Dell Storage NX3230 Systems

Owner's Manual

Notes, cautions, and warnings

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

△ **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.**

Contents

About your system

The Dell Storage NX3230 is a rack system that supports up to two processors based on the Intel Haswell E5-2600 v3 processor family, up to 24 DIMMs, and storage capacity up to 12 internal, hot-swappable 3.5-inch hard disk drives (HDDs) or solid state drives (SSDs).

Back-panel features and indicators
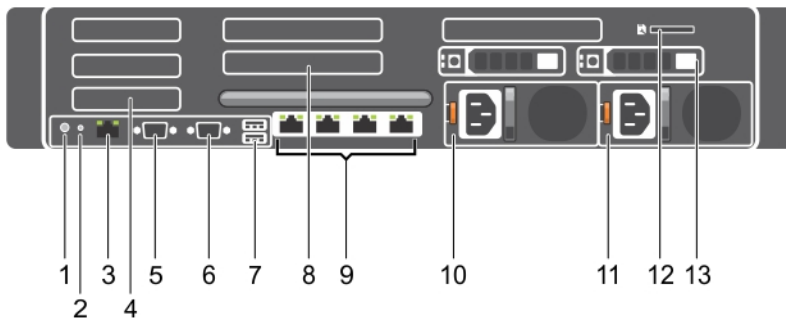
Figure 1. Back-panel features and indicators

Table 1. Back-panel features and indicators

Item	Indicator, button, or connector	Icon	Description
1	System identification button		The identification buttons on the front and back panels can be used to locate a particular system within a rack.
			When one of these buttons is pressed, the system status indicator on the back flashes until one of the buttons is pressed again.
			Press to toggle the system ID on and off.
			If the system stops responding during POST, press and hold the system ID button for more than five seconds to enter BIOS progress mode.
			To reset iDRAC (if not disabled in F2 iDRAC setup), press and hold the button for more than 15 seconds.
2	System identification connector		Connects the optional system status indicator assembly through the optional cable management arm.
3	iDRAC8 Enterprise port		Dedicated management port.
4	Half-height PCIe expansion-card slot (3)		Allows you to connect up to three half-height PCI Express expansion cards.
5	Serial connector	IOIOI	Allows you to connect a serial device to the system.
6	Video connector		Allows you to connect a VGA display to the system.

Item	Indicator, button, or connector	Icon	Description
7	USB connector (2)	SS⬦	Allows you to connect USB drives to the system. The ports are USB 3.0-compliant.
8	Full-height PCIe expansion-card slot (3)		Allows you to connect up to three full-height PCI Express expansion cards.
9	Ethernet connector (4)	⬚	Four integrated 10/100/1000 Mbps NIC connectors Or Four integrated connectors that include: • Two 10/100/1000 Mbps NIC connectors • Two 100 Mbps/1 Gbps/10 Gbps SFP+/10 GbE T connectors
10	Power supply unit (PSU1)		**AC** 750 W, or 1100 W
11	Power supply unit (PSU2)		**Or** **DC** 750 W or 1100 W
12	vFlash media card slot	▯	Allows you to insert a vFlash media card.
13	HDD (2) (back)		Up to two hot-swappable 2.5-inch HDDs.

Front-panel features and indicators
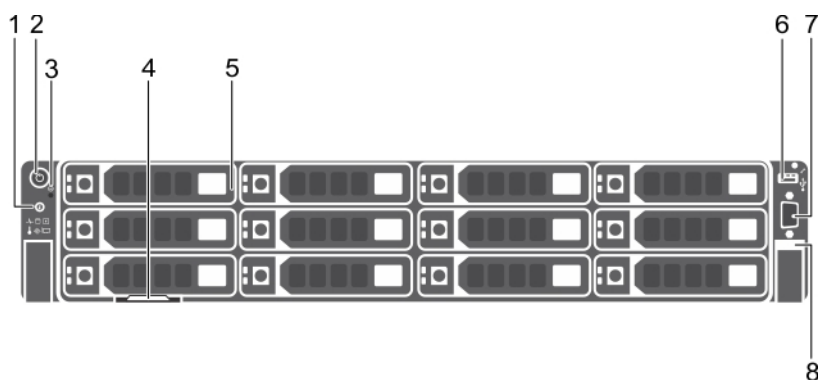
Figure 2. Front-panel features and indicators (twelve 3.5-inch HDD chassis)

Table 2. Front-panel features and indicators

Item	Indicator, Button, or Connector	Icon	Description
1	Diagnostic indicators		The diagnostic indicators glow to display error status.
2	System identification button	ⓘ	The identification buttons on the front and back panels can be used to locate a particular system within a rack. When one of these buttons is pressed, the system status indicator on the back flashes until one of the buttons is pressed again. Press to toggle the system ID on and off. If the system stops responding during POST, press and hold the system ID button for more than five seconds to enter BIOS progress mode.

Item	Indicator, Button, or Connector	Icon	Description
			To reset the iDRAC (if not disabled in F2 iDRAC setup), press and hold the button for more than 15 seconds.
3	Power-on indicator, power button	⏻	The power-on indicator glows when the system power is on. The power button controls the power supply output to the system.
			ⓘ **NOTE: On ACPI-compliant operating systems, turning off the system using the power button causes the system to perform a graceful shutdown before power to the system is turned off.**
4	NMI button	⊝	Used to troubleshoot software and device driver errors when running certain operating systems. This button can be pressed using the end of a paper clip.
			Use this button only if directed to do so by qualified support personnel or by the operating system's documentation.
5	Information tag		A slide-out label panel which allows you to record system information such as Service Tag, NIC, MAC address, and so on as per your need.
6	HDDs		Up to twelve 3.5-inch hot-swappable HDDs.
7	USB management port/iDRAC Direct	⇌	Allows you to connect USB devices to the system or provides access to the iDRAC Direct features. For more information, see the Integrated Dell Remote Access Controller User's Guide at **Dell.com/esmmanuals**. The USB management port is USB 2.0-compliant.
			ⓘ **NOTE: If the system is connected to a power source and an issue is detected, the LCD glows amber regardless of whether the system is turned on or turned off.**
8	iDRAC Direct LED indicator		The indicator glows to display error status.
9	Video connector	▭	Allows you to connect a VGA display to the system.
10	Quick Sync (optional)		ⓘ **NOTE: By default, the Quick Sync option is not available for the Dell Storage NX3230 system.**
			Indicates a Quick Sync enabled system. The Quick Sync feature is optional and requires a Quick Sync bezel. This feature allows management of the system using mobile devices. This feature aggregates hardware/firmware inventory and various system level diagnostic/error information that can be used in troubleshooting the system. For more information, see the Integrated Dell Remote Access Controller User's Guide at **Dell.com/esmmanuals**.

Diagnostic indicators on the front panel

ⓘ **NOTE: The diagnostic indicators are not present if the system is equipped with an LCD display.**

ⓘ **NOTE: No diagnostic indicators are lit when the system is turned off. To start the system, plug it into a working power source and press the power button.**

Table 3. Diagnostic indicators

Icon	Description	Condition	Corrective action
	Health indicator	The indicator turns solid blue if the system is in good health.	None required.
		The indicator flashes amber: • When the system is turned on. • When the system is in standby. • If any error condition exists. For example, a failed fan, PSU, or a hard drive.	Check the System Event Log or system messages for the specific issue. For more information about error messages, see the *Dell Event and Error Messages Reference Guide* at **Dell.com/openmanagemanuals** > **OpenManage software**. The POST process is interrupted without any video output due to invalid memory configurations. See the Getting help section.
	Hard drive indicator	The indicator flashes amber if there is a hard drive error.	Check the System Event Log to determine the hard drive that has an error. Run the appropriate Online Diagnostics test. Restart the system and run embedded diagnostics (ePSA). If the hard drives are configured in a RAID array, restart the system and enter the host adapter configuration utility program.
	Electrical indicator	The indicator flashes amber if the system experiences an electrical error (for example, voltage out of range, or a failed power supply unit (PSU) or voltage regulator).	Check the System Event Log or system messages for the specific issue. If it is due to a problem with the PSU, check the LED on the PSU. Reseat the PSU. If the problem persists, see the Getting help section.
	Temperature indicator	The indicator flashes amber if the system experiences a thermal error (for example, the ambient temperature is out of range or fan failure).	Ensure that none of the following conditions exist: • A cooling fan has been removed or has failed. • System cover, cooling shroud, EMI filler panel, memory module blank, or back filler bracket is removed. • Ambient temperature is too high. • External airflow is obstructed. See the Getting help section.
	Memory indicator	The indicator flashes amber if a memory error occurs.	Check the system event log or system messages for the location of the failed memory. Reseat the memory module. If the problem persists, see the Getting help section.

Related links

Getting help

Hard drive indicator codes

Each hard drive carrier has an activity indicator and a status indicator. The indicators provide information about the current status of the hard drive. The activity LED indicates whether hard drive is currently in use or not. The status LED indicates the power condition of the hard drive.
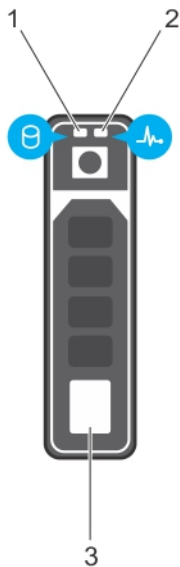
Figure 3. Hard drive indicators

1	hard drive activity indicator	2	hard drive status indicator
3	hard drive		

ⓘ NOTE: **If the hard drive is in the Advanced Host Controller Interface (AHCI) mode, the status indicator (on the right side) does not turn on.**

Table 4. Hard drive indicator codes

Drive-status indicator pattern (RAID only)	Condition
Flashes green twice per second	Identifying drive or preparing for removal.
Off	Drive ready for insertion or removal.
	ⓘ NOTE: **The drive status indicator remains off until all hard drives are initialized after the system is turned on. Drives are not ready for insertion or removal during this time.**
Flashes green, amber, and then turns off	Predicted drive failure
Flashes amber four times per second	Drive failed
Flashes green slowly	Drive rebuilding
Steady green	Drive online
Flashes green for three seconds, amber for three seconds, and then turns off after six seconds	Rebuild stopped

iDRAC Direct LED indicator codes

The iDRAC Direct LED indicator lights up to indicate that the port is connected and is being used as a part of the iDRAC subsystem.

(i) **NOTE: The iDRAC Direct LED indicator does not turn on when the USB port is used in the USB mode.**
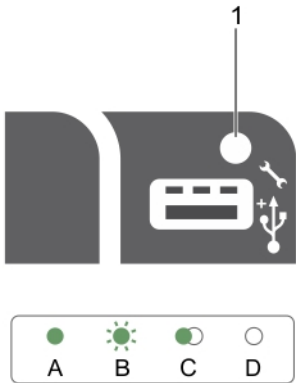
Figure 4. iDRAC Direct LED indicator

1   iDRAC Direct status indicator

The iDRAC Direct LED indicator table describes iDRAC Direct activity when configuring iDRAC Direct by using the management port (USB XML Import).

Table 5. iDRAC Direct LED indicators

Convention	iDRAC Direct LED indicator pattern	Condition
A	Green	Turns green for a minimum of two seconds to indicate the start and end of a file transfer.
B	Flashing green	Indicates file transfer or any operation tasks.
C	Green and turns off	Indicates that the file transfer is complete.
D	Not lit	Indicates that the USB is ready to be removed or that a task is complete.

The following table describes iDRAC Direct activity when configuring iDRAC Direct by using your laptop and cable (Laptop Connect):

Table 6. iDRAC Direct LED indicator patterns

iDRAC Direct LED indicator pattern	Condition
Solid green for two seconds	Indicates that the laptop is connected.
Flashing green (on for two seconds and off for two seconds)	Indicates that the laptop connected is recognized.
Turns off	Indicates that the laptop is unplugged.

NIC indicator codes

EachThe NIC on the back panel has an indicator that provides information about the network activity and link status. The activity LED indicates whether the NIC is currently connected or not. The link LED indicates the speed of the connected network.
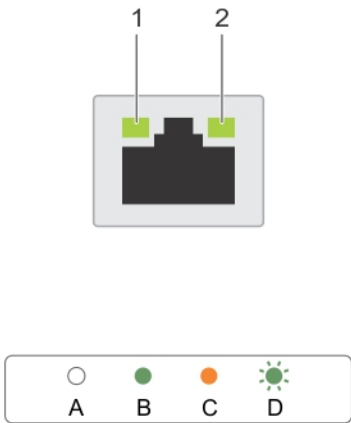
Figure 5. NIC indicators

1	link indicator	2	activity indicator

Table 7. NIC indicators

Convention	Status	Condition
A	Link and activity indicators are off	The NIC is not connected to the network.
B	Link indicator is green	The NIC is connected to a valid network at its maximum port speed (1 Gbps or 10 Gbps).
C	Link indicator is amber	The NIC is connected to a valid network at less than its maximum port speed.
D	Activity indicator is flashing green	Network data is being sent or received.

Power supply unit indicator codes

AC power supply units (PSUs) have an illuminated translucent handle that serves as an indicator and DC PSUs have an LED that serves as an indicator. The indicator shows whether power is present or a power fault has occurred.
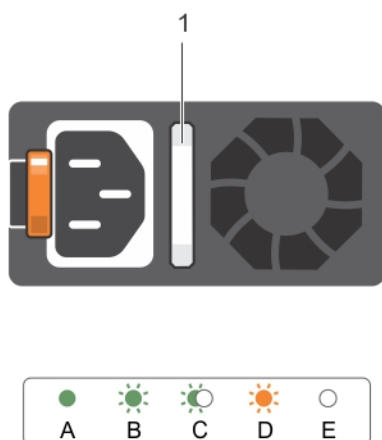
Figure 6. AC PSU status indicator

1   AC PSU status indicator/handle

Table 8. AC PSU status indicators

Convention	Power indicator pattern	Condition
A	Green	A valid power source is connected to the PSU and the PSU is operational.
B	Flashing green	When the firmware of the PSU is being updated, the PSU handle flashes green.
C	Flashing green and turns off	When hot-adding a PSU, the PSU handle flashes green five times at 4 Hz rate and turns off. This indicates a PSU mismatch with respect to efficiency, feature set, health status, and supported voltage. ⓘ **NOTE: Ensure that both the PSUs are of the same capacity.** ⚠ **CAUTION: For AC PSUs, use only PSUs with the Extended Power Performance (EPP) label on the back.** ⓘ **NOTE: Mixing PSUs from previous generations of Dell PowerEdge servers can result in a PSU mismatch condition or failure to turn the system on.**
D	Flashing amber	Indicates a problem with the PSU. ⚠ **CAUTION: When correcting a PSU mismatch, replace only the PSU with the flashing indicator. Swapping the PSU to make a matched pair can result in an error condition and unexpected system shutdown. To change from a high output configuration to a low output configuration or vice versa, you must turn off the system.** ⚠ **CAUTION: AC PSUs support both 220 V and 110 V input voltages with the exception of Titanium PSUs, which support only 220 V. When two identical PSUs receive different input voltages, they can output different wattages, and trigger a mismatch.** ⚠ **CAUTION: If two PSUs are used, they must be of the same type and have the same maximum output power.**

Convention	Power indicator pattern	Condition
		⚠ **CAUTION: Combining AC and DC PSUs is not supported and triggers a mismatch.**
E	Not lit	Power is not connected.
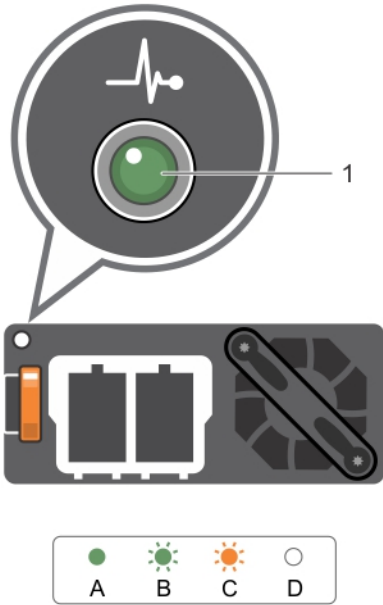
Figure 7. DC PSU status indicator

1   DC PSU status indicator

Table 9. DC PSU status indicators

Convention	Power indicator pattern	Condition
A	Green	A valid power source is connected to the PSU and that the PSU is operational.
B	Flashing green	When hot-adding a PSU, the PSU indicator flashes green. This indicates that there is a PSU mismatch with respect to efficiency, feature set, health status, and supported voltage. Ensure that both the PSUs are of the same capacity.
C	Flashing amber	Indicates a problem with the PSU.
		⚠ **CAUTION: When correcting a PSU mismatch, replace only the PSU with the flashing indicator. Swapping the PSU to make a matched pair can result in an error condition and unexpected system shutdown. To change from a High Output configuration to a Low Output configuration or vice versa, you must turn off the system.**
		⚠ **CAUTION: AC PSU support both 220 V and 110 V input voltages with the exception of Titanium PSU, which support only 220 V. When two identical PSU receive different input voltages, they can output different wattages, and trigger a mismatch.**
		⚠ **CAUTION: If two PSU are used, they must be of the same type and have the same maximum output power.**

Convention	Power indicator pattern	Condition
		⚠ **CAUTION: Combining AC and DC PSU is not supported and triggers a mismatch.**
D	Not lit	Power is not connected.

Locating Service Tag of your system

Your system is identified by a unique Express Service Code and Service Tag number. The Express Service Code is and Service Tag are found on the front of the system by pulling out the information tag. Alternatively, the information may be on a sticker on the chassis of the system. This information is used by Dell to route support calls to the appropriate personnel.

DELL

Documentation resources

This section provides information on the documentation resources for your server.

Table 10. Documentation resources for Dell Storage NX3230 NAS system

Task	Document	Location
Setting up your server	For information about installing the server into a rack, see the Rack documentation included with your rack solution	Dell.com/storagemanuals
	For information about turning on the server and the technical specifications of your system, see the Getting Started With Your System that shipped with your system.	
	For information about Getting Started With Your System that shipped with your system or the Technical specifications section in this document.	
	For information about overview of procedures for setting up the storage system and internal storage, see *Setting Up Your Dell Storage NX3230 Network Attached Storage System*	
Configuring your system	For information about configuring, managing, updating, and restoring the system, see the *Dell Storage Network Attached Storage (NAS) Systems Running Windows Storage Server 2016 or 2012 R2 Administrator's Guide*.	Dell.com/storagemanuals
	For information about the iDRAC features, configuring and logging in to iDRAC, and managing your system remotely, see the Integrated Dell Remote Access Controller User's Guide.	Dell.com/idracmanuals
	For information about understanding Remote Access Controller Admin (RACADM) subcommands and supported RACADM interfaces, see the RACADM Command Line Reference Guide for iDRAC.	Dell.com/idracmanuals
	For information about updating drivers and firmware, see the Download firmware and drivers section in this document.	Dell.com/support/drivers
Deploying your system	For information about deploying the hardware and installing the software on the appliance, see the *Dell Storage Network Attached Storage (NAS) Systems Running Windows Storage Server 2016 or 2012 R2 Troubleshooting Guide*	Dell.com/storagemanuals
Managing your system	For information about the features of the Dell OpenManage Systems Management, see the Dell	Dell.com/openmanagemanuals

Task	Document	Location
	OpenManage Systems Management Overview Guide.	
	For information about setting up, using, and troubleshooting OpenManage, see the Dell OpenManage Server Administrator User's Guide.	Dell.com/openmanagemanuals
	For information about installing, using, and troubleshooting Dell OpenManage Essentials, see the Dell OpenManage Essentials User's Guide	Dell.com/openmanagemanuals
	For information about installing and using Dell System E-Support Tool (DSET), see the Dell System E-Support Tool (DSET) User's Guide.	Dell.com/DSET
	For information about installing and using Active System Manager (ASM), see the Active System Manager User's Guide.	Dell.com/asmdocs
Managing your system	For understanding the features of Dell Lifecycle Controller (LCC), see the Dell Lifecycle Controller User's Guide.	Dell.com/idracmanuals
	For information about partner programs enterprise systems management, see the OpenManage Connections Enterprise Systems Management documents.	Dell.com/ omconnectionsenterprisesystemsmanagement
	For information about connections and client systems management, see the OpenManage Connections Client Systems Management documentation.	Dell.com/dellclientcommandsuitemanuals
Working with the Dell PowerEdge RAID controllers	For information on understanding the features of the Dell PowerEdge RAID controllers (PERC) and deploying the PERC cards, see the Storage controller documentation.	Dell.com/storagecontrollermanuals
Understanding event and error messages	For information on checking the event and error messages generated by the system firmware and agents that monitor system components, see the Dell Event and Error Messages Reference Guide	Dell.com/openmanagemanuals > OpenManage software

DELL

Technical specifications

Table 11. Processor specifications

Processor	
Processor type	One or two Haswell processor E5-2600 v3 product family

Table 12. Power specifications

Power	
AC power supply (per power supply)	
Wattage	750 W, or 1100 W
Heat dissipation	2891 BTU/hr maximum (750 W power supply)
(i) **NOTE: Heat dissipation is calculated using the power supply wattage rating.**	2843 BTU/hr maximum (750 W Titanium power supply)
	4100 BTU/hr maximum (1100 W power supply)
	4416 BTU/hr maximum (DC1100W power supply)
	2891 BTU/hr maximum (750 W mixed mode power supply)
Voltage	100–240 V AC, autoranging, 50/60 Hz
(i) **NOTE: This system is also designed to be connected to IT power systems with a phase to phase voltage not exceeding 230 V.**	Or
	200–240 V AC, autoranging, 50/60 Hz, for 750 W Titanium power supply

Table 13. Expansion bus specification

Expansion Bus	
Bus type	PCI Express Generation 3
Expansion cards	For a list of supported expansion cards, see the Expansion cards and expansion-card risers section in this document.
Expansion slots using riser card:	
Riser 1	(Slot 1) One half-height, low-profile x8 link
	(Slot 2) One half-height, low-profile x8 link
	(Slot 3) One half-height, low-profile x8 link
Riser 2	(Slot 4) One full-height, full-length x16 link
	(i) **NOTE: To use slots 1–4, both the processors must be installed.**
	(Slot 5) One full-height, full-length x8 link

Expansion Bus

Riser 3 (default)	(Slot 6) One full-height, full-length x8 link
	(Slot 7) One full-height, full-length x8 link
Riser 3 (alternate for GPU)	(Slot 6) One full-height, full-length x16 link

Table 14. Memory specifications

Memory

Architecture	1333 MT/s, 1600 MT/s, 1866 MT/s, or 2133 MT/s DDR4 registered, load-reduced Error Correcting Code (ECC) DIMMs
	Support for advanced ECC or memory optimized operation
Memory module sockets	Twenty-four 288-pin
Memory module capacities	
LRDIMMs	32 GB quad-ranked
RDIMMs	4 GB single-ranked, 8 GB, or 16 GB dual-ranked
Minimum RAM	4 GB with a single processor
	8 GB with a dual processor (minimum one memory module per processor)
Maximum RAM	Up to 768 GB with a dual processor
	Up to 384 GB with a single processor

Table 15. Drive specification

Hard Drives

Twelve plus two—hard-drive systems	Up to twelve 3.5 inch and two optional 2.5 inch back-accessible, internal, hot-swappable SAS, SATA, SAS/SATA SSD, or Nearline SAS drives in hard-drive slots 0–11 and 12–13.

Table 16. Connector specification

Connectors

Back

NIC	Four 1 Gbps, two 1 Gbps plus two 10 Gbps, or four 10 Gbps
Serial	9-pin, DTE, 16550-compatible
USB	Two 4-pin, USB 3.0-compliant
Video	15-pin VGA
External vFlash card	One flash memory card slot with iDRAC8 Enterprise card
	(i) **NOTE: The card slot is available for use only if the iDRAC8 Enterprise license is installed on your system.**

Front

USB	One 4-pin, USB 2.0-compliant
	One USB management port/iDRAC Direct

Connectors

Video	15-pin VGA

Internal

USB	One 4-pin, USB 3.0-compliant
Internal Dual SD Module	Two optional flash memory card slots with the internal SD module

ⓘ **NOTE: One card slot is dedicated for redundancy.**

Table 17. Video specification

Video

Video type	Matrox G200eR2
Video memory	16 MB

Table 18. Dimensions and weight

Physical

Height	8.73 cm (3.44 inch)
Width	48.2 cm (18.98 inch)
Depth	75.58 cm (29.75 inch)
Maximum configuration weight	• 30.4 kg (67.02 lb) (2.5-inch hard drive systems) • 36.5 kg (80.47 lb) (3.5-inch hard drive systems)
Empty weight	• 19 kg (41.89 lb) (2.5-inch hard drive systems) • 23.2 kg (51.15 lb) (3.5-inch hard drive systems)

Table 19. Expanded operating temperature

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 on the LCD and in the System Event Log.**

≤ 10% of annual operating hours	Continuous Operation 5 °C–40°C at 5% to 85% RH with 29°C dew point. ⓘ **NOTE: Outside the standard operating temperature (10°C–35°C), the system can operate continuously down to 5°C or as high as 40°C.** For temperatures between 35°C- 40°C, derate maximum allowable temperature by 1°C per 175 m above 950 m (1°F per 319 ft).
≤ 1% of annual operating hours	–5 °C–45°C at 5% to 90% RH with 29°C (84.2°F) maximum dew point.

Expanded Operating Temperature

	ⓘ **NOTE: Outside the standard operating temperature (10°C–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–45 °C, derate 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. • The operating temperature specified is for a maximum altitude of 3050 m (10,000 ft). • 160 W (10 core) processor is not supported. • Tape Backup Unit (TBU) is not supported. • Redundant power supplies are required. • Non Dell qualified peripheral cards and/or peripheral cards greater than 25 W are not supported. • PCIe SSD and GPU is not supported. • Maximum 120 W processor supported on 3.5 inch hard drive chassis. • Maximum 145 W processor supported on 2.5 inch hard drive chassis. • Only SSDs are allowed in the hard drive slots at the back of the 3.5 inch hard drive chassis.

Table 20. Environmental specification

Environmental

ⓘ **NOTE: For additional information about environmental measurements for specific system configurations, see Dell.com/environmental_datasheets.**

Temperature

Storage	−40°C–65°C (−40°F–149°F)
Continuous operation (for altitude less than 950 m or 3117 ft)	10°C to 35°C (50°F to 95°F) with no direct sunlight on the equipment.
Fresh air	For information on fresh air, see Expanded Operating Temperature section.
Maximum temperature gradient (operating and storage)	20°C/h (36°F/h)

Relative humidity

Storage	5% to 95% RH with 33°C (91 °F) maximum dew point. Atmosphere must be non-condensing always.
Operating	10% to 80% Relative Humidity with 29°C (84.2°F) maximum dew point.

Maximum vibration

Operating	0.26 G_{rms} at 5 Hz to 350 Hz (all operation orientations).
Storage	1.87 G_{rms} at 10 Hz to 500 Hz for 15 min (all six sides tested).

Maximum shock

Environmental

Operating	Six consecutively executed shock pulses in the positive and negative x, y, and z axes of 40 G for up to 2.3 ms.
Storage	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.

Maximum altitude

Operating	3,048 (10,000 ft)
Storage	12,000 m (39,370 ft).

Operating altitude de-rating

Up to 35°C (95°F)	Maximum temperature is reduced by 1°C/300 m (1°F/547 ft) above 950 m (3,117 ft).
35 °C–40°C (95 °F–104°F)	Maximum temperature is reduced by 1°C/175 m (1°F/319 ft) above 950 m (3,117 ft).
40 °C–45°C (104 °F–113°F)	Maximum temperature is reduced by 1°C/125 m (1°F/228 ft) above 950 m (3,117 ft).

Particulate contamination

ⓘ **NOTE: 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.**

Air filtration

ⓘ **NOTE: 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.**

Data center air filtration as defined by ISO Class 8 per ISO 14644-1 with a 95 percent upper confidence limit.

ⓘ **NOTE: Air entering the data center must have MERV11 or MERV13 filtration.**

Conductive dust

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

Air must be free from conductive dust, zinc whiskers, or other conductive particles.

Corrosive dust

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

- Air must be free of corrosive dust.
- Residual dust present in the air must have a deliquescent point less than 60% relative humidity.

Gaseous contamination

ⓘ **NOTE: Maximum corrosive contaminant levels measured at ≤50% relative humidity.**

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.

Related links

Expansion cards and expansion card riser

Initial system setup and configuration

Setting up your system

Complete the following steps to set up your system:

1 Unpack the system.
2 Install the system into the rack. For more information about installing the system into the rack, see your system *Rack Installation Placemat* at **Dell.com/poweredgemanuals**.
3 Connect the peripherals to the system.
4 Connect the system to its electrical outlet.
5 Turn the system on by pressing the power button or by using iDRAC.
6 Turn on the attached peripherals.

Options to set up iDRAC IP address

You must configure the initial network settings based on your network infrastructure to enable the communication to and from iDRAC. You can set up the IP address by using one of the following interfaces:

Interfaces	Document/Section
iDRAC Settings utility	See *Dell Integrated Dell Remote Access Controller User's Guide* at **Dell.com/idracmanuals**
Dell Deployment Toolkit	See *Dell Deployment Toolkit User's Guide* at **Dell.com/openmanagemanuals**
Dell Lifecycle Controller	See *Dell Lifecycle Controller User's Guide* at **Dell.com/idracmanuals**
Chassis or Server LCD panel	See the LCD panel section

You must use the default iDRAC IP address 192.168.0.120 to configure the initial network settings, including setting up DHCP or a static IP for iDRAC.

ⓘ **NOTE: To access iDRAC, ensure that you install the iDRAC port card or connect the network cable to the Ethernet connector 1 on the system board.**

ⓘ **NOTE: Ensure that you change the default user name and password after setting up the iDRAC IP address.**

Log in to iDRAC

You can log in to iDRAC as:

· iDRAC user
· Microsoft Active Directory user
· Lightweight Directory Access Protocol (LDAP) user

The default user name and password are `root` and `calvin`. You can also log in by using Single Sign-On or Smart Card.

(i) | **NOTE:** You must have iDRAC credentials to log in to iDRAC.

For more information about logging in to iDRAC and iDRAC licenses, see the latest *Integrated Dell Remote Access Controller User's Guide* at http://www.dell.com/support/home/us/en/19/Products/software/remote_ent_sys_mgmt/rmte_ent_sys_rmte_access_cntrllr.

Managing your system remotely

To perform out-of-band systems management by using iDRAC, configure iDRAC for remote accessibility, set up the management station and managed system, and configure the supported web browsers. For more information, see the *Integrated Dell Remote Access Controller User's Guide* at **Dell.com/idracmanuals**.

You can also remotely monitor and manage the server by using the Dell OpenManage Server Administrator (OMSA) software and OpenManage Essentials (OME) systems management console. For more information, see **Dell.com/openmanagemanuals** > **OpenManage Server Administrator** or **Dell.com/openmanagemanuals** > **OpenManage Essentials**.

Methods to download firmware and drivers

You can download the firmware and drivers from the Dell Support site available at **Dell.com/DHMSmanuals**.

Pre-operating system management applications

You can manage basic settings and features of a system without booting to the operating system by using the system firmware.

Options to manage the pre-operating system applications

Your system has the following options to manage the pre-operating system applications:

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

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 by using two methods:

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

Viewing System Setup

To view the **System Setup** screen, perform the following steps:

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

   ⓘ **NOTE: If your operating system begins to load before you press F2, wait for the system to finish booting, and then restart your system and try again.**

System Setup details

The **System Setup Main Menu** screen details are explained as follows:

Option	Description
System BIOS	Enables you to configure BIOS settings.
iDRAC Settings	Enables you to configure iDRAC settings.

Option	Description
	The iDRAC settings utility is an interface to set up and configure the iDRAC parameters by using UEFI (Unified Extensible Firmware Interface). You can enable or disable various iDRAC parameters by using the iDRAC settings utility. For more information about this utility, see *Integrated Dell Remote Access Controller User's Guide* at **Dell.com/idracmanuals**.
Device Settings	Enables you to configure device settings.

System BIOS

You can use the **System BIOS** screen to edit specific functions such as boot order, system password, setup password, set the RAID mode, and enable or disable USB ports.

Viewing System BIOS

To view the **System BIOS** screen, perform the following steps:

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

    F2 = System Setup

> ⓘ NOTE: If your operating system begins to load before you press F2, wait for the system to finish booting, and then restart your system and try again.

3   On the **System Setup Main Menu** screen, click **System BIOS**.

System BIOS Settings details

The **System BIOS Settings** screen details are explained as follows:

Option	Description
System Information	Specifies information about the system such as the system model name, BIOS version, and Service Tag.
Memory Settings	Specifies information and options related to the installed memory.
Processor Settings	Specifies information and options related to the processor such as speed and cache size.
SATA Settings	Specifies options to enable or disable the integrated SATA controller and ports.
Boot Settings	Specifies options to specify the boot mode (BIOS or UEFI). Enables you to modify UEFI and BIOS boot settings.
Network Settings	Specifies options to change the network settings.
Integrated Devices	Specifies options to manage integrated device controllers and ports and specify related features and options.
Serial Communication	Specifies options to manage the serial ports and specify related features and options.
System Profile Settings	Specifies options to change the processor power management settings, memory frequency, and so on.
System Security	Specifies options to configure the system security settings, such as system password, setup password, Trusted Platform Module (TPM) security. It also manages the power and NMI buttons on the system.
Miscellaneous Settings	Specifies options to change the system date, time, and so on.

Boot Settings

You can use the **Boot Settings** screen to set the boot mode to either **BIOS** or **UEFI**. It also enables you to specify the boot order.

Viewing Boot Settings

To view the **Boot Settings** screen, perform the following steps:

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

    F2 = System Setup

> ⓘ **NOTE:** If your operating system begins to load before you press F2, wait for the system to finish booting, and then restart your system and try again.

3 On the **System Setup Main Menu** screen, click **System BIOS**.
4 On the **System BIOS** screen, click **Boot Settings**.

Boot Settings details

The **Boot Settings** screen details are explained as follows:

Option	Description
Boot Mode	Enables you to set the boot mode of the system. ⚠ **CAUTION: Switching the boot mode may prevent the system from booting if the operating system is not installed in the same boot mode.** 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. This option is set to **BIOS** by default. ⓘ **NOTE: Setting this field to UEFI disables the BIOS Boot Settings menu. Setting this field to BIOS disables the UEFI Boot Settings menu.**
Boot Sequence Retry	Enables or disables the Boot Sequence Retry feature. If this option is set to **Enabled** and the system fails to boot, the system reattempts the boot sequence after 30 seconds. This option is set to **Enabled** by default.
Hard-Disk Failover	Specifies the hard drive that is booted in the event of a hard drive failure. The devices are selected in the **Hard-Disk Drive Sequence** on the **Boot Option Setting** menu. When this option is set to **Disabled**, only the first hard drive in the list is attempted to boot. When this option is set to **Enabled**, all hard drives are attempted to boot in the order selected in the **Hard-Disk Drive Sequence**. This option is not enabled for UEFI Boot Mode.
Boot Option Settings	Configures the boot sequence and the boot devices.
BIOS Boot Settings	Enables or disables BIOS boot options. ⓘ **NOTE: This option is enabled only if the boot mode is BIOS.**
UEFI Boot Settings	Enables or disables UEFI Boot options. The Boot options include **IPv4 PXE** and **IPv6 PXE**. This option is set to **IPv4** by default. ⓘ **NOTE: This option is enabled only if the boot mode is UEFI.**

Choosing the system boot mode

System Setup enables you to specify one of the following boot modes for installing your operating system:

- BIOS boot mode (the default) is the standard BIOS-level boot interface.
- Unified Extensible Firmware Interface (UEFI) (the default) boot mode is an enhanced 64-bit boot interface. If you have configured your system to boot to UEFI mode, it replaces the system BIOS.

1   From the **System Setup Main Menu**, click **Boot Settings**, and select **Boot Mode**.
2   Select the boot mode you want the system to boot into.

> ⚠ CAUTION: **Switching the boot mode may prevent the system from booting if the operating system is not installed in the same boot mode.**

3   After the system boots in the specified boot mode, proceed to install your operating system from that mode.

> ⓘ 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 about supported operating systems, go to Dell.com/ossupport.**

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.

Network Settings

You can use the **Network Settings** screen to modify PXE device settings. The network settings option is available only in the UEFI mode.

> ⓘ NOTE: **The BIOS does not control network settings in the BIOS mode. For the BIOS boot mode, the optional Boot ROM of the network controllers handles the network settings.**

Viewing Network Settings

To view the **Network Settings** screen, perform the following steps:

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

```
F2 = System Setup
```

> ⓘ NOTE: **If your operating system begins to load before you press F2, wait for the system to finish booting, and then restart your system and try again.**

3   On the **System Setup Main Menu** screen, click **System BIOS**.
4   On the **System BIOS** screen, click **Network Settings**.

Network Settings screen details

The **Network Settings** screen details are explained as follows:

Option	Description
PXE Device n (n = 1 to 4)	Enables or disables the device. When enabled, a UEFI boot option is created for the device.
PXE Device n Settings(n = 1 to 4)	Enables you to control the configuration of the PXE device.

UEFI iSCSI Settings

You can use the iSCSI Settings screen to modify iSCSI device settings. The iSCSI Settings option is available only in the UEFI boot mode. BIOS does not control network settings in the BIOS boot mode. For the BIOS boot mode, the option ROM of the network controller handles the network settings.

Viewing UEFI iSCSI Settings

To view the **UEFI iSCSI Settings** screen, perform the following steps:

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

    F2 = System Setup

> ⓘ **NOTE:** If your operating system begins to load before you press F2, wait for the system to finish booting, and then restart your system and try again.

3   On the **System Setup Main Menu** screen, click **System BIOS**.
4   On the **System BIOS** screen, click **Network Settings**.
5   On the **Network Settings** screen, click **UEFI iSCSI Settings**.

UEFI iSCSI Settings details

The **UEFI ISCSI Settings** screen details are explained as follows:

Option	Description
ISCSI Initiator Name	Specifies the name of the iSCSI initiator (iqn format).
ISCSI Device n (n = 1 to 4)	Enables or disables the iSCSI device. When disabled, a UEFI boot option is created for the iSCSI device automatically.

System Security

You can use the **System Security** screen to perform specific functions such as setting the system password, setup password and disabling the power button.

Viewing System Security

To view the **System Security** screen, perform the following steps:

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

    F2 = System Setup

> ⓘ **NOTE:** If your operating system begins to load before you press F2, wait for the system to finish booting, and then restart your system and try again.

3 On the **System Setup Main Menu** screen, click **System BIOS**.

4 On the **System BIOS** screen, click **System Security**.

System Security Settings details

The **System Security Settings** screen details are explained as follows:

Option	Description
Intel AES-NI	Improves the speed of applications by performing encryption and decryption by using the Advanced Encryption Standard Instruction Set (AES-NI). This option is set to **Enabled** by default.
System Password	Sets the system password. This option is set to **Enabled** by default and is read-only if the password jumper is not installed in the system.
Setup Password	Sets the setup password. This option is read-only if the password jumper is not installed in the system.
Password Status	Locks the system password. This option is set to **Unlocked** by default.
TPM Security	ⓘ | NOTE: **The TPM menu is available only when the TPM module is installed.** Enables you to control the reporting mode of the TPM. The **TPM Security** option is set to **Off** by default. You can only modify the TPM Status, TPM Activation, and Intel TXT fields if the **TPM Status** field is set to either **On with Pre-boot Measurements** or **On without Pre-boot Measurements**.
TPM Information	Changes the operational state of the TPM. This option is set to **No Change** by default.
TPM Status	Specifies the TPM status.
TPM Command	⚠ | CAUTION: **Clearing the TPM results in the loss of all keys in the TPM. The loss of TPM keys may affect booting to the operating system.** Clears all the contents of the TPM. The **TPM Clear** option is set to **No** by default.
Intel TXT	Enables or disables the Intel Trusted Execution Technology (TXT) option. To enable the **Intel TXT** option, virtualization technology and TPM Security must be enabled with Pre-boot measurements. This option is set to **Off** by default.
Power Button	Enables or disables the power button on the front of the system. This option is set to **Enabled** by default.
NMI Button	Enables or disables the NMI button on the front of the system. This option is set to **Disabled** by default.
AC Power Recovery	Sets how the system behaves after AC power is restored to the system. This option is set to **Last** by default.
AC Power Recovery Delay	Sets the time delay for the system to power up after AC power is restored to the system. This option is set to **Immediate** by default.
User Defined Delay (60s to 240s)	Sets the **User Defined Delay** option when the **User Defined** option for **AC Power Recovery Delay** is selected.
UEFI Variable Access	Provides varying degrees of securing UEFI variables. When set to **Standard** (the default), UEFI variables are accessible in the operating system per the UEFI specification. When set to **Controlled**, selected UEFI variables are protected in the environment and new UEFI boot entries are forced to be at the end of the current boot order.
Secure Boot	Enables Secure Boot, where the BIOS authenticates each pre-boot image by using the certificates in the Secure Boot Policy. Secure Boot is disabled by default.
Secure Boot Policy	When Secure Boot policy is set to **Standard**, the BIOS uses the system manufacturer's key and certificates to authenticate pre-boot images. When Secure Boot policy is set to **Custom**, the BIOS uses the user-defined key and certificates. Secure Boot policy is set to **Standard** by default.
Secure Boot Policy Summary	Specifies the list of certificates and hashes that secure boot uses to authenticate images.

Secure Boot Custom Policy Settings

Secure Boot Custom Policy Settings is displayed only when **Secure Boot Policy** is set to **Custom**.

Viewing Secure Boot Custom Policy Settings

To view the **Secure Boot Custom Policy Settings** screen, perform the following steps:

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

   > (i) **NOTE: If your operating system begins to load before you press F2, wait for the system to finish booting, and then restart your system and try again.**

3 On the **System Setup Main Menu** screen, click **System BIOS**.
4 On the **System BIOS** screen, click **System Security**.
5 On the **System Security** screen, click **Secure Boot Custom Policy Settings**.

Secure Boot Custom Policy Settings details

The **Secure Boot Custom Policy Settings** screen details are explained as follows:

Option	Description
Platform Key	Imports, exports, deletes, or restores the platform key (PK).
Key Exchange Key Database	Enables you to import, export, delete, or restore entries in the Key Exchange Key (KEK) Database.
Authorized Signature Database	Imports, exports, deletes, or restores entries in the Authorized Signature Database (db).
Forbidden Signature Database	Imports, exports, deletes, or restores entries in the Forbidden Signature Database (dbx).

Creating a system and setup password

Prerequisites

Ensure that the password jumper is enabled. The password jumper enables or disables the system password and setup password features. For more information, see the System board jumper settings section.

> (i) **NOTE: If the password jumper setting is disabled, the existing system password and setup password are deleted and you need not provide the system password to boot the system.**

Steps

1 To enter System Setup, press F2 immediately after turning on or rebooting your system.
2 On the **System Setup Main Menu** screen, click **System BIOS** > **System Security**.
3 On the **System Security** screen, verify that **Password Status** is set to **Unlocked**.
4 In the **System Password** field, type 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 the following special characters are allowed: space, ("), (+), (,), (-), (.), (/), (;), ([), (\), (]), (`).

   A message prompts you to reenter the system password.
5 Reenter the system password, and click **OK**.
6 In the **Setup Password** field, type your setup password and press Enter or Tab.
   A message prompts you to reenter the setup password.

7   Reenter the setup password, and click **OK**.

8   Press Esc to return to the System BIOS screen. Press Esc again.

     A message prompts you to save the changes.

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

Related links

System board jumper settings

Using your system password to secure your system

About this task

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

Steps

1   Turn on or reboot your system.

2   Type the system password and press Enter.

Next steps

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

ⓘ | **NOTE: If an incorrect system password is typed, the system displays a message and prompts you to reenter your password. You have three attempts to type the correct password. After the third unsuccessful attempt, the system displays an error message that the system has stopped functioning and must be turned off. Even after you turn off and restart the system, the error message is displayed until the correct password is entered.**

Deleting or changing system and setup password

Prerequisites

ⓘ | **NOTE: You cannot delete or change an existing system or setup password if the Password Status is set to Locked.**

Steps

1   To enter System Setup, press F2 immediately after turning on or restarting your system.

2   On the **System Setup Main Menu** screen, click **System BIOS** > **System Security**.

3   On the **System Security** screen, ensure that **Password Status** is set to **Unlocked**.

4   In the **System Password** field, alter or delete the existing system password, and then press Enter or Tab.

5   In the **Setup Password** field, alter or delete the existing setup password, and then press Enter or Tab.

     If you change the system and setup password, a message prompts you to reenter the new password. If you delete the system and setup password, a message prompts you to confirm the deletion.

6   Press Esc to return to the **System BIOS** screen. Press Esc again, and a message prompts you to save the changes.

Operating with a setup password enabled

If **Setup Password** is set to **Enabled**, type the correct setup password before modifying the system setup options.

If you do not type the correct password in three attempts, the system displays the following message:

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

Even after you turn off and restart the system, the error message is displayed until the correct password is typed. 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. For more information, see the System Security Settings screen section.

- You cannot disable or change an existing system password.

> ⓘ NOTE: You can use the password status option with the setup password option to protect the system password from unauthorized changes.

Related links

System Information

You can use the **System Information** screen to view system properties such as Service Tag, system model name, and the BIOS version.

Viewing System Information

To view the **System Information** screen, perform the following steps:

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

    F2 = System Setup

> ⓘ NOTE: If your operating system begins to load before you press F2, wait for the system to finish booting, and then restart your system and try again.

3   On the **System Setup Main Menu** screen, click **System BIOS**.
4   On the **System BIOS** screen, click **System Information**.

System Information details

The **System Information** screen details are explained as follows:

Option	Description
System Model Name	Specifies the system model name.
System BIOS Version	Specifies the BIOS version installed on the system.
System Management Engine Version	Specifies the current version of the Management Engine firmware.
System Service Tag	Specifies the system Service Tag.
System Manufacturer	Specifies the name of the system manufacturer.
System Manufacturer Contact Information	Specifies the contact information of the system manufacturer.
System CPLD Version	Specifies the current version of the system complex programmable logic device (CPLD) firmware.
UEFI Compliance Version	Specifies the UEFI compliance level of the system firmware.

Memory Settings

You can use the **Memory Settings** screen to view all the memory settings and enable or disable specific memory functions, such as system memory testing and node interleaving.

Viewing Memory Settings

To view the **Memory Settings** screen, perform the following steps:

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

    F2 = System Setup

> (i) **NOTE:** If your operating system begins to load before you press F2, wait for the system to finish booting, and then restart your system and try again.

3   On the **System Setup Main Menu** screen, click **System BIOS**.
4   On the **System BIOS** screen, click **Memory Settings**.

Memory Settings details

The **Memory Settings** screen details are explained as follows:

Option	Description
System Memory Size	Specifies the memory size in the system.
System Memory Type	Specifies the type of memory installed in the system.
System Memory Speed	Specifies the system memory speed.
System Memory Voltage	Specifies the system memory voltage.
Video Memory	Specifies the amount of video memory.
System Memory Testing	Specifies whether the system memory tests are run during system boot. Options are **Enabled** and **Disabled**. This option is set to **Disabled** by default.
Memory Operating Mode	Specifies the memory operating mode. The options available are **Optimizer Mode**, **Advanced ECC Mode**, **Mirror Mode**, **Spare Mode**, **Spare with Advanced ECC Mode**, **Dell Fault Resilient Mode** and **Dell NUMA Fault Resilient Mode**. This option is set to **Optimizer Mode** by default. (i) **NOTE:** The Memory Operating Mode option can have different default and available options based on the memory configuration of your system. (i) **NOTE:** The Dell Fault Resilient Mode option establishes an area of memory that is fault resilient. This mode can be used by an operating system that supports the feature to load critical applications or enables the operating system kernel to maximize system availability.
Node Interleaving	Specifies if Non-Uniform Memory architecture (NUMA) is supported. If this field is set to **Enabled**, memory interleaving is supported if a symmetric memory configuration is installed. If the field is set to **Disabled**, the system supports NUMA (asymmetric) memory configurations. This option is set to **Disabled** by default.
Snoop Mode	Specifies the Snoop Mode options. The Snoop Mode options available are **Home Snoop**, **Early Snoop**, and **Cluster on Die**. This option is set to **Early Snoop** by default. This field is available only when the **Node Interleaving** is set to **Disabled**.

Processor Settings

You can use the **Processor Settings** screen to view the processor settings, and perform specific functions such as enabling virtualization technology, hardware prefetcher, and logical processor idling.

Viewing Processor Settings

To view the **Processor Settings** screen, perform the following steps:

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

    F2 = System Setup

> ⓘ | **NOTE: If your operating system begins to load before you press F2, wait for the system to finish booting, and then restart your system and try again.**

3   On the **System Setup Main Menu** screen, click **System BIOS**.
4   On the **System BIOS** screen, click **Processor Settings**.

Processor Settings details

The **Processor Settings** screen details are explained as follows:

Option	Description
Logical Processor	Enables or disables the logical processors and displays the number of logical processors. If this option is set to **Enabled**, the BIOS displays all the logical processors. If this option is set to **Disabled**, the BIOS displays only one logical processor per core. This option is set to **Enabled** by default.
QPI Speed	Enables you to control QuickPath Interconnect data rate settings.
Alternate RTID (Requestor Transaction ID) Setting	Modifies Requestor Transaction IDs, which are QPI resources. This option is set to **Disabled** by default. ⓘ | **NOTE: Enabling this option may negatively impact the overall system performance.**
Virtualization Technology	Enables or disables the additional hardware capabilities provided for virtualization. This option is set to **Enabled** by default.
Address Translation Service (ATS)	Defines the Address Translation Cache (ATC) for devices to cache the DMA transactions. This option provides an interface between CPU and DMA Memory Management to a chipset's Address Translation and Protection Table to translate DMA addresses to host addresses. This option is set to **Enabled** by default.
Adjacent Cache Line Prefetch	Optimizes the system for applications that need high utilization of sequential memory access. This option is set to **Enabled** by default. You can disable this option for applications that need high utilization of random memory access.
Hardware Prefetcher	Enables or disables the hardware prefetcher. This option is set to **Enabled** by default.
DCU Streamer Prefetcher	Enables or disables the Data Cache Unit (DCU) streamer prefetcher. This option is set to **Enabled** by default.
DCU IP Prefetcher	Enables or disables the Data Cache Unit (DCU) IP prefetcher. This option is set to **Enabled** by default.
Execute Disable	Enables you to run the disable memory protection technology. This option is set to **Enabled** by default.
Logical Processor Idling	Enables you to improve the energy efficiency of a system. It uses the operating system core parking algorithm and parks some of the logical processors in the system which in turn allows the corresponding processor cores to transition into a lower power idle state. This option can only be enabled if the operating system supports it. It is set to **Disabled** by default.
Configurable TDP	Enables you to reconfigure the processor Thermal Design Power (TDP) levels during POST based on the power and thermal delivery capabilities of the system. TDP verifies the maximum heat the cooling system is needed to dissipate. This option is set to **Nominal** by default.

Option	Description
	ⓘ | **NOTE:** This option is only available on certain stock keeping units (SKUs) of the processors.
X2Apic Mode	Enables or disables the X2Apic mode.
Dell Controlled Turbo	Controls the turbo engagement. Enable this option only when **System Profile** is set to **Performance**. ⓘ | **NOTE:** Depending on the number of installed CPUs, there may be up to four processor listings.
Number of Cores per Processor	Controls the number of enabled cores in each processor. This option is set to **All** by default.
Processor 64-bit Support	Specifies if the processor(s) support 64-bit extensions.
Processor Core Speed	Specifies the maximum core frequency of the processor.
Processor 1	ⓘ | **NOTE:** Depending on the number of CPUs, there may be up to four processors listed. The following settings are displayed for each processor installed in the system:

Option	Description
Family-Model-Stepping	Specifies the family, model, and stepping of the processor as defined by Intel.
Brand	Specifies the brand name.
Level 2 Cache	Specifies the total L2 cache.
Level 3 Cache	Specifies the total L3 cache.
Number of Cores	Specifies the number of cores per processor.

SATA Settings

You can use the **SATA Settings** screen to view the SATA settings of SATA devices and enable RAID on your system.

Viewing SATA Settings

To view the **SATA Settings** screen, perform the following steps:

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

    F2 = System Setup

> ⓘ **NOTE:** If your operating system begins to load before you press F2, wait for the system to finish booting, and then restart your system and try again.

3   On the **System Setup Main Menu** screen, click **System BIOS**.
4   On the **System BIOS** screen, click **SATA Settings**.

SATA Settings details

The **SATA Settings** screen details are explained as follows:

Option	Description
Embedded SATA	Enables the embedded SATA option to be set to **Off**, **ATA**, **AHCI**, or **RAID** modes. This option is set to **AHCI** by default.

Option	Description
Security Freeze Lock	Sends Security Freeze Lock command to the Embedded SATA drives during POST. This option is applicable only for ATA and AHCI modes.
Write Cache	Enables or disables the command for Embedded SATA drives during POST.
Port A	Sets the drive type of the selected device. For **Embedded SATA settings** in **ATA** mode, set this field to **Auto** to enable BIOS support. Set it to **OFF** to turn off BIOS support. For **AHCI** or **RAID** mode, BIOS support is always enabled.

Option	Description
Model	Specifies the drive model of the selected device.
Drive Type	Specifies the type of drive attached to the SATA port.
Capacity	Specifies the total capacity of the hard drive. This field is undefined for removable media devices such as optical drives.

Option	Description
Port B	Sets the drive type of the selected device. For **Embedded SATA settings** in **ATA** mode, set this field to **Auto** to enable BIOS support. Set it to **OFF** to turn off BIOS support. For **AHCI** or **RAID** mode, BIOS support is always enabled.

Option	Description
Model	Specifies the drive model of the selected device.
Drive Type	Specifies the type of drive attached to the SATA port.
Capacity	Specifies the total capacity of the hard drive. This field is undefined for removable media devices such as optical drives.

Option	Description
Port C	Sets the drive type of the selected device. For **Embedded SATA settings** in **ATA** mode, set this field to **Auto** to enable BIOS support. Set it to **OFF** to turn off BIOS support. For **AHCI** or **RAID** mode, BIOS support is always enabled.

Option	Description
Model	Specifies the drive model of the selected device.
Drive Type	Specifies the type of drive attached to the SATA port.
Capacity	Specifies the total capacity of the hard drive. This field is undefined for removable media devices such as optical drives.

Option	Description
Port D	Sets the drive type of the selected device. For **Embedded SATA settings** in **ATA** mode, set this field to **Auto** to enable BIOS support. Set it to **OFF** to turn off BIOS support. For **AHCI** or **RAID** mode, BIOS support is always enabled.

Option	Description
Model	Specifies the drive model of the selected device.
Drive Type	Specifies the type of drive attached to the SATA port.
Capacity	Specifies the total capacity of the hard drive. This field is undefined for removable media devices such as optical drives.

Option	Description
Port E	Sets the drive type of the selected device. For **Embedded SATA settings** in **ATA** mode, set this field to **Auto** to enable BIOS support. Set it to **OFF** to turn off BIOS support. For **AHCI** or **RAID** mode, BIOS support is always enabled.

Option	Description	
	Option	Description
	Model	Specifies the drive model of the selected device.
	Drive Type	Specifies the type of drive attached to the SATA port.
	Capacity	Specifies the total capacity of the hard drive. This field is undefined for removable media devices such as optical drives.

Port F — Sets the drive type of the selected device. For **Embedded SATA settings** in **ATA** mode, set this field to **Auto** to enable BIOS support. Set it to **OFF** to turn off BIOS support.

For **AHCI** or **RAID** mode, BIOS support is always enabled.

	Option	Description
	Model	Specifies the drive model of the selected device.
	Drive Type	Specifies the type of drive attached to the SATA port.
	Capacity	Specifies the total capacity of the hard drive. This field is undefined for removable media devices such as optical drives.

Port G — Sets the drive type of the selected device. For **Embedded SATA settings** in **ATA** mode, set this field to **Auto** to enable BIOS support. Set it to **OFF** to turn off BIOS support.

For **AHCI** or **RAID** mode, BIOS support is always enabled.

	Option	Description
	Model	Specifies the drive model of the selected device.
	Drive Type	Specifies the type of drive attached to the SATA port.
	Capacity	Specifies the total capacity of the hard drive. This field is undefined for removable media devices such as optical drives.

Port H — Sets the drive type of the selected device. For **Embedded SATA settings** in **ATA** mode, set this field to **Auto** to enable BIOS support. Set it to **OFF** to turn off BIOS support.

For **AHCI** or **RAID** mode, BIOS support is always enabled.

	Option	Description
	Model	Specifies the drive model of the selected device.
	Drive Type	Specifies the type of drive attached to the SATA port.
	Capacity	Specifies the total capacity of the hard drive. This field is undefined for removable media devices such as optical drives.

Port I — Sets the drive type of the selected device. For **Embedded SATA settings** in **ATA** mode, set this field to **Auto** to enable BIOS support. Set it to **OFF** to turn off BIOS support.

For **AHCI** or **RAID** mode, BIOS support is always enabled.

	Option	Description
	Model	Specifies the drive model of the selected device.
	Drive Type	Specifies the type of drive attached to the SATA port.
	Capacity	Specifies the total capacity of the hard drive. This field is undefined for removable media devices such as optical drives.

Port J — Sets the drive type of the selected device. For **Embedded SATA settings** in **ATA** mode, set this field to **Auto** to enable BIOS support. Set it to **OFF** to turn off BIOS support.

Option	Description
	For **AHCI** or **RAID** mode, BIOS support is always enabled.

Option	Description
Model	Specifies the drive model of the selected device.
Drive Type	Specifies the type of drive attached to the SATA port.
Capacity	Specifies the total capacity of the hard drive. This field is undefined for removable media devices such as optical drives.

Integrated Devices

You can use the **Integrated Devices** screen to view and configure the settings of all integrated devices including the video controller, integrated RAID controller, and the USB ports.

Viewing Integrated Devices

To view the **Integrated Devices** screen, perform the following steps:

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

   F2 = System Setup

   > ⓘ **NOTE: If your operating system begins to load before you press F2, wait for the system to finish booting, and then restart your system and try again.**

3. On the **System Setup Main Menu** screen, click **System BIOS**.
4. On the **System BIOS** screen, click **Integrated Devices**.

Integrated Devices details

The **Integrated Devices** screen details are explained as follows:

Option	Description
USB 3.0 Setting	Enables or disables the USB 3.0 support. Enable this option only if your operating system supports USB 3.0. If you disable this option, devices operate at USB 2.0 speed. USB 3.0 is enabled by default.
User Accessible USB Ports	Enables or disables the USB ports. Selecting **Only Back Ports On** disables the front USB ports, selecting **All Ports Off** disables all USB ports. The USB keyboard and mouse operate during boot process in certain operating systems. After the boot process is complete, the USB keyboard and mouse do not work if the ports are disabled. > ⓘ **NOTE: Selecting Only Back Ports On and All Ports Off disables the USB management port and also restricts access to iDRAC features.**
Internal USB Port	Enables or disables the internal USB port. This option is set to **Enabled** by default.
Integrated RAID Controller	Enables or disables the integrated RAID controller. This option is set to **Enabled** by default.
Integrated Network Card 1	Enables or disables the integrated network card.
Embedded NIC1 and NIC2	> ⓘ **NOTE: The Embedded NIC1 and NIC2 options are only available on systems that do not have Integrated Network Card 1.** Enables or disables the Embedded NIC1 and NIC2 options. If set to **Disabled**, the NIC may still be available for shared network access by the embedded management controller. The embedded NIC1 and NIC2 options are only available on systems that do not have Network Daughter Cards (NDCs). The Embedded NIC1 and NIC2 option is

Option	Description
	mutually exclusive with the Integrated Network Card 1 option. Configure the Embedded NIC1 and NIC2 option by using the NIC management utilities of the system.
I/OAT DMA Engine	Enables or disables the I/OAT option. Enable only if the hardware and software support the feature.
Embedded Video Controller	Enables or disables the **Embedded Video Controller** option. This option is set to **Enabled** by default.
Current State of Embedded Video Controller	Displays the current state of the embedded video controller. The **Current State of Embedded Video Controller** option is a read-only field. If the Embedded Video Controller is the only display capability in the system (that is, no add-in graphics card is installed), then the Embedded Video Controller is automatically used as the primary display even if the **Embedded Video Controller** setting is set to **Disabled**.
SR-IOV Global Enable	Enables or disables the BIOS configuration of Single Root I/O Virtualization (SR-IOV) devices. This option is set to **Disabled** by default.
OS Watchdog Timer	If your system stops responding, this watchdog timer aids in the recovery of your operating system. When this option is set to **Enabled**, the operating system initializes the timer. When this option is set to **Disabled** (the default), the timer does not have any effect on the system.
Memory Mapped I/O above 4 GB	Enables or disables the support for PCIe devices that need large amounts of memory. This option is set to **Enabled** by default.
Slot Disablement	Enables or disables the available PCIe slots on your system. The slot disablement feature controls the configuration of PCIe cards installed in the specified slot. Slots must be disabled only when the installed peripheral card prevents booting into the operating system or causes delays in system startup. If the slot is disabled, both the Option ROM and UEFI drivers are disabled.

Serial Communication

You can use the **Serial Communication** screen to view the properties of the serial communication port.

Viewing Serial Communication

To view the **Serial Communication** screen, perform the following steps:

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

    F2 = System Setup

> ⓘ NOTE: If your operating system begins to load before you press F2, wait for the system to finish booting, and then restart your system and try again.

3   On the **System Setup Main Menu** screen, click **System BIOS**.
4   On the **System BIOS** screen, click **Serial Communication**.

Serial Communication details

The **Serial Communication** screen details are explained as follows:

Option	Description
Serial Communication	Selects serial communication devices (Serial Device 1 and Serial Device 2) in BIOS. BIOS console redirection can also be enabled and the port address can be specified. This option is set to **Auto** by default.
Serial Port Address	Enables you to set the port address for serial devices. This option is set to **Serial Device 1=COM2, Serial Device 2=COM1** by default.
	> ⓘ NOTE: You can use only Serial Device 2 for the Serial Over LAN (SOL) feature. To use console redirection by SOL, configure the same port address for console redirection and the serial device.

Option	Description
	ⓘ NOTE: Every time the system boots, the BIOS syncs the serial MUX setting saved in iDRAC. The serial MUX setting can independently be changed in iDRAC. Loading the BIOS default settings from within the BIOS setup utility may not always revert the serial MUX setting to the default setting of Serial Device 1.
External Serial Connector	Enables you to associate the External Serial Connector to Serial Device 1, Serial Device 2, or the Remote Access Device by using this option. ⓘ NOTE: 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. ⓘ NOTE: Every time the system boots, the BIOS syncs the serial MUX setting saved in iDRAC. The serial MUX setting can independently be changed in iDRAC. Loading the BIOS default settings from within the BIOS setup utility may not always revert this setting to the default setting of Serial Device 1.
Failsafe Baud Rate	Specifies 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 attempt fails, and the value must not be changed. This option is set to `115200` by default.
Remote Terminal Type	Sets the remote console terminal type. This option is set to `VT 100/VT 220` by default.
Redirection After Boot	Enables or disables the BIOS console redirection when the operating system is loaded. This option is set to **Enabled** by default.

System Profile Settings

You can use the **System Profile Settings** screen to enable specific system performance settings such as power management.

Viewing System Profile Settings

To view the **System Profile Settings** screen, perform the following steps:

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

   `F2 = System Setup`

   > ⓘ NOTE: If your operating system begins to load before you press F2, wait for the system to finish booting, and then restart your system and try again.

3. On the **System Setup Main Menu** screen, click **System BIOS**.
4. On the **System BIOS** screen, click **System Profile Settings**.

System Profile Settings details

The **System Profile Settings** screen details are explained as follows:

Option	Description
System Profile	Sets the system profile. If you set the **System Profile** option to a mode other than **Custom**, the BIOS automatically sets the rest of the options. You can only change the rest of the options if the mode is set to **Custom**. This option is set to **Performance Per Watt Optimized (DAPC)** by default. DAPC is Dell Active Power Controller. ⓘ NOTE: All the parameters on the system profile setting screen are available only when the System Profile option is set to Custom.
CPU Power Management	Sets the CPU power management. This option is set to **System DBPM (DAPC)** by default. DBPM is Demand-Based Power Management.

Option	Description
Memory Frequency	Sets the speed of the system memory. You can select **Maximum Performance**, **Maximum Reliability**, or a specific speed.
Turbo Boost	Enables or disables the processor to operate in the turbo boost mode. This option is set to **Enabled** by default.
Energy Efficient Turbo	Enables or disables the **Energy Efficient Turbo** option. Energy Efficient Turbo (EET) is a mode of operation where a processor's core frequency is adjusted to be within the turbo range based on workload.
C1E	Enables or disables the processor to switch to a minimum performance state when it is idle. This option is set to **Enabled** by default.
C States	Enables or disables the processor to operate in all available power states. This option is set to **Enabled** by default.
Collaborative CPU Performance Control	Enables or disables the CPU power management option. When set to **Enabled**, the CPU power management is controlled by the OS DBPM and the System DBPM (DAPC). This option is set to **Disabled** by default.
Memory Patrol Scrub	Sets the memory patrol scrub frequency. This option is set to **Standard** by default.
Memory Refresh Rate	Sets the memory refresh rate to either 1x or 2x. This option is set to **1x** by default.
Uncore Frequency	Enables you to select the **Processor Uncore Frequency** option. Dynamic mode enables the processor to optimize power resources across the cores and uncore during runtime. The optimization of the uncore frequency to either save power or optimize performance is influenced by the setting of the **Energy Efficiency Policy** option.
Energy Efficient Policy	Enables you to select the **Energy Efficient Policy** option. The CPU uses the setting to manipulate the internal behavior of the processor and determines whether to target higher performance or better power savings.
Number of Turbo Boot Enabled Cores for Processor 1	ⓘ NOTE: **If there are two processors installed in the system, you see an entry for Number of Turbo Boost Enabled Cores for Processor 2.** Controls the number of turbo boost enabled cores for processor 1. The maximum number of cores is enabled by default.
Monitor/Mwait	Enables the Monitor/Mwait instructions in the processor. This option is set to **Enabled** for all system profiles, except **Custom** by default. ⓘ NOTE: **This option can be disabled only if the C States option in the Custom mode is set to disabled.** ⓘ NOTE: **When C States is set to Enabled in the Custom mode, changing the Monitor/Mwait setting does not impact the system power or performance.**

Miscellaneous Settings

You can use the **Miscellaneous Settings** screen to perform specific functions such as updating the asset tag and changing the system date and time.

Viewing Miscellaneous Settings

To view the **Miscellaneous Settings** screen, perform the following steps:

1   Turn on, or restart your system.
2   Press F2 immediately after you see the following message:
    `F2 = System Setup`

> (i) NOTE: If your operating system begins to load before you press F2, wait for the system to finish booting, and then restart your system and try again.

3   On the **System Setup Main Menu** screen, click **System BIOS**.
4   On the **System BIOS** screen, click **Miscellaneous Settings**.

Miscellaneous Settings details

The **Miscellaneous Settings** screen details are explained as follows:

Option	Description
System Time	Enables you to set the time on the system.
System Date	Enables you to set the date on the system.
Asset Tag	Specifies the asset tag and enables you to modify it for security and tracking purposes.
Keyboard NumLock	Enables you to set whether the system boots with the NumLock enabled or disabled. This option is set to **On** by default. (i) NOTE: This option does not apply to 84-key keyboards.
F1/F2 Prompt on Error	Enables or disables the F1/F2 prompt on error. This option is set to **Enabled** by default. The F1/F2 prompt also includes keyboard errors.
Load Legacy Video Option ROM	Enables you to determine whether the system BIOS loads the legacy video (INT 10H) option ROM from the video controller. Selecting **Enabled** in the operating system does not support UEFI video output standards. This field is available only for UEFI boot mode. You cannot set the option to **Enabled** if **UEFI Secure Boot** mode is enabled.
In-System Characterization	Enables or disables **In-System Characterization**. This option is set to **Disabled** by default. The two other options are **Enabled** and **Enabled - No Reboot**. (i) NOTE: The default setting for In-System Characterization is subject to change in future BIOS releases. When enabled, In-System Characterization (ISC) executes during POST upon detecting relevant change(s) in system configuration to optimize system power and performance. ISC takes about 20 seconds to execute, and system reset is needed for ISC results to be applied. The **Enabled - No Reboot** option executes ISC and continues without applying ISC results until the next time system reset occurs. The **Enabled** option executes ISC and forces an immediate system reset so that ISC results can be applied. It takes the system longer to be ready due to the forced system reset. When disabled, ISC does not execute.

iDRAC Settings utility

The iDRAC settings utility is an interface to set up and configure the iDRAC parameters by using UEFI. You can enable or disable various iDRAC parameters by using the iDRAC settings utility.

> (i) **NOTE: Accessing some of the features on the iDRAC settings utility needs the iDRAC Enterprise License upgrade.**

For more information about using iDRAC, see *Dell Integrated Dell Remote Access Controller User's Guide* at **Dell.com/idracmanuals**.

Entering the iDRAC Settings utility

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

Changing the thermal settings

The iDRAC settings utility enables you to select and customize the thermal control settings for your system.

1   Click **iDRAC Settings** > **Thermal**.
2   Under **SYSTEM THERMAL PROFILE** > **Thermal Profile**, select one of the following options:
     - Default Thermal Profile Settings
     - Maximum Performance (Performance Optimized)
     - Minimum Power (Performance per Watt Optimized)
3   Under **USER COOLING OPTIONS**, set the **Fan Speed Offset**, **Minimum Fan Speed**, and **Custom Minimum Fan Speed**.
4   Click **Back** > **Finish** > **Yes**.

Device Settings

Device Settings enables you to configure device parameters.

Dell Lifecycle Controller

Dell Lifecycle Controller (LC) provides advanced embedded systems management capabilities including system deployment, configuration, update, maintenance, and diagnosis. LC is delivered as part of the iDRAC out-of-band solution and Dell system embedded Unified Extensible Firmware Interface (UEFI) applications.

Embedded systems management

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

> (i) **NOTE: Certain platform configurations may not support the full set of features provided by the Dell Lifecycle Controller.**

For more information about setting up the Dell Lifecycle Controller, configuring hardware and firmware, and deploying the operating system, see the Dell Lifecycle Controller documentation at **Dell.com/idracmanuals**.

Boot Manager

The **Boot Manager** screen enables you to select boot options and diagnostic utilities.

Viewing Boot Manager

To enter **Boot Manager**:

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

    F11 = Boot Manager

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

Boot Manager main menu

Menu item	Description
Continue Normal Boot	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.
One-shot Boot Menu	Enables you to access boot menu, where you can select a one-time boot device to boot from.
Launch System Setup	Enables you to access System Setup.
Launch Lifecycle Controller	Exits the Boot Manager and invokes the Dell Lifecycle Controller program.
System Utilities	Enables you to launch System Utilities menu such as System Diagnostics and UEFI shell.

One-shot BIOS boot menu

One-shot BIOS boot menu enables you to select a boot device to boot from.

System Utilities

System Utilities contains the following utilities that can be launched:

- Launch Diagnostics
- BIOS Update File Explorer
- Reboot System

PXE boot

You can use the Preboot Execution Environment (PXE) option to boot and configure the networked systems, remotely.

ⓘ **NOTE: To access the PXE boot option, boot the system and then press F12. The system scans and displays the active networked systems.**

Installing and removing system components

This section provides information about installing and removing the system components.

Topics:

Safety instructions

⚠ **WARNING: Whenever you need to lift the system, get others to assist you. To avoid injury, do not attempt to lift the system by yourself.**

⚠ **WARNING: Opening or removing the system cover while the system is powered on may expose you to a risk of electric shock.**

⚠ **CAUTION: Do not operate the system without the cover for a duration exceeding five minutes.**

⚠ **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 are shipped with your product.**

ⓘ **NOTE: Dell recommends that you always use a static mat and static strap while working on components inside the system.**

ⓘ **NOTE: To ensure proper operation and cooling, all bays in the system and system fans must be populated always with either a component or with a blank.**

Before working inside your system

Prerequisites

Follow the safety guidelines listed in the Safety instructions section.

Steps

1   Turn off the system, including any attached peripherals.
2   Disconnect the system from the electrical outlet and disconnect the peripherals.
3   If installed, remove the front bezel.
4   If applicable, remove the system from the rack.
    For more information, see the *Rack Installation* placemat at **Dell.com/poweredgemanuals**.
5   Remove the system cover.

Related links

  Safety instructions

After working inside your system

Prerequisites

Follow the safety guidelines listed in the Safety instructions section.

Steps

1   Install the system cover.
2   If applicable, install the system into the rack.
    For more information, see the *Rack Installation* placemat at **Dell.com/poweredgemanuals**.
3   If removed, install the front bezel.
4   Reconnect the peripherals and connect the system to the electrical outlet.
5   Turn on the system, including any attached peripherals.

Related links

  Safety instructions

Recommended tools

You need the following tools to perform the removal and installation procedures:

·   Key to the bezel lock.
    The key is needed only if your system includes a bezel.
·   Phillips #2 screwdriver
·   Wrist grounding strap

Front bezel (optional)

The front bezel is attached to the front side of the server and prevents accidents while removing the hard drive or when pressing the reset or power button. The front bezel can also be locked for additional security.

Removing the front bezel

1   Unlock the bezel lock at the left end of the bezel.

2   Lift the release latch next to the bezel lock.

3   Pull the left end of the bezel, unhook the right end and remove the bezel.
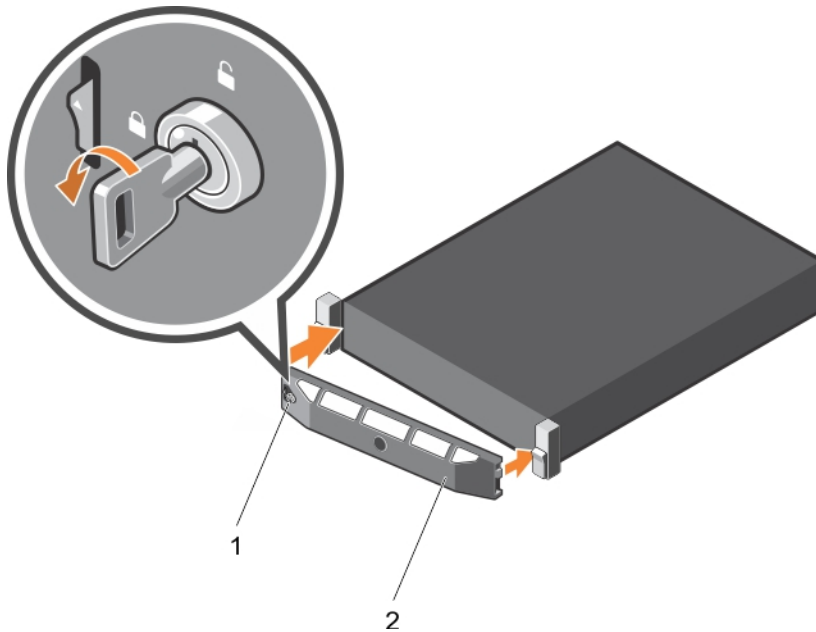
Figure 8. Removing and installing the front bezel

1 bezel lock	2 front bezel

Related links

Safety instructions

Installing the optional front bezel

Prerequisites

Follow the safety guidelines listed in the Safety instructions section.

Steps

1   Locate and remove the bezel key.

> ⓘ NOTE: **The bezel key is attached to the back of the bezel.**

2   Hook the right end of the bezel onto the chassis.

3   Fit the free end of the bezel onto the system.

4   Lock the bezel by using the key.

Related links

Safety instructions

Removing the system cover

Prerequisites

1 Follow the safety guidelines listed in the Safety instructions section.
2 If installed, remove the optional bezel.

Steps

1 Rotate the latch release lock counter clockwise to the unlocked position.
2 Lift the latch toward the back of the system.

   The system cover slides back and the tabs on the system cover disengage from the slots on the chassis.

   ⓘ **NOTE: The position of the latch may vary depending on the configuration of your system.**

3 Hold the cover on both sides, and lift the cover away from the system.

Next steps

1 Install the system cover.

Related links

Safety instructions

Installing the system cover

Prerequisites

1 Follow the safety guidelines listed in the Safety instructions section.
2 Follow the procedure listed in the Before working inside your system section.
3 Ensure that all internal cables are connected and placed out of the way, and no tools or extra parts are left inside the system.

Steps

1 Align the slots on the system cover with the tabs on the chassis.
2 Push the system cover latch down.

   The system cover slides forward and the slots on the system cover engage with the tabs on the chassis. The system cover latch locks into place when the system cover is completely engaged with the tabs on the chassis.

3 Rotate the latch release lock clockwise to the locked position.

Next steps

1 If removed, install the front bezel.
2 Reconnect the peripherals and connect the system to the electrical outlet.
3 Turn on the system, including any attached peripherals.
4 Follow the procedure listed in the After working inside your system section.

Related links

Safety instructions
Before working inside your system
After working inside your system

Inside the 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 are shipped with your product.**
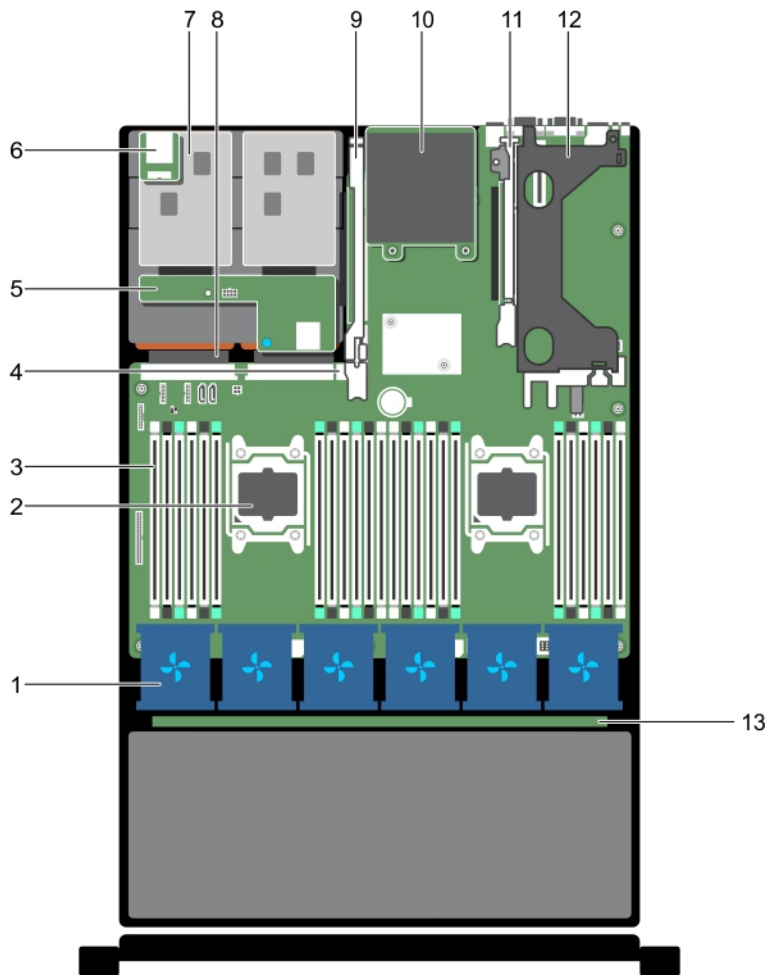
Figure 9. Inside the system— 12 HDD system

1	cooling-fan in the cooling-fan assembly (6)	2	processor (2)
3	DIMMs (24)	4	internal USB port
5	HDD backplane (back)	6	vFlash media slot
7	HDD (2) (back)	8	power supply unit (2)
9	expansion-card riser 3	10	network daughter card
11	expansion-card riser 2	12	expansion-card riser 1
13	HDD backplane		

Cooling shroud

The cooling shroud aerodynamically directs the airflow across the entire system. The airflow passes through all the critical parts of the system, where the vacuum pulls air across the entire surface area of the heat sink, thus allowing increased cooling.

Removing the cooling shroud

Prerequisites

⚠ **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 are shipped with your 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   Follow the safety guidelines listed in the Safety instructions section.
2   Follow the procedure listed in the Before working inside your system section.
3   If installed, remove the full-length PCIe card.

Steps

     Holding the touch points, lift the cooling shroud away from the system.

Next steps

1   Install the cooling shroud.
2   If required, install the full-length PCIe card.
3   Follow the procedure listed in the After working inside your system section.

Related links

Safety instructions
Before working inside your system
After working inside your system

Installing the cooling shroud

Prerequisites

⚠ **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 are shipped with your product.**

1   Follow the safety guidelines listed in the Safety instructions section.
2   Follow the procedure listed in the Before working inside your system section.
3   If applicable, route the cables inside the system along the chassis wall and secure the cables by using the cable-securing bracket.

Steps

1   Align the tabs on the cooling shroud with the securing slots on the chassis.
2   Lower the cooling shroud into the chassis until it is firmly seated.

Next steps

1   Follow the procedure listed in the After working inside your system section.

Related links

Safety instructions
Before working inside your system
After working inside your system

System memory

The system supports DDR4 registered DIMMs (RDIMMs) and load reduced DIMMs (LRDIMMs). System memory holds the instructions that are executed by the processor.

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

Memory bus operating frequency can be 1866 MT/s, 2133 MT/s, or 2400 MT/s depending on the following factors:

- DIMM type (RDIMM or LRDIMM)
- Number of DIMMs populated per channel
- System profile selected (for example, Performance Optimized, Custom, or Dense Configuration Optimized)
- Maximum supported DIMM frequency of the processors

Your system contains 24 memory sockets split into two sets of 12 sockets, one set per processor. Each 12-socket set is organized into four channels. In each channel, the release tabs of the first socket are marked white, the second socket black, and the third socket green.

Memory channels are organized as follows:

Table 21. Memory channels

Processor	Channel 0	Channel 1	Channel 2	Channel 3
Processor 1	Slots A1, A5, and A9	Slots A2, A6, and A10	Slots A3, A7, and A11	Slots A4, A8, and A12
Processor 2	Slots B1, B5, and B9	Slots B2, B6, and B10	Slots B3, B7, and B11	Slots B4, B8, and B12

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

Table 22. Memory population

DIMM Type	DIMMs Populated/ Channel	Voltage	Operating Frequency (in MT/s)	Maximum DIMM Rank/Channel
RDIMM	1		2400, 2133, 1866	Dual rank or single rank
	2	1.2 V	2400, 2133, 1866	Dual rank or single rank
	3		1866	Dual rank or single rank
LRDIMM	1		2400, 2133, 1866	Quad rank
	2	1.2 V	2400, 2133, 1866	Quad rank
	3		2133, 1866	Quad rank

General memory module installation guidelines

(i) **NOTE: Memory configurations that fail to observe these guidelines can prevent your system from booting, stop responding during memory configuration, or operating with reduced memory.**

The 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 installing memory modules:

- RDIMMs and LRDIMMs must not be mixed.
- x4 and x8 DRAM based memory modules can be mixed. For more information, see the Mode-specific guidelines section.
- Up to three dual- or single-rank RDIMMs can be populated per channel.
- Up to three LRDIMMs can be populated per channel regardless of rank count.

- If memory modules with different speeds are installed, they will operate at the speed of the slowest installed memory module(s) or slower depending on system DIMM configuration.
- Populate memory module sockets only if a processor is installed. For single-processor systems, sockets A1 to A12 are available. For dual-processor systems, sockets A1 to A12 and sockets B1 to B12 are available.
- Populate all the sockets with white release tabs first, followed by the black release tabs, and then the green release tabs.
- When mixing memory modules with different capacities, populate the sockets with memory modules with highest capacity first. For example, if you want to mix 4 GB and 8 GB memory modules, populate 8 GB memory modules in the sockets with white release tabs and 4 GB memory modules in the sockets with black release tabs.
- In a dual-processor configuration, the memory configuration for each processor should be identical. For example, if you populate socket A1 for processor 1, then populate socket B1 for processor 2, and so on.
- Memory modules of different capacities can be mixed provided other memory population rules are followed (for example, 4 GB and 8 GB memory modules can be mixed).
- Mixing of more than two memory module capacities in a system is not supported.
- Populate four memory modules per processor (one DIMM per channel) at a time to maximize performance.

Related links

Mode-specific guidelines

Mode-specific guidelines

Four memory channels are allocated to each processor. The allowable configurations depend on the memory mode selected.

(i) **NOTE:** You can mix x4 and x8 DRAM based DIMMs to support RAS features. However, all guidelines for specific RAS features must be followed. x4 DRAM based DIMMs retain Single Device Data Correction (SDDC) in memory optimized (independent channel) mode. x8 DRAM based DIMMs need Advanced ECC mode to gain SDDC.

Sample memory configurations

The following tables show sample memory configurations for one and two processor configurations that follow the appropriate memory guidelines.

(i) **NOTE:** 1R, 2R, and 4R in the following tables indicate single, dual, and quad-rank DIMMs respectively.

Table 23. Memory configurations—single processor

System capacity (in GB)	DIMM size (in GB)	Number of DIMMs	DIMM rank, organization, and frequency	DIMM slot population
4	4	1	1R, x8, 2400 MT/s	A1
			1R, x8, 2133 MT/s	
8	4	2	1R, x8, 2400 MT/s	A1, A2
			1R, x8, 2133 MT/s	
16	4	4	1R, x8, 2400 MT/s	A1, A2, A3, A4
			1R, x8, 2133 MT/s	
	8	2	1R, x8, 2400 MT/s	A1, A2
			1R, x8, 2133 MT/s	
24	4	6	1R, x8, 2400 MT/s	A1, A2, A3, A4, A5, A6

System capacity (in GB)	DIMM size (in GB)	Number of DIMMs	DIMM rank, organization, and frequency	DIMM slot population
			1R, x8, 2133 MT/s	
48	4	12	1R, x8, 1866 MT/s	A1, A2, A3, A4, A5, A6, A7, A8, A9, A10, A11, A12
	8	6	1R, x8, 2400 MT/s	A1, A2, A3, A4, A5, A6
			1R, x8, 2133 MT/s	
96	8	12	1R, x8, 1866 MT/s	A1, A2, A3, A4, A5, A6, A7, A8, A9, A10, A11, A12
	16	6	2R, x8, 2400 MT/s	A1, A2, A3, A4, A5, A6
			2R, x8, 2133 MT/s	
128	16	8	2R, x8, 2400 MT/s	A1, A2, A3, A4, A5, A6, A7, A8
			2R, x8, 2133 MT/s	
384	32	12		A1, A2, A3, A4, A5, A6, A7, A8, A9, A10, A11, A12

* 16 GB DIMMs must be installed in slots numbered A1, A2, A3, A4, A5, A6, A7, and A8 and 8 GB DIMMs must be installed in slots A9 and A11.

Table 24. Memory configurations—two processors

System capacity (in GB)	DIMM size (in GB)	Number of DIMMs	DIMM rank, organization, and frequency	DIMM slot population
16	4	4	1R, x8, 2400 MT/s	A1, A2, B1, B2
			1R, x8, 2133 MT/s	
32	4	8	1R, x8, 2400 MT/s	A1, A2, A3, A4, B1, B2, B3, B4
			1R, x8, 2133 MT/s	
64	4	16	1R, x8, 2400 MT/s	A1, A2, A3, A4, A5, A6, A7, A8, B1, B2, B3, B4, B5, B6, B7, B8
			1R, x8, 2133 MT/s	
	8	8	1R, x8, 2400 MT/s	A1, A2, A3, A4, B1, B2, B3, B4
			1R, x8, 2133 MT/s	
96	4	24	1R, x8, 1866 MT/s	A1, A2, A3, A4, A5, A6, A7, A8, A9, A10, A11, A12, B1, B2, B3, B4, B5, B6, B7, B8, B9, B10, B11, B12
	8	12	1R, x8, 2400 MT/s	A1, A2, A3, A4, A5, A6, B1, B2, B3, B4, B5, B6
			1R, x8, 2133 MT/s	
128	8	16	1R, x8, 2400 MT/s	A1, A2, A3, A4, A5, A6, A7, A8, B1, B2, B3, B4, B5, B6, B7, B8

System capacity (in GB)	DIMM size (in GB)	Number of DIMMs	DIMM rank, organization, and frequency	DIMM slot population
			1R, x8, 2133 MT/s	
	16	8	2R, x8, 2400 MT/s	A1, A2, A3, A4, B1, B2, B3, B4
			2R, x8, 2133 MT/s	
160	8	20	1R, x8, 1866 MT/s	A1, A2, A3, A4, A5, A6, A7, A8, A9, A11, B1, B2, B3, B4, B5, B6, B7, B8, B9, B11
	8	12	1R, x8, 2400 MT/s	A1, A2, A3, A4, A5, A6, B1, B2, B3, B4, B5, B6 *
			1R, x8, 2133 MT/s	
	16	12	2R, x8, 2400 MT/s	A1, A2, A3, A4, A5, A6, B1, B2, B3, B4, B5, B6 *
			2R, x8, 2133 MT/s	
192	8	24	1R, x8, 1866 MT/s	A1, A2, A3, A4, A5, A6, A7, A8, A9, A10, A11, A12, B1, B2, B3, B4, B5, B6, B7, B8, B9, B10, B11, B12
	16	12	2R, x8, 2400 MT/s	A1, A2, A3, A4, A5, A6, B1, B2, B3, B4, B5, B6
			2R, x8, 2133 MT/s	
256	16	16	2R, x8, 2400 MT/s	A1, A2, A3, A4, A5, A6, A7, A8, B1, B2, B3, B4, B5, B6, B7, B8
			2R, x8, 2133 MT/s	
384	16	24	2R, x8, 1866 MT/s	A1, A2, A3, A4, A5, A6, A7, A8, A9, A10, A11, A12, B1, B2, B3, B4, B5, B6, B7, B8, B9, B10, B11, B12
	32	12	2R, x4, 2400 MT/s	A1, A2, A3, A4, A5, A6, B1, B2, B3, B4, B5, B6
			2R, x4, 2133 MT/s	
512	32	16	2R, x4, 2400 MT/s	A1, A2, A3, A4, A5, A6, A7, A8, B1, B2, B3, B4, B5, B6, B7, B8
			2R, x4, 2133 MT/s	
	64	8	4R, x4, 2400 MT/s	A1, A2, A3, A4, A5, A6, A7, A8, B1, B2, B3, B4, B5, B6, B7, B8
			4R, x4, 2133 MT/s	

* 16 GB DIMMs must be installed in slots numbered A1, A2, A3, A4, B1, B2, B3, and B4 and 8 GB DIMMs must be installed in slots A5, A6, B5, and B6.

Removing memory modules

Prerequisites

⚠ 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 are shipped with your product.**

1   Follow the safety guidelines listed in the Safety instructions section.

2   Follow the procedure listed in the Before working inside your system section.

3   Remove the cooling shroud.

⚠ **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: To ensure proper system cooling, memory module blanks must be installed in any memory socket that is not occupied. Remove memory module blanks only if you intend to install memory modules in those sockets.**

Steps

1   Locate the appropriate memory module socket.

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

2   To release the memory module from the socket, simultaneously press the ejectors on both ends of the memory module socket.

3   Lift and remove the memory module from the system.
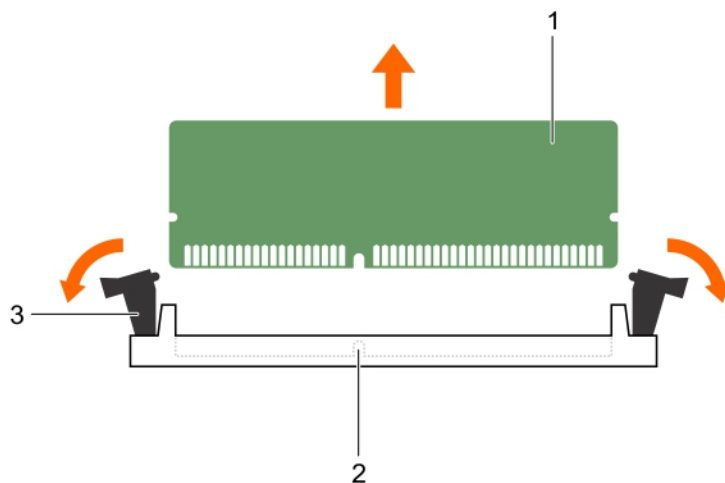
Figure 10. Removing the memory module

1	memory module	2	memory module socket
3	memory module socket ejector (2)		

Next steps

1   Install the memory module.

ⓘ **NOTE: If you are removing the memory module permanently, install a memory module blank.**

2   Install the cooling shroud.

3   Follow the procedure listed in the After working inside your system section.

Related links

Safety instructions
Before working inside your system
After working inside your system

Installing memory modules

Prerequisites

⚠️ **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 are shipped with your product.**

1   Follow the safety guidelines listed in the Safety instructions section.
2   Follow the procedure listed in the Before working inside your system section.

Steps

1   Locate the appropriate memory module socket.

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

2   Open the ejectors on the memory module socket outward to allow the memory module to be inserted into the socket.
3   Align the edge connector of the memory module with the alignment key of the memory module socket, and insert the memory module in the socket.

⚠️ **CAUTION: Do not apply pressure at the center of the memory module; apply pressure at both ends of the memory module evenly.**

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

4   Press the memory module with your thumbs until the socket levers firmly click into place.

When the memory module is properly seated in the socket, the levers on the memory module socket align with the levers on the other sockets that have memory modules installed.
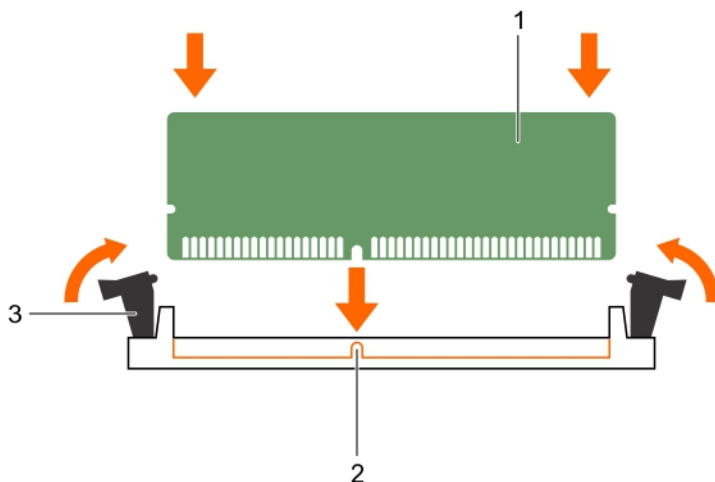
Figure 11. Installing the memory module

1 memory module	2 alignment key

3　memory module socket ejector (2)

Next steps

1　Follow the procedure listed in the After working inside your system section.
2　Press F2 to enter System Setup, and check the **System Memory** setting.

　　The system should have already changed the value to reflect the installed memory.
3　If the value is incorrect, one or more of the memory modules may not be installed properly. Ensure that the memory module is firmly seated in the memory module socket.
4　Run the system memory test in system diagnostics.

Related links

Safety instructions
Before working inside your system
After working inside your system

Hard drives

Your system supports entry hard drives and enterprise-class hard drives. Entry hard drives are designed for 5x8 operating environment with less workload rating to drives and enterprise-class drives are designed for 24x7 operating environment. Selecting the correct drive class will enable the critical areas of quality, functionality, performance, and reliability to be optimized for the target implementation.

ⓘ **NOTE:** Do not mix enterprise-class hard drives with entry hard drives.

Choosing the right drive type depends on the usage pattern. Improper use of entry hard drives (workload rating exceeds 55TB/year) will lead to significant risk and increase the drives failure rate.

For more information on these hard drives, see the *512e and 4Kn Disk Formats* whitepaper and *4K Sector HDD FAQ* document at **Dell.com/poweredgemanuals.**

All hard drives are connected to the system board through the hard drive backplane. Hard drives are supplied in hot-swappable hard drive carriers that fit in the hard drive slots.

△ **CAUTION: Before attempting to remove or install a hard drive while the system is running, see the documentation for the storage controller card to ensure that the host adapter is configured correctly to support hot-swap hard drive removal and insertion.**

△ **CAUTION: Do not turn off or restart your system while the hard drive is being formatted. Doing so can cause a hard drive failure.**

Use only hard drives that have been tested and approved for use with the hard drive backplane.

When you format a hard drive, allow enough time for the formatting to be complete. Be aware that high-capacity hard drives can take a long time to format.

Removing a 3.5-inch hard drive blank

Prerequisites

△ **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: To maintain proper system cooling, all empty hard drive slots must have hard drive blanks installed.**

1　Follow the safety guidelines listed in the Safety instructions section.
2　If installed, remove the front bezel.

Steps

Press the release button and slide the blank out of the hard drive slot.
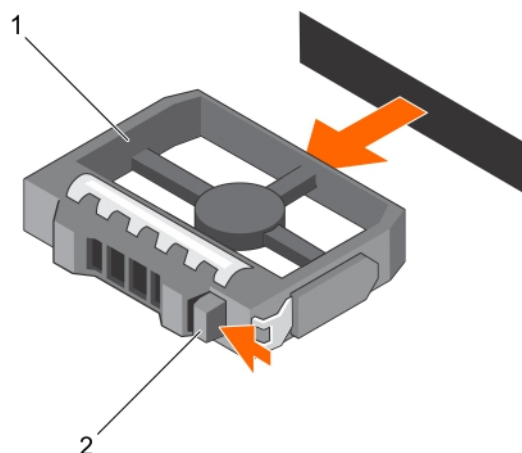

Figure 12. Removing a 3.5-inch hard drive blank

1	hard drive blank	2	release button

Next steps

If applicable, install the front bezel.

Related links

Safety instructions

Installing a 3.5-inch hard drive blank

Prerequisites

1   Follow the safety guidelines listed in the Safety instructions section.

2   If installed, remove the front bezel.

Steps

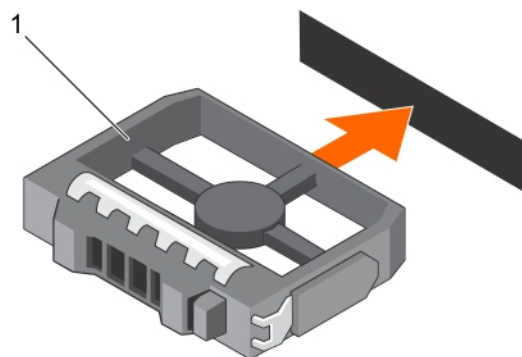Insert the hard drive blank into the hard drive slot until the release button clicks into place.

Figure 13. Installing a 3.5-inch hard drive blank

1	hard drive blank

Next steps

If applicable, install the front bezel.

Related links

Safety instructions

Removing a 2.5 inch hard drive blank (rear)

Prerequisites

⚠ **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: To maintain proper system cooling, all empty hard drive slots must have hard drive blanks installed.**

Follow the safety guidelines listed in safety instructions section.

Steps

Pull the hard drive blank out until it is free of the hard drive slot.
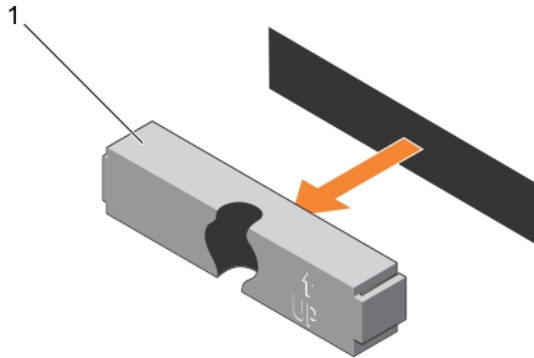
Figure 14. Removing and installing a 2.5 inch hard drive blank (rear)

1   hard drive blank (rear)

Related links

Safety instructions

Installing a 2.5 inch hard drive blank (rear)

Prerequisites

1   Follow the safety guidelines listed in the Safety instructions section.

Steps

Insert the hard drive blank into the hard drive slot until it clicks into place.
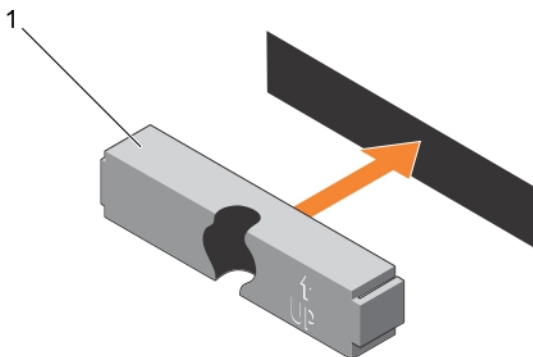
Figure 15. Installing a 2.5 inch hard drive blank (rear)

Next steps

Follow the procedure listed in the After working inside your system section.

Related links

Safety instructions

After working inside your system

Removing a hot swappable hard drive or solid state drive

Prerequisites

⚠ **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   Follow the safety guidelines listed in the Safety instructions section.

2   Follow the procedure listed in the Before working inside your system section.

3   If applicable, remove the bezel.

4   Using the management software, prepare the hard drive for removal. If the hard drive is online, the green activity or fault indicator flashes while the drive is turning off. When the hard drive indicators are off, the hard drive is ready for removal.

For more information, see the documentation for the storage controller.

⚠ **CAUTION: To prevent data loss, ensure that your operating system supports hot-swap drive installation. See the documentation supplied with your operating system.**

Steps

1   Press the release button to open the hard drive or SSD carrier release handle.

2   Slide the hard drive or SSD carrier out of the hard drive slot.

> ⚠ **CAUTION: To maintain proper system cooling, all empty hard drive or SSD slots must have hard drive or SSD blanks installed.**

3   If you are not replacing the hard drive or SSD immediately, insert a hard drive or SSD blank in the empty hard drive slot.
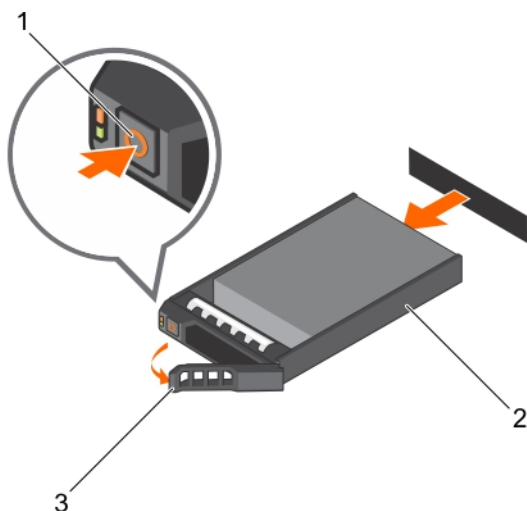
Figure 16. Removing a hot swappable hard drive or SSD

1	release button	2	hard drive or SSD carrier
3	hard drive or SSD carrier handle		

Related links

Safety instructions
Before working inside your system

Installing a hot swappable hard drive

Prerequisites

⚠ 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 are shipped with your product.

⚠ CAUTION: Use only hard drives that have been tested and approved for use with the hard drive backplane.

⚠ CAUTION: Combining SAS and SATA hard drives in the same RAID volume is not supported.

⚠ CAUTION: When installing a hard drive, ensure that the adjacent drives are fully installed. Inserting a hard drive carrier and attempting to lock its handle next to a partially installed carrier can damage the partially installed carrier's shield spring and make it unusable.

⚠ CAUTION: To prevent data loss, ensure that your operating system supports hot-swap drive installation. See the documentation supplied with your operating system.

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

1   Follow the safety guidelines listed in Safety instructions section.

Steps

1   If a hard drive blank is installed in the hard drive slot, remove it.
2   Install a hard drive in the hard drive carrier. For more information, see the Installing a hot swappable hard drive into a hot swappable hard drive carrier section.
3   Press the release button on the front of the hard drive carrier and open the hard drive carrier handle.
4   Insert the hard drive carrier into the hard drive slot until the carrier connects with the backplane.
5   Close the hard drive carrier handle to lock the hard drive in place.

Next steps

Install the optional front bezel.
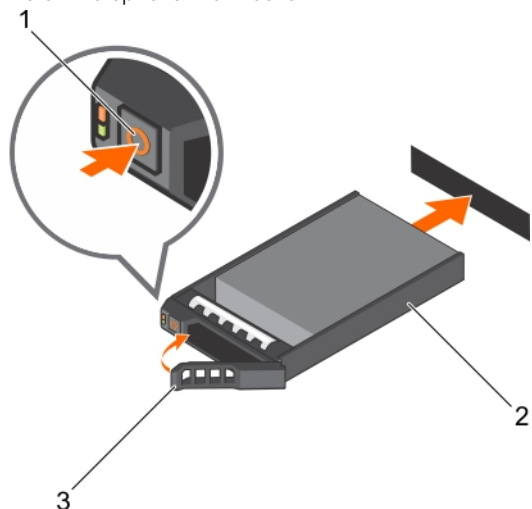
Figure 17. Installing a hot swappable hard drive

1	release button	2	hard drive or SSD carrier
3	hard drive or SSD carrier handle		
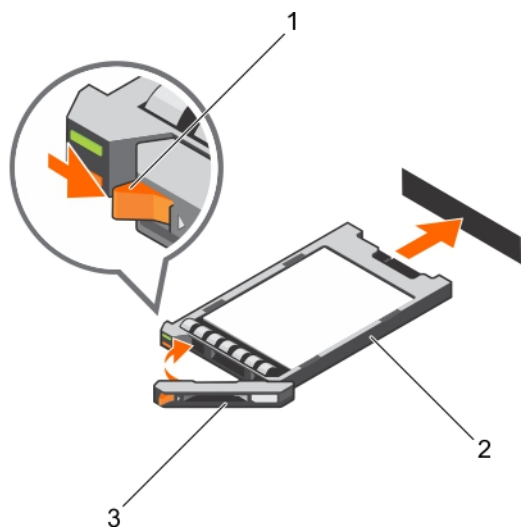
Figure 18. Installing a 1.8-inch hot swappable uSATA SSD

1	release button	2	SSD carrier
3	SSD carrier handle		

Related links

Safety instructions

Installing hard drive into hard-drive carrier

Removing hard drive from hard-drive carrier

Prerequisites

⚠ **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 are shipped with your product.**

1   Ensure that you read the Safety instructions section in this document.

2   Follow the procedure listed in Before working inside your system section in this document.

⚠ **CAUTION: To maintain proper system cooling, all empty hard-drive slots must have hard-drive blanks installed.**

Steps

1   Push out at the edges of the carrier to disengage the tabs on the hard-drive carrier from the slots on the hard drive.

2   Lift the hard-drive carrier away from the hard drive.
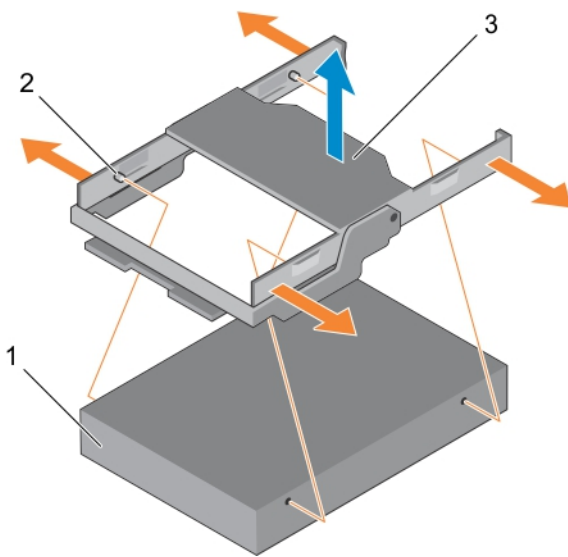
Figure 19. Removing and installing hard drive from hard-drive carrier

1	Hard drive	2	Tab on the hard-drive carrier (4)
3	Hard-drive carrier		

Next steps

Follow the procedure listed in After working inside your system section in this document.

Related links

Safety instructions
Before working inside your system
After working inside your system

Installing hard drive into hard-drive carrier

Prerequisites

1   Ensure that you read the Safety instructions section in this document.

2   Follow the procedure listed in Before working inside your system section in this document.

⚠ 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 are shipped with your product.

Steps

1   Align the tabs on the hard-drive carrier with the slots on the hard drive.

2   Pull the edges of the carrier to fit over the hard drive.

3   Lower the hard-drive carrier onto the hard drive to secure it.

Next steps

Follow the procedure listed in After working inside your system section in this document.

Related links

Safety instructions
Before working inside your system
After working inside your system

Cooling fans

Your system supports six hot-swappable cooling fans.

ⓘ **NOTE: If there is an issue with a particular fan, the fan number is referenced by the system management software, allowing you to easily identify and replace the proper fan by noting the fan numbers on the cooling-fan assembly.**

Removing a cooling fan

Prerequisites

1   Ensure that you read the Safety instructions section in this document.

2   Complete the tasks listed in Before working inside your system section in this document.

⚠ 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 are shipped with your product.

⚠ CAUTION: The cooling fans are hot-swappable. To maintain proper cooling while the system is on, replace only one fan at a time.

ⓘ **NOTE: The procedure for removing each fan is identical.**

Steps

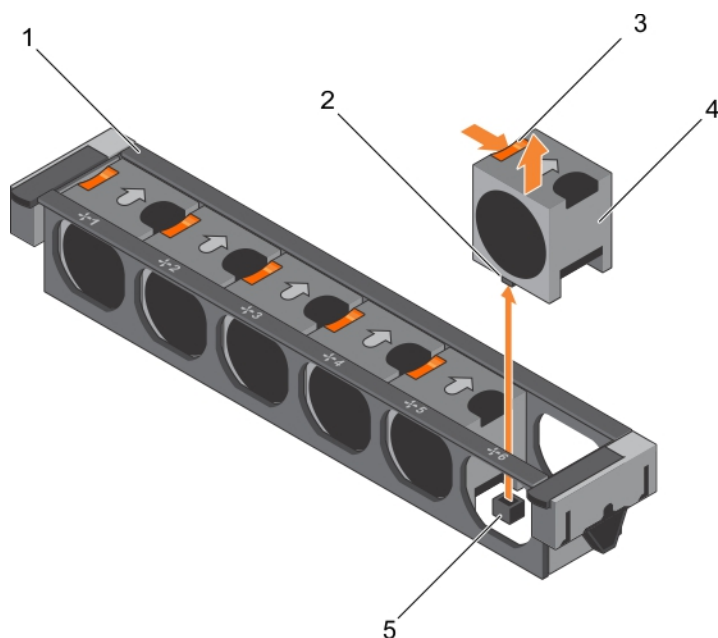Press the fan release tab and lift the cooling fan out of the cooling-fan assembly.

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Figure 20. Removing and installing a cooling fan

1	cooling-fan assembly	2	cooling-fan connector (6)
3	fan release tab (6)	4	cooling fan (6)
5	cooling-fan connector on system board (6)		

Next steps

1   Replace the cooling fan. See the Installing a cooling fan section in this document.
2   Complete the tasks listed in the After working inside your system section in this document.

Related links

Safety instructions
Before working inside your system
Installing a cooling fan
After working inside your system

Installing a cooling fan

Prerequisites

1   Ensure that you read the Safety instructions section in this document.
2   Complete the tasks listed in the Before working inside your system section in this document.

⚠ **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 are shipped with your product.**

Steps

1   Align the plug at the base of the cooling fan with the connector on the system board.
2   Slide the cooling fan into the securing slots until the tabs lock into place.

Next steps

Complete the tasks listed in the After working inside your system section in this document.

Cooling fan assembly

The cooling fan assembly ensures that the key components of the server such as the processors, hard drives, and memory get adequate air circulation to keep them cool. A failure in the server's cooling system can result in the server overheating and may lead to damage.

Removing the cooling fan assembly

Prerequisites

1   Follow the safety guidelines listed in the Safety instructions section.

2   Follow the procedure listed in the Before working inside your system section.

⚠ **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 are shipped with your product.**

Steps

1   Unlock the cooling fan assembly from the chassis by lifting the release levers.

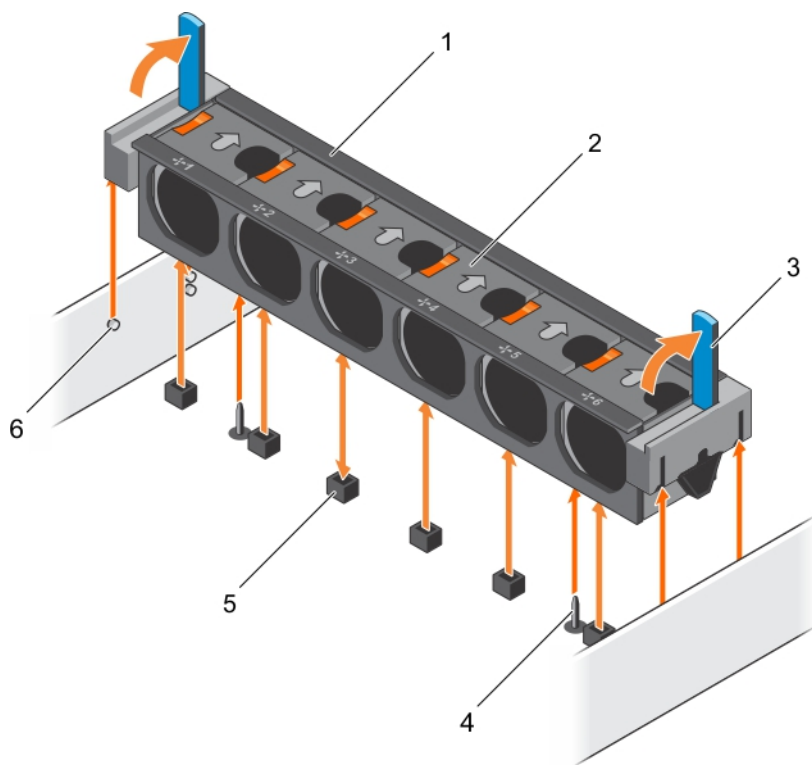2   Lift the cooling fan assembly out of the chassis.

Figure 21. Removing the cooling fan assembly

1	cooling fan assembly	2	cooling fan (6)
3	release lever (2)	4	guide pin on the system board (2)

| 5 | cooling fan connector (6) | 6 | guide pin on the chassis (6) |

Next steps

1 Install the cooling fan assembly.

2 Follow the procedure listed in the After working inside your system section.

Related links

Safety instructions
Before working inside your system
After working inside your system

Installing the cooling fan assembly

Prerequisites

⚠ **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 are shipped with your product.**

1 Follow the safety guidelines listed in Safety instructions section.

2 Follow the procedure listed in the Before working inside your system section.

⚠ **CAUTION: Ensure that the cables are correctly installed and retained by the cable retention bracket before installing the cooling fan assembly. Incorrectly installed cables may get damaged.**

Steps

1 Align the slots on the cooling fan assembly with the guide pins on the chassis.

2 Slide the cooling fan assembly into the chassis.

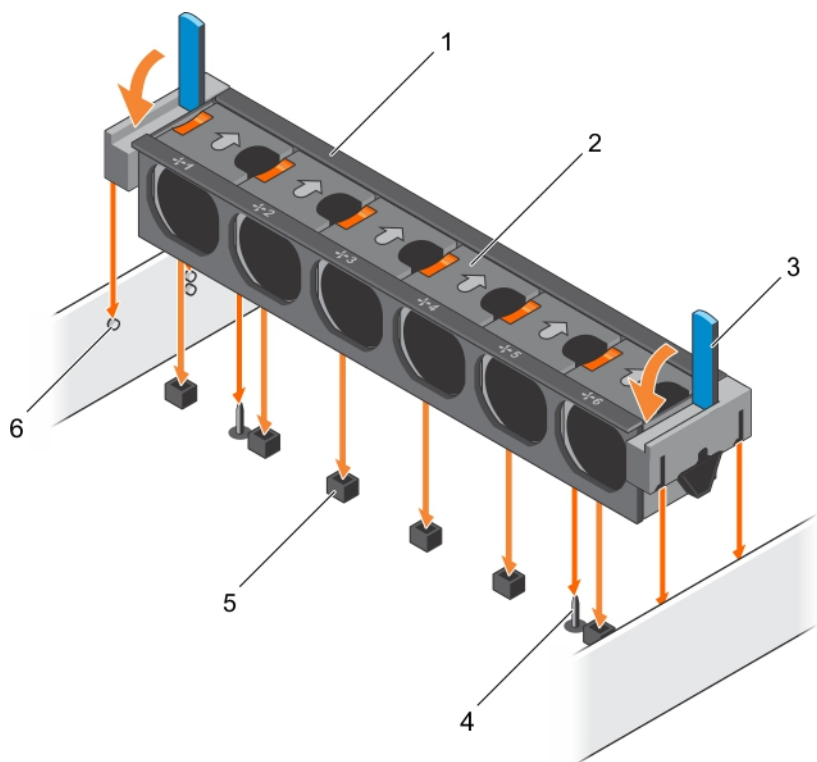3 Lock the cooling fan assembly into the chassis by lowering the release levers until firmly seated.

Figure 22. Installing the cooling fan assembly

1	cooling fan assembly	2	cooling fan (6)
3	release lever (2)	4	guide pin on the system board (2)
5	cooling fan connector (6)	6	guide pin on the chassis (6)

Next steps

Follow the procedure listed in the After working inside your system section.

Related links

Safety instructions
Before working inside your system
After working inside your system

Expansion cards and expansion card riser

An expansion card in the server is an add-on card that can be inserted into an expansion slot on the system board or riser card to add enhanced functionality to the system through the expansion bus.

ⓘ NOTE: A System Event Log (SEL) event is logged if an expansion card riser is unsupported or missing. It does not prevent your system from turning on and no BIOS POST message or F1/F2 pause is displayed.

Expansion card installation guidelines

Depending on your system configuration:

The following PCI Express generation 3 expansion cards are supported:

Table 25. Supported expansion cards

Riser	PCIe slot	Processor connection	Height	Length	Link width	Slot width
1	1	Processor 2	Low Profile	Half Length	x8	x16
1	2	Processor 2	Low Profile	Half Length	x8	x16
1	3	Processor 2	Low Profile	Half Length	x8	x16
2	4	Processor 2	Full Height	Full Length	x16	x16
2	5	Processor 1	Full Height	Full Length	x8	x16
3 (default)	6	Processor 1	Full Height	Full Length	x8	x16
3 (alternate)	6	Processor 1	Full Height	Full Length	x16	x16
3 (default)	7	Processor 1	Full Height	Full Length	x8	x16

(i) **NOTE: To use the PCIe slots 1 through 4 on the riser, both the processors must be installed.**

(i) **NOTE: The expansion-card slots are not hot-swappable.**

The following table provides guidelines for installing expansion cards to ensure proper cooling and mechanical fit. The expansion cards with the highest priority should be installed first using the slot priority indicated. All other expansion cards should be installed in card priority and slot priority order.

Table 26. Expansion card installation order

Card priority	Card type	Slot priority	Max allowed
		NX3230	NX3230
1	PCIe Bridge	4	1
2	GPU (double wide)	Not supported	0
	GPU (single wide)	Not supported	0
3	RAID H730P (low profile)	3, 2	1
4	RAID H830	6, 4, 5	2
	RAID H830 (low profile)	3, 2	2
5	40 Gb NICs (full height)	4, 6, 5	3
	40 Gb NICs (low profile)	3, 2, 1	3
6	FC16 HBA (full height)	4, 6, 5	3
	FC16 HBA (low profile)	2, 3, 1	3
7	10 Gb NICs (full height)	4, 6, 5	3
	10 Gb NICs (low profile)	2, 3, 1	3
8	FC8 HBA (full height)	4, 6, 5	3
	FC8 HBA (low profile)	2, 3, 1	3
9	1 Gb NICs (full height)	4, 6, 5	3
	1 Gb NICs (low profile)	2, 3, 1	3
10	12 Gb SAS (low profile)	3, 2, 1	3
	12 Gb SAS (full height)	6, 4, 5	3

Card priority	Card type	Slot priority	Max allowed
		NX3230	NX3230
11	Integrated RAID	Integrated slot	1
12	NDC	Integrated slot	1

Removing an expansion card from expansion card riser 2 or 3

Prerequisites

⚠ **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 are shipped with your product.**

1 Follow the safety guidelines listed in the Safety instructions section.
2 Follow the procedure listed in the Before working inside your system section.
3 When removing a card from riser 3, ensure that the PCIe holder latch is closed.

ⓘ **NOTE: The procedure for installing and removing a full length PCIe card is similar to the procedure for removing and installing a GPU card.**

Steps

1 Disconnect any cables connected to the expansion card.
2 Lift the expansion card latch out of the guide slot.
3 Hold the expansion card by its edges, and remove it from the expansion card connector.
4 If you are removing the card permanently, install a metal filler bracket over the empty expansion slot opening and close the expansion card latch.

ⓘ **NOTE: You must install a filler bracket over an empty expansion card slot to maintain Federal Communications Commission (FCC) certification of the system. The brackets also keep dust and dirt out of the system and aid in proper cooling and airflow inside the system.**

5 Install the expansion card latch into the slot.
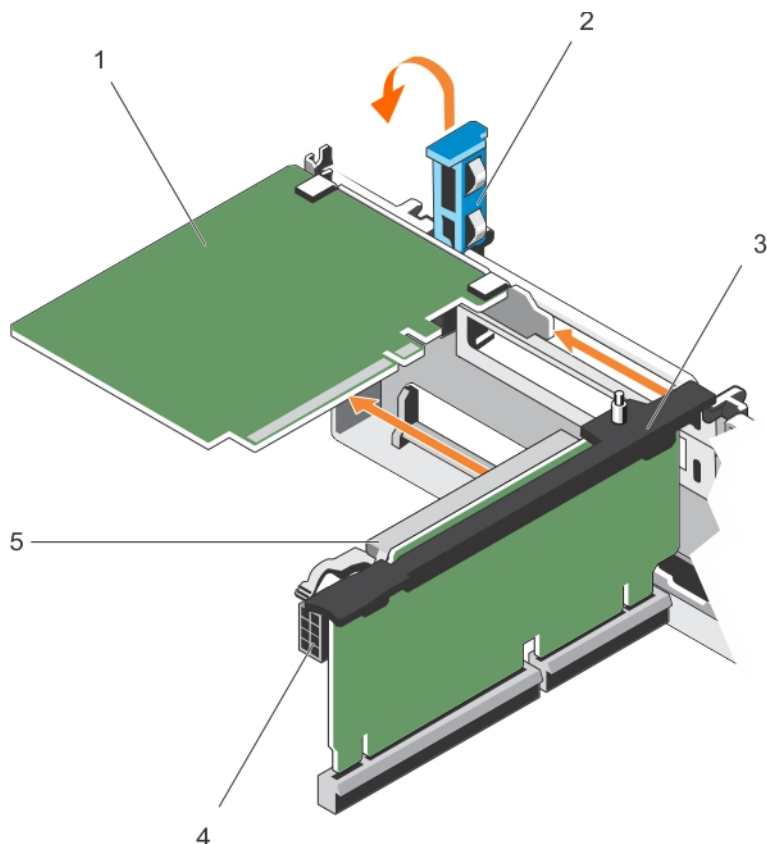6 Close the expansion card locking tabs.

Figure 23. Removing an expansion card from expansion card riser 2 or 3

1	expansion card	2	expansion card latch
3	expansion card riser	4	power connector (for GPU cards)
5	expansion card connector		

Next steps

1 Install an expansion card into the expansion card riser.
2 Follow the procedure listed in the After working inside your system section.

Related video

http://www.Dell.com/XCSeries/XC730xd/PCI

Related links

Safety instructions
Before working inside your system
After working inside your system

Installing an expansion card into the expansion card riser 2 or 3

Prerequisites

1   Follow the safety guidelines listed in the Safety instructions section.

2   Follow the procedure listed in the Before working inside your system section.

⚠ **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 are shipped with your product.**

Steps

1   Unpack the expansion card and prepare it for installation.

     For instructions, see the documentation accompanying the card.

2   Lift the expansion card latch and remove the filler bracket.

3   Holding the card by its edges, position the card so that the connector on the expansion card aligns with the expansion card connector on the riser.

4   Insert the card-edge connector firmly into the expansion card connector until the card is fully seated.

5   Press the touch points to open the expansion card locking tabs.

6   Close the expansion card latch.

7   If applicable, connect the cables to the expansion card.

ⓘ **NOTE: When installing a GPU card on riser 2 or riser 3 (default), connect the GPU card power cable to the power connector on the riser.**
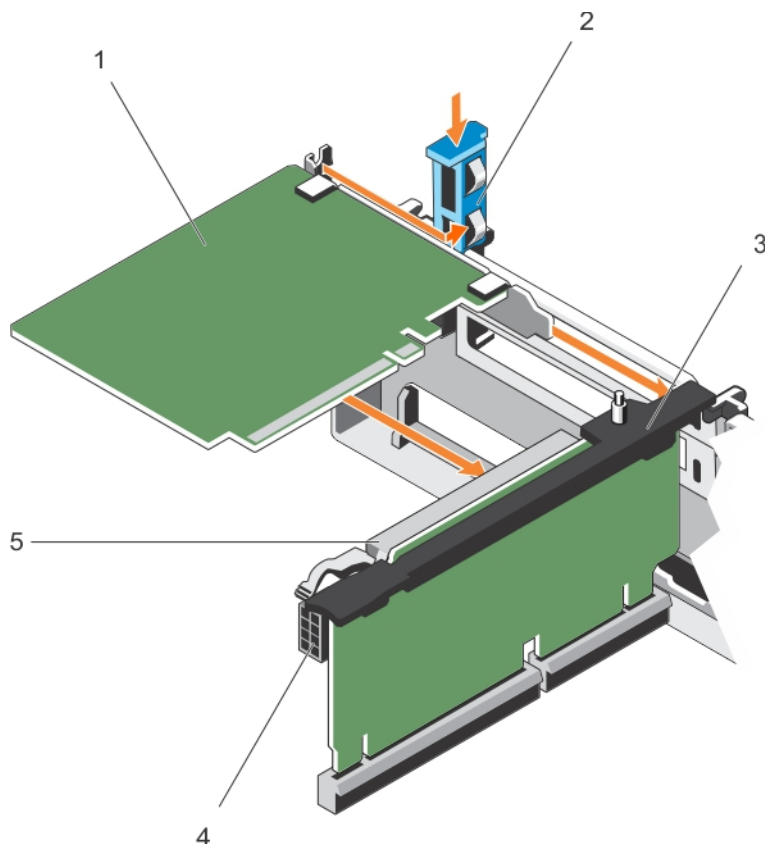
Figure 24. Installing an expansion card into the expansion card riser 2 or 3

1	expansion card	2	expansion card latch
3	expansion card riser	4	power connector (for GPU cards)
5	expansion card connector		

Next steps

1   Follow the procedure listed in the After working inside your system section.
2   Install any device drivers required for the card as described in the documentation for the card.

Related links

Safety instructions
Before working inside your system
After working inside your system

Removing an expansion card from the expansion card riser 1

Prerequisites

⚠ **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 are shipped with your product.**

1   Follow the safety guidelines listed in the Safety instructions section.
2   Follow the procedure listed in the Before working inside your system section.
3   Disconnect any cables connected to the expansion card.
4   Remove the expansion card riser.

(i) **NOTE: The expansion card riser 1 can be used only when both the processors are installed.**

Steps

1   Press tab A and rotate the latch clockwise.

2   Press tab B and rotate the latch downward.

3   Remove the expansion card from the expansion card riser 1.

4   If you are removing the card permanently, install a metal filler bracket over the empty expansion slot opening, and then close the expansion card latch.

(i) **NOTE: You must install a filler bracket over an empty expansion card slot to maintain Federal Communications Commission (FCC) certification of the system. The brackets also keep dust and dirt out of the system and aid in proper cooling and airflow inside the system.**

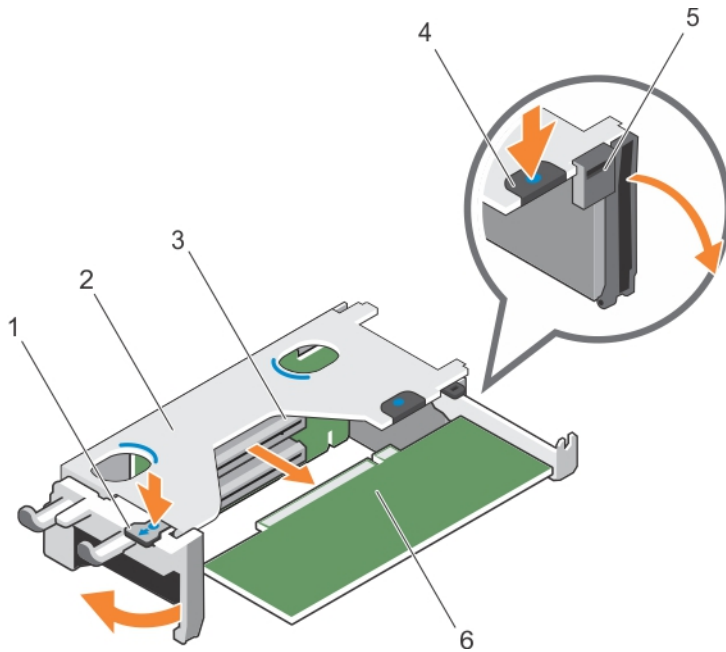5   Close the latches of tab A and tab B.

Figure 25. Removing an expansion card from expansion card riser 1

1	tab A	2	expansion card riser 1 cage
3	expansion card connector	4	tab B
5	latch	6	expansion card

Next steps

1   Install the expansion card.

2   Install the expansion card riser.

3   Follow the procedure listed in the After working inside your system section.

Related links

Safety instructions

Before working inside your system

After working inside your system

Installing an expansion card into the expansion card riser 1

Prerequisites

1   Follow the safety guidelines listed in the Safety instructions section.
2   Follow the procedure listed in the Before working inside your system section.
3   Remove the expansion card riser.

⚠ **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 are shipped with your product.**

ⓘ **NOTE: The expansion card riser 1 can be used only when both the processors are installed.**

Steps

1   Unpack the expansion card and prepare it for installation.

   For instructions, see the documentation accompanying the card.
2   Press tab A and rotate the latch clockwise.
3   Press tab B and rotate the latch down.
4   Holding the card by its edges, position the card so that the card-edge connector aligns with the expansion card connector.
5   Insert the card-edge connector firmly into the expansion card connector until the card is fully seated.
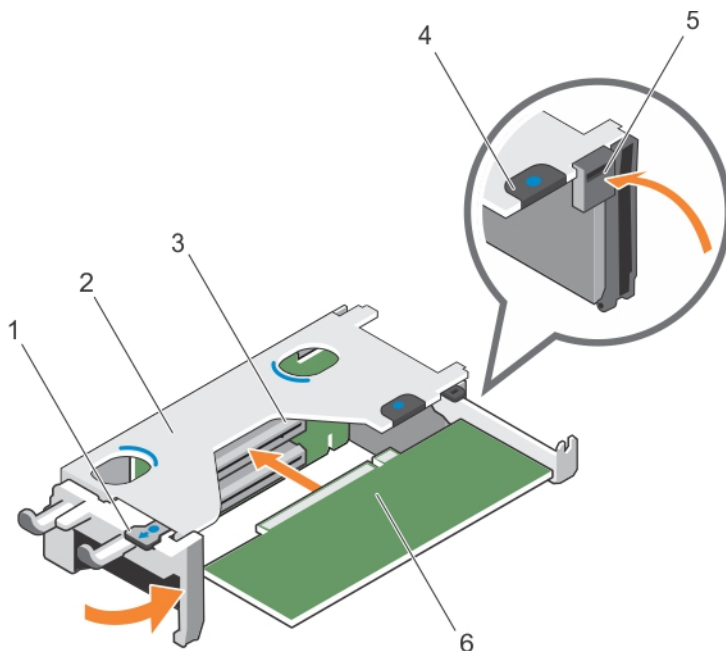6   Close the latches of tab A and tab B.

Figure 26. Installing an expansion card into the expansion card riser 1

1	tab A	2	expansion card riser 1 cage
3	expansion card connector	4	tab B
5	latch	6	expansion card

Next steps

1   Install the expansion card riser.
2   If applicable, connect any cables to the expansion card.

3   Follow the procedure listed in the After working inside your system section.

4   Install any device drivers required for the card as described in the documentation for the card.

Related links

Safety instructions
Before working inside your system
After working inside your system

Removing the riser 1 blank

Prerequisites

⚠ **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 are shipped with your product.**

1   Ensure that you read the Safety instructions section in this document.

2   Complete the tasks listed in Before working inside your system section in this document.

3   Remove the expansion card riser.

Steps

Press tabs on the riser 1 blank and push the riser 1 blank out of the chassis.
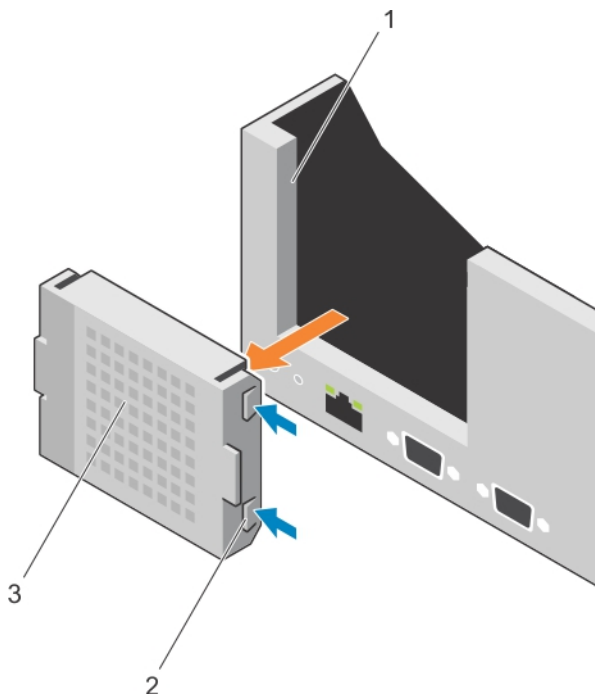

Figure 27. Removing and installing the riser 1 blank

1 slot on the chassis	2 tab (2)
3 riser 1 blank	

Related links

Safety instructions
Before working inside your system

Installing the riser 1 blank

To install the riser 1 blank, align the blank with the slot on the chassis and insert it into the chassis until it clicks into place.

Removing expansion card risers

Prerequisites

⚠ **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 are shipped with your product.**

1   Ensure that you read the Safety instructions section in this document.
2   Complete the tasks listed in Before working inside your system section in this document.
3   If installed, remove any expansion card installed on riser 2 and 3.

ⓘ **NOTE: The expansion card riser 1 can be used only when both the processors are installed.**

Steps

Holding the slots on the expansion card riser, lift the riser from the riser connector on the system board.

ⓘ **NOTE: To remove expansion card risers 2 and 3, hold the edges of the expansion card riser.**

ⓘ **NOTE: To ensure proper system cooling, the riser 1 blank must be installed in the riser 1 slot. Remove the riser 1 blank only if you are installing riser 1.**
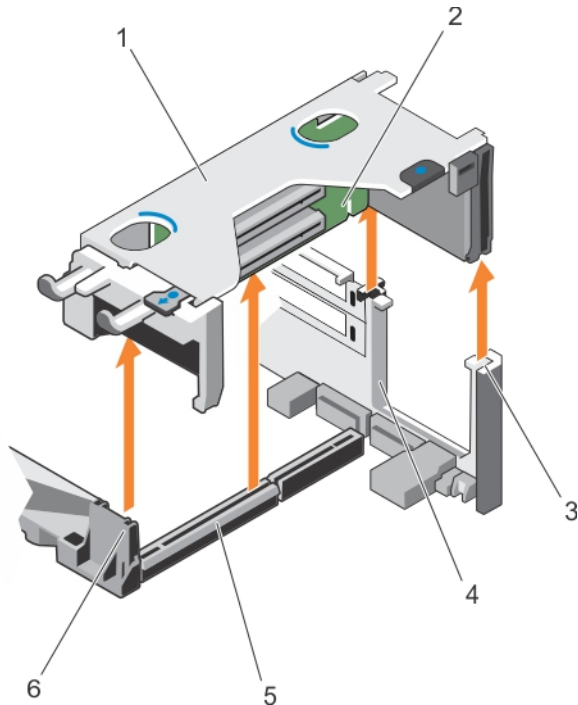
Figure 28. Removing and installing the expansion card riser 1

1	expansion card riser 1 cage	2	expansion card riser 1
3	riser guide-back (right)	4	riser guide-back (left)

5	expansion card riser 1 connector	6	riser guide-front
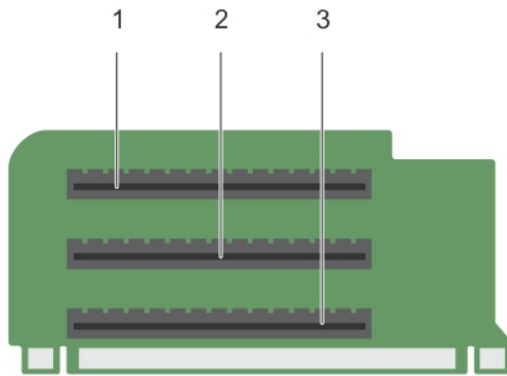
Figure 29. Identifying connectors on the expansion card riser 1

1	expansion card slot 1	2	expansion card slot 2
3	expansion card slot 3		

Figure 30. Removing and installing the expansion card riser 2

1	power connector (for GPU cards)	2	expansion card riser 2
3	riser guide-back	4	expansion card riser 2 connector

5   riser guide-front

Figure 31. Identifying connectors on the expansion card riser 2

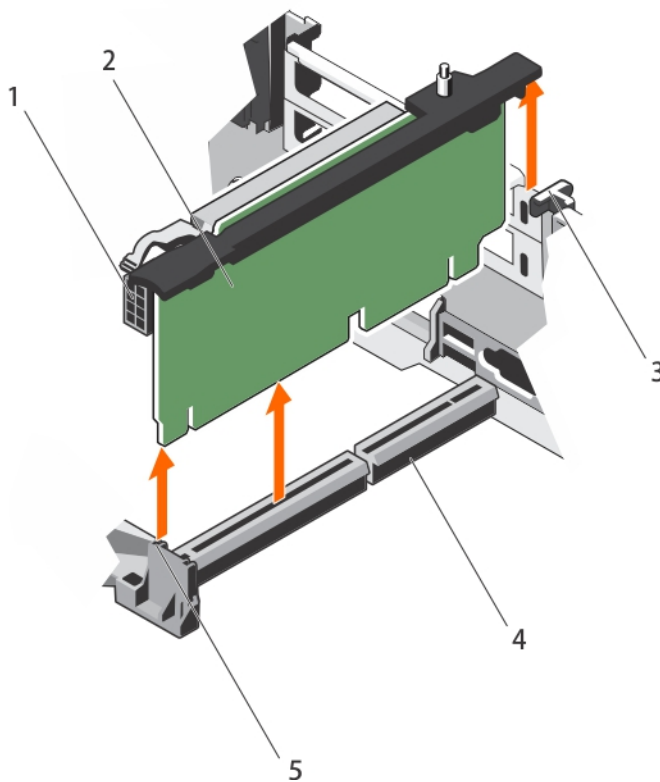1   expansion card slot 4   2   expansion card slot 5
3   power connector (for GPU cards)

Figure 32. Removing and installing the expansion card riser 3

1   riser guide-front   2   power connector (for GPU cards)
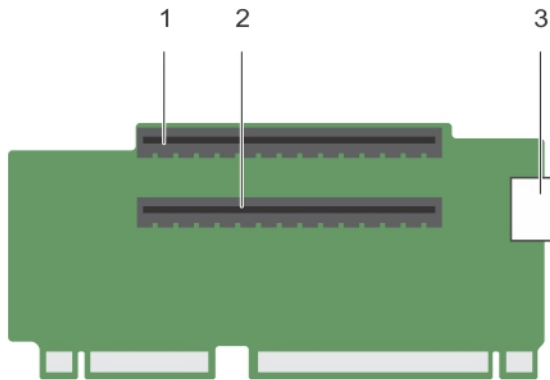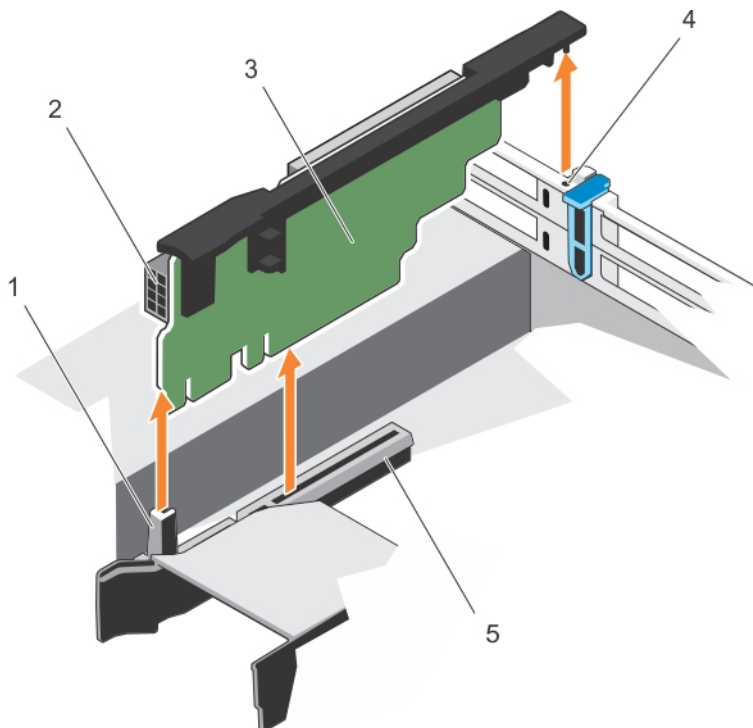3   expansion card riser 3   4   riser guide-back
5   expansion card riser 3 connector
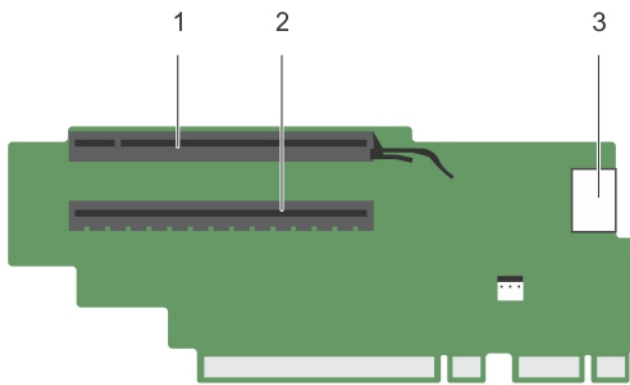
Figure 33. Identifying connectors on the expansion card riser 3 (default)

1	expansion card slot 6	2	expansion card slot 7
3	power connector (for GPU cards)		
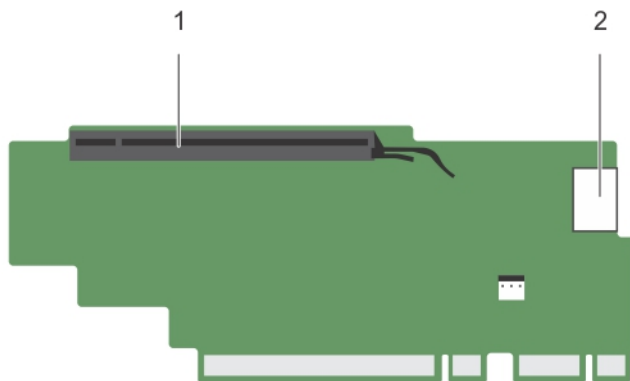
Figure 34. Identifying connectors on the expansion card riser 3 (alternate)

1	expansion card slot 6	2	power connector (for GPU cards)

Next steps

1   If applicable, remove or install an expansion card on the riser.
2   If applicable, replace the expansion card riser.
3   Complete the tasks listed in After working inside your system section in this document.

Related links

Safety instructions
Before working inside your system
After working inside your system

Installing expansion card risers

Prerequisites

1   Ensure that you read the Safety instructions section in this document.

2   Complete the tasks listed in Before working inside your system section in this document.

3   If applicable, reinstall the expansion card(s) into the expansion card riser 1.

⚠ **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 are shipped with your product.**

Steps

1   Align the expansion card riser with the connectors and the riser guides on the system board.

2   Lower the expansion card riser into place until the expansion card riser is fully seated in the connector.

Next steps

1   Install the expansion card(s) into the expansion card risers 2 or 3.

2   Complete the tasks listed in After working inside your system section in this document.

3   Install any device drivers required for the card as described in the documentation for the card.

Related links

Safety instructions
Before working inside your system
After working inside your system

SD vFlash card (optional)

An SD vFlash card is a Secure Digital (SD) card that plugs into the SD vFlash card slot in the iDRAC port card. It provides persistent on-demand local storage and a custom deployment environment that enables automation of server configuration, scripts, and imaging. It emulates USB device(s). For more information, see the Integrated Dell Remote Access Controller User's Guide at **Dell.com/idracmanuals**.

Removing the optional SD vFlash card

Prerequisites

1   Follow the safety guidelines listed in the Safety instructions section.

2   Locate the SD vFlash card slot at the back of the chassis.

Steps

To remove the SD vFlash card, push the SD vFlash card inward to release it, and pull the SD vFlash card from the SD vFlash card slot.
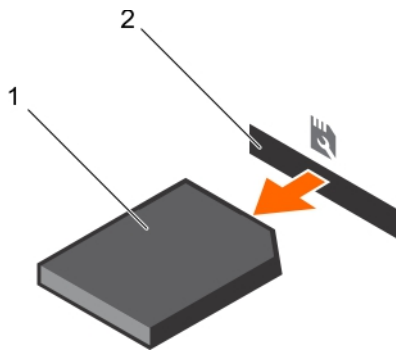
Figure 35. Removing the optional SD vFlash card

1	SD vFlash card	2	SD vFlash card slot

Related links

Safety instructions

Removing the vFlash media unit

Prerequisites

1 Ensure that you read the Safety instructions section in this document.
2 Complete the tasks listed in Before working inside your system section in this document.

⚠ **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 are shipped with your product.**

Steps

1 Remove the screw securing the vFlash media unit to the chassis.
2 Remove the cable from the vFlash media unit and the backplane.
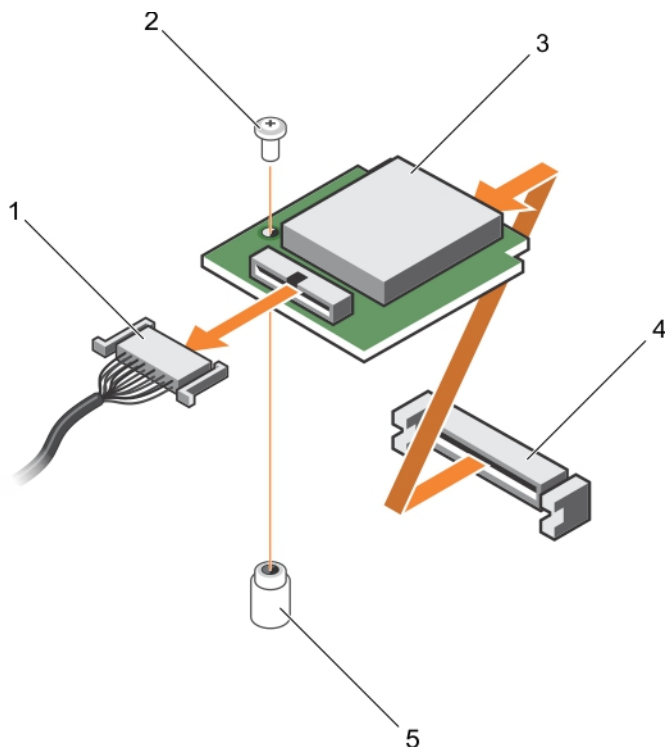3 Slide the vFlash media unit toward the front of chassis and lift it out of the system.

Figure 36. Removing and installing the vFlash media unit

1	cable	2	screw
3	vFlash media unit	4	vFlash media slot
5	standoff		

Next steps

Complete the tasks listed in After working inside your system section in this document.

Related links

Safety instructions
Before working inside your system
After working inside your system

Installing the vFlash media unit

Prerequisites

1 Ensure that you read the Safety instructions section in this document.

2 Complete the tasks listed in Before working inside your system section in this document.

⚠ **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 are shipped with your product.**

Steps

1 Slide in and align the vFlash media unit with the vFlash media slot on the back of the chassis.

2 Connect the cable to the vFlash media unit.

3 Replace the screw securing the vFlash media unit to the chassis.

Next steps

Complete the tasks listed in After working inside your system section in this document.

Related links

Safety instructions
Before working inside your system
After working inside your system

Integrated storage controller card

Your system includes a dedicated expansion card slot on the system board for an integrated storage controller card. The integrated storage controller card provides the integrated storage subsystem for the internal hard drives in your system. The controller supports SAS and SATA hard drives and also enables you to set up the hard drives in RAID configurations. The RAID configurations depend on the version of the storage controller included with your system.

Removing integrated storage controller card

Prerequisites

1   Follow the safety guidelines listed in the Safety instructions section.

2   Follow the procedure listed in the Before working inside your system section.

3   Remove the cooling shroud.

4   Remove the expansion-card riser 1.

5   Keep the #2 Phillips screwdriver handy.

⚠ **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 are shipped with your product.**

Steps

1   Loosen the screws that secure the integrated storage controller cable to the integrated storage-controller card connector on the system board.

2   Lift out the integrated storage controller cable.

3   Lift one end of the card and angle it to disengage the card from the integrated storage-controller card holder on system board.

4   Lift the card out of the chassis.
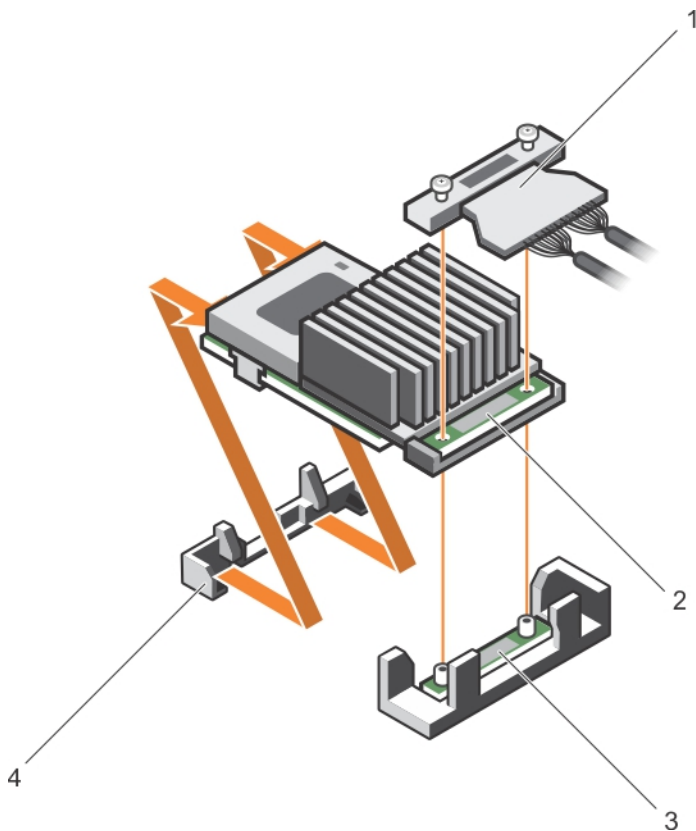
Figure 37. Removing and installing integrated storage controller card

1	Integrated storage controller cable	2	Integrated storage controller card
3	Integrated storage-controller card connector on the system board	4	Integrated storage controller card holder

Next steps

1   Replace the expansion-card riser 1.
2   Replace the cooling shroud.
3   Follow the procedure listed in the After working inside your system section.

Related links

Safety instructions
Before working inside your system
After working inside your system

Installing integrated storage controller card

Prerequisites

1   Follow the safety guidelines listed in the Safety instructions section.
2   Follow the procedure listed in the Before working inside your system section.
3   Remove the cooling shroud.
4   Remove the expansion-card riser 1.
5   Keep the #2 Phillips screwdriver handy.

⚠ **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 are shipped with your product.**

Steps

1   Align the end of the integrated storage-controller card opposite the connector with the integrated storage-controller card holder.

2   Lower the connector side of the integrated storage-controller card into the integrated storage-controller card connector on the system board.

      Ensure that the tabs on the system board align with the screw holes on the integrated storage-controller card.

3   Align the screws on the integrated storage-controller card cable with the screw holes on the connector.

4   Tighten the screws to secure the integrated storage-controller card cable with the integrated storage-controller card connector on the system board.

Next steps

1   Replace the expansion-card riser 1.

2   Replace the cooling shroud.

3   Follow the procedure listed in the After working inside your system section.

Related links

Safety instructions
Before working inside your system
After working inside your system

Network daughter card

The Network daughter card (NDC) is a small, removable mezzanine card. The NDC provides you with the flexibility of choosing different network connectivity options, for example—4 x 1GbE, 2 x 10GbE and 2 x Converged Network Adapter.

Removing the network daughter card

Prerequisites

1   Follow the safety guidelines listed in the Safety instructions section.

2   Follow the procedure listed in the Before working inside your system section.

3   If installed, remove the expansion card riser 2.

4   Keep the Phillips #1 screwdriver ready.

⚠ **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 are shipped with your product.**

Steps

1   Loosen the captive screws that secure the network daughter card (NDC) to the system board.

2   Hold the NDC by the edges on either side of the touch point, and lift the card to disengage it from the connector on the system board.

3   Slide the NDC away from the back of the system until the Ethernet connectors are clear of the slot in the back panel.
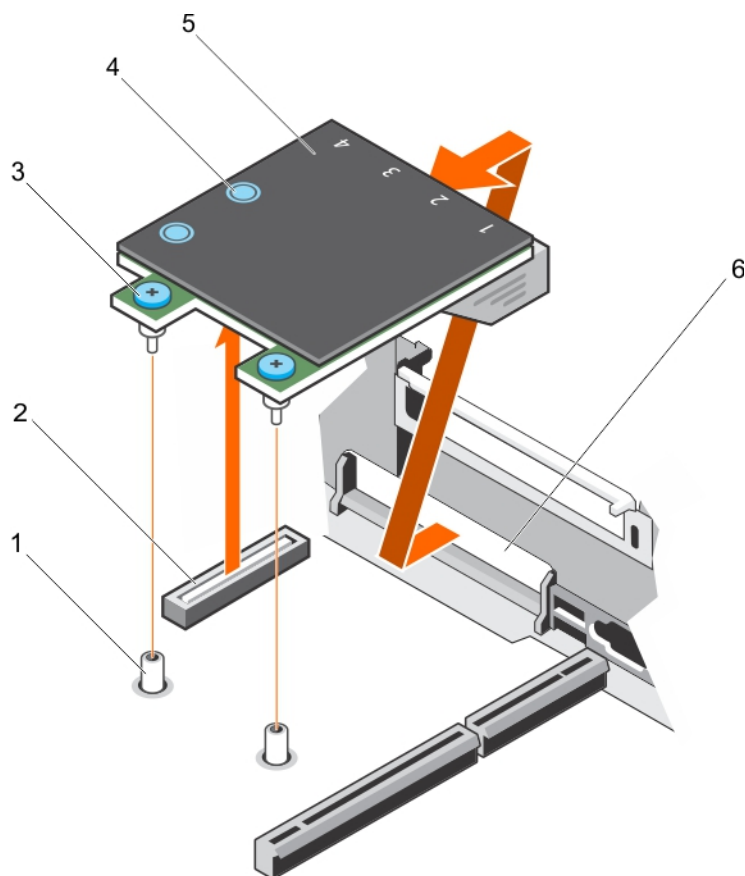
4   Lift the NDC out of the chassis.

Figure 38. Removing the NDC

1	captive screw socket (2)	2	connector on the system board
3	captive screw (2)	4	touch point (2)
5	network daughter card (NDC)	6	back panel slot for Ethernet connectors

Next steps

1. Install the NDC.
2. If removed, install the expansion card riser 1.
3. Follow the procedure listed in the After working inside your system section.

Related links

Safety instructions
Before working inside your system
After working inside your system

Installing the network daughter card

Prerequisites

1. Follow the safety guidelines listed in the Safety instructions section.
2. Follow the procedure listed in the Before working inside your system section.
3. If applicable, remove the expansion card riser 1.
4. Keep the Phillips #1 screwdriver ready.

⚠ **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 are shipped with your product.**

Steps

1   Orient the network daughter card (NDC) so that the Ethernet connectors fit through the slot in the back panel.
2   Align the captive screws on the card with the captive screw sockets on the system board.
3   Press the touch points on the card until the card connector is firmly seated on the system board connector.
4   Tighten the captive screws to secure the NDC to the system board.
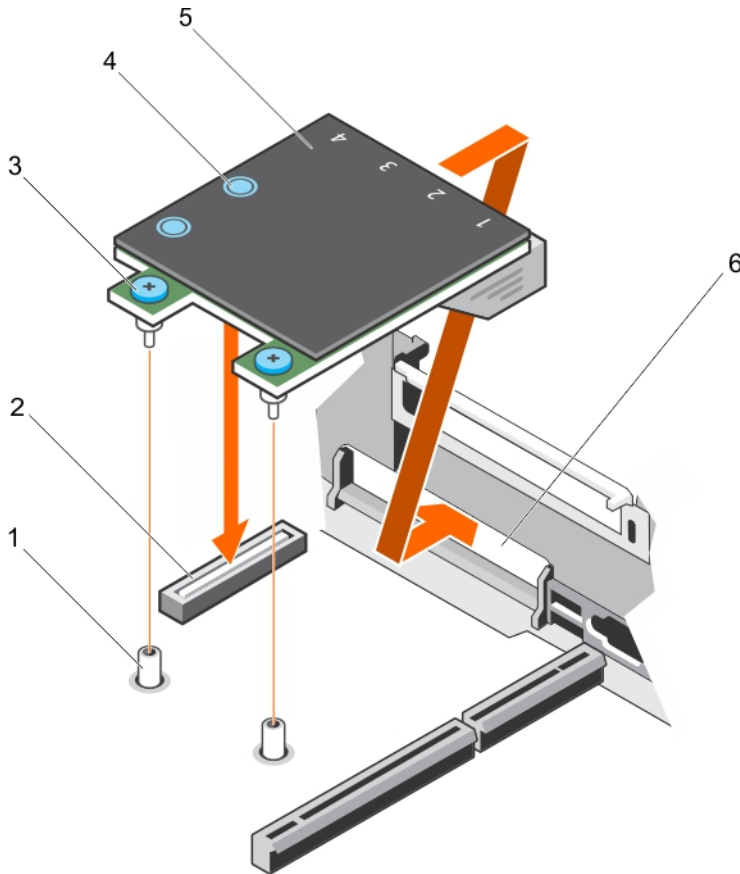
Figure 39. Installing the NDC

1	captive screw socket (2)	2	connector on the system board
3	captive screw (2)	4	touch point (2)
5	network daughter card (NDC)	6	back panel slot for Ethernet connectors

Next steps

1   If applicable, install the expansion card(s) in the expansion card riser 2.
2   Follow the procedure listed in the After working inside your system section.

Related links

Safety instructions
Before working inside your system
After working inside your system

Processors and heat sinks

Use the following procedures when:

- Removing and installing a heat sink
- Installing an additional processor
- Replacing a processor

ⓘ NOTE: To ensure proper system cooling, you must install a processor blank in any empty processor socket.

Removing a processor

Prerequisites

⚠ 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 are shipped with your product.

ⓘ NOTE: This is a Field Replaceable Unit (FRU). Removal and installation procedures should be performed only by Dell certified service technicians.

ⓘ NOTE: If you are upgrading your system, download the latest system BIOS version from Dell.com/support and follow the instructions included in the compressed download file to install the update on your system.

ⓘ NOTE: You can update the system BIOS by using the Dell Lifecycle Controller.

ⓘ NOTE: To ensure proper system cooling, you must install a processor blank in any empty processor socket.

1   Follow the safety guidelines listed in the Safety instructions section.
2   Follow the procedure listed in the Before working inside your system section.
3   Keep the Phillips #2 screwdriver ready.
4   Remove the cooling shroud.
5   Remove the heat sink.

⚠ WARNING: The processor is hot to touch for some time after the system has been powered down. Allow the processor to cool before removing it.

⚠ CAUTION: The processor is held in its socket under strong pressure. Be aware that the release lever can spring up suddenly if not firmly grasped.

Steps

1   Release the *open first* socket lever near the unlock icon 🔓 by pushing the lever down and out from under the tab.

2   Release the *close first* socket release lever near the lock icon 🔒 by pushing the lever down and out from under the tab. Lift the lever 90 degrees upward.

3   Lower the *open first* socket-release lever to lift the processor shield.

4   Hold the tab on the processor shield and lift the processor shield until the *open first* socket-release lever lifts up.

   ⚠ CAUTION: The socket pins are fragile and can be permanently damaged. Be careful not to bend the pins in the socket when removing the processor out of the socket.

5   Lift the processor out of the socket and leave the *open first* socket-release lever up.

   ⓘ NOTE: If you are permanently removing the processor, you must install a socket protective cap in the vacant socket to protect the socket pins and keep the socket free of dust.

   ⓘ NOTE: After removing the processor, place it in an anti-static container for reuse, return, or temporary storage. Do not touch the bottom of the processor. Touch only the side edges of the processor.
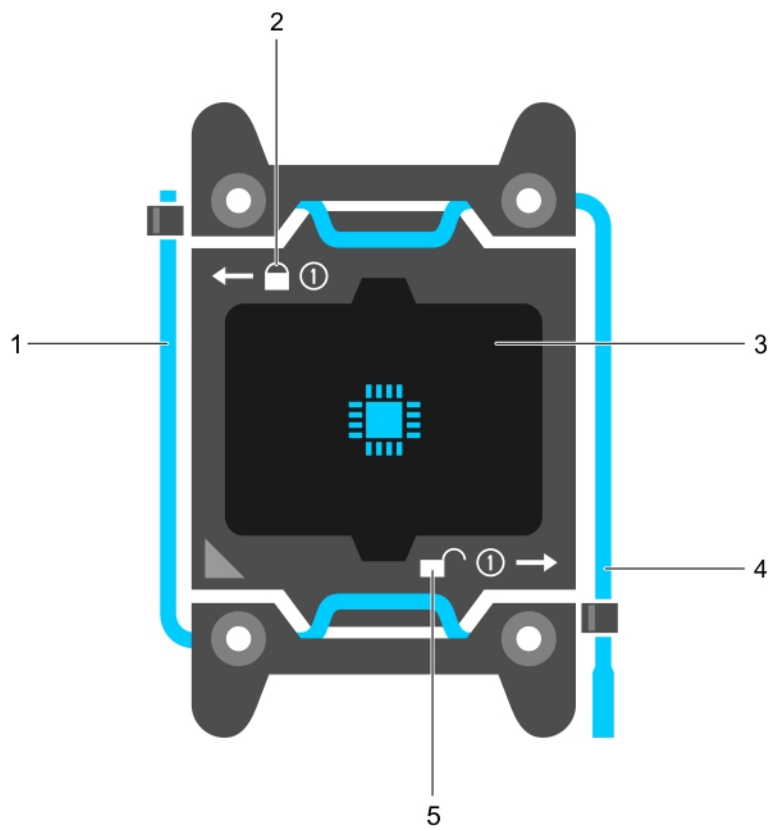
Figure 40. Processor shield

1	*close first* socket release lever	2	lock icon
3	processor	4	*open first* socket release lever
5	unlock icon		
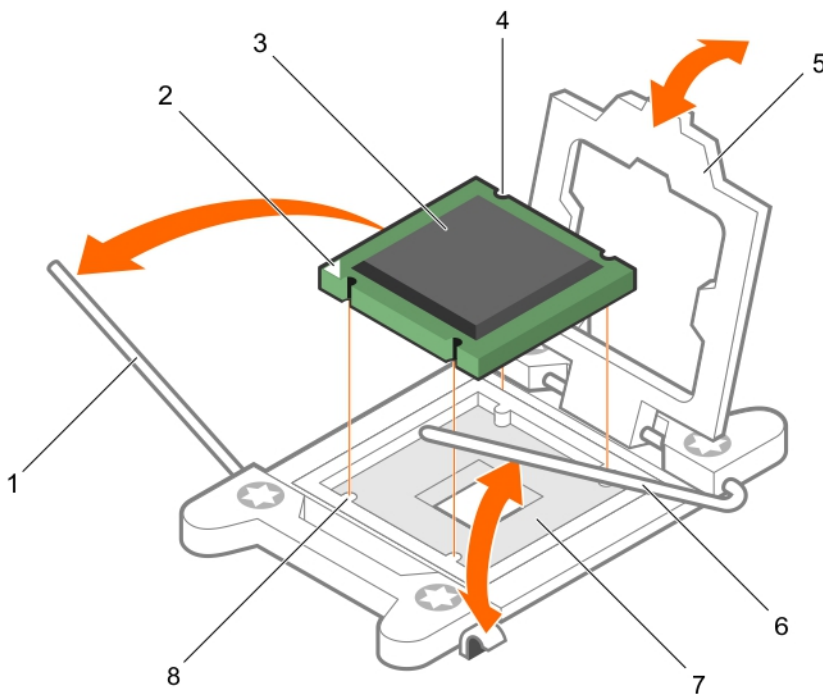
Figure 41. Removing a processor

1	*close first* socket-release lever	2	pin-1 indicator of processor
3	processor	4	slot (4)
5	processor shield	6	*open first* socket-release lever
7	socket	8	socket keys (4)

Next steps

1 Replace the processor(s).
2 Install the heat sink.
3 Reinstall the cooling shroud.
4 Follow the procedure listed in the After working inside your system section.

Related links

Safety instructions
Before working inside your system
After working inside your system

Installing a processor

Prerequisites

⚠ **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 are shipped with your product.**

1 Follow the safety guidelines listed in the Safety instructions section.

2   Follow the procedure listed in the Before working inside your system section.

3   Keep the Phillips #2 screwdriver ready.

4   If you are upgrading your system, download the latest system BIOS version from **Dell.com/support** and follow the instructions included in the compressed download file to install the update on your system.

> **NOTE: You can also update the system BIOS by using the Dell Lifecycle Controller.**

5   Remove the cooling shroud.

> **NOTE: If applicable, close the expansion card latch on the cooling shroud to release the full length card.**

6   If connected, disconnect the cables from expansion card(s).

7   If installed, remove the expansion card riser.

⚠ **WARNING: The heat sink and processor are too hot to touch for some time after the system has been powered down. Allow the heat sink and processor to cool down before handling them.**

△ **CAUTION: Never remove the heat sink from a processor unless you intend to remove the processor. The heat sink is necessary to maintain proper thermal conditions.**

ⓘ **NOTE: If you are installing a single processor, it must be installed in socket CPU1.**

Steps

1   Unpack the new processor.

> **NOTE: If the processor has previously been used in a system, remove any remaining thermal grease from the processor by using a lint-free cloth.**

2   Locate the processor socket.

3   If applicable, remove the socket protective cap.

4   Release the *open first* socket-release lever near the unlock icon 🔓 by pushing the lever down and out from under the tab.

5   Similarly, release the *close first* socket-release lever near the lock icon 🔒 by pushing the lever down and out from under the tab. Lift the lever 90 degrees upward.

6   Hold the tab near the lock symbol on the processor shield and lift it up and out of the way.

> △ **CAUTION: Positioning the processor incorrectly can permanently damage the system board or the processor. Be careful not to bend the pins in the socket.**

> △ **CAUTION: While removing or reinstalling the processor, wipe your hands of any contaminants. Contaminants on the processor pins such as thermal grease or oil can damage the processor.**

7   Align the processor with the socket keys.

> △ **CAUTION: Do not use force to seat the processor. When the processor is positioned correctly, it engages easily into the socket.**

8   Align the pin-1 indicator of the processor with the triangle on the system board.

9   Place the processor on the socket such that the slots on the processor align with the socket keys.

10   Close the processor shield.

11   Lower the *close first* socket-release lever near the lock icon 🔒 and push it under the tab to lock it.

12   Similarly, lower the *open first* socket-release lever near the unlock icon 🔓 and push it under the tab to lock it.
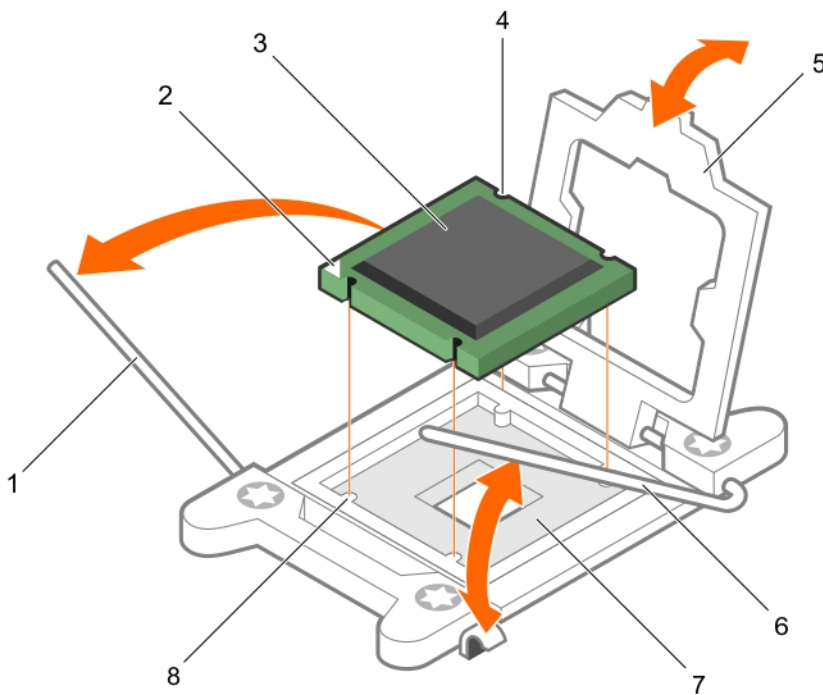
Figure 42. Installing a processor

1	socket-release lever 1	2	pin–1 corner of the processor
3	processor	4	slot (4)
5	processor shield	6	socket-release lever 2
7	processor socket	8	tab (4)

Next steps

ⓘ NOTE: Ensure that you install the heat sink after you install the processor. The heat sink is necessary to maintain proper thermal conditions.

1   Install the heat sink.

2   If removed, reinstall the PCIe expansion card riser.

3   If disconnected, reconnect the cables to the expansion card(s).

4   Follow the procedure listed in the After working inside your system.

5   While booting, press F2 to enter System Setup and verify that the processor information matches the new system configuration.

6   Run the system diagnostics to verify that the new processor operates correctly.

Related links

Safety instructions

Before working inside your system

PCIe card holder

This section provides information about installing and removing PCIe card holder.

Removing the PCIe card holder

Prerequisites

1   Ensure that you read the Safety instructions section in this document.

2   Complete the tasks listed in the Before working inside your system section in this document.

3   If installed, remove the full-length PCIe card.

⚠ **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 are shipped with your product.**

⚠ **CAUTION: Do not use your system without the PCIe card holder installed. The PCIe card holder is necessary to ensure proper system cooling.**

Steps

1   Press the release tab and slide the card holder toward the back of the chassis to release the PCIe card holder from the chassis.

2   Lift the PCIe card holder out of the chassis.

ⓘ **NOTE: To ensure proper system cooling, you must replace the PCIe card holder.**
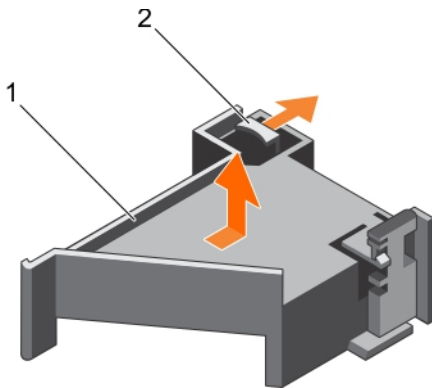
Figure 43. Removing and installing the PCIe card holder

1 PCIe card holder	2 release tab

Next steps

1   Replace the PCIe card holder. See Installing the PCIe card holder section in this document.

2   Complete the tasks listed in the After working inside your system section in this document.

Related links

Installing PCIe card holder
Safety instructions
Before working inside your system
After working inside your system

Installing PCIe card holder

Prerequisites

1   Ensure that you read the Safety instructions section in this document.

2   Complete the tasks listed in Before working inside your system section in this document.

⚠ 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 are shipped with your product.

⚠ CAUTION: Do not use your system without the PCIe card holder installed. The PCIe card holder is necessary to ensure proper system cooling.

Steps

1   Align the PCIe card holder with the notches and tabs on the PSU cage.

2   Press the release tab and slide PCIe card holder toward the front of the chassis until firmly seated.

Next steps

1   If applicable, replace the full-length PCIe card.

2   Complete the tasks listed in After working inside your system section in this document.

Related links

Safety instructions
Before working inside your system
After working inside your system

Opening and closing the PCIe card holder latch

Prerequisites

1   Ensure that you read the Safety instructions section in this document.

2   Complete the tasks listed in Before working inside your system section in this document.

⚠ 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 are shipped with your product.

Steps

1   To open the PCIe card holder latch, press the release tab.

2   To close the PCIe card holder latch, rotate the latch clockwise until it locks.

> ⓘ **NOTE: Before installing a full-length PCIe card, the PCIe card holder latch must be closed. When the full-length PCIe card is installed, open the PCIe card holder latch. Before removing the full-length PCIe card, you must close the PCIe card holder latch.**
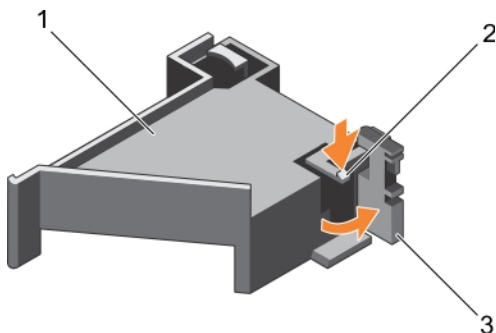

Figure 44. Opening and closing the PCIe card holder latch

1	PCIe card holder	2	release tab
3	PCIe card holder latch		

Next steps

Complete the tasks listed in After working inside your system section in this document.

Related links

Safety instructions
Before working inside your system
After working inside your system

Cable retention bracket

Cable retention bracket provides support to the installed cables. The cable retention bracket also helps to prevent the cables from moving out of place, which may result in loose connections and reduced air flow inside the server.

Removing the cable retention bracket

Prerequisites

1   Ensure that you read the Safety instructions section in this document.
2   Complete the tasks listed in Before working inside your system section in this document.
3   Remove the cooling shroud.
4   Remove the PCIe card holder.
5   Remove all cables routed through the cable retention bracket.

⚠ **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 are shipped with your product.**

Steps

1   Pull the tab to release it from the notch and slide the cable retention bracket toward the front of the chassis to release it from the chassis.
2   Lift the cable retention bracket out of the chassis.

Figure 45. Removing and installing the cable retention bracket
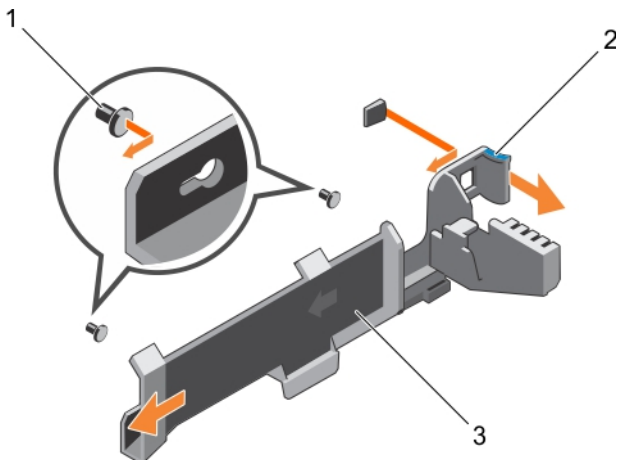
1	alignment pin (2)	2	tab
3	cable retention bracket		

Next steps

1   Replace the cable retention bracket. See Installing the cable retention bracket section in this document.

2   Complete the tasks listed in After working inside your system section in this document.

Related links

Installing the cable retention bracket

Prerequisites

1   Ensure that you read the Safety instructions section in this document.

2   Complete the tasks listed in Before working inside your system section in this document.

3   Remove the cooling shroud.

4   Remove the PCIe card holder.

⚠ **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 are shipped with your product.**

Steps

1   Align the cable retention bracket with the alignment pins on the chassis.

2   Slide the cable retention bracket along the chassis wall until the tab clicks and locks the slots.

3   Place all cables to be routed in the cable retention bracket.

Next steps

1   Install the PCIe card holder.

2   Install the cooling shroud.

3   Complete the tasks listed in After working inside your system section in this document.

Related links

Power supply units

Your system supports one of the following:

- Two 750 W, or 1100 W AC PSU modules or
- Two 1100 W DC power supply modules or
- Two 750 W mixed mode PSU modules

ⓘ **NOTE: Titanium PSU is nominally rated for 200 V AC to 240 V AC input only.**

ⓘ **NOTE: When two identical PSUs are installed, PSU redundancy (1+1 – with redundancy or 2+0 – without redundancy) is configured in system BIOS. In redundant mode, power is supplied to the system equally from both PSUs when the Hot Spare feature is disabled. When the Hot Spare feature is enabled, one of the PSUs will be put into standby when system utilization is low in order to maximize efficiency.**

ⓘ **NOTE: If two PSUs are used, they must be of the same maximum output power.**

ⓘ **NOTE: For AC PSUs, use only PSUs with the Extended Power Performance (EPP) label on the back. Mixing PSUs from previous generations of servers can result in a PSU mismatch condition or failure to turn on.**

Hot spare feature

Your system supports the hot spare feature that significantly reduces the power overhead associated with power supply unit (PSU) redundancy.

When the hot spare feature is enabled, one of the redundant PSUs is switched to the sleep state. The active PSU supports 100 percent of the load, thus operating at higher efficiency. The PSU in the sleep state monitors output voltage of the active PSU. If the output voltage of the active PSU drops, the PSU in the sleep state returns to an active output state.

If having both PSUs active is more efficient than having one PSU in the sleep state, the active PSU can also activate the sleeping PSU.

The default PSU settings are as follows:

- If the load on the active PSU is more than 50 percent, then the redundant PSU is switched to the active state.
- If the load on the active PSU falls below 20 percent, then the redundant PSU is switched to the sleep state.

You can configure the hot spare feature by using the iDRAC settings. For more information about iDRAC settings, see the *Integrated Dell Remote Access Controller User's Guide* available at **Dell.com/idracmanuals**.

Removing the power supply unit blank

Install the power supply unit (PSU) blank only in the second PSU bay.

Prerequisites

⚠️ **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 are shipped with your product.**

Follow the safety guidelines listed in the Safety instructions section.

Steps

If you are installing a second power supply unit (PSU), remove the PSU blank in the bay by pulling the blank outward.

⚠️ **CAUTION: To ensure proper system cooling, the PSU blank must be installed in the second PSU bay in a non-redundant configuration. Remove the PSU blank only if you are installing a second PSU.**
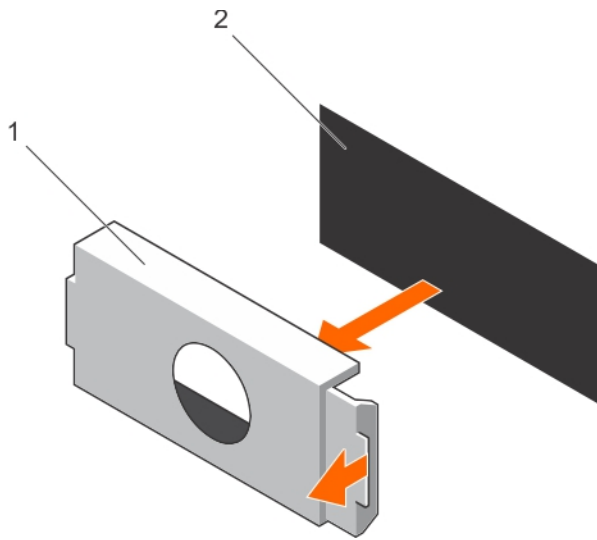
Figure 46. Removing the PSU blank

1	PSU blank	2	PSU bay

Next steps

Install the PSU or PSU blank.

Related links

Safety instructions

Installing the power supply unit blank

Install the power supply unit (PSU) blank only in the second PSU bay.

Prerequisites

⚠ 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 are shipped with your product.**

1   Follow the safety guidelines listed in the Safety instructions section.

Steps

Align the power supply unit blank with the power supply unit slot and push it into the power supply unit slot until it clicks into place.
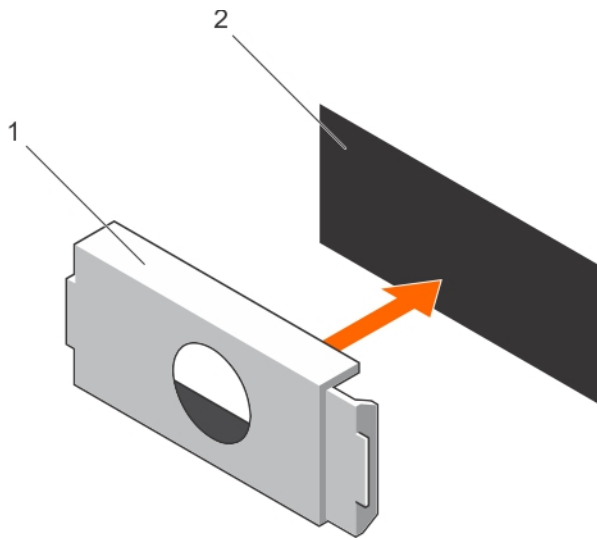
Figure 47. Installing the PSU blank

| 1 | PSU blank | 2 | PSU bay |

Related links

Safety instructions

Removing an AC power supply unit

Prerequisites

⚠ **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 are shipped with your product.**

⚠ **CAUTION: The system needs one power supply unit (PSU) for normal operation. On power-redundant systems, remove and replace only one PSU at a time in a system that is powered on.**

If applicable, unlatch and lift the optional cable management arm if it interferes with the power supply unit (PSU) removal. For information about the cable management arm, see the system's rack documentation.

Follow the safety guidelines listed in the Safety instructions section.

Steps

1   Disconnect the power cable from the power source and from the PSU you intend to remove, and then remove the cables from the strap.
2   Press the release latch and slide the PSU out of the chassis by using the PSU handle.
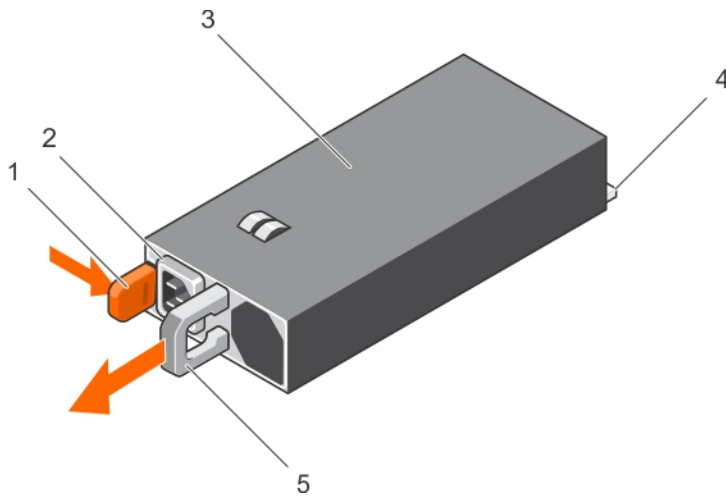
Figure 48. Removing an AC PSU

1	release latch	2	PSU cable connector
3	PSU	4	power connector
5	PSU handle		

Next steps

- If applicable, install the AC PSU.
- If applicable, install the PSU blank.

Related links

Safety instructions

Installing an AC power supply unit

Prerequisites

⚠ **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 are shipped with your product.**

ⓘ **NOTE: The maximum output power (shown in watts) is listed on the PSU label.**

1 Follow the safety guidelines listed in the Safety instructions section.
2 For systems that support redundant power supply units (PSUs), ensure that both the PSUs are of the same type and have the same maximum output power.
3 If installed, remove the PSU blank.

Steps

1 Slide the PSU into the chassis until the PSU is fully seated and the release latch snaps into place.
2 If applicable, relatch the cable management arm.

For information about the cable management arm, see the rack documentation of your system.
3 Connect the power cable to the PSU, and plug the cable into a power outlet.

⚠ **CAUTION: When connecting the power cable, secure the cable with the strap.**

(i) **NOTE:** When installing, hot swapping, or hot-adding a new PSU, wait for 15 seconds for the system to recognize the PSU and determine its status. The PSU redundancy may not occur until discovery is complete. Wait until the new PSU is discovered and enabled before you remove the other PSU. The PSU status indicator turns green to signify that the PSU is functioning properly.
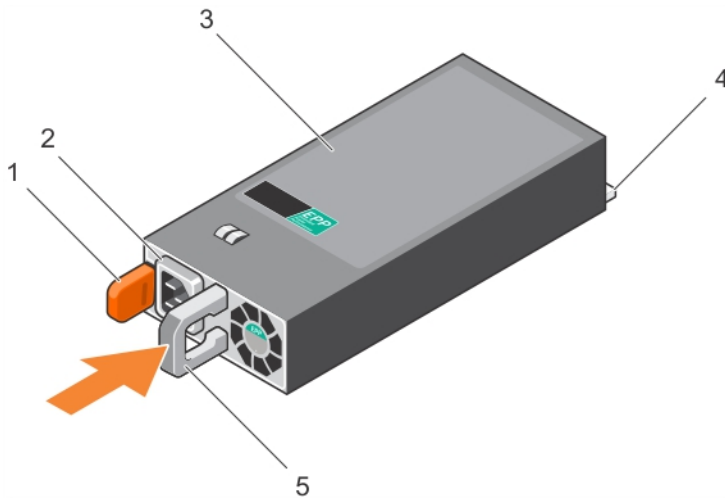
Figure 49. Installing an AC PSU

1	release latch	2	PSU cable connector
3	PSU	4	power connector
5	PSU handle		

Related links

Safety instructions

Wiring instructions for a DC power supply unit

Your system supports up to two –(48–60) V DC power supply units (PSUs).

⚠ **WARNING:** For equipment using –(48–60) V DC power supply units (PSUs), a qualified electrician must perform all connections to DC power and to safety grounds. Do not attempt connecting to DC power or installing grounds yourself. All electrical wiring must comply with applicable local or national codes and practices. Damage due to servicing that is not authorized by Dell is not covered by your warranty. Read and follow all safety instructions that came with the product.

⚠ **CAUTION:** Wire the unit with copper only, unless otherwise specified, use only 10 American Wire Gauge (AWG) wire rated minimum 90 ºC for source and return. Protect the –(48–60) V DC (1 wire) with a branch circuit over-current protection rated 50 A for DC with a high interrupt current rating.

⚠ **CAUTION:** Connect the equipment to a –(48–60) V DC supply source that is electrically isolated from the AC source (reliably grounded –(48–60) V DC SELV source). Ensure that the –(48–60) V DC source is efficiently secured to earth (ground).

(i) **NOTE:** A readily accessible disconnect device that is suitably approved and rated shall be incorporated in the field wiring.

Input requirements

- Supply voltage: –(48–60) V DC
- Current consumption: 32 A (maximum)

Kit contents

- Dell part number 6RYJ9 terminal block or equivalent (1)
- #6-32 nut equipped with lock washer (1)

Required tools

Wire-stripper pliers capable of removing insulation from size 10 AWG solid or stranded, insulated copper wire

ⓘ **NOTE: Use alpha wire part number 3080 or equivalent (65/30 stranding)**

Required wires

- One UL 10 AWG, 2 m maximum (stranded) black wire [–(48–60) V DC]
- One UL 10 AWG, 2 m maximum (stranded) red wire (V DC return)
- One UL 10 AWG, 2 m maximum green/yellow, green with a yellow stripe, stranded wire (safety ground)

Removing a DC power supply unit

Prerequisites

⚠ **WARNING: For equipment using –(48–60) V DC power supply units (PSUs), a qualified electrician must perform all connections to DC power and to safety grounds. Do not attempt connecting to DC power or installing grounds yourself. All electrical wiring must comply with applicable local or national codes and practices. Damage due to servicing that is not authorized by Dell is not covered by your warranty. Read and follow all safety instructions that came with the product.**

⚠ **CAUTION: The system needs one power supply for normal operation. On power-redundant systems, remove and replace only one power supply at a time in a system that is powered on.**

ⓘ **NOTE: You may have to unlatch and lift the optional cable management arm if it interferes with power supply removal. For information about the cable management arm, see the rack documentation of your system.**

Steps

1   Disconnect the power wires from the power source and the connector from the PSU you intend to remove.
2   Disconnect the safety ground wire.
3   Press the release latch and slide the PSU out of the chassis by using the PSU handle.
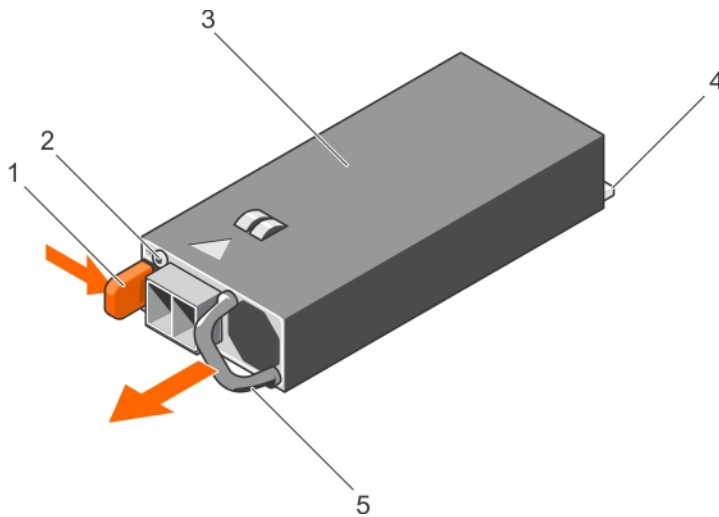
Figure 50. Removing a DC PSU

1	release latch	2	power supply status indicator
3	PSU	4	power connector
5	PSU handle		

Installing a DC power supply unit

Prerequisites

⚠ **WARNING: For equipment using –(48–60) V DC power supply units (PSUs), a qualified electrician must perform all connections to DC power and to safety grounds. Do not attempt connecting to DC power or installing grounds yourself. All electrical wiring must comply with applicable local or national codes and practices. Damage due to servicing that is not authorized by Dell is not covered by your warranty. Read and follow all safety instructions that came with the product.**

1   Follow the safety guidelines listed in the Safety instructions section.

2   Follow the procedure listed in the Before working inside your system section.

3   If installed, remove the PSU blank.

4   Verify that both the PSUs are of the same type and have the same maximum output power.

> ⓘ **NOTE: The maximum output power (shown in watts) is listed on the PSU label.**

Steps

1   Slide the PSU into the chassis until the PSU is fully seated and the release latch snaps into place.

> ⓘ **NOTE: If you have unlatched the cable management arm, relatch it. For information about the cable management arm, see the system's rack documentation.**

2   Connect the safety ground wire.

3   Install the DC power connector in the PSU.

> △ **CAUTION: When connecting the power wires, ensure that you secure the wires with the strap to the PSU handle.**

4   Connect the wires to a DC power source.

> ⓘ **NOTE: When installing, hot-swapping, or hot-adding a new PSU, wait for 15 seconds for the system to recognize the PSU and determine its status. The PSU status indicator turns green to signify that the PSU is functioning properly.**
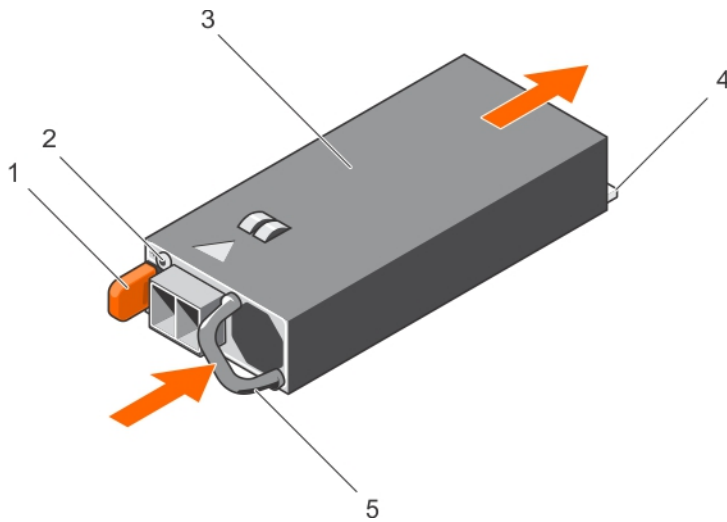
1	release latch	2	power supply status indicator
3	PSU	4	power connector
5	PSU handle		

Next steps

- Follow the procedure listed in the After working inside your system section.

Related links

Safety instructions
Before working inside your system
After working inside your system

System battery

The system battery is used to power the real-time clock and storing the system's BIOS settings.

Replacing system battery

Prerequisites

1   Follow the safety guidelines listed in the Safety instruction section.
2   Follow the procedure listed in the Before working inside your system section.
3   Remove the cooling shroud.

⚠ **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. For more information, see the safety information that shipped with 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 are shipped with your product.**

Steps

1   Locate the battery socket. For more information, see the System Board Connectors section.

⚠ **CAUTION: To avoid damage to the battery connector, you must firmly support the connector while installing or removing a battery.**

2   Place your finger between the securing tabs at the negative side of the battery connector and lift the battery out of the socket.
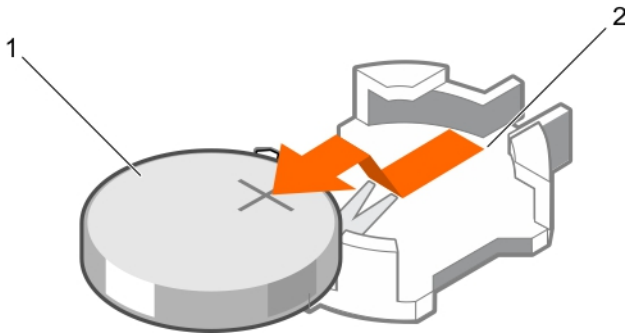
Figure 52. Removing system battery

1	Positive side of the battery connector	2	System battery
3	Negative side of the battery connector		

3   To install a new system battery, hold the battery with the "+" facing up and slide it under the securing tabs.
4   Press the battery into the connector until it snaps into place.
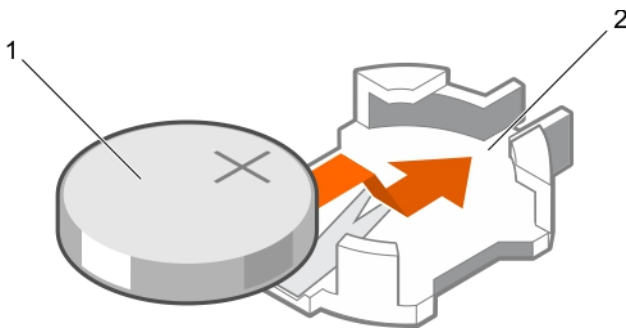
Figure 53. Installing system battery

1	System battery	2	Positive side of the battery connector

Next steps

1   Install the cooling shroud.
2   Follow the procedure listed in the After working inside your system section.
3   While booting, press F2 to enter the System Setup and ensure that the battery is operating properly.
4   Enter the correct time and date in the System Setup **Time** and **Date** fields.
5   Exit the System Setup.

Related links

Safety instructions
Before working inside your system
Jumpers and connectors
After working inside your system

Hard disk drive backplane

The Dell Storage NX3230 system supports 3.5 inch (x12) SAS/SATA backplane, plus 2.5 inch (x2) SAS/SATA backplane (back).

Removing HDD backplane

Prerequisites

1   Ensure that you read the Safety instructions section in this document.
2   Complete the tasks listed in the Before working inside your system section in this document.
3   Remove the cooling shroud.
4   Remove the cooling-fan assembly.
5   Remove all HDDs.

⚠ **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 are shipped with your product.**

⚠ **CAUTION: To prevent damage to the HDDs and HDD backplane, you must remove the HDDs from the system before removing the HDD backplane.**

⚠ **CAUTION: You must note the number of each HDD and temporarily label them before removal so that you can replace them in the same locations.**

Steps

1   Disconnect the SAS/SATA/SSD data cable(s) and power cable from the backplane.
2   Press the release tabs and lift the backplane upward and slide it toward the back of the chassis.

> ⓘ **NOTE: To prevent damage to the control panel flex cable, unlatch the blocking tab on the connector before removing the flex cable. Do not bend the flex cable at the connector. For the x2 backplanes, rotate the locking tab 90 degrees clockwise.**
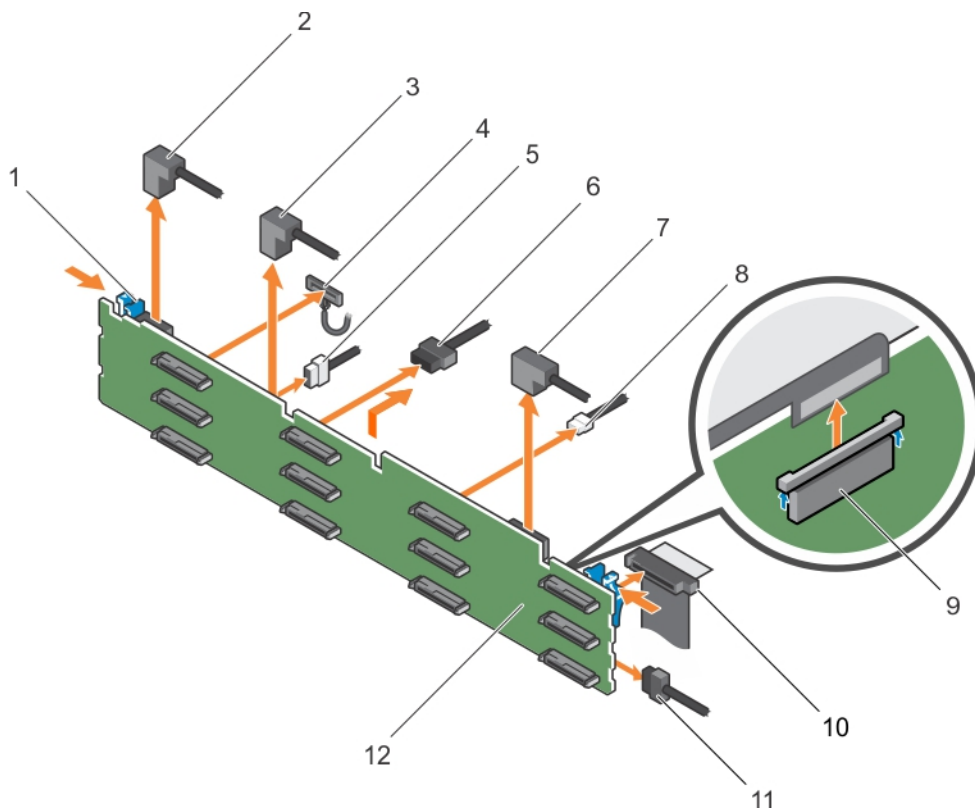
Figure 54. Removing and installing the 3.5 inch (x12) SAS/SATA backplane—NX3230

1	release tab (2)	2	SAS cable A2
3	SAS cable A1	4	left ear control panel cable
5	backplane signal cable	6	backplane power cable (2)
7	SAS cable A0/B0	8	USB cable
9	control panel cable	10	right ear control panel flex cable
11	hard-drive backplane	12	hard-drive backplane connector (12)
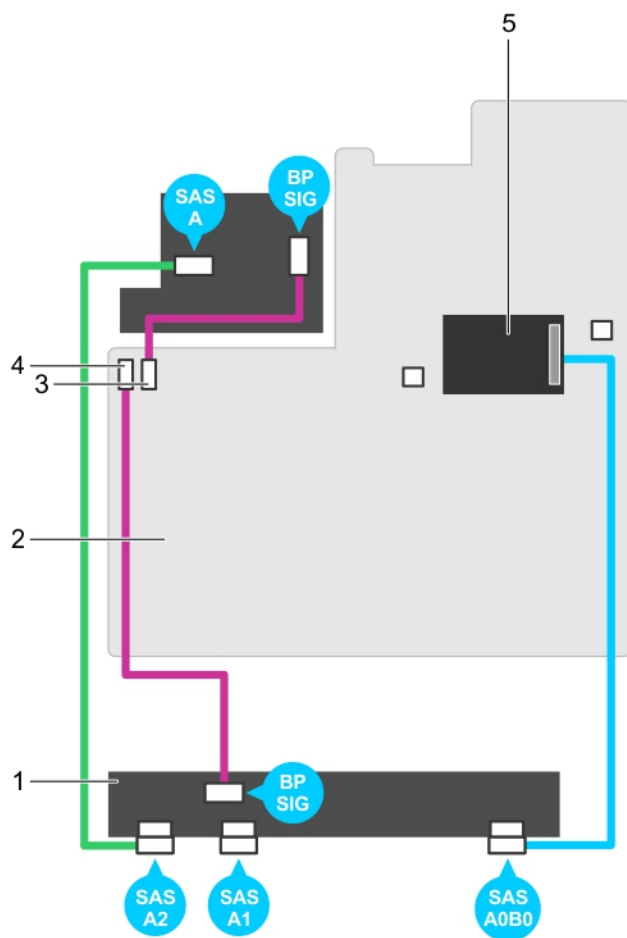
Figure 55. Cabling diagram—3.5 inch (x12) SAS/SATA backplane—NX3230 (option 1)

1	hard-drive backplane	2	system board
3	backplane signal connector 0	4	backplane signal connector 1
5	integrated storage controller card		
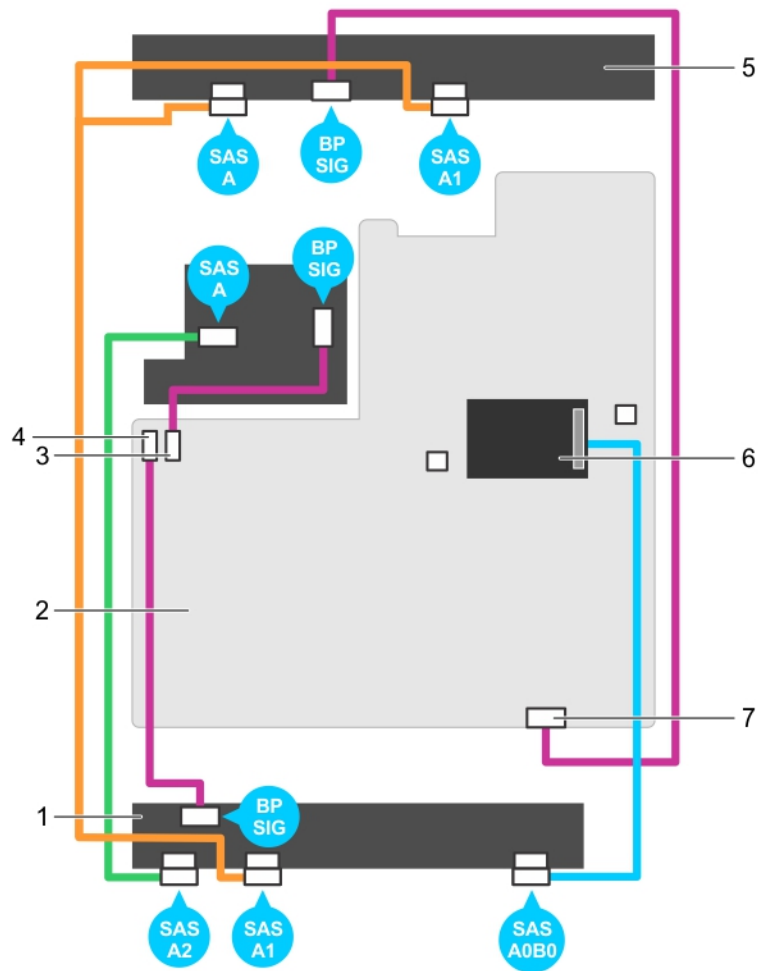
Figure 56. Cabling diagram—3.5 inch (x12) SAS/SATA backplane—NX3230 (option 2)

1	hard-drive backplane	2	system board
3	backplane signal connector 0	4	backplane signal connector 1
5	hard-drive mid plane	6	integrated storage controller card
7	backplane signal connector 2		

Related links

Safety instructions
Before working inside your system

Installing HDD backplane

Prerequisites

1   Ensure that you read the Safety instructions section in this document.
2   Complete the tasks listed in the Before working inside your system section in this document.

⚠ **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 are shipped with your product.**

⚠ **CAUTION: To prevent damage to the control panel flex cable, do not bend the control panel flex cable after it is inserted into the connector.**

Steps

1 Use the hooks on the chassis as guides to align the HDD backplane.

2 Lower the HDD backplane until the release tabs snap into place.

3 Connect the SAS/SATA/SSD data, signal, and power cable(s) to the backplane.

Next steps

1 Replace the cooling-fan assembly.

2 Replace the cooling shroud.

3 Install the HDDs in their original locations.

4 Complete the tasks listed in the After working inside your system section in this document.

Related links

Safety instructions
Before working inside your system
After working inside your system

Removing the optional HDD backplane (back)

Prerequisites

1 Ensure that you read the Safety instructions section in this document.

2 Complete the tasks listed in Before working inside your system section in this document.

3 Remove both HDDs.

⚠ **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 are shipped with your product.**

⚠ **CAUTION: To prevent damage to the drives and backplane, you must remove the HDD from the system before removing the backplane.**

⚠ **CAUTION: You must note the number of each HDD and temporarily label them before removal so that you can replace them in the same locations.**

Steps

1 Disconnect all the cables from the backplane.

2 Lift the release pin and slide the backplane toward the front of the chassis.

3 Lift the backplane to remove it from the chassis.
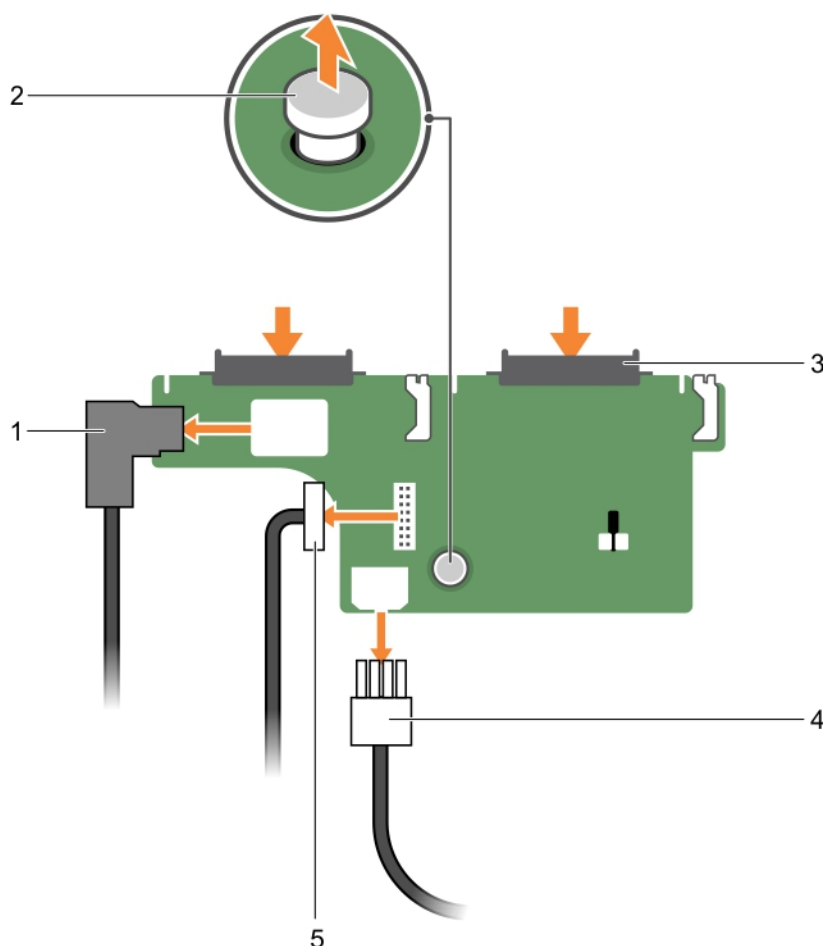
Figure 57. Removing and installing the optional 2.5 inch (x2) HDD backplane—NX3230

1	SAS cable	2	release pin
3	HDD connector (2)	4	power cable
5	backplane signal cable		

Related links

Safety instructions

Before working inside your system

Installing the optional HDD backplane (back)

Prerequisites

1   Ensure that you read the Safety instructions section in this document.

2   Complete the tasks listed in the Before working inside your system section in this document.

⚠ **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 are shipped with your product.**

Steps

1   Align the notches on the backplane with the notches on the chassis.

2   Lift the release pin and slide the backplane toward the back of the chassis until firmly seated.

3   Release the release pin to lock the backplane to the chassis.

4   Reconnect all the cables to the backplane.

Next steps

1   Install both the HDDs in their original location.

2   Complete the tasks listed in the After working inside your system section in this document.

Related links

Safety instructions
Before working inside your system
After working inside your system

Control panel

The control panel contains the power button, the diagnostic indicators, and the front USB ports.

Removing the control panel

Prerequisites

1   Ensure that you read the Safety instructions section in this document.

2   Complete the tasks listed in Before working inside your system section in this document.

3   Keep the T15 Torx screwdriver handy.

△ **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 are shipped with your product.**

△ **CAUTION: Do not use excessive force when removing the control panel cable as it can damage the connectors.**

Steps

1   Disconnect the control panel cable from the hard-drive backplane by pulling on the plastic pull tab.

2   Remove the screws that secure the control panel to the chassis.

3   Fold the plastic pull tab close to the connector.

4   Pull out the control panel cable as you guide the connector and the plastic pull tab through the channel on the chassis.
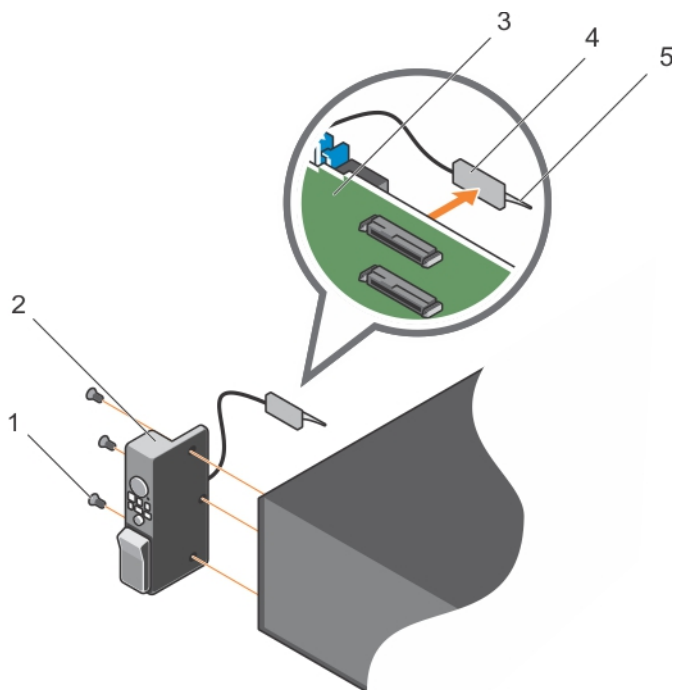
Figure 58. Removing and installing the control panel—NX3230

1	screw (3)	2	control panel
3	hard-drive backplane	4	connector
5	plastic pull tab		

Next steps

1 Replace the control panel. See Installing the Control Panel section in this document.
2 Complete the tasks listed in After working inside your system section in this document.

Related links

Safety instructions
Before working inside your system
After working inside your system
Installing the control panel

Installing the control panel

Prerequisites

1 Ensure that you read the Safety instructions section in this document.
2 Keep the T15 Torx screw driver handy.

> △ **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 are shipped with your product.**

Steps

1 Fold the PPID label around the cable.
2 Fold the pull tab close to the connector and guide the connector and pull tab into the channel.

3   Push the cable until the cable passes completely through the channel.

4   Tighten the screws to secure the control panel to the chassis.

> ⓘ **NOTE:** **You must route the cable properly to prevent it from being pinched or crimped.**

5   Connect the cable connector to the HDD backplane by pushing on the center of the connector.

Next steps

Complete the tasks listed in the After working inside your system section in this document.

Related links

Safety instructions
After working inside your system

Removing the I/O panel

Prerequisites

1   Ensure that you read the Safety instructions section in this document.

2   Complete the tasks listed in the Before working inside your system section in this document.

3   Keep the T15 Torx screwdriver handy.

> ⚠ **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 are shipped with your product.**

> ⚠ **CAUTION:** **To prevent damage to the I/O cable, you must release the locking tab before removing or installing the I/O cable from the connector on the hard-drive backplane.**

Steps

1   Rotate the locking tab on the I/O cable connector clockwise 90 degrees to release the lock.

For more information on the locking tab, see the Removing the hard-drive backplane section in this document.

2   Disconnect the I/O cable from the backplane.

3   Remove the screws securing the I/O panel to the chassis.

4   Pull out the I/O panel cable through the channel on the chassis.
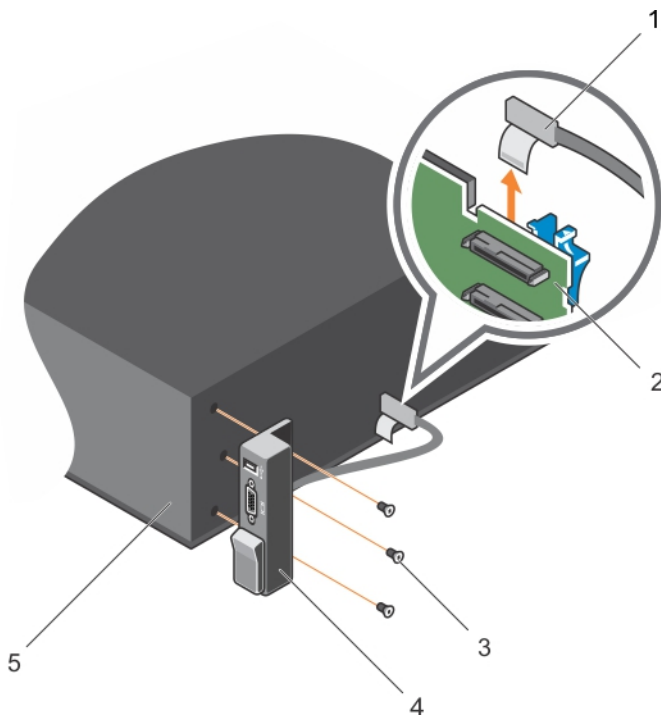
Figure 59. Removing and installing the I/O panel —NX3230

1	I/O panel cable	2	hard-drive backplane
3	screw (3)	4	I/O panel
5	chassis		

Next steps

1   Replace the I/O panel. See the Installing the I/O Panel section in this document.
2   Complete the tasks listed in the After working inside your system section in this document.

Related links

Safety instructions
Before working inside your system
Removing HDD backplane
Installing the I/O panel
After working inside your system

Installing the I/O panel

Prerequisites

1   Ensure that you read through the Safety instructions section in this document.
2   Complete the tasks listed in Before working inside your system section in this document.
3   Keep the T15 Torx screw driver handy.

⚠ **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 are shipped with your product.**

Steps

1   Fold the PPID label around the cable.

2   Push the cable until the cable passes completely through the channel.

> △ **CAUTION: To prevent damage to the I/O cable, you must release the locking tab before removing or installing the I/O cable from the connector on the hard-drive backplane.**

3   If locked, rotate the locking tab on the I/O cable connector clockwise 90 degrees to release the lock.

4   Connect the I/O panel cable to the connector on the hard-drive backplane.

5   Rotate the locking tab on the I/O cable connector counter clockwise 90 degrees to secure the lock.

6   Tighten the screws to secure the control panel to the chassis.

> ⓘ **NOTE: You must route the cable properly to prevent it from being pinched or crimped.**

Next steps

Complete the tasks listed in the After working inside your system section in this document.

Related links

Safety instructions
Before working inside your system
After working inside your system

System board

A system board (also known as the motherboard) is the main printed circuit board found in systems. The system board allows communication between many of the crucial electronic components of the system, such as the central processing unit (CPU) and memory, and also provides connectors for other peripherals. Unlike a backplane, a system board contains a significant number of subsystems such as the processor, expansion cards, and other components.

Removing system board

Prerequisites

> △ **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 are shipped with your product.**

> △ **CAUTION: If you are using the Trusted Platform Module (TPM) with an encryption key, you may be prompted to create a recovery key during program or System Setup. Be sure to create and safely store this recovery key. If you replace this system board, you must supply the recovery key when you restart your system or program before you can access the encrypted data on your HDDs.**

> △ **CAUTION: Do not attempt to remove the TPM plug-in module from the motherboard. Once the TPM plug-in module is installed, it is cryptographically bound to that specific motherboard. Any attempt to remove an installed TPM plug-in module breaks the cryptographic binding, and it cannot be re-installed or installed on another motherboard.**

1   Ensure that you read the Safety instructions section in this document.

2   Complete the tasks listed in the Before working inside your system section in this document.

3   Remove the following:

   a   cooling shroud

   b   Cooling-fan assembly

   c   hard-drive tray (if installed)

   d   power supply unit(s)

   e   all expansion-card risers

   f   integrated storage controller card

g   internal dual SD module

h   PCIe card holder

i   card retention bracket

j   heat sink(s)/heat-sink blank(s)

k   processors(s)/processor blank(s)

> ⚠ **CAUTION: To prevent damage to the processor pins when replacing a faulty system board, ensure that you cover the processor socket with the processor protective cap.**

l   memory modules and memory module blanks

m   network daughter card

Steps

1   Disconnect the mini SAS cable from the system board.

2   Disconnect all other cables from the system board.

> ⚠ **CAUTION: Take care not to damage the system identification button while removing the system board from the chassis.**

> ⚠ **CAUTION: Do not lift the system board assembly by grasping a memory module, processor, or other components.**

3   Hold the system-board holder, lift the blue release pin, lift the system board and slide it toward the front of the chassis.

     Sliding the system board toward the front of the chassis disengages the connectors from the back of the chassis slots.

4   Lift the system board out of the chassis.
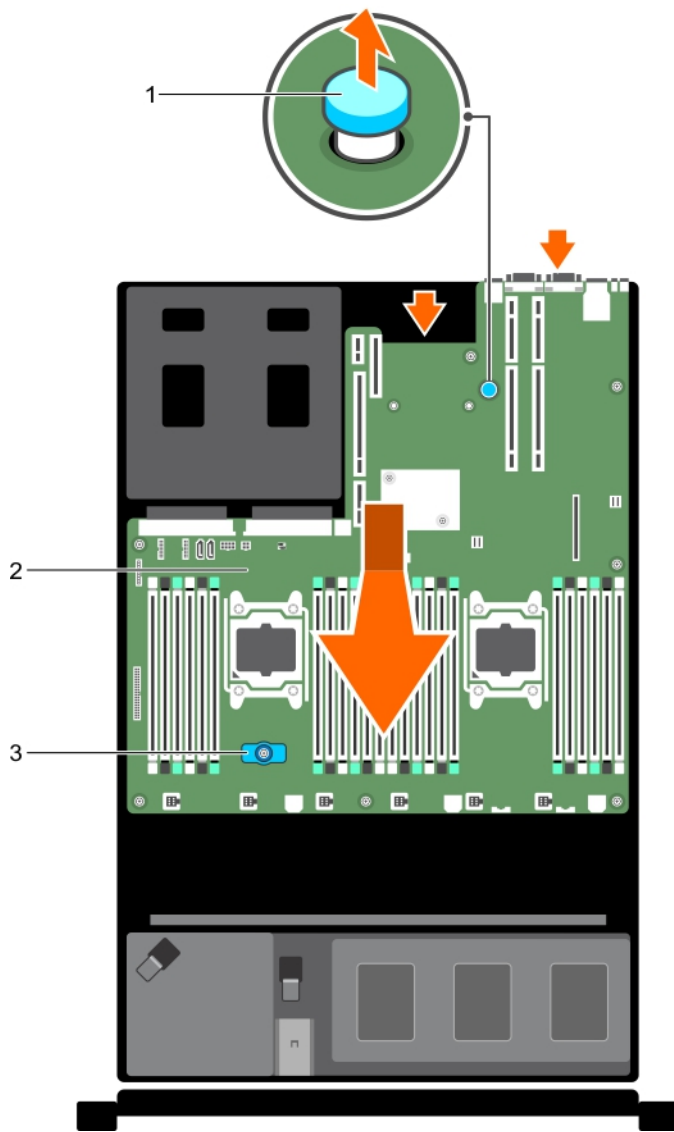
Figure 60. Removing and Installing the System Board

1	system board holder	2	system-board
3	release pin		

Next steps

1 Replace the system board. See the Installing the system board section in this document.
2 Complete the tasks listed in the After working inside your system section in this document.

Related links

Safety instructions
Before working inside your system
Installing system board
After working inside your system

Installing system board

Prerequisites

1 Ensure that you read the Safety instructions section in this document.

2 Complete the tasks listed in the Before working inside your system section in this document.

⚠ **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 are shipped with your product.**

Steps

1 Unpack the new system board assembly.

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

⚠ **CAUTION: Take care not to damage the system identification button while placing the system board into the chassis.**

2 Hold the touch points and lower the system board into the chassis.

3 Push the system board toward the back of the chassis until the board is seated correctly.

Next steps

1 Install the Trusted Platform Module (TPM). For information on how to install TPM, see the Installing the Trusted Platform Module section in this document. For more information about TPM, see the Trusted Platform Module section in this document.

2 Replace the following:

a Cable retention bracket

b PCIe card holder

c Hard drive tray (if applicable)

d Integrated storage controller card

e Internal dual SD module

f All expansion card risers

g Heat sinks or heat-sink blanks and processors/processor blanks

h Memory modules and memory module blanks

i Network daughter card

j Cooling-fan assembly

k Cooling shroud

l PSUs

3 Reconnect all cables to the system board.

ⓘ **NOTE: Ensure that the cables inside the system are routed along the chassis wall and secured using the cable securing bracket.**

4 Complete the tasks listed in the After working inside your system section in this document.

5 Import your new or existing iDRAC Enterprise license. For more information, see the *Integrated Dell Remote Access Controller User's Guide*, at **Dell.com/esmmanuals**.

6 Ensure that you:

a Use the **Easy Restore** feature to restore the Service Tag. For more information, see the Easy Restore section in this document.

b If the service tag is not backed up in the backup flash device, type the system Service Tag manually. For more information, see the Entering the system Service Tag section in this document.

c Update the BIOS and iDRAC versions.

d Re-enable the Trusted Platform Module (TPM). For more information, see the Re-enabling the TPM for BitLocker users or Re-enabling the TPM for Intel TXT users section in this document.

Related links

Restoring the Service Tag by using the Easy Restore feature

By using the Easy Restore feature, you can restore your system's Service Tag, license, UEFI configuration, and the system configuration data after replacing the system board. All data is automatically backed up in a backup flash device. If BIOS detects a new system board and the Service Tag in the backup flash device, BIOS prompts the user to restore the backup information.

1   Turn on the system.

   If BIOS detects a new system board, and if the Service Tag is present in the backup flash device, BIOS displays the Service Tag, the status of the license, and the **UEFI Diagnostics** version.

2   Perform one of the following steps:

   After the restore process is complete, BIOS prompts to restore the system configuration data.

3   Perform one of the following steps:

   •   Press **Y** to restore the system configuration data.

   •   Press **N** to use the default configuration settings.

   After the restore process is complete, the system restarts.

Entering the system Service Tag by using System Setup

If Easy Restore fails to restore the Service Tag, use System Setup to enter the Service Tag.

1   Turn on the system.

2   Press F2 to enter System Setup.

3   Click **Service Tag Settings**.

4   Enter the Service Tag.

   ⓘ **NOTE: You can enter the Service Tag only when the Service Tag field is empty. Ensure that you enter the correct Service Tag. After the Service Tag is entered, it cannot be updated or changed.**

5   Click **Ok**.

6   Import your new or existing iDRAC Enterprise license.

   For more information, see the *Integrated Dell Remote Access Controller User's Guide* at **Dell.com/idracmanuals**.

Trusted Platform Module

Trusted Platform Module (TPM) is a dedicated microprocessor designed to secure hardware by integrating cryptographic keys into devices. A software can use a Trusted Platform Module to authenticate hardware devices. As each TPM chip has a unique and secret RSA key burned in as it is produced, it can perform the platform authentication.

△ **CAUTION: Do not attempt to remove the Trusted Platform Module (TPM) from the system board. After the TPM is installed, it is cryptographically bound to that specific system board. Any attempt to remove an installed TPM breaks the cryptographic binding, and it cannot be re-installed or installed on another system board.**

ⓘ **NOTE: This is a Field Replaceable Unit (FRU). Removal and installation procedures must be performed only by Dell certified service technicians.**

Installing the Trusted Platform Module

Prerequisites

⚠️ **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 are shipped with your product.**

⚠️ **CAUTION: Do not attempt to remove the Trusted Platform Module (TPM) from the system board. Once the TPM is installed, it is cryptographically bound to that specific system board. Any attempt to remove an installed TPM breaks the cryptographic binding, and it cannot be re-installed or installed on another system board.**

1   Follow the safety guidelines listed in the Safety instructions section.
2   Follow the procedure listed in the Before working inside your system section.

Steps

1   Locate the TPM connector on the system board.

   ⓘ **NOTE: To locate the TPM connector on the system board, see the System board connectors section.**

2   Align the edge connectors on the TPM with the slot on the TPM connector.
3   Insert the TPM into the TPM connector such that the plastic rivet aligns with the slot on the system board.
4   Press the plastic rivet until the rivet snaps into place.
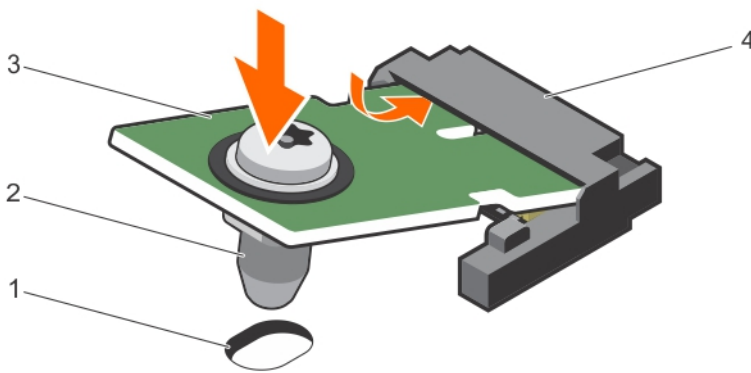
Figure 61. Installing the TPM

1	rivet slot on the system board	2	plastic rivet
3	TPM	4	TPM connector

Next steps

1   Install the system board.
2   Follow the procedure listed in the After working inside your system section.

Related links

Safety instructions
Before working inside your system
System board jumper settings
After working inside your system

Initializing the TPM for BitLocker users

Initialize the TPM.

For more information about initializing the TPM, see http://technet.microsoft.com/en-us/library/cc753140.aspx.

The **TPM Status** changes to **Enabled, Activated**.

Initializing the TPM for TXT users

1   While booting your system, press F2 to enter System Setup.
2   On the **System Setup Main Menu** screen, click **System BIOS** → **System Security Settings**.
3   From the **TPM Security** option, select **On with Pre-boot Measurements**.
4   From the **TPM Command** option, select **Activate**.
5   Save the settings.
6   Restart your system.
7   Enter **System Setup** again.
8   On the **System Setup Main Menu** screen, click **System BIOS** → **System Security Settings**.
9   From the **Intel TXT** option, select **On**.

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 using 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 allowing 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

If a major component or device in the system does not operate properly, running the embedded system diagnostics may indicate component failure.

Running the Embedded System Diagnostics from Boot Manager

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

Steps
1 When the system is booting, press F11.
2 Use the up arrow and down arrow keys to select **System Utilities** > **Launch 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 the Embedded System Diagnostics from the Dell Lifecycle Controller

1 As the system boots, press F11.
2 Select **Hardware Diagnostics** → **Run Hardware 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.

System diagnostic controls

Menu	Description
Configuration	Displays the configuration and status information of all detected devices.
Results	Displays the results of all tests that are run.
System health	Provides the current overview of the system performance.
Event log	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

This topic provides specific information about the system jumpers. It also provides some basic information about jumpers and switches and describes the connectors on the various boards in the system. Jumpers on the system board help to disable system and setup passwords. You must know the connectors on the system board to install components and cables correctly.

Topics:

- System board jumper settings
- System board connectors
- Disabling forgotten password

System board jumper settings

For information on resetting the password jumper to disable a password, see the Disabling a Forgotten Password section.

Table 27. System board jumper settings

Jumper	Setting	Description
PWRD_EN	2 4 6 (default)	The password reset feature is enabled (pins 2–4). BIOS local access is unlocked at the next AC power cycle.
	2 4 6	The password reset feature is disabled (pins 4–6).
NVRAM_CLR	1 3 5 (default)	The configuration settings are retained at the next system boot (pins 3–5).
	1 3 5	The configuration settings are cleared at system boot (pins 1–3).

Related links

Disabling forgotten password

System board connectors
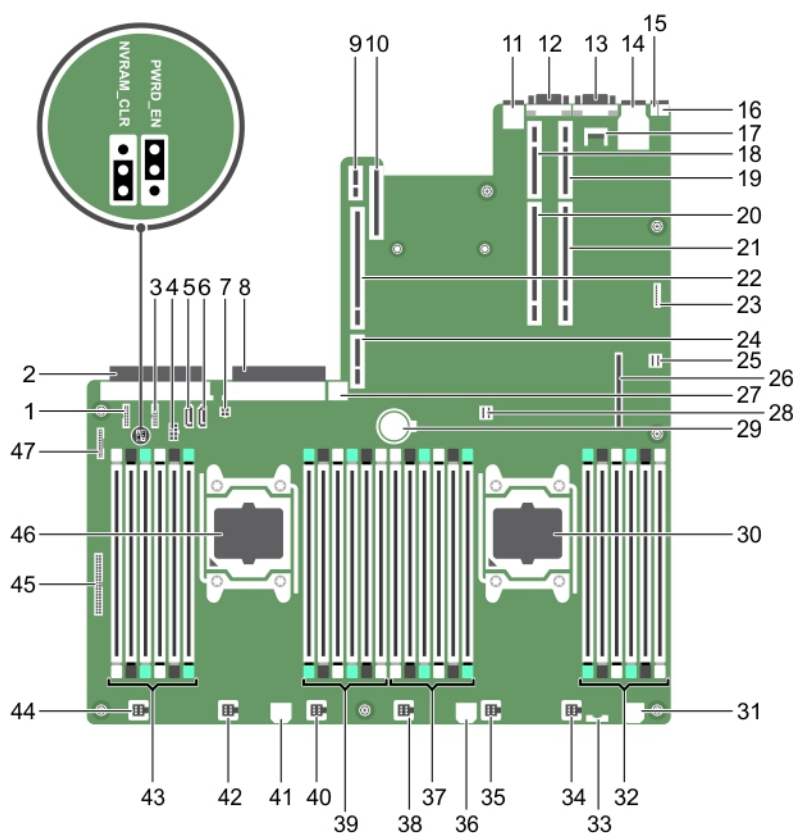
Figure 62. System board jumpers and connectors

Table 28. System board jumpers and connectors

Item	Connector	Description
1	J_BP_SIG1	Backplane signal connector 1
2	J_PS_2	PSU 2 connector
3	J_BP_SIG0	Backplane signal connector 0
4	J_BP0	Backplane power connector 0
5	J_SATA_CD	Optical drive SATA connector
6	J_SATA_TBU	Tape backup unit SATA connector
7	J_TBU	Tape backup unit power connector
8	J_PS_1	PSU 1 connector
9	J_IDSDM	Internal dual SD module connector
10	J_NDC	Network daughter card connector
11	J_USB	USB connector
12	J_VIDEO_REAR	Video connector

Item	Connector	Description
13	J_COM1	Serial connector
14	J_IDRAC_RJ45	iDRAC8 connector
15	J_CYC	System identification connector
16	CYC_ID	System identification button
17	J_TPM_MODULE	Trusted Platform Module connector
18	J_RISER_2AX	Riser 3 connector
19	J_RISER_1AX	Riser 1 connector
20	J_RISER_2BX	Riser 2 connector
21	J_RISER_1BX	Riser 1 connector
22	J_RISER_3AX	Riser 3 connector
23	J_QS	Quick Sync bezel connector
24	J_RISER_3BX	Riser 3 connector
25	J_SATA_B	Internal SAS connector
26	J_STORAGE	Mini PERC connector
27	J_USB_INT	Internal USB connector
28	J_SATA_A	Internal SAS connector
29	BAT	Battery connector
30	CPU 2	Processor socket 2
31	J_BP3	Backplane power connector 3
32	B10, B6, B2, B9, B5, B1	Memory module sockets
33	J_BP_SIG2	Backplane signal connector 2
34	J_FAN2U_6	Cooling fan connector
35	J_FAN2U_5	Cooling fan connector
36	J_BP2	Backplane power connector 2
37	B3, B7, B11, B4, B8, B12	Memory module sockets
38	J_FAN2U_4	Cooling fan connector
39	A10, A6, A2, A9, A5, A1	Memory module sockets
40	J_FAN2U_3	Cooling fan connector
41	J_BP1	Backplane power connector
42	J_FAN2U_2	Cooling fan connector
43	A3, A7, A11, A4, A8, A12	Memory module sockets
44	J_FAN2U_1	Cooling fan connector
45	J_CTRL_PNL	Control panel signal connector
46	CPU 1	Processor 1
47	J_FP_USB	Front-panel USB connector

Disabling forgotten password

The software security features of the system include a system password and a setup password. The password jumper enables or disables password features and clears any password(s) currently in use.

Prerequisites

⚠ **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 are shipped with your product.**

Steps

1   Turn off the system, including any attached peripherals, and disconnect the system from the electrical outlet.
2   Remove the system cover.
3   Move the jumper on the system board jumper from pins 4 and 6 to pins 2 and 4.
4   Install the system cover.

The existing passwords are not disabled (erased) until the system boots with the jumper on pins 2 and 4. However, before you assign a new system and/or setup password, you must move the jumper back to pins 4 and 6.

ⓘ **NOTE: If you assign a new system and/or setup password with the jumper on pins 2 and 4, the system disables the new password(s) the next time it boots.**

5   Reconnect the system to its electrical outlet and turn on the system, including any attached peripherals.
6   Turn off the system, including any attached peripherals, and disconnect the system from the electrical outlet.
7   Remove the system cover.
8   Move the jumper on the system board jumper from pins 2 and 4 to pins 4 and 6.
9   Install the system cover.
10   Reconnect the system to its electrical outlet and turn on the system, including any attached peripherals.
11   Assign a new system and/or setup password.

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 are shipped with your product.**

ⓘ **NOTE: Solution validation was performed by using the factory shipped hardware configuration.**

Topics:

- Troubleshooting system startup failure
- Troubleshooting external connections
- Troubleshooting the video subsystem
- Troubleshooting a USB device
- Troubleshooting iDRAC Direct (USB XML configuration)
- Troubleshooting iDRAC Direct (Laptop connection)
- Troubleshooting a serial I/O device
- Troubleshooting a NIC
- Troubleshooting a wet system
- Troubleshooting a damaged system
- Troubleshooting the system battery
- Troubleshooting power supply units
- Troubleshooting cooling problems
- Troubleshooting cooling fans
- Troubleshooting system memory
- Troubleshooting an internal USB key
- Troubleshooting an SD card
- Troubleshooting a hard drive or SSD
- Troubleshooting a storage controller
- Troubleshooting expansion cards
- Troubleshooting processors
- System messages

Troubleshooting system startup failure

If you boot the system to the BIOS boot mode after installing an operating system from the UEFI Boot Manager, the system stops responding. To avoid this issue, you must boot to the same boot mode in which you installed the operating system.

For all other startup issues, note the system messages that appear on the screen.

Troubleshooting external connections

Before troubleshooting any external devices, ensure that all external cables are securely attached to the external connectors on your system before troubleshooting any external devices.

Troubleshooting the video subsystem

Prerequisites

ⓘ **NOTE: Ensure the Local Server Video Enabled option is selected in the iDRAC Graphical User Interface (GUI), under Virtual Console. If this option is not selected, local video is disabled.**

Steps

1 Check the cable connections (power and display) to the monitor.

2 Check the video interface cabling from the system to the monitor.

3 Run the appropriate diagnostic test.

If the tests run successfully, the problem is not related to video hardware.

Next steps

If the tests fail, see the Getting help section.

Related links

Getting help

Troubleshooting a USB device

Prerequisites

ⓘ **NOTE: Follow steps 1 to 6 to troubleshoot a USB keyboard or mouse. For other USB devices, go to step 7.**

Steps

1 Disconnect the keyboard and/or mouse cables from the system and reconnect them.

2 If the problem persists, connect the keyboard and/or mouse to another USB port on the system.

3 If the problem is resolved, restart the system, enter System Setup, and check if the non-functioning USB ports are enabled.

> ⓘ **NOTE: Older operating systems may not support USB 3.0.**

4 Check if USB 3.0 is enabled in System Setup. If enabled, disable it and see if the issue is resolved.

5 In **iDRAC Settings Utility**, ensure that **USB Management Port Mode** is configured as **Automatic** or **Standard OS Use**.

6 If the problem is not resolved, replace the keyboard and/or mouse with a known working keyboard or mouse.

If the problem is not resolved, proceed to step 7 to troubleshoot other USB devices attached to the system.

If the problem is not resolved, proceed to troubleshoot other USB devices attached to the system.

7 Turn off all attached USB devices, and disconnect them from the system.

8 Restart the system.

9 If your keyboard is functioning, enter System Setup, verify that all USB ports are enabled on the **Integrated Devices** screen. If your keyboard is not functioning, use remote access to enable or disable the USB options.

10 Check if USB 3.0 is enabled in System Setup. If it is enabled, disable it and restart your system.

11 If the system is not accessible, reset the NVRAM_CLR jumper inside your system and restore the BIOS to the default settings. See the System board jumper setting section

12 In the **IDRAC Settings Utility**, ensure that **USB Management Port Mode** is configured as **Automatic** or **Standard OS Use**.

13 Reconnect and turn on each USB device one at a time.

14 If a USB device causes the same problem, turn off the device, replace the USB cable with a known good cable, and turn on the device.

Next steps

If all troubleshooting fails, see the Getting help section.

Related links

Getting help

System board jumper settings

Troubleshooting iDRAC Direct (USB XML configuration)

For information about USB storage device and server configuration, see the Integrated Dell Remote Access Controller User's Guide at **Dell.com/idracmanuals**.

Steps

1   Ensure that your USB storage device is connected to the front USB Management Port, identified by ⟨USB icon⟩ icon.
2   Ensure that your USB storage device is configured with an NTFS or an FAT32 file system with only one partition.
3   Verify that the USB storage device is configured correctly. For more information about configuring the USB storage device, see the Integrated Dell Remote Access Controller User's Guide at **Dell.com/idracmanuals**.
4   In the **iDRAC Settings Utility**, ensure that **USB Management Port Mode** is configured as **Automatic** or **iDRAC Direct Only**.
5   Ensure that the **iDRAC Managed: USB XML Configuration** option is either **Enabled** or **Enabled only when the server has default credential settings**.
6   Remove and reinsert the USB storage device.
7   If import operation does not work, try with a different USB storage device.

Next steps
If all troubleshooting fails, see the Getting help section.
Related links

Getting help

Troubleshooting iDRAC Direct (Laptop connection)

For information about USB laptop connection and server configuration, see the *Integrated Dell Remote Access Controller User's Guide* at **Dell.com/idracmanuals**.

Steps

1   Ensure that your laptop is connected to the front USB Management Port, identified by ⟨USB icon⟩ icon with a USB Type A/A cable.
2   On the **iDRAC Settings Utility** screen, ensure that **USB Management Port Mode** is configured as **Automatic** or **iDRAC Direct Only**.
3   If the laptop is running Windows operating system, ensure that the iDRAC Virtual USB NIC device driver is installed.
4   If the driver is installed, ensure that you are not connected to any network through WiFi or cabled ethernet, as iDRAC Direct uses a non-routable address.

Next steps
If all troubleshooting fails, see the Getting help section.
Related links

Getting help

Troubleshooting a serial I/O device

Prerequisites

Steps

1   Turn off the system and any peripheral devices connected to the serial port.
2   Swap the serial interface cable with a known working cable, and turn on the system and the serial device.

If the problem is resolved, replace the interface cable with a known working cable.

3   Turn off the system and the serial device, and swap the serial device with a compatible device.

4   Turn on the system and the serial device.

Next steps

If the problem persists, see the Getting help section.

Related links

Getting help

Troubleshooting a NIC

Steps

1   Run the appropriate diagnostic test. For more information, see the Using system diagnostics section for the available diagnostic tests.

2   Restart the system and check for any system messages pertaining to the NIC controller.

3   Check the appropriate indicator on the NIC connector:

  · If the link indicator does not glow, the cable connected might be disengaged.

  · If the activity indicator does not glow, the network driver files might be damaged or missing.

    Install or replace the drivers as necessary. For more information, see the NIC documentation.

  · Try another known good network cable.

  · If the problem persists, use another connector on the switch or hub.

4   Ensure that the appropriate drivers are installed and the protocols are bound. For more information, see the NIC documentation.

5   Enter System Setup and confirm that the NIC ports are enabled on the **Integrated Devices** screen.

6   Ensure that all the NICs, hubs, and switches on the network are set to the same data transmission speed and duplex. For more information, see the documentation for each network device.

7   Ensure that all the NICs and switches on the network are set to the same data transmission speed and duplex. For more information, see the documentation for each network device.

8   Ensure that all network cables are of the proper type and do not exceed the maximum length.

Next steps

If the problem persists, see the Getting help section.

Related links

Using system diagnostics
Getting help

Troubleshooting a wet system

Prerequisites

⚠ **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 are shipped with your product.**

Steps

1   Turn off the system and attached peripherals, and disconnect the system from the electrical outlet.

2   Remove the system cover.

3   Remove the following components (if installed) from the system:

  · Power supply unit(s)

  · Optical drive

  · Hard drives

  · Hard drive backplane

  · USB memory key

- Hard drive tray
- Cooling shroud
- Expansion card risers (if installed)
- Expansion cards
- Cooling fan assembly (if installed)
- Cooling fan(s)
- Memory modules
- Processor(s) and heat sink(s)
- System board

4   Let the system dry thoroughly for at least 24 hours.

5   Reinstall the components you removed in step 3 except the expansion cards.

6   Install the system cover.

7   Turn on the system and attached peripherals.

     If the problem persists, see the Getting help section.

8   If the system starts properly, turn off the system, and reinstall all the expansion cards that you removed.

9   Run the appropriate diagnostic test. For more information, see the Using system diagnostics section.

Next steps

If the tests fail, see the Getting help section.

Related links

Getting help
Using system diagnostics

Troubleshooting a damaged system

Prerequisites

⚠ **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 are shipped with your product.**

Steps

1   Turn off the system and attached peripherals, and disconnect the system from the electrical outlet.

2   Remove the system cover.

3   Ensure that the following components are properly installed:
- cooling shroud
- expansion card risers (if installed)
- expansion cards
- power supply unit(s)
- cooling fan assembly (if installed)
- cooling fan(s)
- processor(s) and heat sink(s)
- memory modules
- hard-drive carriers or cage
- hard drive backplane

4   Ensure that all cables are properly connected.

5   Install the system cover.

6   Run the appropriate diagnostic test. For more information, see the Using system diagnostics section.

Next steps

If the problem persists, see the Getting help section.

Related links

Using system diagnostics

Getting help

Troubleshooting the system battery

Prerequisites

⚠ **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 are shipped with your product.**

ⓘ **NOTE: If the system 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 system time to speed up or slow down. If the system seems to operate normally except for the time set in System Setup, the problem may be caused by a software, rather than by a defective battery.**

Steps

1   Re-enter the time and date in System Setup.

2   Turn off the system, and disconnect it from the electrical outlet for at least an hour.

3   Reconnect the system to the electrical outlet, and turn on the system.

4   Enter System Setup.

    If the date and time displayed in System Setup are not correct, check the System Error Log (SEL) for system battery messages.

Next steps

If the problem persists, see the Getting help section.

Related links

Getting help

Troubleshooting power supply units

⚠ **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 are shipped with your product.**

The following sections provide information on troubleshooting power source and power supply units problems.

Troubleshooting power source problems

1   Press the power button to ensure that your system is turned on. If the power indicator does not glow when the power button is pressed, press the power button firmly.

2   Plug in another working power supply unit to ensure that the system board is not faulty.

3   Ensure that no loose connections exist.

    For example, loose power cables.

4   Ensure that the power source meets applicable standards.

5   Ensure that there are no short circuits.

6   Have a qualified electrician check the line voltage to ensure that it meets the needed specifications.

Power supply unit problems

1   Ensure that no loose connections exist.

   For example, loose power cables.

2   Ensure that the power supply unit (PSU) handle or LED indicates that the PSU is working properly.

   For more information about PSU indicators, see the Power indicator codes section.

3   If you have recently upgraded your system, ensure that the PSU has enough power to support the new system.

4   If you have a redundant PSU configuration, ensure that both the PSUs are of the same type and wattage.

   You may have to upgrade to a higher wattage PSU.

5   Ensure that you use only PSUs with the Extended Power Performance (EPP) label on the back.

6   Reseat the PSU.

> ⓘ **NOTE: After installing a PSU, allow several seconds for the system to recognize the PSU and determine if it is working properly.**

   If the problem persists, see the Getting help section.

Related links

   Getting help
   Power supply unit indicator codes

Troubleshooting cooling problems

> ⚠ **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 are shipped with your product.**

Ensure that the following conditions exist:

- System cover, cooling shroud, EMI filler panel, memory module blank, or back filler bracket is not removed.
- Ambient temperature is not higher than the system specific ambient temperature.
- External airflow is not obstructed.
- A cooling fan is not removed or has not failed.
- The expansion card installation guidelines have been followed.

Additional cooling can be added by one of the following methods:

From the iDRAC web GUI:

1   Click **Hardware** > **Fans** > **Setup**.

2   From the **Fan Speed Offset** drop-down list, select the cooling level required or set the minimum fan speed to a custom value.

From F2 System Setup:

1   Select **iDRAC Settings** > **Thermal**, and set a higher fan speed from the fan speed offset or minimum fan speed.

From RACADM commands:

1   Run the command `racadm help system.thermalsettings`

For more information, see the Integrated Dell Remote Access User's Guide at **Dell.com/idracmanuals**.

Troubleshooting cooling fans

Prerequisites

⚠ **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 are shipped with your product.**

ⓘ **NOTE: The fan number is referenced by the systems management software. In the event of a problem with a particular fan, you can easily identify and replace it by noting down the fan numbers on the cooling fan assembly.**

1   Follow the safety guidelines listed in the Safety instructions section.
2   Follow the procedure listed in the Before working inside your system section.

Steps

1   Reseat the fan or the fan's power cable.
2   Restart the system.

Next steps

1   Follow the procedure listed in the After working inside your system section.
2   If the problem persists, see the Getting help section.

Related links

Safety instructions
Before working inside your system
Getting help

Troubleshooting system memory

Prerequisites

⚠ **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 are shipped with your product.**

Steps

1   If the system is operational, run the appropriate system diagnostic test. See the Using system diagnostics section for the available diagnostic tests.

   If the diagnostic tests indicate a fault, follow the corrective actions provided by the diagnostic tests.

2   If the system is not operational, turn off the system and attached peripherals, and unplug the system from the power source. Wait at least for 10 seconds, and then reconnect the system to the power source.

3   Turn on the system and attached peripherals, and note the messages on the screen.

   If an error message is displayed indicating a fault with a specific memory module, go to step 12.

4   Enter System Setup, and check the system memory setting. Make any changes to the memory settings, if needed.

   If the memory settings match the installed memory but the problem still persists, go to step 12.

5   Turn off the system and attached peripherals, and disconnect the system from the electrical outlet.

6   Remove the system cover.

7   Check the memory channels and ensure that they are populated correctly.

   ⓘ **NOTE: See the system event log or system messages for the location of the failed memory module. Reinstall the memory device.**

8   Reseat the memory modules in their sockets.

9   Install the system cover.

10   Enter System Setup and check the system memory setting.

If the problem is not resolved, proceed with step 11.

11 Remove the system cover.

12 If a diagnostic test or error message indicates a specific memory module as faulty, swap or replace the module with a known working memory module.

13 To troubleshoot an unspecified faulty memory module, replace the memory module in the first DIMM socket with a module of the same type and capacity.

If an error message is displayed on the screen, this may indicate a problem with the installed DIMM type(s), incorrect DIMM installation, or defective DIMM(s). Follow the on-screen instructions to resolve the problem.

14 Install the system cover.

15 As the system boots, observe any error message that is displayed and the diagnostic indicators on the front of the system.

16 If the memory problem persists, repeat step 12 through step 15 for each memory module installed.

Next steps

If the problem persists, see the Getting help section.

Related links

Getting help

Using system diagnostics

Troubleshooting an internal USB key

Prerequisites

⚠ **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 are shipped with your product.**

Steps

1 Enter System Setup and ensure that the **USB key port** is enabled on the **Integrated Devices** screen.

2 Turn off the system and attached peripherals, and disconnect the system from the electrical outlet.

3 Remove the system cover.

4 Locate the USB key and reseat it.

5 Install the system cover.

6 Turn on the system and attached peripherals, and check if the USB key is functioning.

7 If the problem is not resolved, repeat step 2 and step 3.

8 Insert a known working USB key.

9 Install the system cover.

Next steps

If the problem persists, see the Getting help section.

Related links

Getting help

Troubleshooting an SD card

Prerequisites

⚠ **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 are shipped with your product.**

ⓘ **NOTE: Certain SD cards have a physical write-protect switch on the card. If the write-protect switch is turned on, the SD card is not writable.**

Steps

1 Enter System Setup, and ensure that the **Internal SD Card Port** is enabled.

2 Turn off the system, including any attached peripherals, and disconnect the system from the electrical outlet.

3 Remove the system cover.

> ⓘ **NOTE: When an SD card failure occurs, the internal dual SD module controller notifies the system. On the next restart, the system displayed a message indicating the failure. If redundancy is enabled at the time of SD card failure, a critical alert will be logged and chassis health will degrade.**

4 Replace the failed SD card with a new SD card.

5 Install the system cover.

6 Reconnect the system to its electrical outlet and turn on the system, including any attached peripherals.

7 Enter System Setup, and ensure that the **Internal SD Card Port** and **Internal SD Card Redundancy** modes are set to the needed modes.

   Verify that the correct SD slot is set as **Primary SD Card**.

8 Check if the SD card is functioning properly.

9 If the **Internal SD Card Redundancy** option is set to **Enabled** at the time of the SD card failure, the system prompts you to perform a rebuild.

> ⓘ **NOTE: The rebuild is always sourced from the primary SD card to the secondary SD card.**

Troubleshooting a hard drive or SSD

Prerequisites

> ⚠ **CAUTION: This troubleshooting procedure can erase data stored on the hard drive. Before you proceed, back up all files on the hard drive.**

> ⚠ **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 are shipped with your product.**

Steps

1 Run the appropriate diagnostic test. See the Using system diagnostics section.

   Depending on the results of the diagnostics test, proceed as required through the following steps.

2 If your system has a RAID controller and your hard drives are configured in a RAID array, perform the following steps:

   a Restart the system and press F10 during system startup to run the Dell Lifecycle Controller, and then run the Hardware Configuration wizard to check the RAID configuration.

      See the Dell Lifecycle Controller documentation or online help for information about RAID configuration.

   b Ensure that the hard drives are configured correctly for the RAID array.

   c Take the hard drive offline and reseat the drive.

   d Exit the configuration utility and allow the system to boot to the operating system.

3 Ensure that the needed device drivers for your controller card are installed and are configured correctly. For more information, see the operating system documentation.

4 Restart the system and enter the System Setup.

5 Verify that the controller is enabled and the drives are displayed in the System Setup.

Next steps

If the problem persists, see the Getting help section.

Related links

Getting help
Using system diagnostics

Troubleshooting a storage controller

⚠ **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 are shipped with your product.**

ⓘ **NOTE: When troubleshooting a SAS or PERC controller, see the documentation for your operating system and the controller.**

1   Run the appropriate diagnostic test. See the Using system diagnostics section.
2   Turn off the system and attached peripherals, and disconnect the system from the electrical outlet.
3   Remove the system cover.
4   Verify that the installed expansion cards are compliant with the expansion card installation guidelines.
5   Ensure that each expansion card is firmly seated in its connector.
6   Install the system cover.
7   Reconnect the system to the electrical outlet, and turn on the system and attached peripherals.
8   If the problem is not resolved, turn off the system and attached peripherals, and disconnect the system from the electrical outlet.
9   Remove the system cover.
10 Remove all expansion cards installed in the system.
11 Install the system cover.
12 Reconnect the system to the electrical outlet, and turn on the system and attached peripherals.
13 Run the appropriate diagnostic test. See the Using system diagnostics section. If the tests fail, see the Getting help section.
14 For each expansion card you removed in step 10, perform the following steps:
    a   Turn off the system and attached peripherals, and disconnect the system from the electrical outlet.
    b   Remove the system cover.
    c   Reinstall one of the expansion cards.
    d   Install the system cover.
    e   Run the appropriate diagnostic test. See the Using system diagnostics section.

If the problem persists, see the Getting help section.

Related links

Using system diagnostics
Getting help

Troubleshooting expansion cards

Prerequisites

⚠ **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 are shipped with your product.**

ⓘ **NOTE: When troubleshooting an expansion card, you also have to see the documentation for your operating system and the expansion card.**

Steps

1   Run the appropriate diagnostic test. See the Using system diagnostics section.
2   Turn off the system and attached peripherals, and disconnect the system from the electrical outlet.
3   Remove the system cover.
4   Ensure that each expansion card is firmly seated in its connector.
5   Install the system cover.
6   Turn on the system and attached peripherals.

7   If the problem is not resolved, turn off the system and attached peripherals, and disconnect the system from the electrical outlet.

8   Remove the system cover.

9   Remove all expansion cards installed in the system.

10 Install the system cover.

11 Run the appropriate diagnostic test. See the Using system diagnostics section.

    If the tests fail, see the Getting help section.

12 For each expansion card you removed in step 8, perform the following steps:

    a   Turn off the system and attached peripherals, and disconnect the system from the electrical outlet.
    b   Remove the system cover.
    c   Reinstall one of the expansion cards.
    d   Install the system cover.
    e   Run the appropriate diagnostic test. See the Using system diagnostics section.

Next steps

If the problem persists, see the Getting help section.

Related links

Using system diagnostics
Getting help

Troubleshooting processors

Prerequisites

⚠ **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 are shipped with your product.**

Steps

1   Run the appropriate diagnostics test. See the Using system diagnostics section.

2   Turn off the system and attached peripherals, and disconnect the system from the electrical outlet.

3   Remove the system cover.

4   Ensure that the processor and heat sink are properly installed.

5   Install the system cover.

6   Run the appropriate diagnostic test. See the Using system diagnostics section.

7   If the problem persists, see the Getting help section.

Related links

Getting help
Using system diagnostics

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** > **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 need you to respond by typing y (yes) or n (no).

Diagnostic messages

The system diagnostic utility generates messages if there are errors detected when you run diagnostic tests on your system. For more information about system diagnostics, see the Using system diagnostics section.

Related links

Using system diagnostics

Alert messages

The 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 links listed in the Documentation resources section of this manual.

Related links

Documentation resources

Getting help

Topics:

- Contacting Dell
- Documentation feedback
- Quick Resource Locator

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 about 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 lower 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.
5. For contact details of Dell Global Technical Support:
   a. Click Global Technical Support.
   b. The **Contact Technical Support** page is displayed with details to call, chat, or e-mail the Dell Global Technical Support team.

Documentation feedback

Click the **Feedback** link in any of the Dell documentation pages, fill out the form, and click **Submit** to send your feedback.

Quick Resource Locator

Use the Quick Resource Locator (QRL) to get immediate access to system information and how-to videos. This can be done by visiting **Dell.com/QRL** or by using your smartphone or tablet and a model-specific Quick Resource (QR) code located on your Dell Storage system. To try out the QR code, scan the following image:

Figure 63. Quick resource locator