Dell PowerEdge XE9680L

Technical Guide

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DELL Technologies

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.

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System overview

The Dell PowerEdge XE9680L is Dell's latest 2-socket, 4U direct liquid-cooled rack server that is designed to handle AI/ML and HPC workloads.

The system features:

- Two 5th Generation Intel® Xeon® Scalable Processors (up to 64C/350 W).
- Up to 32 DDR5 DIMM slots.
- Six 2800 W AC Titanium PSUs with support for 3+3 FTR and 5+1 redundancy policies with NVIDIA H200 GPUs .
- Six 3000 W AC Titanium PSUs with support for 3+3 FTR and 5+1 redundancy policies with NVIDIA B200 GPUs .
- Six high-performance CPU cooling fans on the top layer and six high-performance GPU cooling fans on the bottom layer of the system.
- Up to 12 PCIe Gen5 slots to support the latest Gen5 PCIe devices and networking, enabling flexible networking design.
- Up to eight U.2 NVMe SSD drives (PSBB direct)
- Eight NVIDIA HGX H200 GPUs containing PCIe Gen5 modules, enhancing capabilities for AI, machine learning, and high-performance computing.
- Eight NVIDIA HGX B200 GPUs containing PCIe Gen5 modules, enhancing capabilities for AI, machine learning, and high-performance computing.

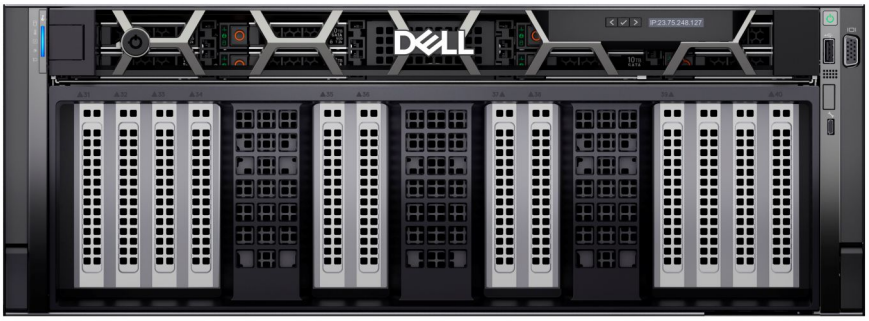

Figure 1. Front view of the 8 x U.2 NVMe SSD drives

Topics:

- Key workloads
- Messaging
- System features

Key workloads

The versatile XE9680L is designed to train the most demanding ML/DL large models including:

- Generative AI Training, Fine-Tuning, and large-scale LLM inferencing
- Large natural language processing models, recommendation engines, speech recognition models, conversational AI, chatbots, and digital humans
- AI/ML/DL Training - especially large model training with large datasets
- HPC - Accelerate compute and simulation workloads.

Messaging

For a comprehensive look at the messaging, refer the internal launch assets pages.

PowerEdge Central link: PowerEdge .Next - Acceleration Optimized (sharepoint.com).

System features

The following table shows the features of the PowerEdge XE9680L.

Table 1. Features

Features	PowerEdge XE9680L
Processors	• Two 5th Generation Intel Xeon Scalable processors with up to 64 cores
Memory	DIMM Speed • Up to 5600 MT/s (1 DPC) • Up to 4400 MT/s (2 DPC) Memory Type • RDIMM Memory module slots • 32 DDR5 DIMM slots • Supports DDR5 registered DIMMs (RDIMMs) slots. Maximum RAM • RDIMM 4 TB
Storage Controllers	• Internal Boot: Boot Optimized Storage Subsystem (NVMe BOSS-N1): HWRAID 1, 2 x M.2 SSDs
Drive Bays	Front bays: • 8 x U.2 NVMe direct from PSB
Power Supplies	• 6 x 2800 W AC Titanium with support for 3+3 FTR and 5+1 redundancy policies (for NVIDIA H200 GPUs) • 6 x 3000 W AC Titanium with support for 3+3 FTR and 5+1 redundancy policies (for NVIDIA B200 GPUs)
Cooling Options	• Direct Liquid Cooling
Fans	High performance (HPR) Gold fans
	Six high-performance cooling fans on the top layer, and six high-performance cooling fans on the bottom layer of the system
Dimension	Height: 174.3 mm (6.86 inches)
	Width: Upper 2U: 447 mm (17.59 inches), Lower 2U: 434 mm (17.08 inches)
	Depth: 1037.57 mm (40.82 inches) with bezel
	1025.62 mm (40.37 inches) without bezel
Form Factor	4U rack server
Embedded Management	• iDRAC9 • iDRAC Direct • iDRAC RESTful with Redfish • iDRAC Service Manual
Bezel	Optional LCD bezel or security bezel
OpenManage Software	• CloudIQ for PowerEdge plug-in • OpenManage Enterprise • OpenManage Power Manager plug-in • OpenManage Services plug-in • OpenManage Update Manager plug-in
Mobility	Not supported
OpenManage Integrations	• BMC TrueSight • OpenManage Integration with ServiceNow • Red Hat Ansible Modules

Table 1. Features (continued)

Features	PowerEdge XE9680L	
	• Terraform Providers	
Security	• Cryptographically signed firmware • Data at Rest Encryption (SEDs with local or external key mgmt) • Secure Boot • Secured Component Verification (Hardware integrity check) • Secure Erase • Silicon Root of Trust • System Lockdown (requires iDRAC9 Enterprise or Datacenter) • TPM 2.0 FIPS, CC-TCG certified	
Embedded NIC	2 x 1 GbE LOM	
Networking Options	OCP x8 Mezz 3.0	
GPU Options	8 x NVIDIA GPUs with NVLink: • 8 x NVIDIA HGX H200 141GB 700W SXM5 GPUs, fully interconnected with NVIDIA NVLink technology • 8 x NVIDIA HGX B200 180GB 1000W SXM6 GPUs, fully interconnected with NVIDIA NVLink technology	
Ports	Front Ports • 1 x USB 2.0 • 1 x iDRAC Direct (Micro-AB USB) port • 1 x VGA	Rear Ports • 1 x USB 2.0 • 1 x iDRAC Direct Ethernet port • 1 x USB 3.0
PCIe	12 Gen5 PCIe slots • 10 x16 Gen5 (x16 PCIe) Full-height, Half-length • 2 x16 Gen5 (x16 PCIe) Full-height, Half-length for NIC/SmartNIC/DPU	
Operating System and Hypervisors	• Canonical Ubuntu Server LTS For specifications and interoperability details, see Dell Enterprise Operating Systems on Servers, Storage, and Networking page at Dell.com/OSsupport.	

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Chassis views and features

Topics:

- Chassis views

Chassis views

System configurations - Front view for PowerEdge XE9680L

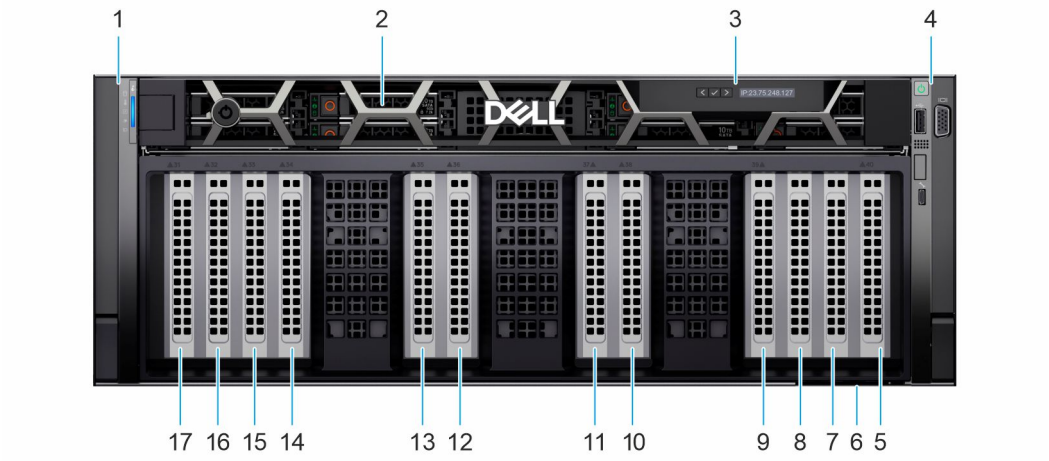


Figure 2. Front view of 8 x U.2 SSD drive system

Table 2. Features available on the front of the 8 x U.2 NVMe SSD drives system

Item	Ports, panels, and slots	Icon	Description
1	Left control panel	N/A	Contains the system health, system ID, and the status LED indicator.
2	Drives	N/A	Enables you to install drives that are supported on your system
3	LCD panel	N/A	The LCD panel of your system provides system information, status, and error messages to indicate if the system is functioning correctly or if the system needs attention.
4	Right control panel	N/A	Contains the power button, USB port, iDRAC Direct (Micro-AB USB) port.
5	PCIe (slot 42)	N/A	The expansion card riser enables you to connect PCI Express expansion cards. For more information , see the Expansion card installation guidelines section.
6	Express Service Tag	N/A	The Express Service Tag is a slide-out label panel that contains system information such as Service Tag, NIC, MAC address, and so on. If you have opted for the secure default access to iDRAC, the Information tag will also contain the iDRAC secure default password.

Table 2. Features available on the front of the 8 x U.2 NVMe SSD drives system (continued)

Item	Ports, panels, and slots	Icon	Description
7	PCIe (slot 41)	N/A	The expansion card riser enables you to connect PCI Express expansion cards. For more information , see the Expansion card installation guidelines section.
8	PCIe (slot 40)	N/A	The expansion card riser enables you to connect PCI Express expansion cards. For more information , see the Expansion card installation guidelines section.
9	PCIe (slot 39)	N/A	The expansion card riser enables you to connect PCI Express expansion cards. For more information , see the Expansion card installation guidelines section.
10	PCIe (slot 38)	N/A	The expansion card riser enables you to connect PCI Express expansion cards. For more information , see the Expansion card installation guidelines section.
11	PCIe (slot 37)	N/A	The expansion card riser enables you to connect PCI Express expansion cards. For more information , see the Expansion card installation guidelines section.
12	PCIe (slot 36)	N/A	The expansion card riser enables you to connect PCI Express expansion cards. For more information , see the Expansion card installation guidelines section.
13	PCIe (slot 35)	N/A	The expansion card riser enables you to connect PCI Express expansion cards. For more information , see the Expansion card installation guidelines section.
14	PCIe (slot 34)	N/A	The expansion card riser enables you to connect PCI Express expansion cards. For more information , see the Expansion card installation guidelines section.
15	PCIe (slot 33)	N/A	The expansion card riser enables you to connect PCI Express expansion cards. For more information , see the Expansion card installation guidelines section.
16	PCIe (slot 32)	N/A	The expansion card riser enables you to connect PCI Express expansion cards. For more information , see the Expansion card installation guidelines section.
17	PCIe (slot 31)	N/A	The expansion card riser enables you to connect PCI Express expansion cards. For more information , see the Expansion card installation guidelines section.

System configurations - Rear view for PowerEdge XE9680L

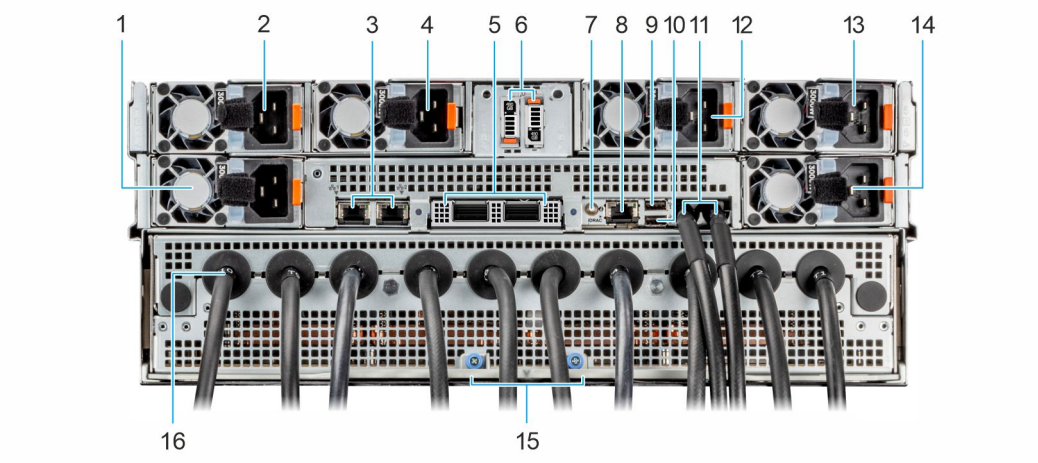


Figure 3. Rear view of the system

Table 3. Rear view of the system

Item	Ports, panels, or slots	Icon	Description
1	Power supply unit (PSU) 2	2	PSU2 of the system
2	Power supply unit (PSU) 1	1	PSU1 of the system
3	NIC Ports		The NIC ports are embedded on the LOM card that is connected to the system board.
4	Power supply unit (PSU) 3	3	PSU3 of the system
5	OCP NIC Card	N/A	The OCP NIC card supports OCP 3.0. The NIC ports are integrated on the OCP card which is connected to the system board.
6	BOSS-N1	N/A	There are two M.2 connectors that are populated on the board and support two NVMe drives for boot.
7	System Identification (ID) button		The System Identification (ID) button is available on the front and back of the system. Press the button to identify a system in a rack by turning on the system ID button. You can also use the system ID button to reset iDRAC and to access BIOS using the step through mode. When pressed, the system ID LED in the back panel blinks until either the front or rear button is pressed again. Press the button to toggle between on or off mode. **NOTE:** If the server stops responding during POST, press and hold the **System ID** button for more than five seconds to enter the BIOS progress mode. **NOTE:** To reset the iDRAC (if not disabled on the iDRAC setup page by pressing F2 during system boot), press and hold the **System ID** button for more than 15 seconds.
8	Dedicated iDRAC9 Ethernet port		Enables you to remotely access iDRAC. For more information, see the *Integrated Dell Remote Access Controller User's Guide* at PowerEdge Manuals
9	USB 2.0 port		The USB port is 4-pin, 2.0-compliant. This port enables you to connect USB devices to the system.
10	USB 3.0 port		The USB port is 9-pin and 3.0-compliant. This port enables you to connect USB devices to the system.

Table 3. Rear view of the system (continued)

Item	Ports, panels, or slots	Icon	Description
11	Direct Liquid Cooling tubes from the processors	N/A	Cold coolant flows into the system from one tube and hot coolant leaves the system from another tube.
12	Power supply unit (PSU) 4	4	PSU4 of the system
13	Power supply unit (PSU) 5	5	PSU5 of the system
14	Power supply unit (PSU) 6	6	PSU6 of the system
15	Rear sled handle	N/A	The rear sled handle is used to slide out the bottom layer of the system.
16	Direct Liquid Cooling tubes from the GPUs	N/A	Cold coolant flows into the system from one tube and hot coolant leaves the system from another tube.

System configurations - Inside view for PowerEdge XE9680L

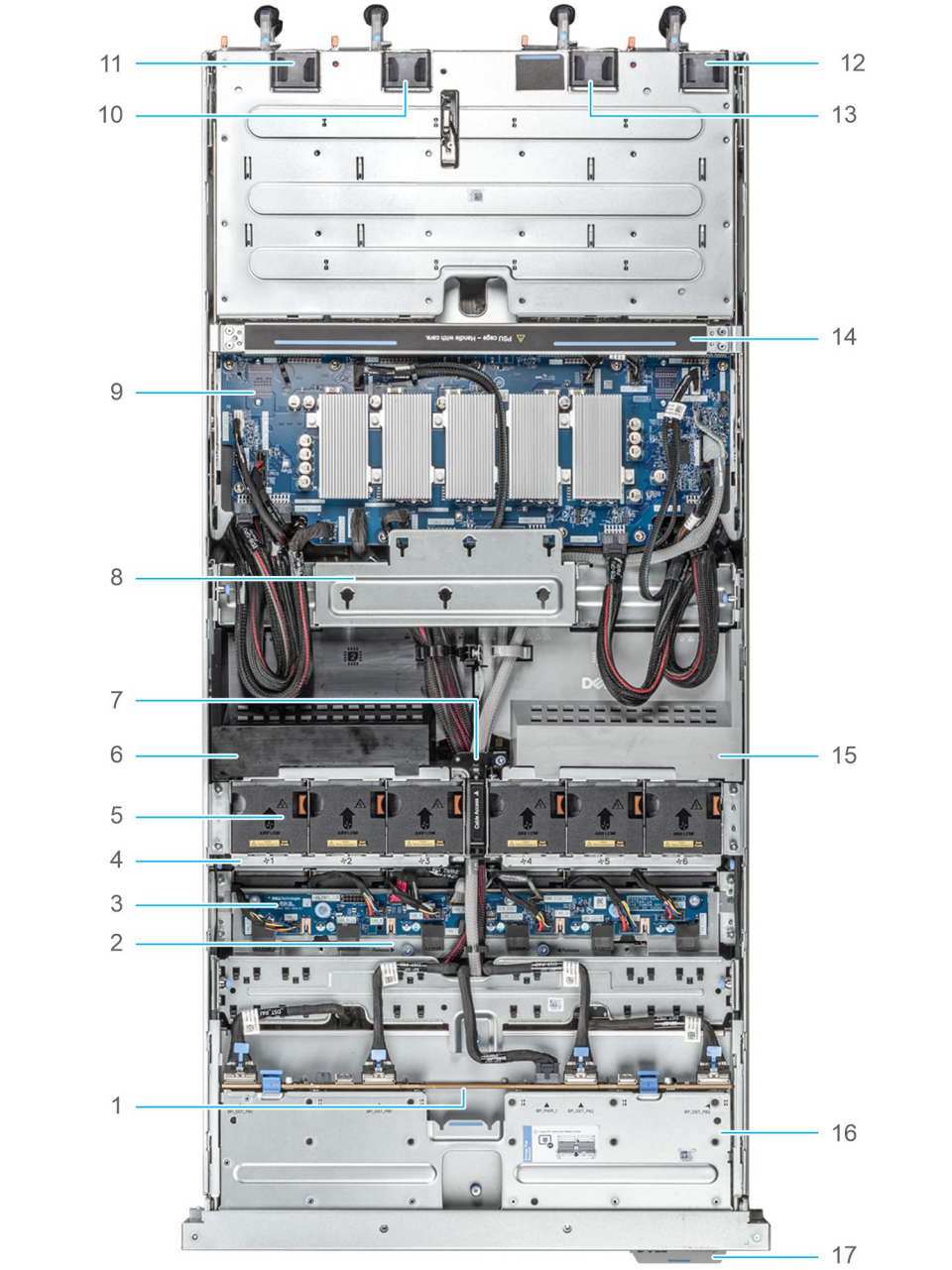


Figure 4. Inside view of the PowerEdge XE9680L

1. Backplane
2. Bottom layer of the system
3. GPU Fan board
4. CPU Fan cage
5. CPU Fans
6. System board Air baffle
7. Cable clip
8. Rear Support bracket

NOTE: The design may vary.

9. Power Distribution Board (PDB)
10. Power Supply Unit 4 (PSU 4)
11. Power Supply Unit 5 (PSU 5)
12. Power Supply Unit 1 (PSU 1)
13. Power Supply Unit 3 (PSU 3)
14. PDB Cage handle
15. System board Air baffle
16. Drive cage
17. Express Service Tag

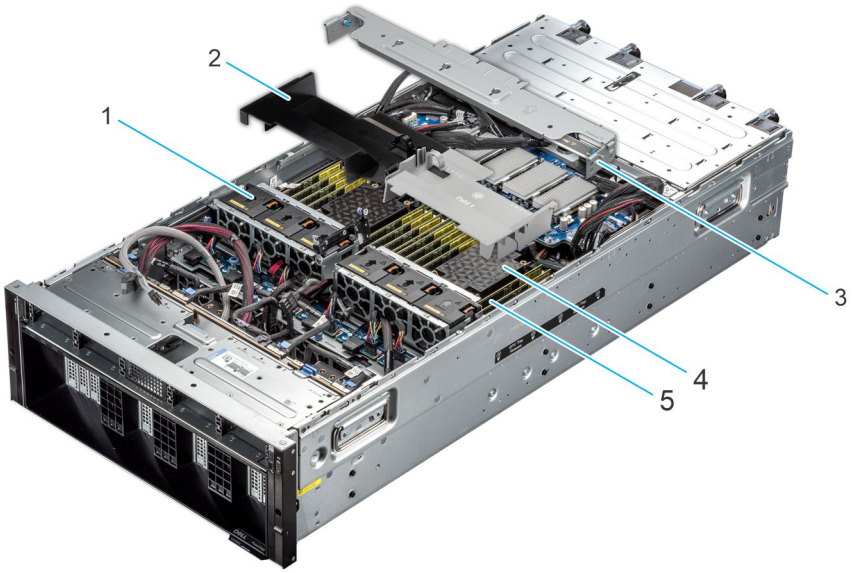


Figure 5. Inside view of the PowerEdge XE9680L

1. CPU cooling fans
2. Air shroud
3. Support bracket
4. Processor
5. Memory module

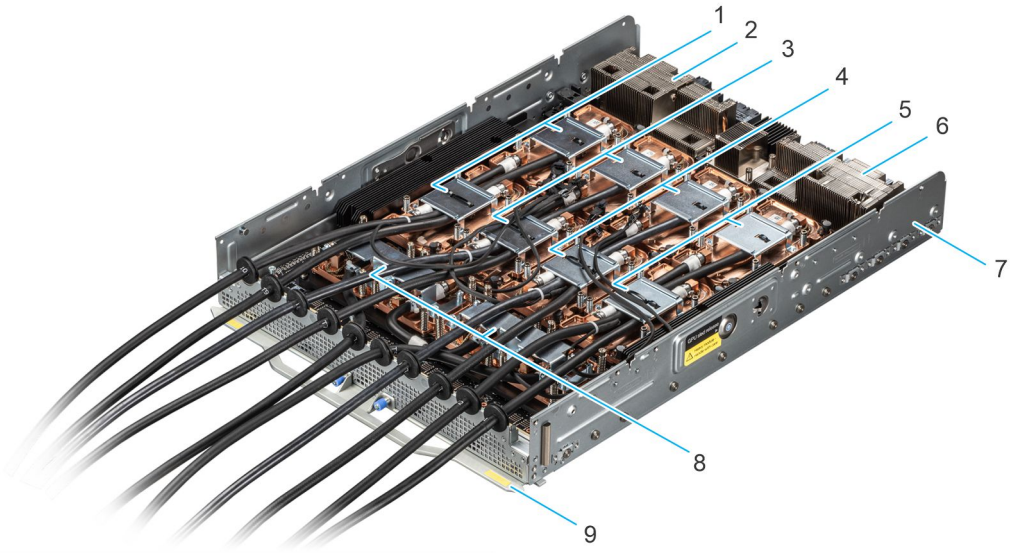


Figure 6. Inside view of the H200 GPU sled of the PowerEdge XE9680L - Delta version

1. Loop 2: GPU with Cold plates
2. Retimer heat sink
3. Loop 3: GPU with Cold plates
4. Loop 4: GPU with Cold plates
5. Loop 5: GPU with Cold plates
6. Retimer heat sink
7. H200 GPU sled chassis
8. Loop 1: NVLink Switches (NVS)
9. GPU sled handle

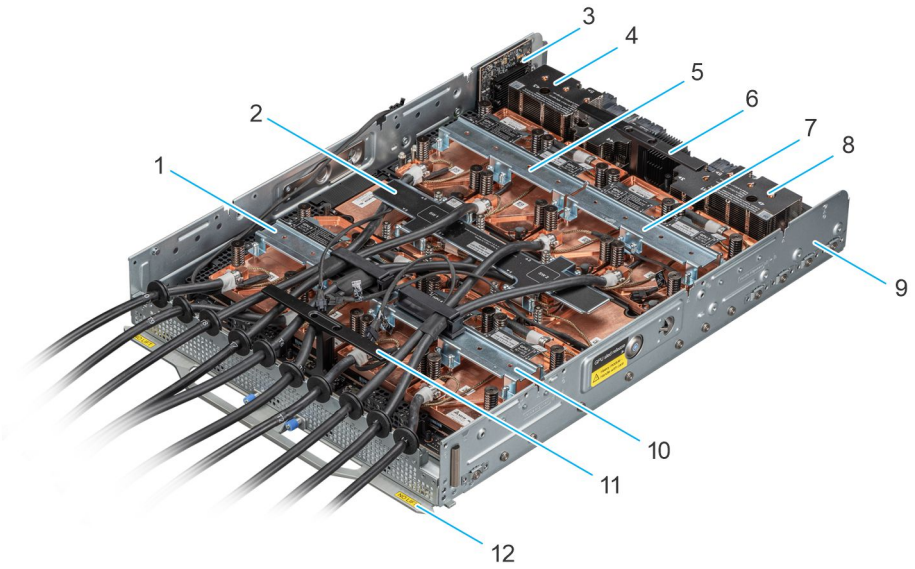


Figure 7. Inside view of the B200 GPU sled of the PowerEdge XE9680L - Delta version

1. Loop 5: GPU with Cold plates
2. Loop 3: NVLink Switches (NVS) cold plate
3. CX-7 module on GPU
4. Retimer heat sink
5. Loop 2: GPU with Cold plates
6. GPU board holder
7. Loop 1: GPU with Cold plates
8. Retimer heat sink
9. B200 GPU sled chassis
10. Loop 4: GPU with Cold plates
11. GPU board holder
12. GPU sled handle

3

Processor

Topics:

- Processor features

Processor features

The 5th Generation Intel® Xeon® Scalable Processor stack is the next-generation data center processor offering improved performance, standard increased memory speeds, expanded UPI speeds and enhanced security.

The following lists the features and functions that are in the 5th Generation Intel® Xeon® Scalable Processor offering:

- Increased core counts with up to 64 cores
- Enhanced memory performance with DDR5 and memory speed up to 5600 MT/s at 1 DIMMs per CPU (1DPC) or 4400 MT/s at (2DPC) and 32 DIMMs in total.
- More, faster I/O with PCI Express 5 and up to 80 lanes (per socket)
- Faster UPI with up to four Intel Ultra Path Interconnect (Intel® UPI) at up to 20 GT/s, increasing multisocket bandwidth.
- Enhanced security for virtualized environments with Intel Trust Domain Extensions (Intel® TDX) for confidential computing

Supported processors

The following table shows the Intel Emerald Rapids(5th Generation Intel® Xeon® Scalable Processors) SKUs that are supported on the XE9680L.

Table 4. 5th Generation Intel® Xeon® Scalable Processors for XE9680L

Processor	Core count	Clock Speed (GHz)	Cache (M)	UPI (GT/s)	Cores	Threads	Turbo	Memory Speed (MT/s)	Memory Capacity	TDP
8592+	XCC	1.9	320	20	64	128	Turbo	5600	4 TB	350 W
8580	XCC	2.0	300	20	60	120	Turbo	5600	4 TB	350 W
8570	XCC	2.1	300	20	56	112	Turbo	5600	4 TB	350 W
8568Y+	XCC	2.3	300	20	48	96	Turbo	5600	4 TB	350 W
8562Y+	MCC	2.8	60	20	32	64	Turbo	5600	4 TB	300 W

4

Memory subsystem

Topics:

- Memory specifications

Memory specifications

The PowerEdge XE9680L system supports the following memory specifications for optimized operation.

Table 5. Supported DIMMs

DIMM Speed (MT/s)	DIMM Type	DIMM Capacity (GB)	Ranks per DIMM	Data Width	DIMM Volts (V)
5600	RDIMM	64	2	x4	1.1
		96	2	x4	1.1
		128	4	x4	1.1

Table 6. Memory technology

Feature	PowerEdge XE9680L (DDR5)
DIMM type	RDIMM
Transfer speed	• Up to 5600 MT/s (1 DPC) • Up to 4400 MT/s (2 DPC)
Voltage	1.1 V
Memory module socket	32, 288-pin

NOTE: Maximum DIMM transfer speed support dependent on CPU SKU and DIMM population.

5

Storage

Topics:

- Drives
- Internal storage configuration

Drives

The PowerEdge XE9680L supports:

- 8 x 2.5-inch hot-swappable NVMe SSD drives

Internal storage configuration

Table 7. Internal Storage Configuration Matrix

Supported Options	Total HDD/SSD (not BOSS)	NVMe	1st Front Storage	2nd Front Storage	3rd Front Storage	Rear Storage	PERC Qty	Storage Controller (s)	CPU Qty
C02	8	8 / 0	8 x 2.5-inch NVMe direct attached	N/A	N/A	N/A	0	N/A	2 CPU

6

Networking

Topics:

- Overview

Overview

PowerEdge offers a wide variety of options to get information moving to and from our servers. Industry best technologies are chosen, and systems management features are added by our partners to firmware to tie in with iDRAC. These adapters are rigorously validated for worry-free, fully supported use in Dell servers.

7

PCIe subsystem

Topics:

- Expansion card installation guidelines

Expansion card installation guidelines

The PowerEdge XE9680L system supports up to 12 PCIe Gen5 slots to support the latest Gen5 PCIe devices and networking, enabling flexible networking design.

Table 8. PCIe Riser Configurations

Config No.	Riser configuration	No. of Processors	PERC type supported	Rear storage possible
1	RS1+RS2+RS3+RS4	2	Without Front PERC	No

Table 9. Expansion card slots

PCIe SW	PCIe slot	Processor Connection	PCIe slot height	PCIe slot length	PCIe slot width
PCIe SW4	31	Processor 2	Full height	Half length	x16
	32	Processor 2	Full height	Half length	x16
	33	Processor 2	Full height	Half length	x16
PCIe SW3	34	Processor 2	Full height	Half length	x16
	35	Processor 2	Full height	Half length	x16
	36	Processor 2	Full height	Half length	x16
PCIe SW2	37	Processor 1	Full height	Half length	x16
	38	Processor 1	Full height	Half length	x16
	39	Processor 1	Full height	Half length	x16
PCIe SW1	40	Processor 1	Full height	Half length	x16
	41	Processor 1	Full height	Half length	x16
	42	Processor 1	Full height	Half length	x16

Table 10. NIC/Smart NIC/DPU slots

PCIe slot	Processor Connection	PCIe slot height	PCIe slot length	PCIe slot width
33	Processor 2	Full height	Half length	x16
39	Processor 1	Full height	Half length	x16

NOTE: DPUs with high power consumption (> 75 W) should be installed in slots 33 and 39. NICs/SmartNICs with normal power consumption (< 75 W) can be installed in any slot 31-42.

Table 11. Configuration 1: RS1+RS2+RS3+RS4

Card type	Slot priority	Maximum number of cards
NVIDIA (DPU: 200G, 2P)	33, 39	2
NVIDIA (SmartNIC/DPU: 400G, 1P)	31,37,34, 40, 32, 38, 35, 41, 36, 42, 33, 39	12
NVIDIA (NIC: 100 GbE, 2P)	31,37,34, 40, 32, 38, 35, 41, 36, 42, 33, 39	12
NVIDIA (InfiniBand/Ethernet: NDR400 VPI, 1P).	31,37,34, 40, 32, 38, 35, 41, 36, 42, 33, 39	12
NVIDIA (GPGPU H200, 8-GPU SXM5 BB)	21, 22, 23, 24, 25, 26, 27, 28	8
FOXCONN (BOSS-N1)	Integrated Slot	1
LOM Card	Integrated Slot	1
Intel (OCP: 10Gb, 4P, BT)	Integrated Slot	1
Broadcom (OCP: 25 Gb, 2P, v3)	Integrated Slot	1
NVIDIA (GPGPU B200, 8-GPU SXM6 BB)	21, 22, 23, 24, 25, 26, 27, 28	8

Table 12. Configuration 1: RS1+RS2+RS3+RS4

Card type	Slot priority	Maximum number of cards
NVIDIA (DPU: 200G, 2P)	33, 39	2
NVIDIA (SmartNIC/DPU: 400G, 1P)	31,37,34, 40, 32, 38, 35, 41, 36, 42, 33, 39	12
NVIDIA (NIC: 100 GbE, 2P)	31,37,34, 40, 32, 38, 35, 41, 36, 42, 33, 39	12
NVIDIA (InfiniBand/Ethernet: NDR400 VPI, 1P).	31,37,34, 40, 32, 38, 35, 41, 36, 42, 33, 39	12
FOXCONN (BOSS-N1)	Integrated Slot	1
LOM Card	Integrated Slot	1
Intel (OCP: 10Gb, 4P, BT)	Integrated Slot	1
Broadcom (OCP: 25 Gb, 2P, v3)	Integrated Slot	1
NVIDIA (GPGPU B200, 8-GPU SXM6 BB)	21, 22, 23, 24, 25, 26, 27, 28	8

8

Power, thermal, and acoustics

PowerEdge servers have an extensive collection of sensors that automatically track thermal activity, which helps regulate temperature thereby reducing server noise and power consumption. The table below lists the tools and technologies Dell offers to lower power consumption and increase energy efficiency.

Topics:

- Power
- Thermal
- PowerEdge XE9680L acoustics

Power

Table 13. Power tools and technologies

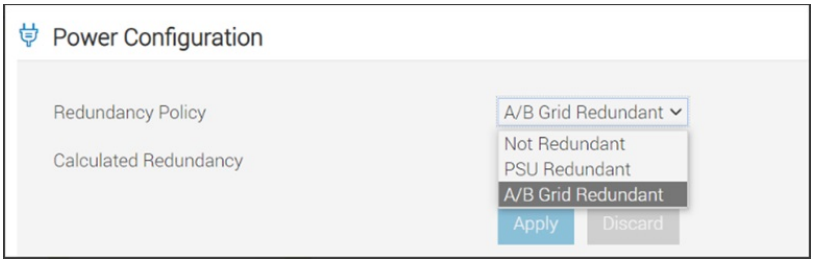
Feature	Description
Power Supply Units(PSU) portfolio	Dell's PSU portfolio includes intelligent features such as dynamically optimizing efficiency while maintaining availability and redundancy. Find additional information in the Power supply units section.
PSU redundancy options	• Not Redundant (5+1) FR (System can get full performance) • PSU Redundant (3+3) FTR (System may throttle when more than one PSU is down) • A/B Grid Redundant (Not supported in power configuration of iDRAC GUI)  **Figure 8. PSU redundancy options**
Tools for right sizing	Enterprise Infrastructure Planning Tool (EIPT) is a tool that can help you determine the most efficient configuration possible. With Dell's EIPT, you can calculate the power consumption of your hardware, power infrastructure, and storage at a given workload. Learn more at Enterprise Infrastructure Planning Tool.
Industry Compliance	Dell's servers are compliant with all relevant industry certifications and guide lines, including 80 PLUS.
Power monitoring accuracy	PSU power monitoring improvements include: • Dell's power monitoring accuracy is currently 1%, whereas the industry standard is 5% • More accurate reporting of power • Better performance under a power cap
Power capping	Use Dell's systems management to set the power cap limit for your systems to limit the output of a PSU and reduce system power consumption. Dell is the first hardware vendor to leverage Intel Node Manager for circuit-breaker fast capping.

Table 13. Power tools and technologies (continued)

Feature	Description
Systems Management	iDRAC Enterprise and Datacenter provides server-level management that monitors, reports and controls power consumption at the processor, memory and system level. Dell OpenManage Power Center delivers group power management at the rack, row, and data center level for servers, power distribution units, and uninterruptible power supplies.
Active power management	Intel Node Manager is an embedded technology that provides individual server-level power reporting and power limiting functionality. Dell offers a complete power management solution comprised of Intel Node Manager accessed through Dell iDRAC9 Datacenter and OpenManage Power Center that allows policy-based management of power and thermal at the individual server, rack, and data center level. Hot spare reduces power consumption of redundant power supplies. Thermal control off a speed optimizes the thermal settings for your environment to reduce fan consumption and lower system power consumption. Idle power enables Dell servers to run as efficiently when idle as when at full workload.
Fresh Air cooling	Refer to ASHRAE A3/A4 Thermal Restriction.
Rack infrastructure	Dell offers some of the industry's highest-efficiency power infrastructure solutions, including: • Power distribution units (PDUs) • Uninterruptible power supplies (UPSs) • Energy Smart containment rack enclosures Find additional information at: Power and Cooling.

The power cap policy setting in iDRAC configuration page controls CPU related power consumption. In XE9680L systems, most of the power is consumed by GPU which cannot be controlled by this setting. Enabling power cap feature will drive CPU to run at very low or lowest frequency speed.

NOTE: As of version 7.00.60.00 and later, power cap function is not available.

Power Supply Units

Table 14. PSU specifications for the PowerEdge XE9680L system

PSU	Power Rating	Class	Heat dissipation (maximum)	Frequency	Voltage	Current
3000 W Mixed Mode	3000 W	Titanium	10,900 BTU/hr	50/60 Hz	209.1 - 240 V AC	16 A
		N/A	11,000 BTU/hr	N/A	240 V DC	14.6 A
	2800 W	N/A	10,500 BTU/hr	50/60 Hz	200 V AC–209 V AC	16 A

Table 15. PSU specifications for the PowerEdge XE9680L system

PSU	Power Rating	Class	Heat dissipation (maximum)	Frequency	Voltage	Current
2800 W Mixed Mode	2800 W	Titanium	10,500 BTU/hr	50/60 Hz	200 V AC–240 V AC	15.6 A
		N/A	10,500 BTU/hr	N/A	240 V DC	13.6 A
3000 W Mixed Mode	3000 W	Titanium	10,900 BTU/hr	50/60 Hz	209.1 - 240 V AC	16 A
		N/A	11,000 BTU/hr	N/A	240 V DC	14.6 A

Table 15. PSU specifications for the PowerEdge XE9680L system (continued)

PSU	Power Rating	Class	Heat dissipation (maximum)	Frequency	Voltage	Current
	2800 W	N/A	10,500 BTU/hr	50/60 Hz	200 V AC–209 V AC	16 A

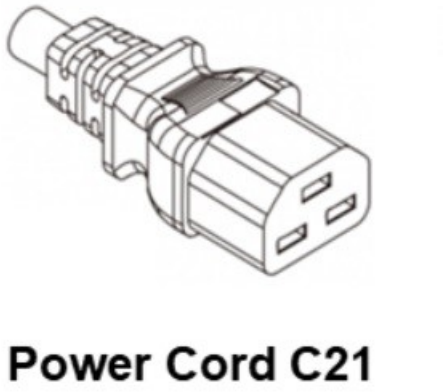


Figure 9. PSU power cord

Table 16. PSU power cord

Form factor	Output	Power cord
Redundant 86 mm	2800 W 54 VDC	C21
	3000 W VDC	C21

NOTE: Do not mix PSUs from different vendors within a single system configuration to ensure optimal performance and reliability.

Thermal

PowerEdge servers have an extensive collection of sensors that automatically track thermal activity, which helps regulate temperature thereby reducing server noise and power consumption.

Thermal design

Thermal management of the platform helps deliver high performance with the right amount of cooling to components, while maintaining the lowest fan speeds possible. This is done across a wide range of ambient temperatures from 10°C to 35°C (50°F to 95°F) and to extended ambient temperature ranges.

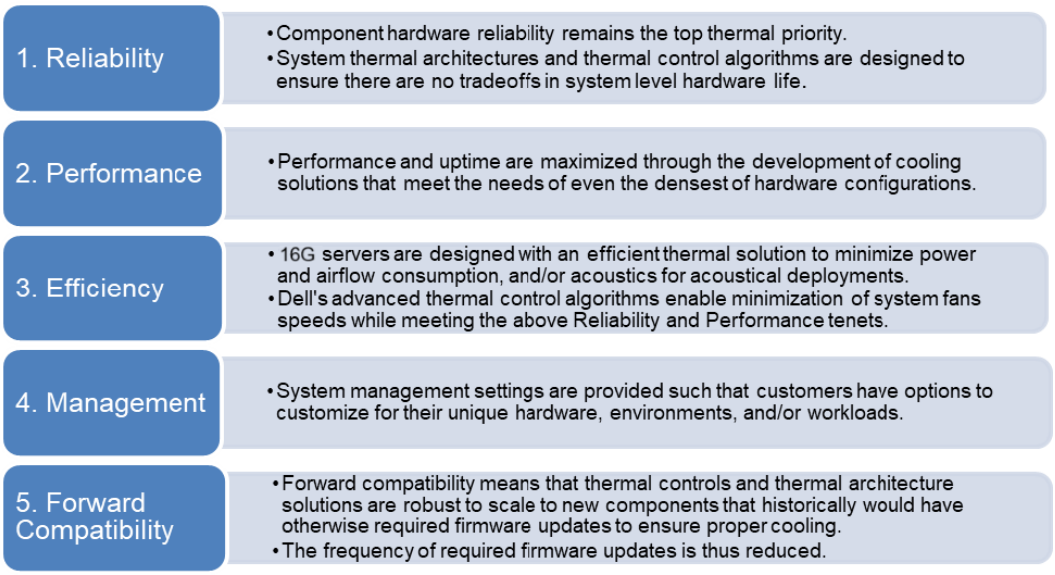


Figure 10. Thermal design characteristics

The thermal design of the PowerEdge XE9680L reflects the following:

- Optimized thermal design: The system layout is architected for optimum thermal design.
- System component placement and layout are designed to provide maximum airflow coverage to critical components with minimum expense of fan power.
- Comprehensive thermal management: The thermal control system regulates the fan speed based on several different responses from all system-component temperature sensors, and inventory for system configurations. Temperature monitoring includes components such as processors, DIMMs, chipsets, the inlet air ambient, hard disk drives, and OCP.
- Open and closed loop thermal fan speed control: Open loop thermal control uses system configuration to determine fan speed based on inlet air ambient temperature. A closed loop thermal control method uses feedback temperatures to dynamically determine proper fan speeds.
- User-configurable settings: With the understanding and realization that every customer has unique set of circumstances or expectations from the system, in this generation of servers, we have introduced limited user- configurable settings residing in the iDRAC BIOS setup screen. For more information, see the Dell PowerEdge XE9680L Installation and Service Manual at PowerEdge Manuals and "Advanced Thermal Control: Optimizing across Environments and Power Goals" on Dell.com.
- Cooling redundancy: The PowerEdge XE9680L allows N+1 fan redundancy, allowing continuous operation with one rotor failure in the system.
- Environmental Specifications: The optimized thermal management makes the PowerEdge XE9680L reliable under a wide range of operating environments.

Thermal restriction matrix

Table 17. Thermal Restriction Matrix- 5th Generation Intel® Xeon® Scalable Processors

CPU (W)	Heat sink type	Fan Type	8 x 2.5-inch NVMe SSDs
			ASHRAE A2 (Max 35° C)
Intel EMR 56C 8570, 8592+, 8580, 8568Y+ CPU (350W) Intel EMR 56C 8562Y+ CPU (300W)	DLC coldplates	High-Performance Gold Fans (CPU Fan)	Supported

Table 18. GPU/FPGA Thermal Restriction Matrix for H200 GPU

TDP (W)	Heat sink type	Fan Type	8 x 2.5-inch NVMe SSDs
			ASHRAE A2 (Max 35° C)
H200 8-GPU (700 W per GPU)	DLC coldplates	High-Performance Gold Fans (GPU Fan)	Supported

Table 19. GPU/FPGA Thermal Restriction Matrix for B200 GPU

TDP (W)	Heat sink type	Fan Type	8 x 2.5-inch NVMe SSDs
			ASHRAE A2 (Max 35° C)
B200 8-GPU (1000 W per GPU)	DLC coldplates	High-Performance Gold Fans (GPU Fan)	Supported

Other restrictions:

- ASHRAE A3/A4 environments are not supported.
- Install a hard drive blank if the slot is not equipped with a hard drive.
- DIMM blank is not required when the DIMM population quantity is 16 pieces or more.

PowerEdge XE9680L acoustics

Acoustical performances of the typical configurations of XE9680L are listed in the tables below. The acoustical numbers that are listed in the table are test results with a single unit of XE9680L only, not including the sound contributed by CDUs.

Table 20. Acoustical configurations of PowerEdge XE9680L

Configuration	NVIDIA H200 GPU (U.2 drive configuration)
Fan Type	12 x High-Performance Platinum (6056)
CPU TDP	2 x Intel Emerald Rapids 350 W
RDIMM Memory	32 x 128 GB DDR5
Backplane Type	1 x 8 U.2 BP
HDD/SSD Type	8 x U.2 SSD
PERC	None
BOSS	16G BOSS
BOSS M.2	Micron 480 GB
OCP	25G OCP NIC
PSU Type	6 x 2800 W
Bezel	Yes
GPU	NVIDIA HGX H200 8-GPU
PCI	10 x 400G NIC
DPU	2 x 400G DPU

Table 21. Acoustical configurations of PowerEdge XE9680L

Configuration	NVIDIA B200 GPU (U.2 drive configuration)
Fan Type	12 x High-Performance Platinum (6056)

Table 21. Acoustical configurations of PowerEdge XE9680L (continued)

Configuration	NVIDIA B200 GPU (U.2 drive configuration)
CPU TDP	2 x Intel Emerald Rapids 350 W
RDIMM Memory	32 x 96 GB DDR5
Backplane Type	1 x 8 U.2 BP
HDD/SSD Type	8 x U.2 SSD
PERC	None
BOSS	16G BOSS
BOSS M.2	Micron 480 GB
OCP	25G OCP NIC
PSU Type	6 x 3000 W
Bezel	Yes
GPU	NVIDIA HGX B200 8-GPU
PCI	10 x 400G NIC
DPU	2 x 200G DPU

Table 22. Acoustical experience of PowerEdge XE9680L Edition configurations

Configuration		GPU NVIDIA H200 (U.2)
Acoustical Performance: Idle/ Operating @ 25°C Ambient.		
$L_{wA,m}$[1](B)	Idle[4]	7.4
	Operating[5], Customer Usage Operating[6]	7.6
K_v (B)	Idle[4]	0.4
	Operating[5], Customer Usage Operating[6]	0.4
$L_{pA,m}$[2](dBA)	Idle[4]	61
	Operating[5], Customer Usage Operating[6]	62
Prominent discrete tones[3]		Not noticeable
Acoustical Performance: Idle/ Operating @ 28°C Ambient.		
$L_{wA,m}$[1](B)		7.7
K_v (B)		0.4
$L_{pA,m}$[2](dBA)		63
Acoustical Performance: Idle/ Operating @ 35°C Ambient.		
$L_{wA,m}$[1](B)		8.2
K_v (B)		0.4
$L_{pA,m}$[2](dBA)		68

Table 23. Acoustical experience of PowerEdge XE9680L Edition configurations

Configuration		GPU NVIDIA B200 (U.2)
Acoustical Performance: Idle/ Operating @ 25°C Ambient.		
$L_{wA,m}$[1](B)	Idle[4]	7.2

Table 23. Acoustical experience of PowerEdge XE9680L Edition configurations (continued)

Configuration		GPU NVIDIA B200 (U.2)
	Operating[5], Customer Usage Operating[6]	7.8
K_v (B)	Idle[4]	0.4
	Operating[5], Customer Usage Operating[6]	0.4
$L_{pA,m}$[2](dBA)	Idle[4]	60
	Operating[5], Customer Usage Operating[6]	64
Prominent discrete tones[3]		Not noticeable
Acoustical Performance: Idle/ Operating @ 28°C Ambient.		
$L_{wA,m}$[1](B)		7.5
K_v (B)		0.4
$L_{pA,m}$[2](dBA)		62
Acoustical Performance: Idle/ Operating @ 35°C Ambient.		
$L_{wA,m}$[1](B)		8.8
K_v (B)		0.4
$L_{pA,m}$[2](dBA)		71

- $L_{wA,m}$: The declared mean A-weighted sound power level (LwA) is calculated per section 5.2 of ISO 9296 with data collected using the methods that are described in ISO 7779. Data presented here may not be fully compliant with ISO 7779.
- $L_{pA,m}$: The declared means that the A-weighted emission sound pressure level is at the bystander position per section 5.3 of ISO 9296 and measured using methods that are described in ISO 7779. The system is placed in a 24U rack enclosure, 25 cm above a reflective floor. Engineering data presented here may not be fully compliant with ISO 7779 declaration requirements.
- **Prominent discrete tones:** Criteria of Annex D of ECMA-74 and Prominence Ratio method of ECMA-418 are followed to determine if discrete tones are prominent and to report them, if so.
- **Idle mode:** The steady-state condition in which the server is energized but not operating any intended function.
- **Operating mode:** Operating mode is represented by the maximum of the steady state acoustical output at 50% of CPU TDP or active storage drives for the respective sections of Annex C of ECMA-74.
- Customer Usage Operating mode: The operating mode is represented by the maximum of the steady state acoustical output at 100% of CPU TDP, 100% of Memory, 100% SSD, and 100% GPU load as the components showed in the above configurations.

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Rails information

Figure 11. System Information Label

The rail offerings for the PowerEdge XE9680L consist of only one type which is stab-in sliding rail.

See the *Dell Enterprise Systems Rail Sizing and Rack Compatibility Matrix* available at rail-rack-matrix for information regarding:

- Specific details about rail types
- Rail adjustability ranges for various rack mounting flange types
- Rail depth with and without cable management accessories
- Rack types that are supported for various rack mounting flange types.

Key factors governing proper rail selection include the following:

- Identifying the type of rack in which they will be installed.
- The spacing between the front and rear mounting flanges of the rack.
- The type and location of any equipment that is mounted in the back of the rack such as power distribution units (PDUs), and the overall depth of the rack.
- Overall depth of the rack

Stab-in, Sliding features summary

The Generic Tool-less stab-in sliding rail supports tool-less installation in 19" EIA-310-E compliant square hole and unthreaded round hole 4-post racks. It allows for the partial extension of the system out of the rack, enabling serviceability of key internal components.

B38 Stab-in sliding rails for 4-post racks

- Supports stab-in installation of the chassis to the rails.
- Support for tool-less installation in 19" EIA-310-E compliant square, unthreadedd round hole racks including all generations of the Dell racks. Also supports tool-less installation in threaded round hole 4-post racks.
- Support for tool-less installation in Dell Titan or Titan-D racks
- Support partial extension of the system out of the rack to allow serviceability of key internal components.

Rack Installation

Installing Stab-in Rails to the system

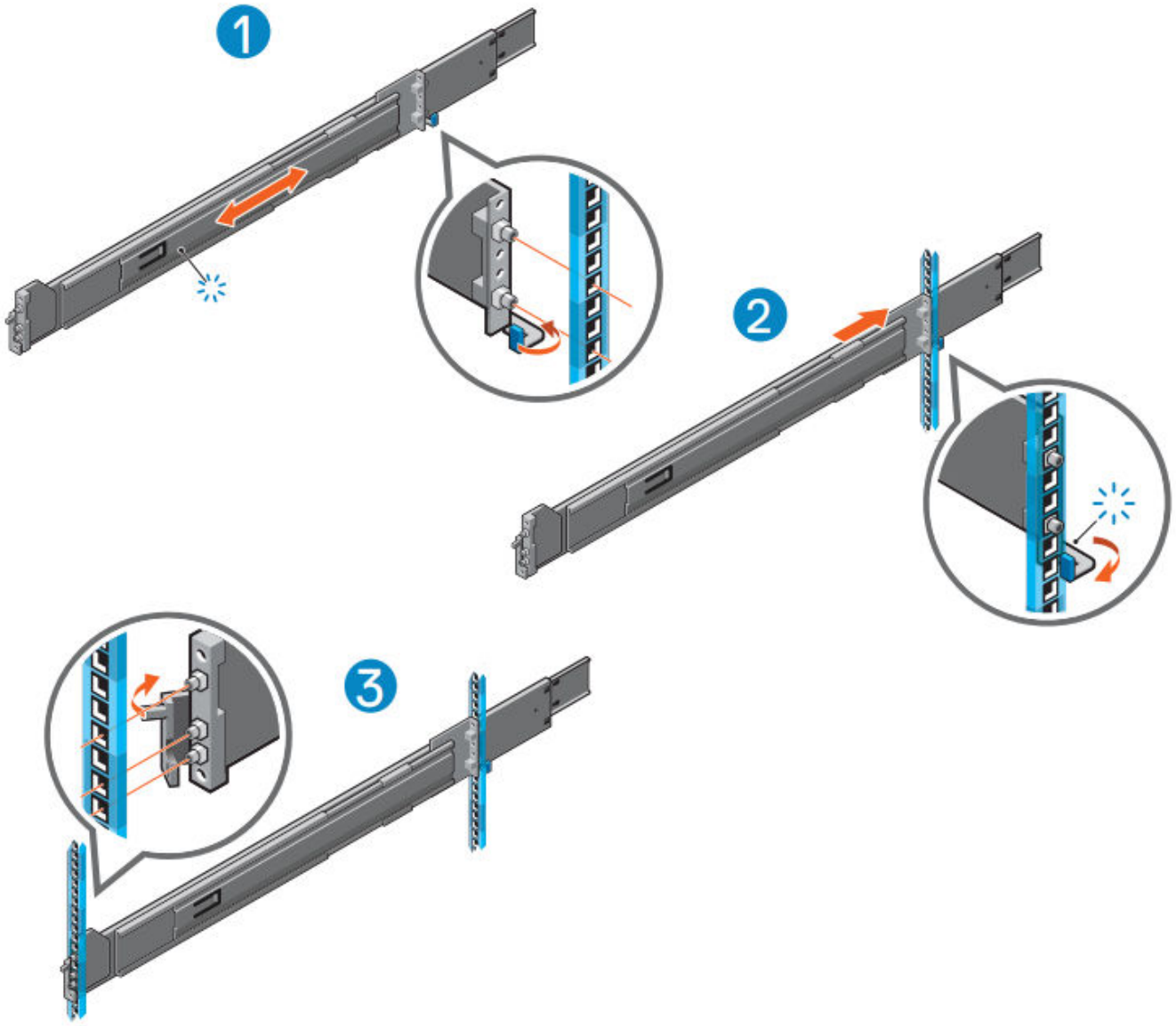
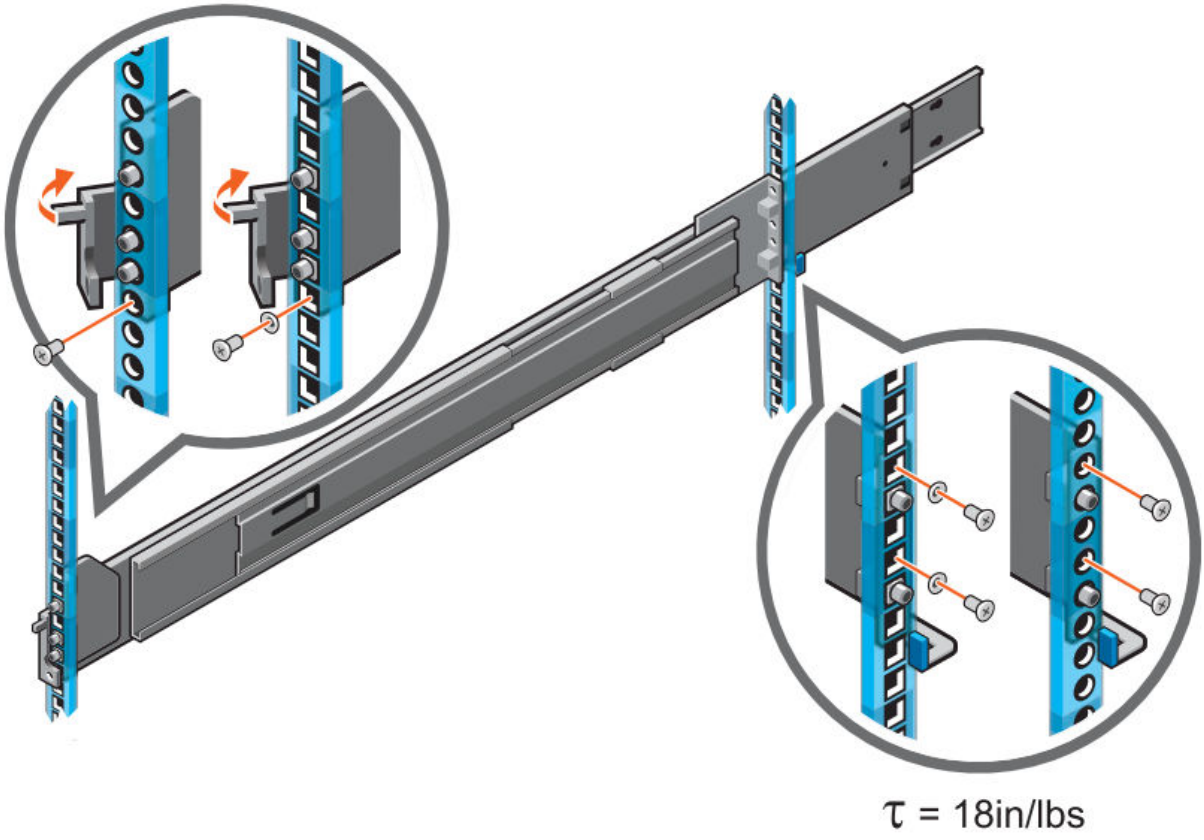


Figure 12. Installing the rail 4-POST racks

Figure 13. Install the supplied hardware to secure rails for the rack level shipping



NOTE: To secure the rails to square hole or unthreaded round hole rack for shipping or in unstable environments, install supplied hardware to the rails.

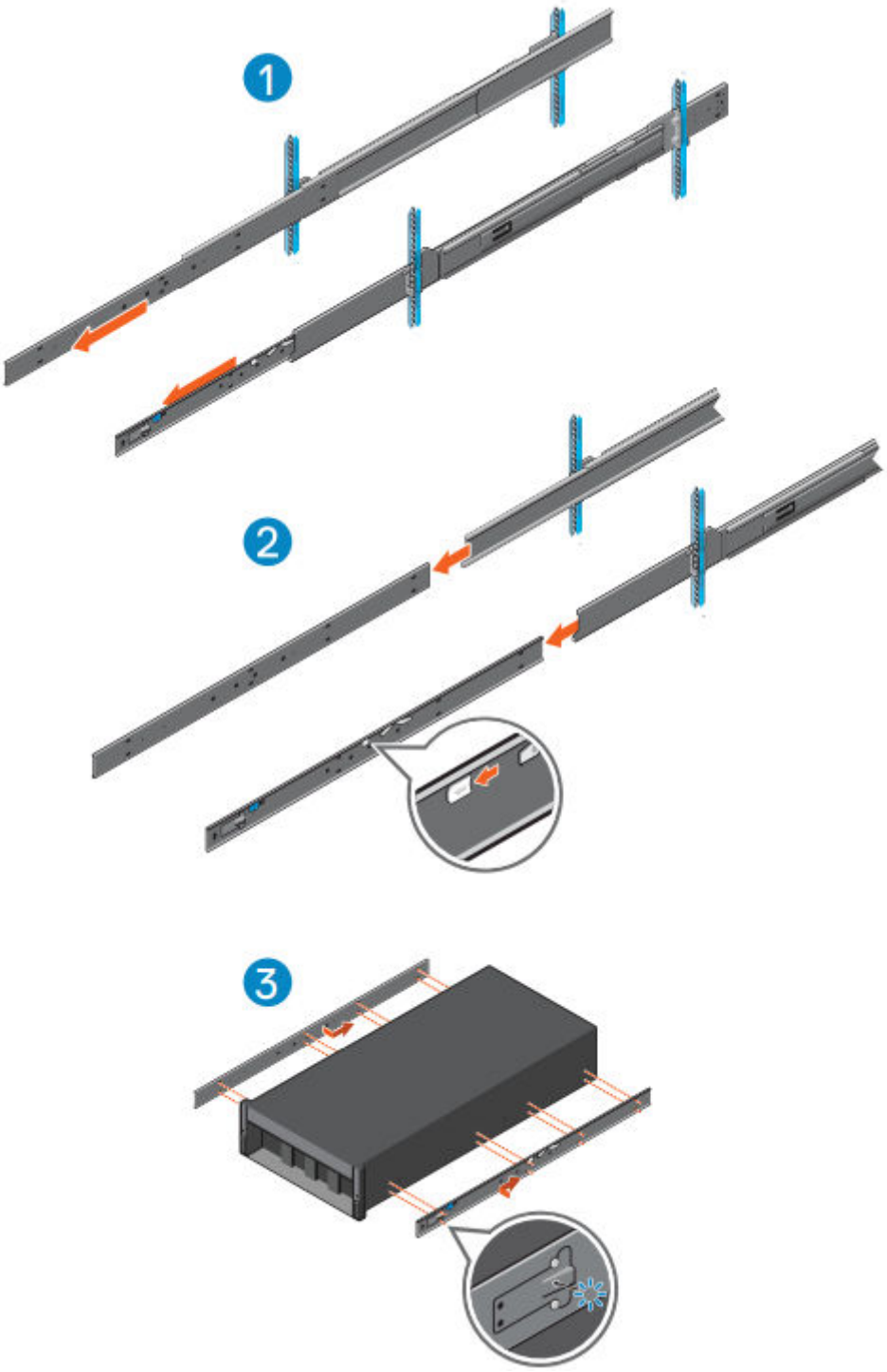


Figure 14. Install the stab-in rails to the system

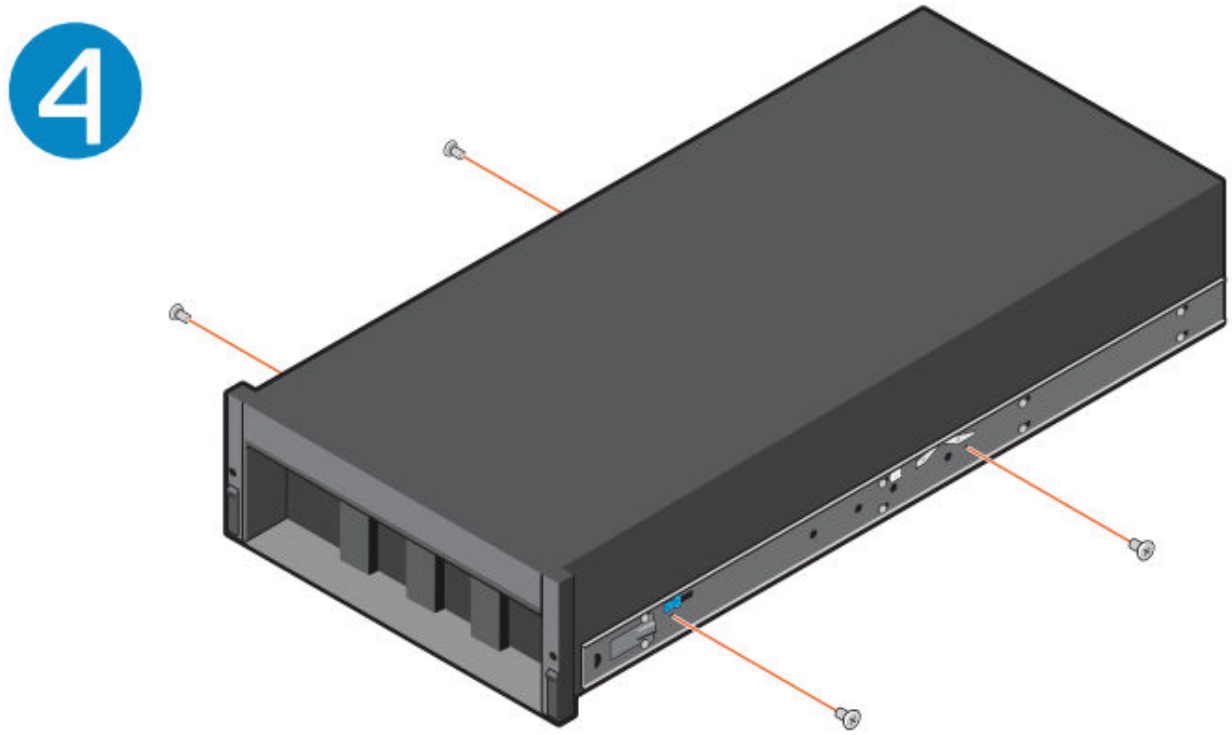
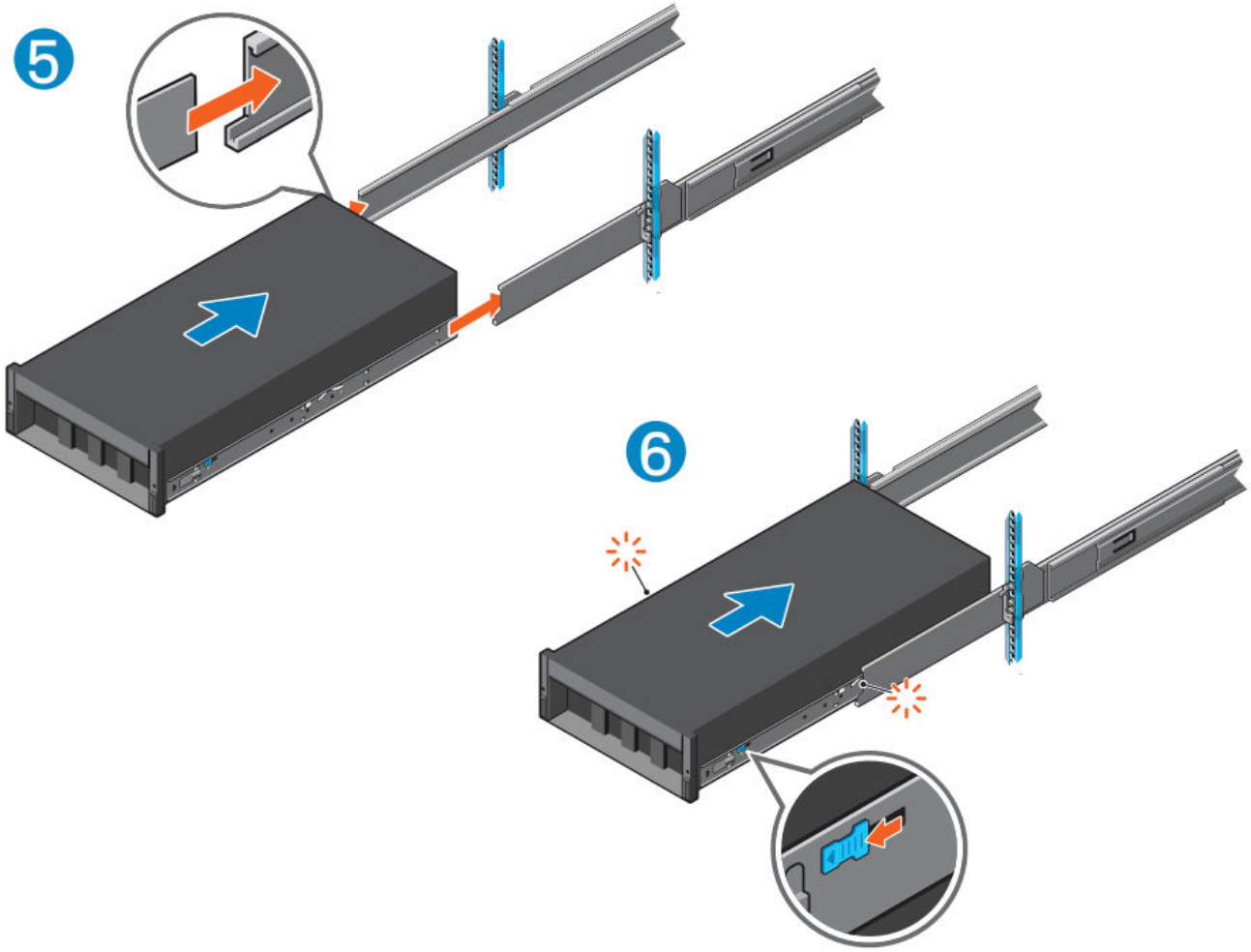


Figure 15. Shipping screws on the inner rails

NOTE: For rack-level shipping, the shipping screws must be installed on the inner rails.

Figure 16. Install the stab-in rails to the system



NOTE: You can remove the system from the rails by performing the installation procedure in reverse order.

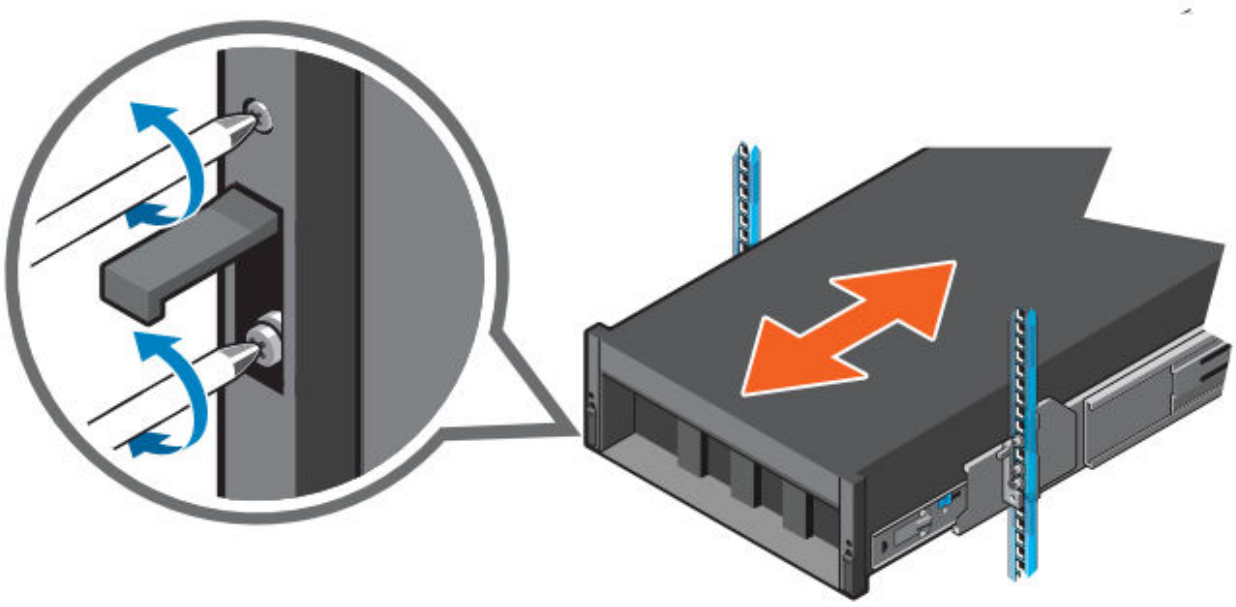


Figure 17. Securing or releasing the system to the rails

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Operating Systems and Virtualization

Topics:

- Supported operating systems

Supported operating systems

The PowerEdge XE9680L supports the following operating system:

- Canonical Ubuntu Server LTS

11

Dell Systems Management

Dell delivers management solutions that help IT administrators effectively deploy, update, monitor, and manage IT assets. Dell solutions and tools enable you to quickly respond to problems by helping them to manage Dell servers efficiently; in physical, virtual, local, and remote environments; all without the need to install an agent in the operating system.

The OpenManage portfolio includes:

- Innovative embedded management tools - integrated Dell Remote Access Controller (iDRAC)
- Consoles - OpenManage Enterprise
- Extensible with plug-ins - OpenManage Power Manager
- Update tools - Repository Manager

Dell has developed comprehensive systems management solutions that are based on open standards and has integrated with management consoles from partners such as Microsoft and VMware, allowing advanced management of Dell servers. Dell management capabilities extend to offerings from the industry's top systems management vendors and frameworks such as Ansible, Splunk, and ServiceNow. OpenManage tools automate the full span of server life cycle management activities along with powerful RESTful APIs to script or integrate with your choice of frameworks.

For more information about the entire OpenManage portfolio, see:

- The latest Dell Systems Management Overview Guide.

Topics:

- Integrated Dell Remote Access Controller (iDRAC)
- Systems Management software support matrix

Integrated Dell Remote Access Controller (iDRAC)

iDRAC9 delivers advanced, agent-free, local and remote server administration. Embedded in every PowerEdge server, iDRAC9 provides a secure means to automate a multitude of common management tasks. Because iDRAC is embedded within every PowerEdge server, there is no additional software to install; just plug in power and network cables, and iDRAC is ready to go. Even before installing an operating system (operating system) or hypervisor, IT administrators have a complete set of server management features at their fingertips.

With iDRAC9 in-place across the Dell PowerEdge portfolio, the same IT administration techniques and tools can be applied throughout. This consistent management platform allows easy scaling of PowerEdge servers as an organization's infrastructure grows. Customers can use the iDRAC RESTful API for the latest in scalable administration methods of PowerEdge servers. With this API, iDRAC enables support for the Redfish standard and enhances it with Dell extensions to optimize at-scale management of PowerEdge servers. By having iDRAC at the core, the entire OpenManage portfolio of Systems Management tools allows every customer to tailor an effective, affordable solution for any size environment.

Zero Touch Provisioning (ZTP) is embedded in iDRAC. ZTP - Zero Touch Provisioning is Intelligent Automation Dell's agent-free management puts IT administrators in control. Once a PowerEdge server is connected to power and networking, that system can be monitored and fully managed, whether you're standing in front of the server or remotely over a network. In fact, with no need for software agents, an IT administrator can: · Monitor · Manage · Update · Troubleshoot and remediate Dell servers. With features like zero-touch deployment and provisioning, iDRAC Group Manager, and System Lockdown, iDRAC9 is purpose-built to make server administration quick and easy. For those customers whose existing management platform utilizes in-band management, Dell does provide iDRAC Service Module, a lightweight service that can interact with both iDRAC9 and the host operating system to support legacy management platforms.

When ordered with DHCP enabled from the factory, PowerEdge servers can be automatically configured when they are initially powered up and connected to your network. This process uses profile-based configurations that ensure each server is configured per your specifications. This feature requires an iDRAC Enterprise license.

iDRAC9 offers following license tiers:

Table 24. iDRAC9 license tiers

License	Description
iDRAC9 Basic	• Available only on 100-500 series rack/tower • Basic instrumentation with iDRAC web UI • For cost conscious customers that see limited value in management
iDRAC9 Express	• Default on 600+ series rack/tower, modular, and XR series • Includes all features of Basic • Expanded remote management and server life-cycle features
iDRAC9 Enterprise	• Available as an upsell on all servers • Includes all features of Basic and Express. Includes key features such as virtual console, AD/LDAP support, and more • Remote presence features with advanced, Enterprise-class, management capabilities
iDRAC9 Datacenter	• Available as an upsell on all servers • Includes all features of Basic, Express, and Enterprise. Includes key features such as telemetry streaming, Thermal Manage, automated certificate management, and more • Extended remote insight into server details, focused on high end server options, granular power, and thermal management

For a full list of iDRAC features by license tier, see Integrated Dell Remote Access Controller 9 User's Guide at Dell.com.

For more details on iDRAC9 including white papers and videos, see:

- Support for Integrated Dell Remote Access Controller 9 (iDRAC9) on the Knowledge Base page at Dell.com

Systems Management software support matrix

Table 25. Systems Management software support matrix

Categories	Features	PE mainstream
Embedded Management and In-band Services	iDRAC9 (Express, Enterprise, and Datacenter licenses)	Supported
	OpenManage Mobile	Not Supported
	OM Server Administrator (OMSA)	Not Supported
	iDRAC Service Module (iSM)	Supported
	Driver Pack	Not Supported
Change Management	Update Tools (Repository Manager, DSU, Catalogs)	Supported
	Server Update Utility	Not Supported
	Lifecycle Controller Driver Pack	Supported
	Bootable ISO	Supported
Console and Plug-ins	OpenManage Enterprise	Supported
	Power Manager Plug-in	Supported
	Update Manager Plug-in	Supported
	SupportAssist Plug-in	Not Supported
	CloudIQ	Supported
Integrations and connections	OM Integration with VMware Vcenter/vROps	Not Supported
	OM Integration with Microsoft System Center (OMIMSC)	Not Supported
	Integrations with Microsoft System Center and Windows Admin Center (WAC)	Not Supported

Table 25. Systems Management software support matrix (continued)

Categories	Features	PE mainstream
	ServiceNow	Supported
	Ansible	Supported (post-RTS)
	Terraform Providers	Supported (post-RTS)
Security	Secure Enterprise Key Management	Supported
	Secure Component Verification	Supported
Standard operating system	Red Hat Enterprise Linux, SUSE, Ubuntu	Supported (Tier-1)

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Appendix A. Additional specifications

Topics:

- Chassis dimensions
- System weight
- NIC port specifications
- Video specifications
- USB ports specifications
- PSU rating
- Environmental specifications

Chassis dimensions

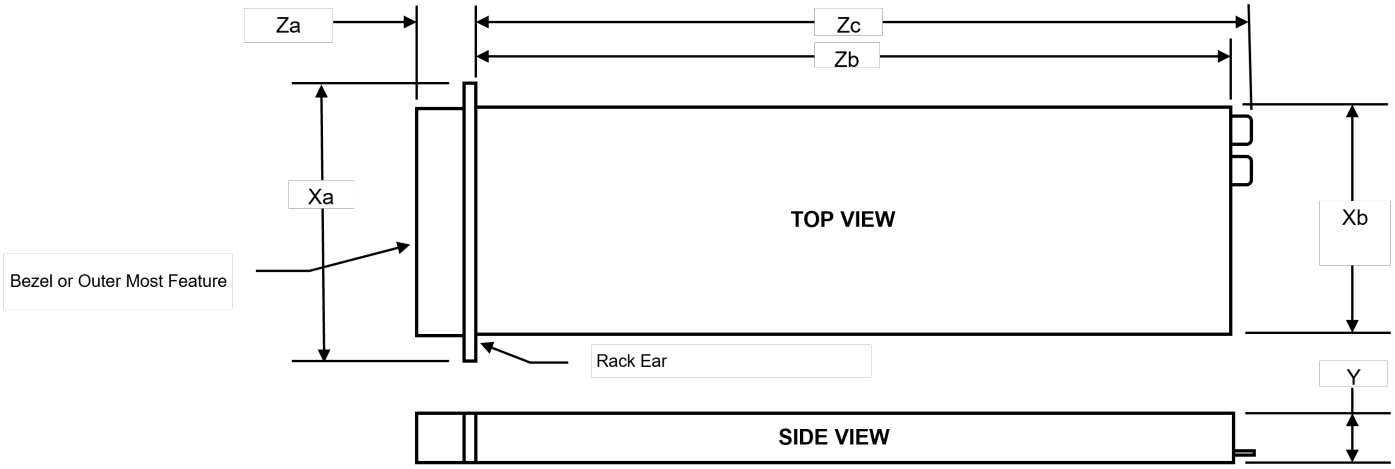

Figure 18. Chassis dimensions

Table 26. Chassis dimension for the PowerEdge XE9680L system

Drives	Xa	Xb	Y	Za (with bezel)	Za (without bezel)	Zb	Zc
8 x 2.5-inch SSDs + GPU	482 mm (18.97 inches)	Upper 2U: 447 mm (17.59 inches), Lower 2U: 434 mm (17.08 inches)	174.3 mm (6.86 inches)	35.67 mm (1.4 inches)	24.05 mm (0.94 inches	966 mm (38.03 inches, top) Ear to rear wall	1001.57mm (39.43 inches) Ear to PSU handle

NOTE: Zb is the nominal rear wall external surface where the system board I/O connectors reside.

NOTE: Chassis length is longer than usual, need to consider potential interferences with the rear mounted PDU or the rear rack door when installed on rack.

System weight

Table 27. Weight for the PowerEdge XE9680L system with 8 x 2U SSDs

System configuration	Maximum weight (with all drives/SSDs)
Fully populated XE9680L system with H200 GPUs	91.63 kgs (202.00 pounds)
Fully populated XE9680L system with B200 GPUs	95.6 kgs (210.76 pounds)

Table 28. PowerEdge system weight handling recommendations

Chassis weight	Description
40–70 pounds	Recommend two persons to lift.
70 pounds- 120 pounds	Recommend three persons to lift.
≥ 121 pounds	Recommend to use a server-lift.

CAUTION: The system is heavy and may slide, potentially causing damage when being installed or removed from a higher position on the rack.

NIC port specifications

The PowerEdge XE9680L system supports up to two 10/100/1000 Mbps Network Interface Controller (NIC) ports embedded on the LAN on Motherboard (LOM) and integrated on the optional Open Compute Project (OCP) cards.

Table 29. NIC port specification for the system

Feature	Specifications
LOM card	1 GbE x 2
OCP card (OCP 3.0)	Intel 10 GbE x 4, Broadcom 25 GbE x 2

Video specifications

The system supports integrated Matrox G200 graphics controller with 16 MB of video frame buffer.

Table 30. Supported front video resolution options for the system

Resolution	Refresh rate (Hz)	Color depth (bits)
1024 x 768	60	8, 16, 32
1280 x 800	60	8, 16, 32
1280 x 1024	60	8, 16, 32
1360 x 768	60	8, 16, 32
1440 x 900	60	8, 16, 32
1600 x 900	60	8, 16, 32
1600 x 1200	60	8, 16, 32
1680 x 1050	60	8, 16, 32
1920 x 1080	60	8, 16, 32
1920 x 1200	60	8, 16, 32

Table 31. Supported rear video resolution options for the system

Resolution	Refresh rate (Hz)	Color depth (bits)
1024 x 768	60	8, 16, 32
1280 x 800	60	8, 16, 32
1280 x 1024	60	8, 16, 32
1360 x 768	60	8, 16, 32
1440 x 900	60	8, 16, 32
1600 x 900	60	8, 16, 32
1600 x 1200	60	8, 16, 32
1680 x 1050	60	8, 16, 32
1920 x 1080	60	8, 16, 32
1920 x 1200	60	8, 16, 32

USB ports specifications

Table 32. PowerEdge XE9680L USB specifications

Front		Rear	
USB port type	**No. of ports**	**USB port type**	**No. of ports**
USB 2.0-compliant port	One	USB 3.0-compliant port	One
iDRAC Direct port (Micro-AB USB 2.0-compliant port)	One	USB 2.0-compliant ports	One

NOTE: The micro USB 2.0 compliant port can only be used as an iDRAC Direct or a management port.

NOTE: Avoid connecting USB devices to the iDRAC Direct port of the XE9680L system during system initialization, POST, boot operations, or GPU firmware updates.

PSU rating

Below table lists the power capacity of the PSUs in High/Low line operation mode.

Table 33. PSUs Highline and Lowline Ratings

Features	2800 W Titanium	3000 W Titanium
Peak Power (Highline/-72 VDC)	4760 W	5100 W
Highline/-72 VDC	2800 W	3000 W / 2800 W
Peak Power (Lowline/-40 VDC)	N/A	N/A
Lowline/-40 VDC	N/A	N/A
Highline 240 VDC	2800 W	3000 W
DC-(48-60) V	N/A	N/A

The PowerEdge XE9680L supports six AC or DC power supplies.

Dell PSUs have achieved Titanium efficiency levels as shown in the table below.

Table 34. PSU Efficiency Level

Form Factor	Output	Class	10%	20%	50%	100%
Redundant 86 mm	2800 W AC (Input 240 AC)	Titanium	90.00%	94.00%	96.00%	94.00%
	3000 W (Input 240AC)	Titanium	90.00%	94.00%	96.00%	94.00%

Environmental specifications

NOTE: For additional information about environmental certifications, see the Product Environmental Datasheet located with the Manuals & Documents on Dell Support.

Table 35. Continuous operation specifications for ASHRAE A2

Temperature	Specifications
Allowable continuous operations	
Temperature ranges for altitudes <= 900 m (<= 2953 ft)	10–35°C (50–95°F) with no direct sunlight on the equipment
Humidity percent ranges (non-condensing always)	8% RH with -12°C minimum dew point to 80% RH with 21°C (69.8°F) maximum dew point
Operational altitude de-rating	Maximum temperature is reduced by 1°C/300 m (1.8°F/984 Ft) above 900 m (2953 Ft)

Table 36. Shared requirements across all categories

Temperature	Specifications
Allowable continuous operations	
Maximum temperature gradient (applies to both operation and non-operation)	20°C in an hour* (36°F in an hour) and 5°C in 15 minutes (9°F in 15 minutes), 5°C in an hour* (9°F in an hour) for tape **NOTE:** * - Per ASHRAE thermal guidelines for tape hardware, these are not instantaneous rates of temperature change.
Non-operational temperature limits	-40°C to 65°C (-104°F to 149°F)
Non-operational humidity limits	5% to 95% RH with 27°C (80.6°F) maximum dew point
Maximum non-operational altitude	12,000 meters (39,370 ft)
Maximum operational altitude	3,050 meters (10,006 ft)

Table 37. Maximum vibration specifications

Maximum vibration	Specifications
Operating	0.21 G_{rms} at 5 Hz to 500 Hz (all operation orientations)
Storage	1.38 G_{rms} at 7 Hz to 250 Hz for 15 minutes

Table 38. Maximum shock pulse specifications

Maximum shock pulse	Specifications
Operating	Six consecutively performed shock pulses in the positive and negative x, y, and z axis of 6 G for up to 11 ms.
Storage	Performed shock pulses in z axis (one pulse) of 71 G for up to 2 ms

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Appendix B. Standards compliance

The system conforms to the following industry standards.

Table 39. Industry standard documents

Standard	URL for information and specifications
ACPIAdvance Configuration and Power Interface Specification, v6.4	Specifications and Tools
Ethernet IEEE Std 802.3-2022	IEEE Standards Association
IPMI Intelligent Platform Management Interface, v2.0	IPMI
DDR5 Memory DDR5 SDRAM Specification	DDR5 SDRAM
PCI Express PCI Express Base Specification, v5.0	pciexpress
PMBus Power System Management Protocol Specification, v1.2	PMBus specifications
SAS Serial Attached SCSI, 3 (SAS-3) (T10/INCITS 519)	SCSI
SATA Serial ATA Rev. 3.3	sata-io.org
SMBIOS System Management BIOS Reference Specification, v3.3.0	DMTF SMBIOS
TPM Trusted Platform Module Specification, v1.2 and v2.0	trustedcomputinggroup.org
UEFI Unified Extensible Firmware Interface Specification, v2.7	uefi.org/specifications
PI Platform Initialization Specification, v1.7	
USB Universal Serial Bus v2.0 and SuperSpeed v3.0 (USB 3.1 Gen1)	USB Implementers Forum, Inc. USB document library
NVMe Express Base Specification. Revision 2.0c	NVMe specifications
NVMe Command Set Specifications 1. NVM Express NVM Command Set Specification. Revision 1.1c 2. NVM Express Zoned Namespaces Command Set. Revision 1.0c 3. NVM Express® Key Value Command Set. Revision 1.0c	
NVMe Transport Specifications 1. NVM Express over PCIe Transport. Revision 1.0c 2. NVM Express RDMA Transport Revision. 1.0b 3. NVM Express TCP Transport. Revision 1.0c	
NVMe NVM Express Management Interface. Revision 1.2c	
NVMe NVMe Boot Specification. Revision 1.0	

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Appendix C Additional resources

Table 40. Additional resources

Resource	Description of contents	Location
Installation and Service Manual	This manual, available in PDF format, provides the following information: • Chassis features • System Setup program • System indicator codes • System BIOS • Remove and replace procedures • Diagnostics • Jumpers and connectors	Dell.com/Support/Manuals
Getting Started Guide	This guide ships with the system, and is also available in PDF format. This guide provides the following information: • Initial setup steps	Dell.com/Support/Manuals
Rack Installation Guide	This document ships with the rack kits, and provides instructions for installing a server in a rack.	Dell.com/Support/Manuals
System Information Label	The system information label documents the system board layout and system jumper settings. Text is minimized due to space limitations and translation considerations. The label size is standardized across platforms.	Inside the system chassis cover
QR code for system resources	This code on the chassis can be scanned by a phone application to access additional information and resources for the server, including videos, reference materials, service tag information, and Dell contact information.	Inside the system chassis cover
Enterprise Infrastructure Planning Tool (EIPT)	The Dell online EIPT enables easier and more meaningful estimates to help you determine the most efficient configuration possible. Use EIPT to calculate the power consumption of your hardware, power infrastructure, and storage.	Dell.com/calc

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Appendix D: Service and support

Topics:

- Why attach service contracts
- ProSupport Infrastructure Suite
- Specialty Support Services
- ProDeploy Infrastructure Suite
- Supplemental Deployment Services
- Unique Deployment Scenarios
- DAY 2 – Automation Services with Ansible
- Dell Technologies Consulting Services

Why attach service contracts

Dell PowerEdge servers include a standard hardware warranty that highlights our commitment to product quality by guaranteeing repair or replacement of defective components. While industry-leading, our warranties are limited to 1 or 3 years, depending on model, and do not cover software assistance. Call records show that customers are most often seeking Dell technical support for software related issues like configuration guidance, troubleshooting, upgrade assistance or performance tuning. Encourage customers to purchase ProSupport service contracts to supplement warranty coverage and ensure optimal support for both hardware and software. ProSupport provides a complete hardware guarantee beyond the original warranty period.

ProSupport Infrastructure Suite

ProSupport Infrastructure Suite is a set of support services that enable customers to build the solution that is right for their organization. It is an industry-leading, enterprise-class support that aligns with the criticality of your systems, the complexity of your environment, and the allocation of your IT resources.

Figure 19. ProSupport Enterprise Suite

	Basic Hardware Support	ProSupport	BEST ProSupport Plus
Customer Advocacy *via assigned Services Account Manager* ⓘ			
Benefit from personalized services assistance that aligns with your business goals.			✓
Stay ahead of challenges with actionable insights gained through comprehensive service intelligence.			✓
Experience fast critical issue resolution through coordinated team response and executive escalation paths.			✓
Ensure **coverage continuity** by planning effectively for technology lifecycle transitions.			✓
Proactive Monitoring & Actionable Insights *via Dell's connectivity solutions and tools*			
Quickly visualize performance through a current system health score		✓	✓
Cybersecurity monitoring and mitigation recommendations provide another layer of protection		✓	✓
Predictive performance and capacity analysis address bottlenecks		✓	✓
Prevent or plan for downtime with predictive hardware anomaly detection		✓	✓
Energy consumption and carbon footprint forecasting support sustainability and stewardship initiatives		✓	✓
Get ahead of problems with proactive issue detection with automated case creation	✓	✓	✓
Streamline internal IT efforts with efficient service request and escalation management tools	✓	✓	✓
Minimize disruptions by self-dispatching eligible parts	✓	✓	✓
Support Essentials			
Keep systems code current and performing at peak through Proactive System Maintenance			✓
Count on Mission Critical Support during Sev 1 incidents and natural disasters ⓘ			✓
Enjoy priority access to senior technical support engineers			✓
Bringing your own software? We provide limited 3rd party software support ⓘ			✓
Choose onsite parts delivery and labor response that meets your needs	Next Business Day	NBD or 4-hour	4-hour
Select product coverage that best augments your internal resources	Hardware	Hardware & Software	Hardware & Software
Have an issue? We are here for you by phone, chat and online	Local business hours	24/7/365	24/7/365

ProSupport Plus for Infrastructure

ProSupport Plus for Infrastructure is the ultimate solution for customers seeking preventative maintenance and optimal performance on their business-critical assets. The service caters to customers who require proactive, predictive, and personalized support for systems that manage critical business applications and workloads. When customers purchase PowerEdge server, we recommend ProSupport Plus, our proactive and preventative support service for business-critical systems. ProSupport Plus provides all the benefits of ProSupport, including the following "Top five reasons to buy ProSupport Plus (PSP)"

1. **Priority access to specialized support experts:** Immediate advanced troubleshooting from an engineer that understands Dell infrastructure solutions.
2. **Mission Critical Support:** When critical (Severity 1) support issues happen, the customer is assured that we do all that we can to get them back up and running as quickly as possible.
3. **Service Account Manager:** A customer's #1 support advocate, ensuring they get the best possible proactive and predictive support experience.
4. **Systems maintenance:** On a semiannual basis, we will keep a customer's ProSupport Plus system(s) up to date by installing the latest firmware, BIOS, and driver updates to improve performance and availability.
5. **Third-party software support:** Dell is a customer's single point of accountability for any eligible third-party software that is installed on their ProSupport Plus system, whether they purchased the software from us or not.

ProSupport for Infrastructure

Comprehensive 24x7 support for hardware and software – best for production, but not critical, workloads and applications. The ProSupport service offers highly trained experts around the clock and around the globe to address IT needs. We help minimize disruptions and maximize availability of PowerEdge server workloads with:

- 24x7 support through phone, chat and online
- A central point of accountability for all hardware and software issues
- Hypervisor, operating system, and application support
- Dell security advisories
- Onsite response service levels 4 hour or Next Business Day options

- Proactive issue detection with automated case creation
- Predictive hardware anomaly detection
- Incident Manager assigned for Severity 1 cases
- Collaborative third-party support
- Access to AIOps Platforms - (MyService360, TechDirect, and CloudIQ)
- Consistent experience regardless of where customers are located or what language that they speak.

Basic Hardware Support

Provides reactive hardware support during normal business hours, excluding local national holidays. No software support or software-related guidance. For improved levels of support, choose ProSupport or ProSupport Plus.

Specialty Support Services

Optional specialty support services complement the ProSupport Infrastructure Suite to provide additional proficiencies that are critical for modern data center operations.

Hardware coverage add-ons to ProSupport

- **Keep Your Hard Drive (KYHD), Keep Your Component (KYC), or Keep Your GPU (KYGPU):**

  Normally if a device fails under warranty, Dell replaces it using a one-for-one exchange process.KYHD/KYCC/KYGPU gives you the option to retain your device. It provides full control of sensitive data and minimizes security risk by letting you retain possession of failed drives, components, or GPU when receiving replacement parts without incurring additional cost.
- **Onsite Diagnosis Service:**

  Ideal for sites with non-technical staff. Dell field technician performs initial troubleshooting diagnosis onsite and transfers to Dell remote engineers to resolve the issue.
- **ProSupport Add-on for HPC:**

  Sold as an add-on to a ProSupport service contract, the ProSupport Add-on for HPC provides solution-aware support to cover the additional requirements that are required to maintain an HPC environment such as:

  - Access to senior HPC experts
  - Advanced HPC cluster assistance: Performance, interoperability, and configuration
  - Enhanced HPC solution level end-to-end support
  - Remote pre-support engagement with HPC Specialists during ProDeploy implementation
- **ProSupport Add-on for Telco (Respond & Restore):**

  An add-on service designed for the top 31 TELCO customers globally, Respond & Restore provides direct access to Dell solution experts who specialize in TELCO carrier-grade support. This add-on also provides a hardware uptime guarantee, meaning if a system fails, Dell has it installed and operational within 4 hours for Severity 1 issues. Dell incurs penalties and fees if SLAs are not met.

Personalized Support and Supplemental Site-wide Expertise

- **Technical Account Manager:**

  Designated technology lead who monitors and manages the performance and configuration of specific technology sets.
- **Designated Remote Support:**

  Personalized support expert who manages all troubleshooting and resolution of IT assets.
- **Multivendor Support Service:**

  Support your third-party devices as one service plan for servers, storage, and networking (includes coverage for: Broadcom, Cisco, Fujitsu, HPE, Hitachi, Huawei, IBM, Lenovo, NetApp, Oracle, Quanta, SuperMicro and others).

Services for large enterprises

- **ProSupport One for Data Center:**

  ProSupport One for Data Center offers flexible site-wide support for large and distributed data centers with more than 1,000 assets (combined total of server, storage, networking, so forth). This offering is built on standard ProSupport features that leverage our global scale and are tailored to specific customer needs. While not for everyone, this service option offers a truly unique solution for our largest customers with the most complex environments.

  - Team of assigned Services Account Managers with remote or onsite options
  - Assigned technical and field engineers who are trained on the customer's environment and configurations.
  - On-demand reporting and recommendations that are enabled by ProSupport AIOps tools (MyService360, TechDirect, and CloudIQ)
  - Flexible onsite support and parts options that fit their operational model
  - A tailored support plan and training for their operations staff
- **ProSupport One for CSPs (Cloud Serviced Providers)**

  ProSupport One for CSPs is a unique offer that is designed for a limited set of Dell accounts purchasing Gen AI computing solutions greater than 1,000 servers and $250M in sales. PS1 for CSPs improves the entire services experience combining support, deployment (rack integration), residency services, a designated support engineer and the LOIS parts locker as one holistic bundle. Special pricing has been determined to compete effectively against competitors and provide the best customer experience. PS1 for CSPs can only be sold with XE Servers and all networking platforms (Dell and NVIDIA). All other products would be eligible for the standard PS1DC not this special bundle offer. More details on PS1 for CSPs here.
- **Logistics Online Inventory Solution (LOIS)**

  Ideal for large organizations that have their own staff to support their data center. Dell offers a service that is called Logistics Online Inventory Solution which is an onsite parts locker that provides self-maintainers with a local inventory of common replacement components. Having access to these parts lockers allows the self-maintainer to replace a failed component immediately without delay. Each replacement part would automatically initiate a replenishment of the parts inventory that is shipped the next day or delivered onsite by Dell during a regular scheduled visit (called Scheduled Onsite Service). As part of the LOIS system, customers can integrate their systems directly to Dell TechDirect using APIs to help streamline the support management process.

End-of-Life Services

- **Post Standard Support (PSS)**

  Extend service life beyond the initial seven years of ProSupport, adding up to five more additional years of hardware coverage.
- **Data Sanitization & Data Destruction**

  Renders data unrecoverable on repurposed or retired products, ensuring security of sensitive data and enabling compliance and provides NIST-compliant certification.
- **Asset Recovery Services**

  Recycle, resale, and disposal of hardware. Helps you securely and responsibly retire IT assets that are no longer needed while protecting both your business and the planet.

ProDeploy Infrastructure Suite

ProDeploy Infrastructure Suite provides various deployment offerings that satisfy a customer's unique needs. It is made up of various sub-offers: Factory Configuration Services, Rack Integration, Basic Deployment, ProDeploy, ProDeploy Plus, and optionally ProDeploy FLEX which allows for some customization of the features listed.

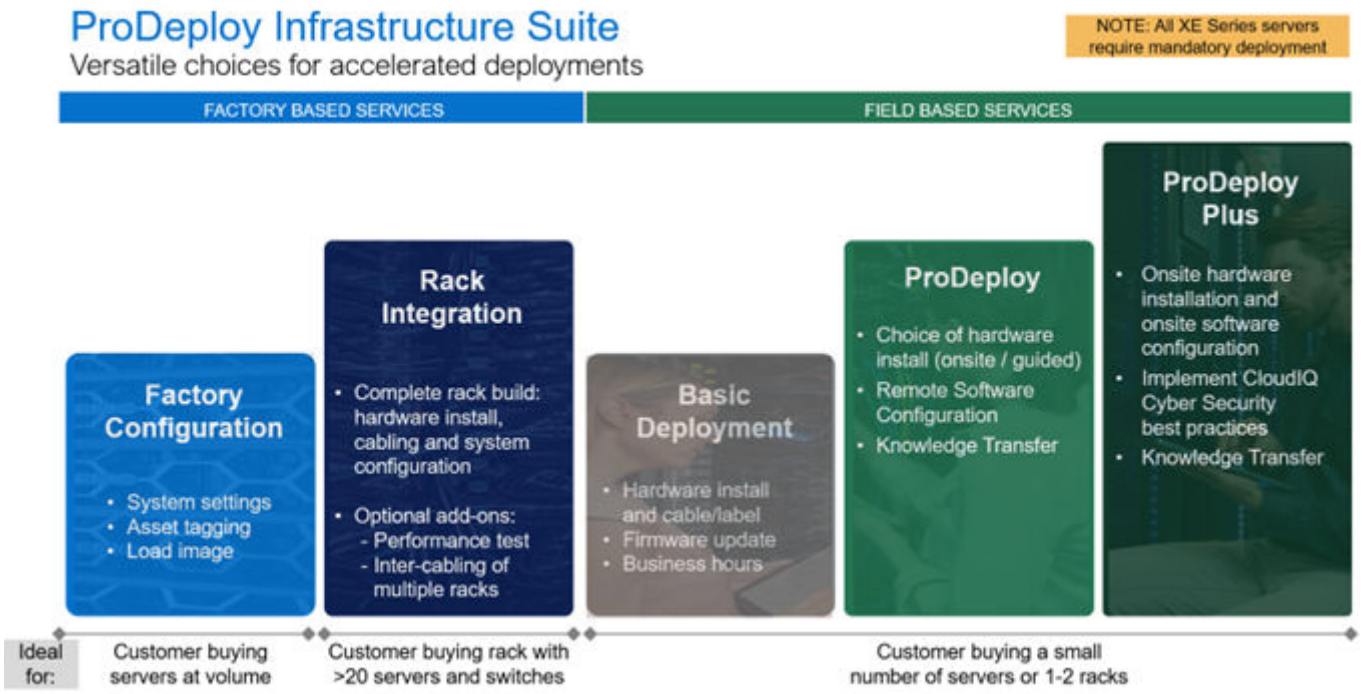

Figure 20. ProDeploy Infrastructure Suite

Factory-based Services

Pre-configured systems or complete racks, customized prior to shipping to the customer's site.

Rack Integration or ProDeploy FLEX Rack Integration

Ideal for customers buying servers in volume and seeking pre-configuration prior to shipping such as: custom image, system settings, and asset tagging so it arrives ready to use out of the box. Furthermore, servers are packaged and bundled to meet specific shipping and distribution requirements for each customer location to facilitate the rollout process. Once the server is onsite, Dell can install and configure the server to the environment using any of the field-based deployment services outlined in the next section.

- STANDARD SKUs for Rack Integration is available in then USA only and requires:
  - 20 or more devices (XE, R and C series servers, VxRail and all Dell or non-Dell switches).
  - Shipping to contiguous USA.
- USE CUSTOM QUOTE for Rack Integration scenarios that require:
  - Any Direct Liquid Cooling (DLC) implementation
  - Shipping to multiple locations or shipment to any country outside USA or shipping outside contiguous USA
  - Air-cooled racks containing less than 20 servers
  - Any rack that includes Storage

Factory Configuration

Ideal for customers buying servers in volume and seeking pre-configuration prior to shipping such as: custom image, system settings, and asset tagging so it arrives ready to use out of the box. Furthermore, servers are packaged and bundled to meet specific shipping and distribution requirements for each customer location to facilitate the rollout process. Once the server is onsite, Dell can install and configure the server to the environment using any of the field-based deployment services outlined in the next section.

ProDeploy Flex | Modular deployment (built in factory, onsite or remote)

Pre -deployment	Single point of contact for project management	●
	Expanded end-to-end project management	Selectable
	Site readiness review and implementation planning	●
Deployment	Deployment service hours	24/7
	Hardware installation options [1]	Onsite, factory[2,5] or remote[3]
	System software installation and configuration options [1]	Onsite, factory[2,5] or remote[3]
	Multivendor networking deployment [4]	Onsite, factory[2,5] or remote[3]
	Onsite Deployment in remote locations	Selectable
	Onsite Deployment in challenging environments	Selectable
	Onsite Deployment with special site-based protocols or requirements	Selectable
	Install connectivity software based on Secure Connect Gateway technology	●
	Dell NativeEdge Orchestrator deployment	Selectable
	Configure 3rd party software applications and workloads [4]	Selectable
Post -deployment	Deployment verification, documentation, and knowledge transfer	●
	Configuration data transfer to Dell support	●
Online collaboration	Online collaborative environment - Planning, managing and tracking delivery process	●

[1] Hardware and Software delivery methods can be independently chosen; selecting Rack integration for software requires hardware Rack integration to also be selected.
[2] Factory Rack Integration for server and VxRail; includes associated Dell network switches; final onsite rack installation available.
[3] Remote hardware option includes project specific instructions, documentation and live expert guidance for hardware installation.
[4] Select 3rd party multivendor networking and software applications.
[5] Pair with Field Onsite Hardware service for final installation.

Figure 21. ProDeploy Flex modular services

Field-based services

Put PowerEdge servers to work faster with Dell field-based deployment services. Whether we are deploying one server to one thousand – we have you covered. Dell provides versatile delivery options to fit every budget and operating model.

- **ProDeploy Plus:** Elevate Infrastructure deployments with our most complete service from planning through onsite hardware installation and software configuration including the implementation of cybersecurity best practices. ProDeploy Plus provides the skill and scale that is needed to successfully execute demanding deployments in today's complex IT environments. The deployment starts with a site readiness review and implementation plan. Certified deployment experts perform the software configuration to include setup of leading operating systems and hypervisors. Dell will also configure PowerEdge software tools to include iDRAC and OpenManage system utilities as well as support AIOps platforms: MyService360, TechDirect, and CloudIQ. Unique to ProDeploy Plus, the cybersecurity implementation helps customers understand potential security risks and make recommendations for reducing product attack surfaces. The system is tested, validated prior to completion. The customer will also receive full project documentation and knowledge transfer to complete the process.
- **ProDeploy:** ProDeploy provides remote software configuration and choice of hardware installation (onsite or guided). ProDeploy is great for customers who are price sensitive or willing to participate in some portion of the deployment to include providing remote access to their network. The ProDeploy remote software includes everything mentioned in ProDeploy Plus except it does not include the added value, cybersecurity implementation, and implementatiod best practices.
- **Basic Deployment:** Basic Deployment delivers worry-free professional installation by experienced technicians. This service is often sold to Competency Enabled Partners who will have Dell do the hardware installation while they complete the software configuration. Furthermore, Basic Deployment tends to be purchased by large enterprises who have smart technical staff. These companies just need Dell to install the hardware, and they will perform the software configuration. The last use case for Basic Deployment is when paired with Factory Configuration services. The servers are preconfigured in the factory, and the basic deployment service will install the system into the rack to finalize the deployment.

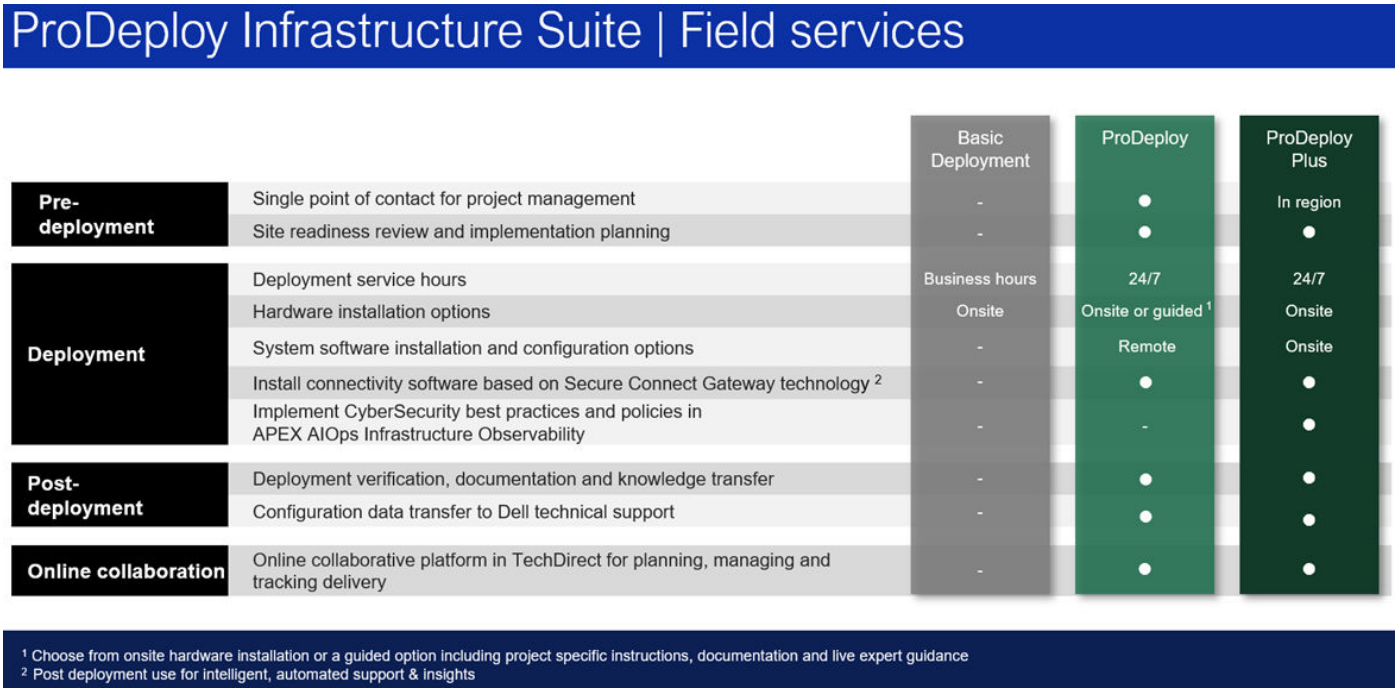

Figure 22. ProDeploy Infrastructure Suite - Field services

Supplemental Deployment Services

Additional ways to expand scope or deploy for unique scenarios.

Two Host Adder (requires PD/PDP)

Deploying new storage, compute, or networking devices may require interconnection to other servers (also called hosts). The Dell delivery team will set up four hosts per device as part of every ProDeploy service. For example, if the customer is buying two storage arrays the ProDeploy service will automatically include connectivity of four hosts each (4x2=8 total hosts per project since there are two devices). This supplemental "Two Host Adder" service provides for the configuration of additional hosts above what is already provided as part of the ProDeploy service. In many cases, customers can work with us while we set up the included hosts, so they may understand how to do the rest themselves. Always ask the customer how many hosts are being connected and sell the host adder depending on the customer's technology skillset. Note that this service applies to the connectivity of Dell devices not 3rd party devices.

Additional Deployment Services (ADT) – sold with or without PD/PDP

You can expand the scope of a ProDeploy engagement leveraging Additional Deployment Time (ADT). ADT covers additional tasks above the normal deliverables of the ProDeploy offers. ADT can also be used as a standalone service without ProDeploy. SKUs are available for both Project Management and Technical Resource Expertise. SKUs are sold as blocks of four hours remote or eight hours onsite. The delivery team can help in scoping the number of hours required for additional tasks.

Data Migration Services

Migrating data sets is no easy task. Our experts use proven tools and process to streamline data migrations and avoid compromising data. A customer project manager works with our experienced team of experts to create a migration plan. Data migration is part of every technology upgrade, platform change, and shift to the cloud. You can rely on Dell data migration services to perform a seamless transition.

Residency Services

Certified technical professionals act like an extension of your IT staff to enhance internal capabilities and resources and help you realize faster adoption and maximized ROI of new technology. Residency Services help customers transition to new capabilities quickly by leveraging specific technology skill sets. Residency experts can provide post implementation management and knowledge transfer that is related to a new technology acquisition or day-to-day operational management of the IT infrastructure.

- Global experts available to serve in-person (onsite) or virtual (remote)
- Engagements starting at 2 weeks with flexibility to adjust
- Residency is available for project management needs, and many different technology skills sets such as: Server, storage, Gen AI, networking, security, multi-cloud, data mgmt., and modern workforce application residents

Unique Deployment Scenarios

Custom Deployment Services

When a deployment is beyond the scope of the ProDeploy Infrastructure Suite, you can turn to the custom deployment services team to address complex implementation scenarios and customer unique requirements. The Dell custom deployment team is staffed with solution architects who will assist with customer scoping calls to define the project and develop the statement of work. Custom services can handle a wide range of deployments that can be performed in the factory or onsite. All custom engagement services are requested through SFDC.

Deployment of AI or HPC

Dell provides a number of deploy options for Artificial Intelligence (AI) or High-Performance Computing (HPC) implementations. These complex environments require specialists that understand advanced feature sets. Dell deploys and understands the complexities to optimize the environment. AI and HPC deployments are always scoped as custom service engagements.

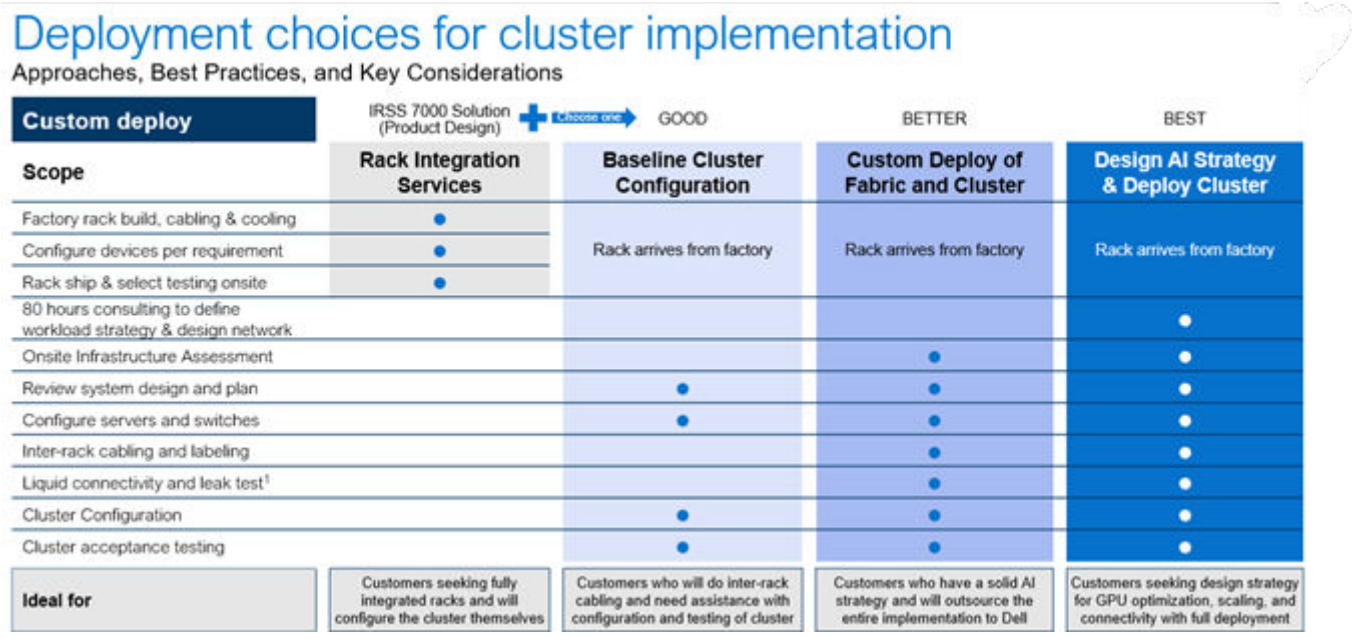

Figure 23. Deployment choices for cluster implementation

DAY 2 – Automation Services with Ansible

Dell solutions are built as "automation ready" with integrated APIs (Application Programming Interfaces) to allow customers to programmatically call actions on the product through code. Although Dell has published Anisble automation use cases,

some customers need additional assistance with GitOps. By the end of the service, the customer will have the foundational components required to accelerate automation and understand how the programming works together: Day 1 and Day 2 use case automation scripts (ansible modules), CI/CD tool (Jenkins), and Version control (Git).

Dell Technologies Consulting Services

Our expert consultants help customers transform faster, and quickly achieve business outcomes for the high-value workloads Dell PowerEdge systems can handle. From strategy to full-scale implementation, Dell Technologies Consulting can help determine how to perform IT, workforce, or application transformation. We use prescriptive approaches and proven methodologies that are combined with the portfolio and partner ecosystem of Dell Technologies to help achieve real business outcomes. From multicloud, applications, DevOps, and infrastructure transformations, to business resiliency, data center modernization, analytics, workforce collaboration, and user experiences-we are here to help.

Dell Managed Services

Some customers prefer Dell to manage the complexity and risk of daily IT operations, Dell Managed Services utilizes proactive, AI enabled delivery operations and modern automation to help customers realize desired business outcomes from their infrastructure investments. With these technologies, our experts run, update, and fine-tune customer environments that are aligned with service levels, while providing environment-wide and down-to-the-device visibility. There are two types of managed service offers. First the outsourcing model or CAPEX model where Dell manages the customer owned assets using our people and tools. The second is the as-a-Service model or OPEX model called APEX. In this service, Dell owns all technology and all the management of it. Many customers will have a blend of the two management types depending on the goals of the organization.

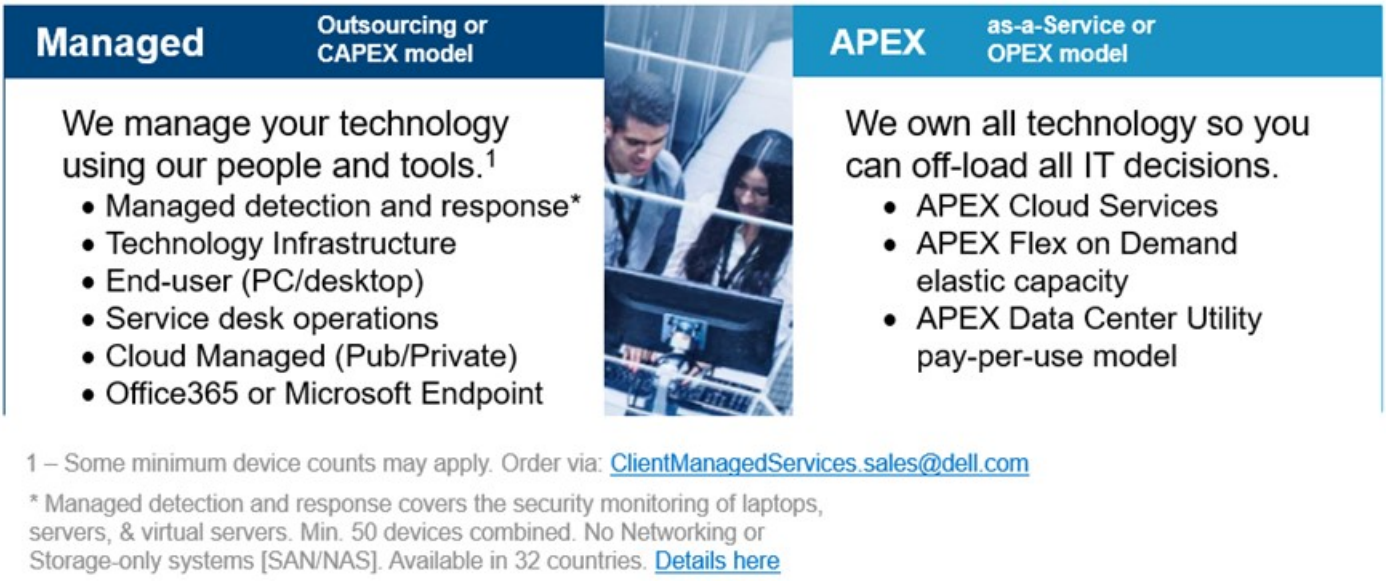

Figure 24. Dell Managed Services

Managed Detection and Response (MDR)

Dell Technologies Managed Detection and Response (MDR) is powered by Secureworks Taegis XDR software platform. MDR is a managed service that secures the customer's IT environment against malicious actors and provides remediation if and when a threat is identified. When a customer purchases MDR, they will receive the following features from our team:

- Dell badge resources
- Agent rollout assistance to help deploy the Secureworks Endpoint Agent
- 24x7 threat detection and investigation
- Up to 40 hrs per quarter of response and active remediation activities
- If the customer experiences a breach, we will provide up to 40 hrs per year of Cyber incident response initiation
- Quarterly reviews with the customer to review the data

Dell Technologies Education Services

Build the IT skills required to influence the transformational outcomes of the business. Enable talent and empower teams with the right skills to lead and perform transformational strategy that drives competitive advantage. Leverage the training and certification that is required for real transformation.

Dell Technologies Education Services offers PowerEdge server training and certifications that are designed to help customers achieve more from their hardware investment. The curriculum delivers the information and the practical, firsthand skills that their team must confidently install, configure, manage, and troubleshoot Dell servers.

To learn more or register for a class today, see Education.Dell.com.

Resources

Service for powerEdge