **NOTE:** Follow steps 10 and 11 to restore ERM information for each node in the sled.
10. Press any of the following keys for restore options for each node:
  - a. Y – to restore the service tag, license, and diagnostics information of each node.
  - b. N – to navigate to the Lifecycle Controller based restore options.
  - c. F10 – to restore data from a previously created Hardware Server Profile.After the restore process is complete, BIOS prompts to restore the configuration data for each node.
11. Press the following keys to restore configuration data for each node:
  - a. Y – to restore the configuration data.
  - b. N – to use the default configuration settings.After the restore process is complete, the system restarts.

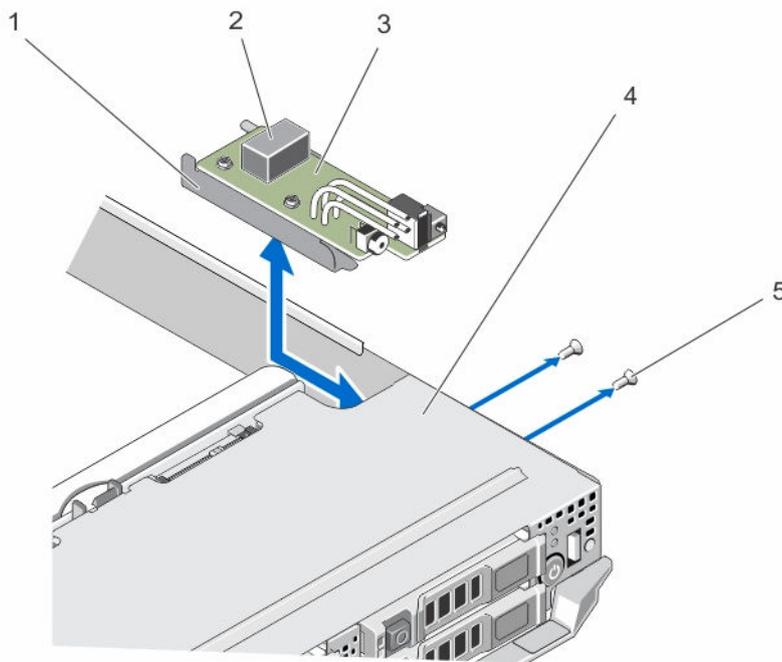
## Control panel

### Removing the control panel

 **CAUTION:** Many repairs may only be done by a certified service technician. You should only perform troubleshooting and simple repairs as authorized in your product documentation, or as directed by the online or telephone service and support team. Damage due to servicing that is not authorized by Dell is not covered by your warranty. Read and follow the safety instructions that came with the product.

1. Turn off the nodes using the operating system commands, or the iDRAC, or the CMC.

The sled is powered off when all the nodes are turned off.
2. Remove the sled from the enclosure.
3. Remove the following:
  - a. hard drives/SSDs
  - b. memory modules
  - c. cable cover
  - d. cooling shroud
  - e. hard-drive/SSD backplane
  - f. system board
4. Disconnect the control-panel cable from the control-panel board.
5. Remove the two screws securing the control-panel assembly to the chassis.
6. Slide the control-panel assembly out and away from the chassis.
7. Remove the three screws securing the control-panel board to the control-panel bracket, and lift the control-panel board away from the bracket.



**Figure 30. Removing and installing the control panel**

- |                          |                                  |
|--------------------------|----------------------------------|
| 1. control-panel bracket | 2. control-panel cable connector |
| 3. control-panel board   | 4. sled                          |
| 5. screws (2)            |                                  |

## Installing the control panel

**⚠ CAUTION:** Many repairs may only be done by a certified service technician. You should only perform troubleshooting and simple repairs as authorized in your product documentation, or as directed by the online or telephone service and support team. Damage due to servicing that is not authorized by Dell is not covered by your warranty. Read and follow the safety instructions that came with the product.

1. Align the screw holes on the control-panel board with the screw holes on the control-panel bracket.
2. Install the three screws to secure the control-panel board to the control-panel bracket.
3. Connect the control-panel cable to the connector on the control-panel board.
4. Position the control-panel assembly so that the USB connector and USB select button face the front of the system.
5. Slide the control-panel assembly into the chassis, until the USB select button and connector align with the slots on the chassis.

The screw holes on the control-panel bracket align with the screw holes on the chassis.

6. Install the two screws to secure the control-panel assembly to the chassis.
7. Install the following:
  - a. system board

- b. hard-drive/SSD backplane
  - c. cooling shroud
  - d. cable cover
  - e. memory modules
  - f. hard-drives/SSDs
- 8.** Install the sled in the enclosure.
  - 9.** Turn on the sled.

# Troubleshooting your system

## Safety first—for you and your system

 **CAUTION:** Many repairs may only be done by a certified service technician. You should only perform troubleshooting and simple repairs as authorized in your product documentation, or as directed by the online or telephone service and support team. Damage due to servicing that is not authorized by Dell is not covered by your warranty. Read and follow the safety instructions that came with the product.

 **NOTE:** For troubleshooting information on the FX2 enclosure components, see the *Dell PowerEdge FX2 and FX2s Enclosure Owner's Manual* at [Dell.com/poweredgemanuals](http://Dell.com/poweredgemanuals).

## Troubleshooting system memory

 **CAUTION:** Many repairs may only be done by a certified service technician. You should only perform troubleshooting and simple repairs as authorized in your product documentation, or as directed by the online or telephone service and support team. Damage due to servicing that is not authorized by Dell is not covered by your warranty. Read and follow the safety instructions that came with the product.

 **NOTE:** Before performing the following procedure, ensure that you have installed the memory modules according to the memory module installation guidelines for the sled.

1. Restart the sled:
  - a. Turn off the nodes using the operating system commands or the iDRAC.
  - b. Press the power button once to turn off the sled
  - c. Press the power button again to power on the sled.  
If no error messages appear, go to step 6. If an error message appears, go to step 2.
2. Enter the System Setup and check the system memory setting.  
If the amount of memory installed matches the system memory setting, go to step 6.
3. Remove the sled from the enclosure.

 **CAUTION:** The memory modules are hot to touch for some time after the sled has been powered down. Allow time for the memory modules to cool before handling them. Handle the memory modules by the card edges and avoid touching the components.

4. Reseat the memory modules in their sockets.
5. Install the sled in the enclosure.
6. Run the appropriate diagnostic test. For more information, see Using System Diagnostics.  
If the test fails, see [Getting Help](#).

## Troubleshooting hard drives

 **CAUTION:** Many repairs may only be done by a certified service technician. You should only perform troubleshooting and simple repairs as authorized in your product documentation, or as directed by the online or telephone service and support team. Damage due to servicing that is not authorized by Dell is not covered by your warranty. Read and follow the safety instructions that came with the product.

 **CAUTION:** This troubleshooting procedure can destroy data stored on the hard drive. Before you proceed, back up all the files on the hard drive, if possible.

1. Run the appropriate controllers test and the hard drive tests in system diagnostics.  
If the tests fail, go to step 3.
2. Take the hard drive offline and wait until the hard-drive indicator codes on the drive carrier signal that the drive may be removed safely, then remove and reseal the drive carrier in the sled.
3. Restart the sled, enter the System Setup and confirm that the drive controller is enabled.
4. Ensure that any required device drivers are installed and are configured correctly.
  -  **NOTE:** Installing a hard drive into another bay may break the mirror if the mirror state is optimal.
5. Remove the hard drive and install it in the other drive bay.
6. If the problem is resolved, reinstall the hard drive in the original bay.  
If the hard drive functions properly in the original bay, the drive carrier could have intermittent problems. Replace the drive carrier.
7. If the hard drive is the boot drive, ensure that the drive is configured and connected properly.
8. Partition and logically format the hard drive.
9. If possible, restore the files to the drive.  
If the problem persists, see [Getting Help](#).

## Troubleshooting USB devices

 **CAUTION:** Many repairs may only be done by a certified service technician. You should only perform troubleshooting and simple repairs as authorized in your product documentation, or as directed by the online or telephone service and support team. Damage due to servicing that is not authorized by Dell is not covered by your warranty. Read and follow the safety instructions that came with the product.

1. Ensure that the sled is turned on.
2. Check the USB device connection to the sled.
3. Ensure that the USB device is selected on the node that you are working on, by pressing the USB select button once.
4. Swap the USB device with a known-working USB device.
5. Connect the USB devices to the sled using a powered USB hub.
6. If another sled is installed, connect the USB device to that sled. If the USB device works with a different sled, the first sled may be faulty. See [Getting Help](#).

## Troubleshooting the system board

 **CAUTION:** Many repairs may only be done by a certified service technician. You should only perform troubleshooting and simple repairs as authorized in your product documentation, or as directed by the online or telephone service and support team. Damage due to servicing that is not authorized by Dell is not covered by your warranty. Read and follow the safety instructions that came with the product.

1. Remove the sled from the enclosure.
2. Clear the sled NVRAM.
3. If the problem with the sled persists, remove and reinstall the sled in the enclosure.
4. Turn on the sled.
5. Run the appropriate diagnostic test. For more information, see Using System Diagnostics. If the tests fail, see [Getting Help](#).

## Troubleshooting the system battery

 **CAUTION:** Many repairs may only be done by a certified service technician. You should only perform troubleshooting and simple repairs as authorized in your product documentation, or as directed by the online or telephone service and support team. Damage due to servicing that is not authorized by Dell is not covered by your warranty. Read and follow the safety instructions that came with the product.

The battery maintains the sled configuration, date, and time information in the NVRAM when the sled is turned off. You may need to replace the battery if an incorrect time or date is displayed during the boot routine.

You can operate the sled without a battery; however, the sled configuration information maintained by the battery in NVRAM is erased each time you remove power from the sled. Therefore, you must re-enter the system configuration information and reset the options each time the sled boots until you replace the battery.

1. Re-enter the time and date through the System Setup.
2. Remove the sled from the enclosure for at least one hour.
3. Install the sled in the enclosure.
4. Enter the System Setup.

If the date and time are not correct in the System Setup, replace the battery. If the problem is not resolved by replacing the battery, see [Getting Help](#).

 **NOTE:** If the sled is turned off for long periods of time (for weeks or months), the NVRAM may lose its system configuration information. This situation is caused by a defective battery.

 **NOTE:** Some software may cause the sled time to speed up or slow down. If the sled operates normally except for the time maintained by the System Setup, the problem may be caused by a software rather than by a defective battery.

## System messages

For a list of event and error messages generated by the system firmware and agents that monitor system components, see the Dell Event and Error Messages Reference Guide at [Dell.com/openmanagemanuals](https://www.dell.com/openmanagemanuals) > **OpenManage software**.

### Warning messages

A warning message alerts you to a possible problem and prompts you to respond before the system continues a task. For example, before you format a hard drive, a message warns you that you may lose all data on the hard drive. Warning messages usually interrupt the task and require you to respond by typing y (yes) or n (no).

 **NOTE:** Warning messages are generated by either the application or the operating system. For more information, see the documentation that accompanied the operating system or application.

### Diagnostic messages

The system diagnostic utilities may issue messages if you run diagnostic tests on your system. For more information about system diagnostics, see [Using system diagnostics](#).

### Alert messages

Systems management software generates alert messages for your system. Alert messages include information, status, warning, and failure messages for drive, temperature, fan, and power conditions. For more information, see the systems management software documentation.

## Using system diagnostics

If you experience a problem with your system, run the system diagnostics before contacting Dell for technical assistance. The purpose of running system diagnostics is to test your system hardware without requiring additional equipment or risking data loss. If you are unable to fix the problem yourself, service and support personnel can use the diagnostics results to help you solve the problem.

### Dell Embedded System Diagnostics

 **NOTE:** The Dell Embedded System Diagnostics is also known as Enhanced Pre-boot System Assessment (ePSA) diagnostics.

The Embedded System Diagnostics provides a set of options for particular device groups or devices enabling you to:

- Run tests automatically or in an interactive mode
- Repeat tests
- Display or save test results
- Run thorough tests to introduce additional test options to provide extra information about the failed device(s)
- View status messages that inform you if tests are completed successfully
- View error messages that inform you of problems encountered during testing

### When to use the Embedded System Diagnostics

Run the Embedded System Diagnostics (ePSA) if your system does not boot.

### Running the Embedded System Diagnostics

The embedded system diagnostics program is run from the Dell Lifecycle Controller.

 **CAUTION:** Use the embedded system diagnostics to test only your system. Using this program with other systems may cause invalid results or error messages.

1. As the system boots, press F11.
2. Use the up and down arrow keys to select **System Utilities** → **Launch Dell Diagnostics**.  
The **ePSA Pre-boot System Assessment** window is displayed, listing all devices detected in the system. The diagnostics starts executing the tests on all the detected devices.

### Running Embedded System Diagnostics from an external media

1. Format the external resource media (USB flash drive or CD) to emulate a hard drive.  
See the documentation that came with the resource media for instructions.
2. Configure the resource media to be a bootable device.

3. Create a directory for system diagnostics on the resource media.
4. Copy the system diagnostics files into the directory.  
To download the Dell diagnostics utility, go to [Dell.com/support/drivers](https://Dell.com/support/drivers), select your product, and click **Get drivers and downloads** from the product page.
5. Connect the resource media to your system.
6. As the system boots, press F11.
7. When prompted, select the media to perform a one-time boot.  
If diagnostics does not start automatically after the diagnostics media is booted, enter **psa** at the command prompt.

## System diagnostics controls

Menu	Description
<b>Configuration</b>	Displays the configuration and status of all detected devices.
<b>Results</b>	Displays the results of all tests that are executed.
<b>System health</b>	Provides the current overview of the system performance.
<b>Event log</b>	Displays a time-stamped log of the results of all tests run on the system. This is displayed if at least one event description is recorded.

# Jumpers and connectors

## System board jumper settings

**CAUTION:** Many repairs may only be done by a certified service technician. You should only perform troubleshooting and simple repairs as authorized in your product documentation, or as directed by the online or telephone service and support team. Damage due to servicing that is not authorized by Dell is not covered by your warranty. Read and follow the safety instructions that came with the product.

**NOTE:** Each node in the sled has separate configuration jumpers. To locate the jumpers for each node, see [System Board Connectors](#).

For information on resetting the password jumper to disable a password, see [Disabling A Forgotten Password](#).

**Table 14. System board jumper settings**

Jumper	Setting	Description
NVRAM_CLR	 1 3 5 (default)	The configuration settings are retained at system boot.
	 1 3 5	The configuration settings are cleared at the next system boot. (If the configuration settings become corrupted to the point where the system does not boot, install the jumper and boot the system. Remove the jumper before restoring the configuration information.)
PWRD_EN	 2 4 6 (default)	The password feature is enabled.
	 2 4 6	The password feature is disabled.

## System board connectors

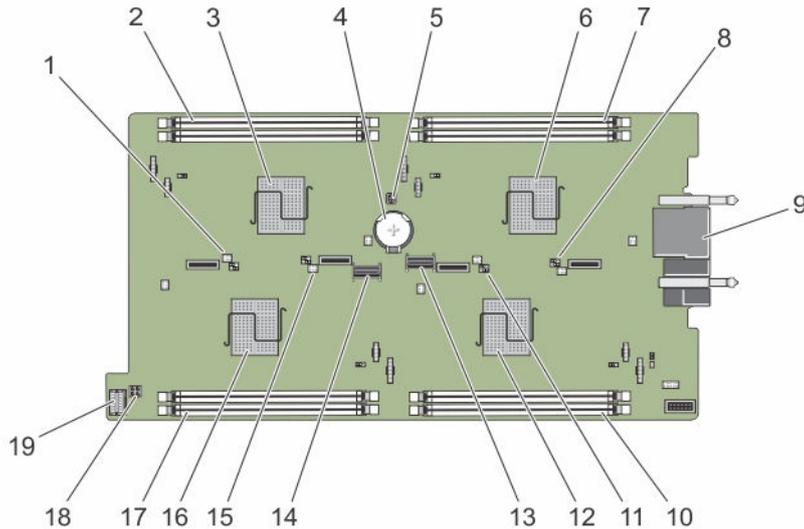


Figure 31. System board connectors

Table 15. System board connectors

Item	Connector	Description
1	J_PW_NVRAM4	System configuration jumpers for node D
2	C_A1, C_A2	Memory module sockets for node C
3	C	CPU and heat sink for Node C
4	BATTERY	Connector for the 3.0 V coin cell battery
5	J_FRU	Easy Restore Module connector
6	A	CPU and heat sink for Node A
7	A_A1, A_A2	Memory module sockets for node A
8	J_PW_NVRAM1	System configuration jumpers for node A
9	J_BLADE	Sled connectors to the enclosure midplane
10	B_A1, B_A2	Memory module sockets for node B
11	J_PW_NVRAM3	System configuration jumpers for node B
12	B	CPU and heat sink for Node B
13	SATA_A	SATA connector
14	SATA_B	SATA connector
15	J_PW_NVRAM2	System configuration jumpers for node C

Item	Connector	Description
16	D	CPU and heat sink for Node D
17	D_A1, D_A2	Memory module sockets for node D
18	J_BP_PWR	Hard-drive/SSD backplane power connector
19	J_CP	Control panel connector

## Disabling a forgotten password

The sled software security features include a system password and a setup password. The password jumper enables these password features or disables them, and clears any password(s) currently in use.

 **CAUTION: Many repairs may only be done by a certified service technician. You should only perform troubleshooting and simple repairs as authorized in your product documentation, or as directed by the online or telephone service and support team. Damage due to servicing that is not authorized by Dell is not covered by your warranty. Read and follow the safety instructions that came with the product.**

1. Turn off the nodes using the operating system commands, or the iDRAC, or the CMC.  
The sled is powered off when all the nodes are turned off.
2. Remove the sled from the enclosure.
3. Locate the jumpers on the system board.
4. Relocate the jumper plug to disable the password feature.
5. Install the sled in the enclosure.
6. Turn on the sled.

When the sled is on, the power-on indicator is solid green. The nodes also power on when the sled is turned on, and the node indicators are solid blue. Allow the sled to finish booting.

The existing passwords are not disabled (erased) until the system boots with the password removed. However, before you assign a new system and/or setup password, you must reinstall the password jumper.

 **NOTE:** If you assign a new system and/or setup password with the jumper removed, the system disables the new password(s) the next time it boots.

7. Turn off the nodes using the operating system commands, or the iDRAC, or the CMC.  
The sled is powered off when all the nodes are turned off.
8. Remove the sled from the enclosure.
9. Locate the jumpers on the system board.
10. Relocate the jumper plug to enable the password feature.
11. Install the sled in the enclosure.
12. Turn on the sled.
13. Assign a new system and/or setup password.

# Technical specifications

## Dimensions and weight

Physical	Dimensions
Width	21.09 cm (8.3 inch)
Height	4.03 cm (1.58 inch)
Depth	51.23 cm (20.16 inch)
Weight (maximum)	3.5 kg (7.7 lb)

## Processor specifications

Processor	Specifications
Processor type	Four Intel Atom processor C2000 product family

## Memory specifications

Memory	Specifications
Architecture	1600 MT/s DDR3 DIMMs
Memory module sockets	Eight 240-pin
Memory module capacities (UDIMMs)	4 GB (single-rank) and 8 GB (dual-rank)
Minimum RAM	16 GB
Maximum RAM	64GB

## Drive specifications

Drives	Specifications
Hard drives	Four 2.5-inch, warm-swap SATA hard drives
SSDs	Four 2.5-inch, warm-swap SATA SSDs, or Eight 1.8 inch, hot-swap SATA SSDs

Drives	Specifications
Optical drive	External optional USB DVD
	 <b>NOTE:</b> DVD devices are data only.

## Connectors specifications

Connectors	Specifications
USB	One 4-pin, USB 2.0-compliant

## Video specifications

Video	Specifications
Video type	Matrox G200 integrated with iDRAC
Video memory	8 MB shared with iDRAC application memory

## Battery specifications

Battery	Specifications
System battery	CR 2477N 3.0 V Lithium coin cell

## Expanded operating temperature

 **NOTE:** When operating in the expanded temperature range, system performance may be impacted.

 **NOTE:** When operating in the expanded temperature range, ambient temperature warnings may be reported in the System Event Log.

Expanded operating temperature	Specifications
≤ 10% of annual operating hours	<p>5 °C to 10 °C (41 °F to 50 °F), and 35 °C to 40 °C (95 °F to 104 °F) at 5% to 85% RH with 29 °C (84.2 °F) dew point.</p> <p> <b>NOTE:</b> Outside the standard operating temperature (10 °C to 35 °C), the system can operate down to 5 °C or up to 40 °C for a maximum of 10% of its annual operating hours.</p> <p>For temperatures between 35 °C and 40 °C, de-rate maximum allowable dry bulb temperature by 1 °C per 175 m above 950 m (1 °F per 319 ft).</p>
≤ 1% of annual operating hours	<p>–5 °C to 5 °C (23 °F to 41 °F), and 40 °C to 45 °C (104 °F to 113 °F) at 5% to 90% RH with 29 °C (84.2 °F) dew point.</p>

Expanded operating temperature

**Specifications**

 **NOTE:** Outside the standard operating temperature (10 °C to 35 °C), the system can operate down to –5 °C or up to 45 °C for a maximum of 1% of its annual operating hours.

For temperatures between 40 °C and 45 °C, de-rate maximum allowable dry bulb temperature by 1 °C per 125 m above 950 m (1 °F per 228 ft).

Expanded operating temperature restrictions

Do not perform a cold startup below 5 °C.

## Environmental specifications

 **NOTE:** For additional information about environmental measurements for specific system configurations, see [Dell.com/environmental\\_datasheets](https://Dell.com/environmental_datasheets).

Temperature

**Specifications**

Maximum Temperature Gradient (Operating and Storage)

20 °C/h (36 °F/h)

Storage Temperature Limits

–40 °C to 65 °C (–40 °F to 149 °F)

Temperature (Continuous Operation)

**Specifications**

Temperature Ranges (for altitude less than 950 m or 3117 ft)

10 °C to 40 °C (50 °F to 104 °F) with no direct sunlight on the equipment.

Humidity Percentage Range

10% to 80% Relative Humidity with 29 °C (84.2 °F) maximum dew point.

Relative Humidity

**Specifications**

Storage

5% to 95% RH with 33 °C (91 °F) maximum dew point. Atmosphere must be non-condensing at all times.

<b>Maximum Vibration</b>	<b>Specifications</b>
<b>Operating</b>	0.26 G <sub>rms</sub> at 5 Hz to 350 Hz (all operation orientations).
<b>Storage</b>	1.87 G <sub>rms</sub> at 10 Hz to 500 Hz for 15 min (all six sides tested).
<b>Maximum Shock</b>	<b>Specifications</b>
<b>Operating</b>	One shock pulse in the positive z axis of 31 G for 2.6 ms in all operational orientations.
<b>Storage</b>	Six consecutively executed shock pulses in the positive and negative x, y, and z axes (one pulse on each side of the system) of 71 G for up to 2 ms.
<b>Maximum Altitude</b>	<b>Specifications</b>
<b>Operating</b>	3048 m (10,000 ft).
<b>Storage</b>	12,000 m (39,370 ft).
<b>Operating Altitude De-rating</b>	<b>Specifications</b>
<b>≤ 35 °C (95 °F)</b>	Maximum temperature is reduced by 1 °C/300 m (1 °F/547 ft) above 950 m (3,117 ft).
<b>40 °C (104 °F)</b>	Maximum temperature is reduced by 1 °C/175 m (1 °F/319 ft) above 950 m (3,117 ft).
<b>≥ 45 °C (113 °F)</b>	Maximum temperature is reduced by 1 °C/125 m (1 °F/228 ft) above 950 m (3,117 ft).

This section defines the limits to help avoid IT equipment damage and/or failure from particulates and gaseous contamination. If it is determined that levels of particulates or gaseous pollution are beyond the limits specified below and are the reason for the damage and/or failures to your equipment, it may be necessary for you to re-mediate the environmental conditions that are causing the damage and/or failures. Re-mediation of environmental conditions will be the responsibility of the customer.

<b>Particulate Contamination</b>	<b>Specifications</b>
<b>Air Filtration</b>	Data center air filtration as defined by ISO Class 8 per ISO 14644-1 with a 95% upper confidence limit.
	 <b>NOTE:</b> Applies to data center environments only. Air filtration requirements do not apply to IT equipment designed to be used outside a data center, in environments such as an office or factory floor.
	 <b>NOTE:</b> Air entering the data center must have MERV11 or MERV13 filtration.
<b>Conductive Dust</b>	Air must be free of conductive dust, zinc whiskers, or other conductive particles.
	 <b>NOTE:</b> Applies to data center and non-data center environments.
<b>Corrosive Dust</b>	<ul style="list-style-type: none"> <li>Air must be free of corrosive dust.</li> </ul>

**Particulate  
Contamination**

**Specifications**

- Residual dust present in the air must have a deliquescent point less than 60% relative humidity.

 **NOTE:** Applies to data center and non-data center environments.

**Gaseous  
Contamination**

**Specifications**

**Copper Coupon  
Corrosion Rate**

<300 Å/month per Class G1 as defined by ANSI/ISA71.04-1985.

**Silver Coupon  
Corrosion Rate**

<200 Å/month as defined by AHSRAE TC9.9.

 **NOTE:** Maximum corrosive contaminant levels measured at  $\leq 50\%$  relative humidity.

# Getting help

## Contacting Dell

Dell provides several online and telephone-based support and service options. If you do not have an active internet connection, you can find contact information on your purchase invoice, packing slip, bill, or Dell product catalog. Availability varies by country and product, and some services may not be available in your area. To contact Dell for sales, technical assistance, or customer-service issues:

1. Go to **Dell.com/support**.
2. Select your country from the drop-down menu on the bottom right corner of the page.
3. For customized support:
  - a. Enter your system Service Tag in the **Enter your Service Tag** field.
  - b. Click **Submit**.  
The support page that lists the various support categories is displayed.
4. For general support:
  - a. Select your product category.
  - b. Select your product segment.
  - c. Select your product.  
The support page that lists the various support categories is displayed.

## Accessing system information by using QRL

You can use the Quick Resource Locator (QRL) to get immediate access to the information about your system.

Ensure that your smartphone or tablet has the QR code scanner installed.

The QRL includes the following information about your system:

- How-to videos
  - Reference materials, including the Owner's Manual, LCD diagnostics, and mechanical overview
  - Your system service tag to quickly access your specific hardware configuration and warranty information
  - A direct link to Dell to contact technical support and sales teams
1. Go to **Dell.com/QRL** and navigate to your specific product or
  2. Use your smartphone or tablet to scan the model-specific Quick Resource (QR) code located in the following image or on your Dell PowerEdge system:



## Locating your system Service Tag

Your system is identified by a unique Express Service Code and Service Tag number. The Express Service Code and Service Tag are found on the front of the system. This information is used by Dell to route support calls to the appropriate personnel.