

Lenovo ThinkSystem DG5000

Product Guide

Lenovo ThinkSystem DG5000 is an all-QLC flash storage system, available as unified, that is designed to provide performance, simplicity, capacity, security, and high availability for medium-sized enterprises. Powered by the ONTAP storage management software, the DG5000 delivers enterprise-class storage management capabilities with a wide choice of host connectivity options and enhanced data management features. The DG5000 is a perfect fit for a wide range of enterprise workloads, including artificial intelligence, big data and analytics.

Lenovo ThinkSystem DG5000 models are 2U rack-mount controller enclosures that include two controllers, 128 GB RAM and 16 GB battery-backed NVRAM (64 GB RAM and 8 GB NVRAM per controller), and 24 SFF hot-swap drive bays (2U24 form factor). Controllers provide universal 1/10/25 GbE NAS/iSCSI or 8/16/32 Gb Fibre Channel (FC) ports, or 1/10 GbE RJ-45 ports for host connectivity, depending on configuration.

A single ThinkSystem DG5000 Storage Array scales out to 48 QLC SSDs with the attachment of one Lenovo ThinkSystem DG240N 2U24 NVMe Expansion Enclosure. Up to 12x DG5000 Storage Arrays can be combined into a clustered system in a NAS environment, or up to 6x DG5000 Storage Arrays can be combined into a clustered system in a SAN environment.



Figure 1. Lenovo ThinkSystem DG5000 Storage Array

Did you know?

The ThinkSystem DG5000 offers end-to-end QLC (quad-level cell) Flash drive storage solution.

QLC increases flash storage density and reduces costs because it stores four bits per cell compared to Triple-level cell (TLC) drives which store three bits per cell.

QLC is ideal for replacing hard drive technology because it offers better performance, comparable cost, and better TCO due to increased density and lower power consumption.

Key features

The Lenovo ThinkSystem DG5000 offers the following key features and benefits:

- Available as a Unified storage platform.
- Unified platform options are available with either the Essentials or Complete software feature offerings.
- Compact QLC Flash storage system delivering high-performance and low-latency at an affordable price point, enabling customers of all sizes to enhance their analytics and AI deployments and accelerate applications' access to data.
- All-flash array capabilities to meet the demand for higher speed storage and provide higher IOPs and bandwidth with lower power usage and total cost of ownership than hybrid or HDD-based solutions.
- All-flash storage with dual active/active controller configurations for high availability and performance.
- A rich set of storage management functions available, including snapshots, volume copy, quality of service, thin provisioning, compression, deduplication, encryption, disk-based backup, application- and virtual machine-aware backup, quick data recovery, clustering, synchronous replication, and asynchronous replication.
- Improved performance and data protection with RAID-DP and RAID-TEC, as well as support for traditional RAID 4.
- Flexible host connectivity to match diverse client needs with support for unified NAS and SAN storage protocols, including 1/10/25 GbE NAS and iSCSI, 8/16/32 Gb Fibre Channel connectivity, and 32 Gb NVMe over Fibre Channel (NVMe/FC).
- NVMe drive-side connectivity with multipathing with up to 24x 2.5-inch small form factor (SFF) drives in the controller enclosure and expansion enclosure.
- Optional licensed functions, object storage tiering (FabricPool).
- Scale-out clustering of up to 12 ThinkSystem DG Series and DM Series storage systems for NAS connectivity or up to six DG Series and DM Series storage systems for SAN connectivity.
- Intuitive, web-based GUI for easy system setup and management.
- Designed for 99.9999% availability with redundant hot-swap components, including controllers and I/O modules, power supplies, and non-disruptive firmware upgrades.

Lenovo ThinkSystem DG5000 supports the 2.5-inch QLC SSDs and all drives are dual-port and hot-swappable. The DG5000 supports attachment of one DG240N 2U24 NVMe Expansion Enclosure and drives are designed to be added dynamically, which helps to quickly and seamlessly respond to ever-growing capacity demands.

The DG5000 offers high levels of system and data availability with the following features:

- Dual-active controllers (high availability pair) with automatic load balancing and failover
- Mirrored, battery-backed controller NVRAM using 8GB of available physical memory per controller
- Dual-port QLC SSDs with automatic drive failure detection and rebuild
- Redundant, hot-swappable and customer replaceable hardware components, including transceivers, controllers, I/O modules, power supplies, and drives
- Automated failover for the data path between the host and the drives with multipathing
- Non-disruptive controller and drive firmware upgrades
- Scale-out clustering

Components and connectors

The following figure shows the front of the DG5000.

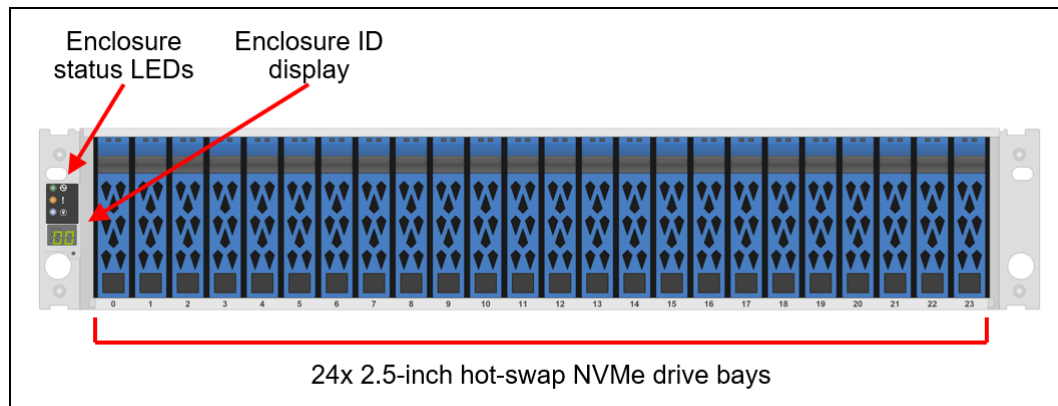


Figure 2. ThinkSystem DG5000 front view

The following figure shows the rear of the DG5000 with two hot-swap controllers and two hot-swap redundant power supplies.

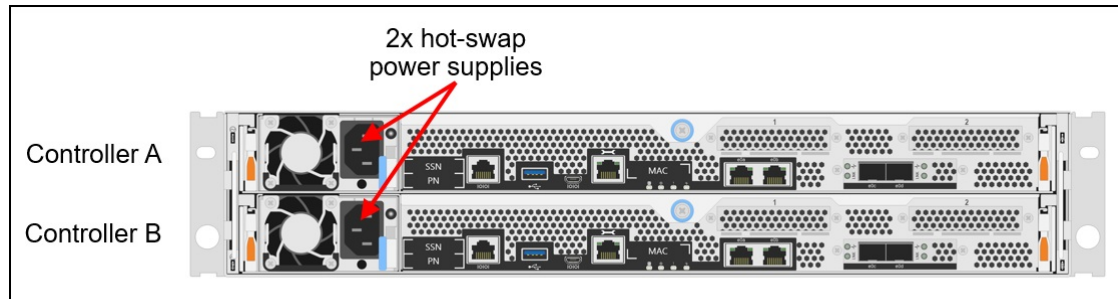


Figure 3. ThinkSystem DG5000 2U enclosure rear view

The following figure shows the components of each of the controllers.

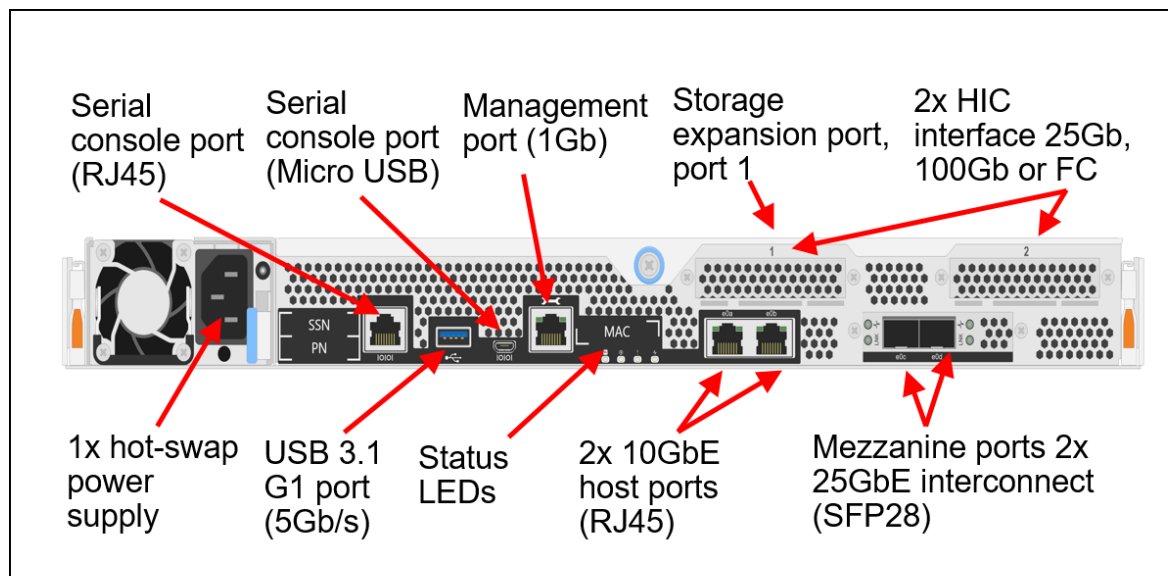


Figure 4. ThinkSystem DG5000 controller

The rear of a single DG5000 controller includes the following components:

- 1 x redundant hot-swap power supply
- Serial console port (RJ45) – inactive port
- Serial console port (Micro USB) - console port: 115.2k baud rate
- 1GbE management port (RJ45)
- 2x Host Interface Card (HIC) ports:
 - Bay 1/port 1 for HIC host connections (25Gb, FC) or optional HIC 100Gb for expansion connection.
 - Bay 2/port 2 for HIC host connections (25Gb, FC)
- USB 3.1 G1 port
- Status LEDs
- 2x 10GBASE-T on-board ports - Host connectivity only
- 2x Mezzanine 25Gb Ethernet ports – HA and cluster interconnects, controller to controller only,

Per controller, the two Host Interface Cards provide one of the following combinations of ports:

- 8x 10/25 GbE ports
- 8x 32Gb FC ports
- 4x 10/25 GbE and 4x 32Gb FC ports
- 4x 10/25 GbE and for expansion storage 2x 100 GbE ports
- 4x 32Gb FC and for expansion storage 2x 100 GbE ports

The following figure shows the front of the ThinkSystem DG240N 2U24 NVMe Expansion Enclosure.

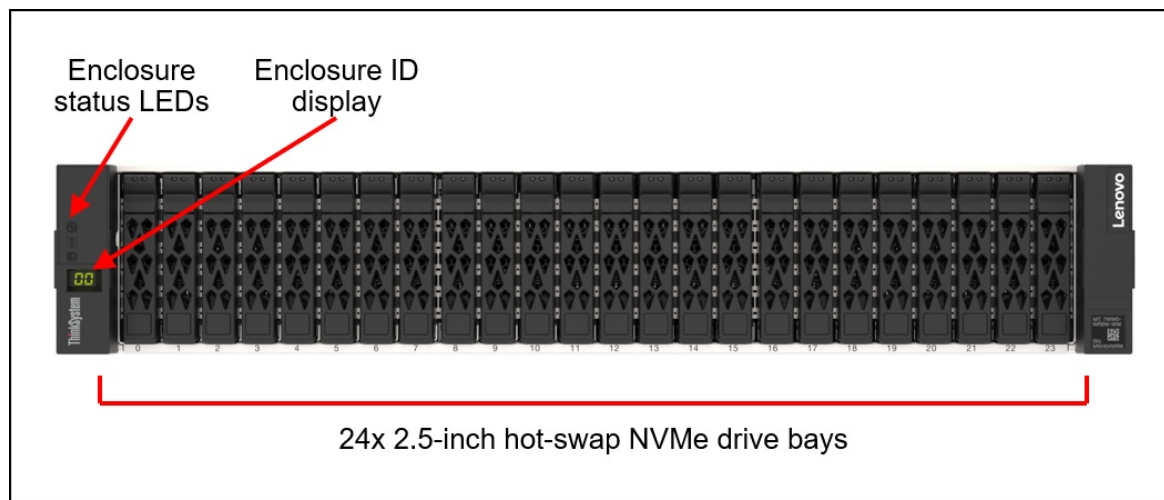


Figure 5. ThinkSystem DG240N 2U24 NVMe Expansion Enclosure front view

The following figure shows the rear of the DG240N expansion enclosure.

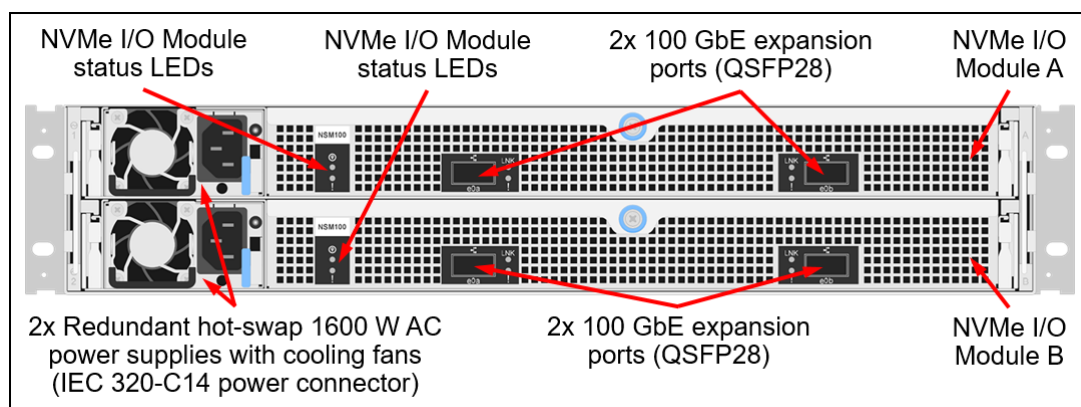


Figure 6. ThinkSystem DG240N 2U24 NVMe Expansion Enclosure rear view

The rear of the ThinkSystem DG240N 2U24 NVMe Expansion Enclosure includes the following components:

- Two redundant hot-swap NVMe I/O Modules; each with the following ports:
 - Two 100 GbE QSFP28 expansion ports for connections to the controller enclosure.
- Two redundant hot-swap power supplies

System specifications

The following table lists the ThinkSystem DG5000 storage system specifications.

Note: The supported hardware options, software features, and interoperability listed in this product guide are based on the ONTAP software version 9.12.1 P4 or later. For details about specific software releases that introduced support for certain hardware options and software features, refer to the Release notes of the particular software release for the ThinkSystem DG5000 that can be found at:

<http://datacentersupport.lenovo.com>

Table 1. ThinkSystem DG5000 system specifications

Attribute	Specification
Machine types	<ul style="list-style-type: none">DG5000 controller enclosure: 7DE4DG240N expansion enclosure: 7Y62
Form factor	<ul style="list-style-type: none">DG5000: 2U rack mountDG240N: 2U rack mount
Controller configuration	Dual active-active controller configuration (HA pair). Up to 6 HA pairs can be combined into a single SAN cluster, or up to 12 HA pairs can be combined into a single NAS cluster.
HA pair/cluster interconnect ports	4x 25 GbE SFP28 ports (DAC cables or SW fiber optics, LC). 2 ports per controller
RAID levels	RAID-4, RAID-DP, RAID-TEC
Controller memory	128 GB RAM per system (64 GB per controller). 16 GB battery-backed NVRAM per system (8 GB per controller) mirrored between the controllers.
Drive bays	Up to 48 SFF hot-swap NVMe drive bays (1x 24-drive DG5000 controller enclosure + 1x 24-drive DG240N expansion enclosure)
Drive technology	NVME QLC SSDs
Drive expansion connectivity	Each DG5000 controller supports one 2-port 100GbE HIC and must be installed in port1 only for connectivity to a single DG240N expansion enclosure.
Drives	15.36 TB NVMe QLC SSDs (0.2 DWPD)
Storage capacity	Up to 737 TB by using 48x 15.36 TB drives
Storage protocols	<ul style="list-style-type: none">NAS (File access): NFS, CIFS/SMB.SAN (Block access): iSCSI, FC, NVMe/FC, NVMe/TCP

Attribute	Specification
Host connectivity	<p>Base ports (per controller enclosure):</p> <ul style="list-style-type: none"> 2x 10GBASE-T ports <ul style="list-style-type: none"> Ports can be used for iSCSI, CIFS, and NFS. <p>Optional ports via HIC adapters (2 per controller):</p> <ul style="list-style-type: none"> 25GbE HIC, with 4x 10/25 GbE SFP28 ports (DAC cables or SW fiber optic cables, LC) Fibre Channel HIC, with 4x 8/16/32 Gb FC SFP+ host ports, 32Gb transceivers included (SW fiber optic cables, LC) <p>The following host connectivity HIC combinations are supported in each controller:</p> <ul style="list-style-type: none"> 25GbE + 25GbE 32Gb FC + 32Gb FC 25GbE + 32Gb FC <p>The following combinations of storage expansion HIC in port 1 and host HIC in port 2 are supported in each controller:</p> <ul style="list-style-type: none"> 100GbE (port 1) + 25GbE (port 2) 100GbE (port 1) + 32Gb FC (port 2) <p>Note: ONTAP does not support host direct attach for FC protocol.</p>
Category 1 Host operating systems*	Windows Server 2019, Windows Server 2022, RedHat, SuSE and VMware
Category 2 Host operating systems**	Citrix Hypervisor (CentOS, Ubuntu - best effort only). For version details, see the latest Category 2 Interoperability Matrix, available as a download from Lenovo Storage Interoperation Center (LSIC).
Performance†	Up to 440,000 random read IOPS (8 KB blocks).
Configuration maximums‡	<ul style="list-style-type: none"> Maximum raw storage capacity: 737 TB Maximum aggregate size: 400 TB Maximum number of FlexVol volumes per controller: 1000 Maximum volume size: 300 TB. Maximum number of LUNs per controller: 8192 Maximum number of LUNs per FlexVol volume: 512 Maximum LUN size: 128 TB. Maximum number of drives in a RAID group (data + parity drives): <ul style="list-style-type: none"> RAID 4: 14 (13 + 1 NVMe SSDs) RAID-DP: 28 (26 + 2 NVMe SSDs) RAID-TEC: 29 (26 + 3 NVMe SSDs) Maximum number of initiators per controller: 2048 Maximum number of snapshots per FlexVol volume: 1023
Cooling	Redundant cooling with the fans that are built into power supplies (DG5000 and DG240N enclosures).
Power supply	DG5000: Two redundant hot-swap 1600 W Platinum AC power supplies. 200-240V supply. DG240N: Two redundant hot-swap 1600 W Platinum AC power supplies. 200-240V supply.
Hot-swap parts	Controllers, I/O modules, drives, power supplies, and transceivers and DAC cables.
Management ports	<ul style="list-style-type: none"> 1x 1 GbE port (UTP, RJ-45) per controller for out-of-band management. 2x Serial console ports (RJ-45 and Micro-USB) for system configuration.
Management interfaces	ThinkSystem Storage Manager web-based GUI; SSH CLI; Serial console CLI; SNMP, email, and syslog alerts.
Security features	Secure Socket Layer (SSL), Secure Shell (SSH), user level security, role-based access control (RBAC), LDAP authentication.

Attribute	Specification
Warranty and support	Three-, four-, or five-year customer-replaceable unit and onsite limited warranty with selectable service levels: 9x5 service coverage next business day (NBD) onsite response (Foundation) or 24x7 service coverage with 4-hour onsite response (Essential). Premier Support is also available. Software support is included in the Foundation or Essential Service for the duration of the warranty period.
Dimensions	DG5000 enclosure: <ul style="list-style-type: none"> Height: 87 mm (3.4 in.) Width with flange: 483 mm (19 in.) Width without flange: 447 mm (17.6 in.) Depth: 543 mm (21.4 in.) DG240N expansion enclosure: <ul style="list-style-type: none"> Height: 87 mm (3.4 in.) Width with flange: 483 mm (19 in.) Width without flange: 447 mm (17.6 in.) Depth: 543 mm (21.4 in.)
Weight	<ul style="list-style-type: none"> DG5000 enclosure: (fully configured): 24.6 kg (54.3 lb) DG240N expansion enclosure (fully configured): 30.2 kg (66.6 lb)

* For Category 1 operating system support information, see [Lenovo Storage Interoperation Center \(LSIC\)](#).

** For Category 2 operating system support information, see the latest Category 2 Interoperability Matrix. Go to the [Lenovo Storage Interoperation Center \(LSIC\)](#) home page and scroll down to the Lenovo Information section and click the **Download Lenovo 3rd party of interop matrix** link.

† Estimated performance based on internal measurements.

‡ For a detailed list of configuration limits and restrictions for a specific version of the software, refer to the Lenovo Data Center Support website:

<http://datacentersupport.lenovo.com>

Controller enclosures

Preconfigured and factory-integrated models of the ThinkSystem DG5000 Unified Flash Storage Array are configured by using the Lenovo Data Center Solution Configurator (DCSC), <http://dcsc.lenovo.com>

The following table lists the CTO base model for the ThinkSystem DG5000.

Table 2. ThinkSystem DG5000 CTO base model

Machine Type/Model	Feature code	Description
7DE4CTO1WW	BF3C	ThinkSystem DG5000 QLC

The models of the ThinkSystem DG5000 ship with the following items:

- One chassis with the following components:
 - Two controllers
 - Two power supplies
- Rack Mount Kit
- 2m USB Cable (USB Type A to Micro-USB)
- Documentation flyer
- Two customer-configured power cables

The following table lists the feature codes for controller software. The selection here must match the software license selected as described in the [Software](#) section. DG Series controller software is available as a Unified offering, supporting SAN, NAS, and Object storage protocols, or as a DG

The following table lists the software options for the ThinkSystem DG5000.

Table 3. Controller software offerings

Machine Type/Model	Feature code	Description
CTO only	BWU9	Storage Essential Bundle Offering
CTO only	BWU8	Storage Complete Bundle Offering

Controllers

The ThinkSystem DG5000 controller enclosures ship with two DG5000 64GB NVMe controllers. A controller provides interfaces for host connectivity, management, and internal drives, and it runs ONTAP storage management software. Each DG5000 controller enclosure provides 128 GB RAM and 16 GB battery-backed NVRAM (64 GB RAM and 8 GB NVRAM per controller).

Each ThinkSystem DG5000 controller has two interconnect 25 GbE SFP28 ports to cable a directly-connected dual-controller HA pair or for switched cluster interconnect with multiple dual-controller HA pairs. Up to six HA pairs can be combined into a single SAN cluster or up to 12 HA pairs can be combined into a single NAS cluster.

Each DG5000 controller also has the following host interfaces:

- 2x 10GBASE-T RJ-45 ports
- 2x slots for additional host interfaces using HIC adapters; choices of HIC adapters are:
 - 25GbE HIC, with 4x 10/25 GbE SFP28 (DAC cables or SW fiber optic cables, LC)
 - Fibre Channel HIC, with 4x 8/16/32 Gb FC SFP+ host ports, 32Gb transceivers included (SW fiber optic cables, LC)

Two controllers are required for selection and must have the same HIC adapters installed. The use of a DG240N expansion enclosure requires a 100GbE HIC for connectivity installed in port 1 in each controller.

The following table lists the controllers for the DG5000 Storage Array and supported connectivity options.

Tip: The Fibre Channel HIC includes 32Gb transceivers

Table 4. DG5000 controllers and connectivity options

Part number	Feature code	Description	Maximum quantity per controller enclosure
Controller			
None*	BEVS	Lenovo ThinkSystem 2U NVMe Controller with Platinum PSU	2
Host Interface Cards			
4C57A67134	BEVR	Lenovo ThinkSystem Storage HIC, 100Gb NVMe-RoCE,2-ports, Storage Only**	2
4C57A67132	BEVQ	Lenovo ThinkSystem Storage HIC, 10/25Gb iSCSI,4-ports †	4
4C57A67133	BEVP	Lenovo ThinkSystem Storage HIC, 16/32Gb FC,4-ports	4
CTO Only	C4SA	Lenovo ThinkSystem Storage HIC, 100Gb NVMe-RoCE,2-Ports, Host Only	2
SFP+ transceiver for 10GbE optical cables			
4XF7A14919	B4K9	10Gb SW Optical iSCSI SFP+ Module 1 pack	16
25Gb SR SFP28 transceiver			
4TC7A94751	C4K4	Lenovo 25G SR SFP28 Amphenol Ethernet Transceiver	16

Part number	Feature code	Description	Maximum quantity per controller enclosure
40Gb SR SFP28 ethernet transceivers			
4TC7A81809	BQBL	40G Ethernet SR Transceiver	4
QSFP+/QSFP28 transceivers for 100 GbE adapter cards			
4M27A67042	BFH1	Lenovo 100Gb SR4 QSFP28 Ethernet Transceiver	4

* Factory-installed only.

**HIC for expansion connectivity only. The C4SA PN is the same as BEVR. Also note that BEVR and C4SA can not be configured on the same system. RoCE connection to host not supported on this system for (HIC) BEVR/C4SA.

† For 25G leverage: 4M27A67041 Lenovo 25Gb SR SFP28 ethernet transceiver

The following table lists the supported optical and copper cables.

Tip: The 100GbE cables used to connect the DG240N expansion enclosure are configured with the DG240N.

Table 5. Supported cables

Part number	Feature code	Description	Maximum quantity per controller enclosure
DAC breakout cable options for 100GbE			
7Z57A03564	AV22	Lenovo 1m 100G QSFP28 to 4x25G SFP28 Breakout DAC Cable	4
7Z57A03565	AV23	Lenovo 3m 100G QSFP28 to 4x25G SFP28 Breakout DAC Cable	4
7Z57A03566	AV24	Lenovo 5m 100G QSFP28 to 4x25G SFP28 Breakout DAC Cable	4
DAC cable options for 25 GbE SFP28 connectivity			
7Z57A03557	AV1W	Lenovo 1m Passive 25G SFP28 DAC Cable	20
7Z57A03558	AV1X	Lenovo 3m Passive 25G SFP28 DAC Cable	20
7Z57A03559	AV1Y	Lenovo 5m Passive 25G SFP28 DAC Cable	20
DAC cable options for 40 GbE QSFP+ to 4x 10 GbE SFP+ host connectivity			
49Y7886	A1DL	Lenovo 1m Passive QSFP+ to SFP+ Breakout DAC Cable	4
49Y7887	A1DM	Lenovo 3m Passive QSFP+ to SFP+ Breakout DAC Cable	4
49Y7888	A1DN	Lenovo 5m Passive QSFP+ to SFP+ Breakout DAC Cable	4
DAC cable options for 25GbE SFP28 and 10 GbE SFP+ connectivity (base ports and interconnect ports)			
00D6288	A3RG	0.5m Passive DAC SFP+ Cable	16
90Y9427	A1PH	1m Passive DAC SFP+ Cable	16
00AY764	A51N	1.5m Passive DAC SFP+ Cable	16
00AY765	A51P	2m Passive DAC SFP+ Cable	16
90Y9430	A1PJ	3m Passive DAC SFP+ Cable	16
90Y9433	A1PK	5m Passive DAC SFP+ Cable	16
OM3 cable options for 16/32 Gb FC and 25 GbE SW SFP28 optical transceivers			
00MN499	ASR5	Lenovo 0.5m LC-LC OM3 MMF Cable	16

Part number	Feature code	Description	Maximum quantity per controller enclosure
00MN502	ASR6	Lenovo 1m LC-LC OM3 MMF Cable	16
00MN505	ASR7	Lenovo 3m LC-LC OM3 MMF Cable	16
00MN508	ASR8	Lenovo 5m LC-LC OM3 MMF Cable	16
00MN511	ASR9	Lenovo 10m LC-LC OM3 MMF Cable	16
00MN514	ASRA	Lenovo 15m LC-LC OM3 MMF Cable	16
00MN517	ASRB	Lenovo 25m LC-LC OM3 MMF Cable	16
00MN520	ASRC	Lenovo 30m LC-LC OM3 MMF Cable	16
OM4 cable options for 16/32 Gb FC and 25 GbE SFP28 optical transceivers			
4Z57A10845	B2P9	Lenovo 0.5m LC-LC OM4 MMF Cable	16
4Z57A10846	B2PA	Lenovo 1m LC-LC OM4 MMF Cable	16
4Z57A10847	B2PB	Lenovo 3m LC-LC OM4 MMF Cable	16
4Z57A10848	B2PC	Lenovo 5m LC-LC OM4 MMF Cable	16
4Z57A10849	B2PD	Lenovo 10m LC-LC OM4 MMF Cable	16
4Z57A10850	B2PE	Lenovo 15m LC-LC OM4 MMF Cable	16
4Z57A10851	B2PF	Lenovo 25m LC-LC OM4 MMF Cable	16
4Z57A10852	B2PG	Lenovo 30m LC-LC OM4 MMF Cable	16
UTP Category 6 cables for 1/10 GbE RJ-45 adapter cards and 1 GbE RJ-45 management ports			
00WE123	AVFW	0.75m Green Cat6 Cable	6
00WE127	AVFX	1.0m Green Cat6 Cable	6
00WE131	AVFY	1.25m Green Cat6 Cable	6
00WE135	AVFZ	1.5m Green Cat6 Cable	6
00WE139	AVG0	3m Green Cat6 Cable	6

Expansion enclosures

The Lenovo ThinkSystem DG5000 supports attachment of one ThinkSystem DG240N 2U24 enclosure. The expansion enclosure can be added to the system non-disruptively.

The following table lists the CTO base models for the ThinkSystem DG Series expansion enclosures.

Table 6. CTO base models for the ThinkSystem DG Series expansion enclosures

Description	Machine Type/Model	Feature code
Lenovo ThinkSystem DG240N 2U24 NVMe Expansion Enclosure (with 2x PSUs)	7Y62CTO2WW	B6W6

Configuration note: Two NVMe I/O expansion modules (feature code B73A) are pre-selected by the configurator.

The models of the ThinkSystem DG240N ship with the following items:

- One chassis with the following components:
 - Two NVMe I/O modules
 - Two power supplies
- Rack Mount Kit
- Publications Flyer
- Two customer-configured power cables
- Four customer-configured 100G QSFP28 Passive DAC cables

The ThinkSystem DG240N expansion enclosure ships with two NVMe I/O expansion modules. Each NVMe I/O expansion module provides two external 100 GbE QSFP28 ports (labeled Ports A and B) that are used for direct-attach connections to the DG5000 enclosure.

The DG5000 controller enclosure supports direct attachment of one DG240N NVMe expansion enclosure for a total of up to 48 NVMe drives. To connect the DG240N, a 100 GbE HIC (4C57A67134) in port 1 is required to be installed in the DG5000 for each controller.

The following table lists ordering information for the NVMe expansion enclosure connectivity options.

Table 7. NVMe expansion enclosure connectivity options

Part number	Feature code	Description	Required quantity
7Z57A03561	AV1Z	Lenovo 1m Passive 100G QSFP28 DAC Cable	4
7Z57A03562	AV20	Lenovo 3m Passive 100G QSFP28 DAC Cable	4
7Z57A03563	AV21	Lenovo 5m Passive 100G QSFP28 DAC Cable	4

Configuration note: Four 100G QSFP28 DAC cables are needed per expansion enclosure for directly connecting the expansion enclosure to the controller enclosure (two from each controller)

Drives

The ThinkSystem DG5000 and DG240N enclosures each support up to 24 SFF hot-swap drives, in packs of 2 drives.

The following table lists supported drive packs for the controller and expansion enclosures.

Configuration notes:

- When ordering the systems, select the drives that match the ONTAP offering and bundle you are installing on the DG controller. Drive feature codes are specific to Unified Essentials and Unified Complete bundles. See the [Software](#) section for details.
- Drives are sold in packs. Supported quantities are as follows:
 - The DG5000 2U24 SFF controller enclosure supports only 8, 10, 12, 14, 16, 18, 20, 22 or 24 SFF drives
 - The DG240N 2U24 SFF expansion enclosure supports only 4, 6, 8, 10, 12, 14, 16, 18, 20, 22 or 24 SFF drives
 - A minimum number of drive packs is 4. (4 packs of 2 drives is required)
- For factory-installed drive packs, all drives in the enclosure must be of the same type and capacity.
- In DCSC, use "guided mode" to configure controller and add expansion accordingly. DCSC will auto display supported drives based on selected software bundle: unified complete or unified essential.

Field upgrades: Drive packs for field upgrades can be ordered via the CTO base 7D4FCTO5WW (BXFS), ThinkSystem DG Drive Pack Upgrades for DG5000/DG7000. These are for use in existing expansion enclosures that have not been fully populated with the factory-installed drive packs

Note that the feature code varies, based on the software license Unified Essentials or Unified Complete with Unified.

Table 8. DG5000 enclosure drive pack options

Part number	Feature code	Description	SED support	Maximum quantity per 2U enclosure
QLC NVMe SSD				
CTO only	BXG8*	Lenovo ThinkSystem 30.7TB (2x 15.36TB QLC NVMe SSD) Drive Pack for DG5000 - Unified Complete Bundle	Support	12
CTO only	BXG7*	Lenovo ThinkSystem 30.7TB (2x 15.36TB QLC NVMe SSD) Drive Pack for DG5000 - Unified Essential Bundle	Support	12
CTO only	C1M2*	Lenovo ThinkSystem 61.4TB (2x 30.72TB QLC NVMe SSD) Drive Pack for DG5000 - Unified Complete Bundle	Support	12
CTO only	C1M3*	Lenovo ThinkSystem 61.4TB (2x 30.72TB QLC NVMe SSD) Drive Pack for DG5000 - Unified Essential Bundle	Support	12
CTO only	BXJJ**	Lenovo ThinkSystem 30.7TB (2x 15.36TB QLC NVMe SSD) Drive Pack for DG5000	Support	12
CTO only	C1LP**	Lenovo ThinkSystem 61.4TB (2x 30.72TB QLC NVMe SSD) Drive Pack for DG5000	Support	12

*Drive packs for field upgrades can be ordered via the CTO base 7D4FCTO5WW (BXFS). A minimum of 1 drive packs is required. No mixing. Only available when DG7000 (FC BXFS) is selected..

**For Brazil geography

The following table lists supported drive pack options for the DG240N Enclosure.

Table 9. DG240N expansion enclosure drive pack options

Part number	Feature code	Description	SED support	Maximum quantity per 2U enclosure
QLC NVMe SSD				
CTO only	BXG8	Lenovo ThinkSystem 30.7TB (2x 15.36TB QLC NVMe SSD) Drive Pack for DG5000 - Unified Complete Bundle	Support	12
CTO only	BXG7	Lenovo ThinkSystem 30.7TB (2x 15.36TB QLC NVMe SSD) Drive Pack for DG5000 - Unified Essential Bundle	Support	12
CTO only	C1M2	Lenovo ThinkSystem 61.4TB (2x 30.72TB QLC NVMe SSD) Drive Pack for DG5000 - Unified Complete Bundle	Support	12
CTO only	C1M3	Lenovo ThinkSystem 61.4TB (2x 30.72TB QLC NVMe SSD) Drive Pack for DG5000 - Unified Essential Bundle	Support	12
CTO only	BXJJ*	Lenovo ThinkSystem 30.7TB (2x 15.36TB QLC NVMe SSD) Drive Pack for DG5000	Support	12
CTO only	C1LP*	Lenovo ThinkSystem 61.4TB (2x 30.72TB QLC NVMe SSD) Drive Pack for DG5000	Support	12

*For Brazil geography

Software

In this section:

- [Feature bundles](#)
- [ONTAP software versions](#)
- [Extended ONTAP features](#)
- [Ansible playbooks for DG/DM Series](#)

ONTAP software unifies data management across flash, disk, and cloud to simplify the Lenovo DG/DM storage environment. It builds the foundation for a Data Fabric, making it easy to move the data where it is needed across flash, disk, and cloud resources.

Feature bundles

Controller software for the DG5000 is available in the following bundles of features:

Table 10. Software features and specifications summary

Attribute	Unified Essential	Unified Complete
Controller software feature code	BWU9	BWU8
RAID-4, RAID-DP, and RAID-TEC data protection	Included	Included
SAN (Block access): iSCSI, FC, NVMe/FC	Included	Included
NAS (File access): NFS, CIFS/SMB	Included	Included
All Flash Array (AFA) capability	Included	Included
Thin provisioning	Included	Included
Compression	Included	Included
Compaction	Included	Included
Deduplication	Included	Included
Snapshots	Included	Included
Encryption*	Included*	Included*
Balanced placement	Included	Included
Dynamic capacity expansion	Included	Included
Adaptive Quality of Service	Included	Included
SnapRestore	Included	Included
FlexClone	Included	Included
FlexVol	Included	Included
FlexCache	Included	Included
SnapMirror asynchronous replication	No	Included
SyncMirror data protection	Included	Included
Trusted Platform Module (TPM) support	Included**	Included**
MetroCluster IP	Included	Included
NVMe over FC Protocol	Included	Included
NVMe over TCP Protocol	Included	Included
SnapMirror Business Continuity (SMBC)	No	Included
SnapMirror synchronous replication	No	Included
FlexGroup	Included	Included
SnapVault disk-based storage backup	No	Included
SnapCenter	No	Included
ONTAP S3	Included	Included

Attribute	Unified Essential	Unified Complete
Autonomous Anti-ransomware Protection	No	Included
Multitenant Key Management	No	Included
SnapLock	No	Included
SnapMirror Cloud	No	Included
SnapMirror S3	No	Included
FarbricPool	Optional	Optional

* Requires the encryption version of ONTAP. See the [ONTAP software](#) section

** Not available in PRC

The features are summarized as follows:

- **RAID-4, RAID-DP, and RAID-TEC data protection** : Provides the flexibility to choose the level of data protection required and helps improve performance and availability with built-in spare capacity and by distributing data across all physical drives in the aggregate, sustaining to up to one (RAID-4), two (RAID-DP), or three (RAID-TEC) concurrent drive failures.
- **Thin provisioning**: Optimizes efficiency by allocating storage space based on the minimum space required by each application at any given time, so that applications consume only the space they are actually using, not the total space that has been allocated to them, which allows customers to purchase storage they need today and add more as application requirements grow.
- **Compression**: Provides transparent inline and post-process data compression to reduce the amount of storage that customers need to purchase and manage.
- **Deduplication**: Performs general-purpose deduplication for removal of redundant data to reduce the amount of storage that customers need to purchase and manage.
- **Snapshots**: Enables creation of read-only copies of data for backup, parallel processing, testing, and development, and have the copies available almost immediately.
- **Encryption**: Provides software-based encryption for data at rest for enhanced data security with the traditional drives and embedded key management (requires the encryption-capable version of the ONTAP software).
- **Balanced placement**: Provides automated workload distribution across the cluster to help increase utilization and performance.
- **Dynamic capacity expansion**: Allows the capacity of a volume or aggregate to be expanded by adding new physical drives.
- **Adaptive Quality of Service**: Simplifies operations and maintains consistent workload performance by defining QoS policies and automatically adjusting storage resources to respond to workload changes.
- **SnapRestore**: Enables quick recovery of data by reverting a local volume or file to its previous state from a particular snapshot copy stored on the file system.
- **FlexClone**: References snapshot metadata to create writable point-in-time copies of a volume.
- **FlexVol**: Provides abstraction layer between the logical volume and its physical location in the storage array.
- **FlexCache**: Speeds up access to data and offloads traffic from heavily accessed volumes for read-intensive workloads by placing frequently used data in cache locally or remotely (closer to the point of client access) and serving the data to the clients directly from cache without accessing the data source.
- **SnapMirror asynchronous replication**: Provides storage system-based data replication between the storage systems containing source (local) and destination (remote) volumes by using asynchronous (at specified regular intervals) data transfers over IP communication links.
- **SyncMirror data protection**: Adds extra level of data protection and availability by mirroring a pair of RAID aggregates.
- **Trusted Platform Module (TPM)**: For encryption enabled systems. The encryption keys for the

onboard key manager (OKM) are no longer stored in the boot device, but instead are stored in the physical TPM for systems so equipped, offering greater security and protection. Moving to the TPM is a nondisruptive process.

- **MetroCluster IP:** Provides storage system-based clustering with online, real-time data mirroring between the local and remote sites by using synchronous data transfers over IP communication links to deliver continuous availability with zero RPO and near-zero RTO. All storage systems in a MetroCluster IP configuration must be of the same model. New to ONTAP 9.11: MetroCluster with Storage Virtual Machine Disaster Recovery (SVM-DR) can now use a third site for the SVM-DR
- **NVMe over TCP Protocol:** Enables NVMe over TCP
- **Data Protection Optimized (DPO):** Increases the amount of concurrent SnapMirror sessions per node, as well as improving SnapMirror performance to the cluster.
- **SnapMirror synchronous replication:** Provides storage system-based data replication between the storage systems containing source (local) and destination (remote) volumes by using synchronous (as soon as the data is written to the source volume)
- **FlexGroup:** Enables a single volume to span across multiple clustered storage arrays to maximize storage capacity and automate load distribution. New to ONTAP 9.11: FlexGroups can now be created as SnapLock volumes.
- **SnapVault disk-based storage backup:** Enables data stored on multiple systems to be backed up to a central, secondary system quickly and efficiently as read-only snapshot copies.
- **SnapCenter:** Provides application- and virtual machine-aware backup and restoration of data by using the Snapshots technology and leverages the SnapMirror capabilities of storage systems to provide onsite or offsite backup set mirroring for disaster recovery.
- **ONTAP S3:** Expands the DG/DM Series unified story and allows customers to manage, block, file, and object data from one interface. Customers can now natively store data in S3 buckets onboard the DG/DM Series.
- **SnapMirror S3 :** Enables you to protect buckets in ONTAP S3 object stores using familiar SnapMirror mirroring and backup functionality. Requires ONTAP 9.11 or later on both source and destination clusters. Requires the Unified Premium Bundle.
- **SnapMirror Cloud:** A backup and recovery technology designed for ONTAP users who want to transition their data protection workflows to the cloud. SnapMirror Cloud is an extension to the family of SnapMirror replication technologies. While SnapMirror is frequently used for ONTAP-to-ONTAP backups, SnapMirror Cloud uses the same replication engine to transfer Snapshot copies for ONTAP to S3-compliant object storage backups.
- **Multitenant Key Management (MTKM):** Provides the ability for individual tenants or storage virtual machines (SVMs) to maintain their own keys through KMIP for NVE. With multitenant external key management, you can centralize your organization's key management functions by department or tenant while inherently confirming that keys are not stored near the assets. This approach decreases the possibility of compromise.
- **Anti-ransomware:** Uses workload analysis in NAS (NFS and SMB) environments to proactively detect and warn about abnormal activity that might indicate a ransomware attack. When an attack is suspected, anti-ransomware also creates new Snapshot backups, in addition to existing protection from scheduled Snapshot copies. New to ONTAP 9.11: Optional multi-admin verification to approve administration functions that could result in data loss.

Optional Extended features also available via Feature on Demand (FoD) (see the [Extended ONTAP features](#) section)

- **FabricPool:** FabricPool is a hybrid storage solution that uses an all flash (all SSD) aggregate as the performance tier and an object store as the external capacity tier. Data in a FabricPool is stored in a tier based on whether it is frequently accessed or not. Using a FabricPool helps you reduce storage cost without compromising performance, efficiency, or protection.
- No license is required when tiering to StorageGRID or ONTAP S3.

ONTAP software versions

The following table lists the software selection options for the DG5000. The table also indicates which markets each version is available in.

Table 11. Software selection

Feature code	Description	Availability
ONTAP 9.1x		
C4K5	Lenovo ThinkSystem Storage ONTAP 9.15 Software Encryption - IPAv2	All markets
C4K6	Lenovo ThinkSystem Storage ONTAP 9.15 Software NonEncryption - IPAv2	All markets
C4AG	Lenovo ThinkSystem Storage ONTAP 9.16 Software Encryption - IPAv2	All markets
C4AH	Lenovo ThinkSystem Storage ONTAP 9.16 Software NonEncryption - IPAv2	All markets

Software maintenance is included in the DG5000 warranty and support (see [Warranty and support](#) for details)

Extended ONTAP features

FabricPool is an optional extended feature. To obtain this feature license, order the part numbers as listed in the following table.

Note: Extended features are only available as field upgrades and are not orderable as part of a CTO configuration.

Table 12. Optional software features

Part number	Feature code	Description	Quantity
4P47A37057	None*	DM Series FabricPool – 1TB Increment – 3 years	1 per TB of storage capacity
4P47A37288	None*	DM Series FabricPool – 1TB Increment – 5 years	1 per TB of storage capacity

* Field upgrade only; no factory installation.

Configuration notes:

- The FabricPool feature is a cluster-wide, capacity-based license that is available for 3-year or 5-year subscription terms.
- No license is required when tiering to StorageGRID or ONTAP S3.

Ansible playbooks for DM/DG Series

Ansible Playbooks give customers the ability to quickly deploy and use DM/DG Series storage systems using a standard open source deployment tool. Each playbook executes a set of tasks to achieve a configuration/provisioning goal.

Lenovo has created playbooks that can be used with DM/DG Series storage systems to help with:

- Provisioning
- Configuring

To access the Ansible Playbooks for Lenovo ThinkSystem DM/DG Series storage systems, go to the following page:

<https://github.com/lenovo/ansible-dm-series-ontap>

Management

The ThinkSystem DG5000 supports the following management interfaces:

- Lenovo ThinkSystem Storage Manager, a web-based interface via HTTPS for single-system management or centralized management of the cluster of systems, that runs on the storage system itself and requires only a supported browser (Microsoft Internet Explorer, Google Chrome, or Mozilla Firefox), so there is no need for a separate console or plug-in.
- Command line interface (CLI) via SSH or through serial console.
- Syslog, SNMP, and e-mail notifications.

Power supplies and cables

The ThinkSystem DG5000 and DG240N 2U24 SFF enclosures ship with two redundant hot-swap 1600 W (200-240 V) Platinum AC power supplies, each with an IEC 320-C14 connector.

Each ThinkSystem DG Series enclosure requires the selection of two power cables.

Note: A 110V power source is supported; however, the system is limited to a single IO card per controller when using 110V power

Rack installation

The individually shipped ThinkSystem DG5000 and DG240N enclosures come with the ThinkSystem Storage Rack Mount Kit 2U24 listed in the following table.

Table 13. 4-post rack mount kit

Feature code	Description	Quantity
B6Y6	Lenovo ThinkSystem NVMe Rail Kit 4 post	1

When the ThinkSystem DM Series enclosures are factory-integrated and shipped installed in a rack cabinet, the rack mount kits that support Ship-in-Rack (SIR) capabilities are derived by the configurator. The SIR-capable rack mount kits are listed in the following table.

Table 14. 4-post SIR rack mount kits

Feature code	Description	Quantity
B6Y7	ThinkSystem NVMe Adjustable Rail Kit	1

The following table summarizes the rack mount kit features and specifications.

Table 15. Rack mount kit features and specifications summary

Attribute	Screw-in fixed rail with adjustable depth	
	2U24	2U24 SIR
Feature code	B38Y	B6TH
Enclosure support	DG5000, DG240N	DG5000, DG240N
Rail type	Fixed (static) with adjustable depth	Fixed (static) with adjustable depth
Tool-less installation	No	No
In-rack maintenance	Yes*	Yes*
Ship-in-rack (SIR) support	No	Yes
1U PDU support	Yes	Yes
0U PDU support	Limited**	Limited**
Rack type	IBM or Lenovo 4-post, IEC standard-compliant	IBM or Lenovo 4-post, IEC standard-compliant
Mounting holes	Square or round	Square or round
Mounting flange thickness	2.0 - 3.3 mm (0.08 - 0.13 in.)	2.0 - 3.3 mm (0.08 - 0.13 in.)
Distance between front and rear mounting flanges^	605 - 813 mm (23.8 - 32 in.)	605 - 813 mm (23.8 - 32 in.)

* The majority of the enclosure components can be serviced from the front or rear of the enclosure, which does not require the removal of the enclosure from the rack cabinet.

** If a 0U PDU is used, the rack cabinet must be at least 1000 mm (39.37 in.) deep for 2U24 enclosures.

^ Measured when mounted on the rack, from the front surface of the front mounting flange to the rear most point of the rail.

Physical specifications

The ThinkSystem DG5000 controller enclosure has the following dimensions and weight:

- Height: 87 mm (3.4 in.)
- Width with flange: 483 mm (19 in.)
- Width without flange: 447 mm (17.6 in.)
- Depth: 543 mm (21.4 in.)
- Weight (fully configured): 24.6 kg (54.3 lb)

The ThinkSystem DG240N 2U24 SFF enclosure has the following dimensions and weight:

- Height: 87 mm (3.4 in.)
- Width with flange: 483 mm (19 in.)
- Width without flange: 447 mm (17.6 in.)
- Depth: 543 mm (21.4 in.)
- Weight (fully configured): 30.2 kg (66.6 lb)

Operating environment

The ThinkSystem DG5000 and DG240N 2U24 SFF enclosures are supported in the following environment:

- Air temperature:
 - Operating: 10 to 35 °C (50 to 95 °F)
 - Non-operating: -40 °C to +70 °C (-40 °F to 158 °F)
 - Maximum altitude: 3050 m (10,000 ft)
- Relative humidity:
 - Operating: 8% to 80% (non-condensing)
 - Non-operating: 10% to 95% (non-condensing)
- Electrical power:
 - DG5000:
 - 200 to 240 (nominal) V AC; 50 Hz or 60 Hz; 5.40 A
 - Power load = 1079W (maximum), 826.9W (typical)
 - DG240N:
 - 100 to 127 (nominal) V AC; 50 Hz or 60 Hz; 4.11 A
 - 200 to 240 (nominal) V AC; 50 Hz or 60 Hz; 2.05 A
 - Maximum system power load: 390 W
- Heat dissipation:
 - DG5000: 3682.79 BTU/Hr (maximum), 2822.13 BUT/Hr (typical)
 - DG240N: 1331 BTU/hour
- Acoustical noise emission:
 - DG5000: 7.2 bels
 - DG240N: 6.4 bels

Warranty upgrades and post-warranty support

The DG5000 and expansion enclosure have a 3-year warranty based on the machine type of the system:

- DG5000 controller enclosure: 7DE4 (3-year warranty)
- DG240N expansion enclosure: 7Y62 (3-year warranty)

Our global network of regional support centers offers consistent, local-language support enabling you to vary response times and level of service to match the criticality of your support needs:

- **Standard Next Business Day** – Best choice for non-essential systems requiring simple maintenance.
- **Premier Next Business Day** – Best choice for essential systems requiring technical expertise from senior-level Lenovo engineers.
- **Premier 24x7 4-Hour Response** – Best choice for systems where maximum uptime is critical.
- **Premier Enhanced Storage Support 24x7 4-Hour Response** – Best choice for storage systems where maximum uptime is critical.

For more information, consult the brochure [Lenovo Operational Support Services for Data Centers Services](#).

Services

Lenovo Data Center Services empower you at every stage of your IT lifecycle. From expert advisory and strategic planning to seamless deployment and ongoing support, we ensure your infrastructure is built for success. Our comprehensive services accelerate time to value, minimize downtime, and free your IT staff to focus on driving innovation and business growth.

Note: Some service options may not be available in all markets or regions. For more information, go to <https://lenovolocator.com/>. For information about Lenovo service upgrade offerings that are available in your region, contact your local Lenovo sales representative or business partner.

In this section:

- [Lenovo Advisory Services](#)
- [Lenovo Plan & Design Services](#)
- [Lenovo Deployment, Migration, and Configuration Services](#)
- [Lenovo Support Services](#)
- [Lenovo Managed Services](#)
- [Lenovo Sustainability Services](#)

Lenovo Advisory Services

Lenovo Advisory Services simplify the planning process, enabling customers to build future-proofed strategies in as little as six weeks. Consultants provide guidance on projects including VM migration, storage, backup and recovery, and cost management to accelerate time to value, improve cost efficiency, and build a flexibly scalable foundation.

- **Assessment Services**

An Assessment helps solve your IT challenges through an onsite, multi-day session with a Lenovo technology expert. We perform a tools-based assessment which provides a comprehensive and thorough review of a company's environment and technology systems. In addition to the technology based functional requirements, the consultant also discusses and records the non-functional business requirements, challenges, and constraints. Assessments help organizations like yours, no matter how large or small, get a better return on your IT investment and overcome challenges in the ever-changing technology landscape.

- **Design Services**

Professional Services consultants perform infrastructure design and implementation planning to support your strategy. The high-level architectures provided by the assessment service are turned into low level designs and wiring diagrams, which are reviewed and approved prior to implementation. The implementation plan will demonstrate an outcome-based proposal to provide business capabilities through infrastructure with a risk-mitigated project plan.

Lenovo Plan & Design Services

Unlock faster time to market with our tailored, strategic design workshops to align solution approaches with your business goals and technical requirements. Leverage our deep solution expertise and end-to-end delivery partnership to meet your goals efficiently and effectively.

Lenovo Deployment, Migration, and Configuration Services

Optimize your IT operations by shifting labor-intensive functions to Lenovo's skilled technicians for seamless on-site or remote deployment, configuration, and migration. Enjoy peace of mind, faster time to value, and comprehensive knowledge sharing with your IT staff, backed by our best-practice methodology.

- **Deployment Services for Storage and ThinkAgile**

A comprehensive range of remote and onsite options tailored specifically for your business needs to ensure your storage and ThinkAgile hardware are fully operational from the start.

- **Hardware Installation Services**

A full-range, comprehensive setup for your hardware, including unpacking, inspecting, and positioning components to ensure your equipment is operational and error-free for the most seamless and efficient installation experience, so you can quickly benefit from your investments.

- **DM/DG File Migration Services**

Take the burden of file migration from your IT's shoulders. Our experts will align your requirements and business objectives to the migration plans while coordinating with your team to plan and safely execute the data migration to your storage platforms.

- **DM/DG/DE Health Check Services**

Our experts perform proactive checks of your Firmware and system health to ensure your machines are operating at peak and optimal efficiency to maximize up-time, avoid system failures, ensure the security of IT solutions and simplify maintenance.

- **Factory Integrated Services**

A suite of value-added offerings provided during the manufacturing phase of a server or storage system that reduces time to value. These services aim at improving your hardware deployment experience and enhance the quality of a standard configuration before it arrives at your facility.

Lenovo Support Services

In addition to response time options for hardware parts, repairs, and labor, Lenovo offers a wide array of additional support services to ensure your business is positioned for success and longevity. Our goal is to reduce your capital outlays, mitigate your IT risks, and accelerate your time to productivity.

- **Premier Support for Data Centers**

Your direct line to the solution that promises the best, most comprehensive level of support to help you fully unlock the potential of your data center.

- **Premier Enhanced Storage Support (PESS)**

Gain all the benefits of Premier Support for Data Centers, adding dedicated storage specialists and resources to elevate your storage support experience to the next level.

- **Committed Service Repair (CSR)**

Our commitment to ensuring the fastest, most seamless resolution times for mission-critical systems that require immediate attention to ensure minimal downtime and risk for your business. This service is only available for machines under the Premier 4-Hour Response SLA.

- **Multivendor Support Services (MVS)**

Your single point of accountability for resolution support across vast range of leading Server, Storage, and Networking OEMs, allowing you to manage all your supported infrastructure devices seamlessly from a single source.

- **Keep Your Drive (KYD)**

Protect sensitive data and maintain compliance with corporate retention and disposal policies to ensure your data is always under your control, regardless of the number of drives that are installed in your Lenovo server.

- **Technical Account Manager (TAM)**

Your single point of contact to expedite service requests, provide status updates, and furnish reports to track incidents over time, ensuring smooth operations and optimized performance as your business grows.

- **Enterprise Software Support (ESS)**

Gain comprehensive, single-source, and global support for a wide range of server operating systems and Microsoft server applications.

For more information, consult the brochure [Lenovo Operational Support Services for Data Centers](#).

Lenovo Managed Services

Achieve peak efficiency, high security, and minimal disruption with Lenovo's always-on Managed Services. Our real-time monitoring, 24x7 incident response, and problem resolution ensure your infrastructure operates seamlessly. With quarterly health checks for ongoing optimization and innovation, Lenovo's remote active monitoring boosts end-user experience and productivity by keeping your data center's hardware performing at its best.

Lenovo Managed Services provides continuous 24x7 remote monitoring (plus 24x7 call center availability) and proactive management of your data center using state-of-the-art tools, systems, and practices by a team of highly skilled and experienced Lenovo services professionals.

Quarterly reviews check error logs, verify firmware & OS device driver levels, and software as needed. We'll also maintain records of latest patches, critical updates, and firmware levels, to ensure your systems are providing business value through optimized performance.

Lenovo Sustainability Services

- **Asset Recovery Services**

Lenovo Asset Recovery Services (ARS) provides a secure, seamless solution for managing end-of-life IT assets, ensuring data is safely sanitized while contributing to a more circular IT lifecycle. By maximizing the reuse or responsible recycling of devices, ARS helps businesses meet sustainability goals while recovering potential value from their retired equipment. For more information, see the [Asset Recovery Services offering page](#).

- **CO2 Offset Services**

Lenovo's CO2 Offset Services offer a simple and transparent way for businesses to take tangible action on their IT footprint. By integrating CO2 offsets directly into device purchases, customers can easily support verified climate projects and track their contributions, making meaningful progress toward their sustainability goals without added complexity.

- **Lenovo Certified Refurbished**

Lenovo Certified Refurbished offers a cost-effective way to support IT circularity without compromising on quality and performance. Each device undergoes rigorous testing and certification, ensuring reliable performance and extending its lifecycle. With Lenovo's trusted certification, you gain peace of mind while making a more sustainable IT choice.

Lenovo TruScale

Lenovo TruScale XaaS is your set of flexible IT services that makes everything easier. Streamline IT procurement, simplify infrastructure and device management, and pay only for what you use – so your business is free to grow and go anywhere.

Lenovo TruScale is the unified solution that gives you simplified access to:

- The industry's broadest portfolio – from pocket to cloud – all delivered as a service
- A single-contract framework for full visibility and accountability
- The global scale to rapidly and securely build teams from anywhere
- Flexible fixed and metered pay-as-you-go models with minimal upfront cost
- The growth-driving combination of hardware, software, infrastructure, and solutions – all from one single provider with one point of accountability.

For information about Lenovo TruScale offerings that are available in your region, contact your local Lenovo sales representative or business partner.

Regulatory compliance

The ThinkSystem DG Series enclosures conform to the following regulations:

- United States: FCC Part 15, Class A; UL 60950-1
- Canada: ICES-003, Class A; CAN/CSA-C22.2 60950-1
- Mexico NOM
- European Union: CE Mark (EN55032 Class A, EN55024, IEC/EN60950-1); ROHS Directive 2011/65/EU
- Russia, Kazakhstan, Belarus: EAC
- China: CCC GB 4943.1, GB 17625.1, GB 9254 Class A; CELP; CECP
- Japan: VCCI, Class A
- Taiwan: BSMI CNS 13438, Class A; CNS 14336-1
- Korea KN32/35, Class A
- Australia/New Zealand: AS/NZS CISPR 22 Class A

Interoperability

Lenovo provides end-to-end storage compatibility testing to deliver interoperability throughout the network. The ThinkSystem DG5000 Unified Flash Storage Array supports attachment to Lenovo servers by using NVMe over Fibre Channel (NVMe/FC), NAS (NFS and CIFS/SMB), iSCSI, and Fibre Channel storage connectivity.

For end-to-end storage configuration support, refer to the Lenovo Storage Interoperation Center (LSIC): <https://datacentersupport.lenovo.com/us/en/lisic>

Use the LSIC to select the known components of your configuration and then get a list all other supported combinations, with details about supported hardware, firmware, operating systems, and drivers, plus any additional configuration notes. View results on screen or export them to Excel.

Cluster interconnect

The following table lists the Ethernet storage switch that can be used with the Lenovo ThinkSystem DG5000 for cluster interconnect and MetroCluster IP configurations.

Table 16. Ethernet storage switch

Description	Part number
Mellanox SN2100 16 Port, QSFP28, 100GbE Switch, Rear to Front (PSE) Exhaust	7DBUCTO1WW
Mellanox SN2100 16 port, QSFP28, 100GbE Switch, Front to Rear (oPSE) Exhaust	7DBUCTO2WW

For more information, see the NVIDIA SN2100 16-port 100Gb Ethernet Storage Switch Article: <https://lenovopress.lenovo.com/lp1756-nvidia-sn2100-100gb-ethernet-storage-switch>

Fibre Channel SAN switches

Lenovo offers the ThinkSystem DB Series of Fibre Channel SAN switches for high-performance storage expansion. See the DB Series product guides for models and configuration options:

- ThinkSystem DB Series SAN Switches:
<https://lenovopress.com/storage/switches/rack#rt=product-guide>

Rack cabinets

The following table lists the supported rack cabinets.

Table 17. Rack cabinets (D)

Model	Description
7D6DA007WW	ThinkSystem 42U Onyx Primary Heavy Duty Rack Cabinet (1200mm)
7D6DA008WW	ThinkSystem 42U Pearl Primary Heavy Duty Rack Cabinet (1200mm)
7D6EA009WW	ThinkSystem 48U Onyx Primary Heavy Duty Rack Cabinet (1200mm)
7D6EA00AWW	ThinkSystem 48U Pearl Primary Heavy Duty Rack Cabinet (1200mm)
93604PX	42U 1200mm Deep Dynamic Rack
93614PX	42U 1200mm Deep Static Rack
93634PX	42U 1100mm Dynamic Rack
93634EX	42U 1100mm Dynamic Expansion Rack
93074RX	42U Standard Rack (1000mm)

For specifications about these racks, see the Lenovo Rack Cabinet Reference, available from:

<https://lenovopress.com/lp1287-lenovo-rack-cabinet-reference>

For more information, see the list of Product Guides in the Rack cabinets category:

<https://lenovopress.com/servers/options/racks>

Power distribution units

The following table lists the power distribution units (PDUs) that are offered by Lenovo.

Table 18. Power distribution units

Part number	Feature code	Description	ANZ	ASEAN	Brazil	EET	MEA	RUCIS	WE	HTK	INDIA	JAPAN	LA	NA	PRC
0U Basic PDUs															
4PU7A93176	C0QH	0U 36 C13 and 6 C19 Basic 32A 1 Phase PDU v2	Y	Y	Y	Y	Y	Y	Y	Y	Y	N	Y	Y	Y
4PU7A93169	C0DA	0U 36 C13 and 6 C19 Basic 32A 1 Phase PDU	Y	Y	Y	Y	Y	Y	Y	Y	Y	N	Y	Y	Y
4PU7A93177	C0QJ	0U 24 C13/C15 and 24 C13/C15/C19 Basic 32A 3 Phase WYE PDU v2	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
4PU7A93170	C0D9	0U 24 C13/C15 and 24 C13/C15/C19 Basic 32A 3 Phase WYE PDU	Y	Y	Y	Y	Y	Y	Y	Y	Y	N	Y	Y	Y
0U Switched and Monitored PDUs															
4PU7A93181	C0QN	0U 21 C13/C15 and 21 C13/C15/C19 Switched and Monitored 48A 3 Phase Delta PDU v2 (60A derated)	N	Y	N	N	N	N	N	Y	N	Y	N	Y	N
4PU7A93174	C0D5	0U 21 C13/C15 and 21 C13/C15/C19 Switched and Monitored 48A 3 Phase Delta PDU (60A derated)	N	Y	N	N	N	N	N	Y	N	N	N	Y	N
4PU7A93178	C0QK	0U 20 C13 and 4 C19 Switched and Monitored 32A 1 Phase PDU v2	Y	Y	Y	Y	Y	Y	Y	Y	Y	N	Y	Y	Y
4PU7A93171	C0D8	0U 20 C13 and 4 C19 Switched and Monitored 32A 1 Phase PDU	Y	Y	Y	Y	Y	Y	Y	Y	Y	N	Y	Y	Y
4PU7A93182	C0QP	0U 18 C13/C15 and 18 C13/C15/C19 Switched and Monitored 63A 3 Phase WYE PDU v2	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
4PU7A93175	C0CS	0U 18 C13/C15 and 18 C13/C15/C19 Switched and Monitored 63A 3 Phase WYE PDU	Y	Y	Y	Y	Y	Y	Y	Y	Y	N	Y	Y	Y
4PU7A93180	C0QM	0U 18 C13/C15 and 18 C13/C15/C19 Switched and Monitored 32A 3 Phase WYE PDU v2	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
4PU7A93173	C0D6	0U 18 C13/C15 and 18 C13/C15/C19 Switched and Monitored 32A 3 Phase WYE PDU	Y	Y	Y	Y	Y	Y	Y	Y	Y	N	Y	Y	Y
4PU7A93179	C0QL	0U 16 C13/C15 and 16 C13/C15/C19 Switched and Monitored 24A 1 Phase PDU v2 (30A derated)	N	Y	N	N	N	N	N	Y	N	Y	N	Y	N
4PU7A93172	C0D7	0U 16 C13/C15 and 16 C13/C15/C19 Switched and Monitored 24A 1 Phase PDU(30A derated)	N	Y	N	N	N	N	N	Y	N	N	N	Y	N
1U Switched and Monitored PDUs															
4PU7A90808	C0D4	1U 18 C19/C13 Switched and monitored 48A 3P WYE PDU V2 ETL	N	N	N	N	N	N	N	Y	N	Y	Y	Y	N
4PU7A81117	BNDV	1U 18 C19/C13 switched and monitored 48A 3P WYE PDU - ETL	N	N	N	N	N	N	N	N	N	N	N	Y	N
4PU7A90809	C0DE	1U 18 C19/C13 Switched and monitored 48A 3P WYE PDU V2 CE	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	N	Y
4PU7A81118	BNDW	1U 18 C19/C13 switched and monitored 48A 3P WYE PDU – CE	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	N	Y

Part number	Feature code	Description	ANZ	ASEAN	Brazil	EET	MEA	RUCIS	WE	HTK	INDIA	JAPAN	LA	NA	PRC
4PU7A90810	C0DD	1U 18 C19/C13 Switched and monitored 80A 3P Delta PDU V2	N	N	N	N	N	N	N	Y	N	Y	Y	Y	N
4PU7A77467	BLC4	1U 18 C19/C13 Switched and Monitored 80A 3P Delta PDU	N	N	N	N	N	N	N	N	N	Y	N	Y	N
4PU7A90811	C0DC	1U 12 C19/C13 Switched and monitored 32A 3P WYE PDU V2	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
4PU7A90812	C0DB	1U 12 C19/C13 Switched and monitored 60A 3P Delta PDU V2	N	N	N	N	N	N	N	Y	N	Y	Y	Y	N
4PU7A77469	BLC6	1U 12 C19/C13 switched and monitored 60A 3P Delta PDU	N	N	N	N	N	N	N	N	N	N	N	Y	N
71763NU	6051	Ultra Density Enterprise C19/C13 PDU 60A/208V/3PH	N	N	Y	N	N	N	N	N	N	Y	Y	Y	N
71762NX	6091	Ultra Density Enterprise C19/C13 PDU Module	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Line cords for 1U PDUs that ship without a line cord															
40K9611	6504	DPI 32a Cord (IEC 309 3P+N+G)	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
40K9612	6502	DPI 32a Cord (IEC 309 P+N+G)	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
40K9613	6503	DPI 63a Cord (IEC 309 P+N+G)	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
40K9614	6500	DPI 30a Cord (NEMA L6-30P)	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
40K9615	6501	DPI 60a Cord (IEC 309 2P+G)	N	N	Y	N	N	N	Y	N	N	Y	Y	Y	N

For more information, see the Lenovo Press documents in the PDU category:
<https://lenovopress.com/servers/options/pdu>

Uninterruptible power supply units

The following table lists the uninterruptible power supply (UPS) units that are offered by Lenovo.

Table 19. Uninterruptible power supply units

Part number	Description
Rack-mounted or tower UPS units - 100-125VAC	
7DD5A001WW	RT1.5kVA 2U Rack or Tower UPS-G2 (100-125VAC)
7DD5A003WW	RT3kVA 2U Rack or Tower UPS-G2 (100-125VAC)
Rack-mounted or tower UPS units - 200-240VAC	
7DD5A002WW	RT1.5kVA 2U Rack or Tower UPS-G2 (200-240VAC)
7DD5A005WW	RT3kVA 2U Rack or Tower UPS-G2 (200-240VAC)
7DD5A007WW	RT5kVA 3U Rack or Tower UPS-G2 (200-240VAC)
7DD5A008WW	RT6kVA 3U Rack or Tower UPS-G2 (200-240VAC)
7DD5A00AWW	RT11kVA 6U Rack or Tower UPS-G2 (200-240VAC)

† Only available in China and the Asia Pacific market.

For more information, see the list of Product Guides in the UPS category:
<https://lenovopress.com/servers/options/ups>

Lenovo Financial Services

Why wait to obtain the technology you need now? No payments for 90 days and predictable, low monthly payments make it easy to budget for your Lenovo solution.

- **Flexible**

Our in-depth knowledge of the products, services and various market segments allows us to offer greater flexibility in structures, documentation and end of lease options.

- **100% Solution Financing**

Financing your entire solution including hardware, software, and services, ensures more predictability in your project planning with fixed, manageable payments and low monthly payments.

- **Device as a Service (DaaS)**

Leverage latest technology to advance your business. Customized solutions aligned to your needs. Flexibility to add equipment to support growth. Protect your technology with Lenovo's Premier Support service.

- **24/7 Asset management**

Manage your financed solutions with electronic access to your lease documents, payment histories, invoices and asset information.

- **Fair Market Value (FMV) and \$1 Purchase Option Leases**

Maximize your purchasing power with our lowest cost option. An FMV lease offers lower monthly payments than loans or lease-to-own financing. Think of an FMV lease as a rental. You have the flexibility at the end of the lease term to return the equipment, continue leasing it, or purchase it for the fair market value. In a \$1 Out Purchase Option lease, you own the equipment. It is a good option when you are confident you will use the equipment for an extended period beyond the finance term. Both lease types have merits depending on your needs. We can help you determine which option will best meet your technological and budgetary goals.

Ask your Lenovo Financial Services representative about this promotion and how to submit a credit application. For the majority of credit applicants, we have enough information to deliver an instant decision and send a notification within minutes.

Seller training courses

The following sales training courses are offered for employees and partners (login required). Courses are listed in date order.

1. **Partner Technical Webinar - Cost Effective Storage Solutions**

2025-01-14 | 60 minutes | Employees and Partners

In this 60-minute replay, Lenovo Storage Architect, Dan Beins presented Lenovo's strategy, capabilities, and portfolio for Data Management. Dan did a super job going beyond the product feature / function and talking about where our products bring value to our customer's Data Management.

Tags: Data Management

Published: 2025-01-14

Length: 60 minutes

Start the training:

Employee link: Grow@Lenovo

Partner link: [Lenovo Partner Learning](#)

Course code: 011025

2. **Lenovo ThinSystem DG/DM Storage Series Portfolio Overview**

2024-09-10 | 60 minutes | Employees and Partners

This course builds on what you've learned in the Data Management Overview course. The course will help position the Lenovo ThinkSystem DG and DM series storage products. Completing this course will help you:

- understand the advantages of each product line and
- understand the key features and relate them to a range of customer business needs, whether small-scale or enterprise-level storage needs

Tags: Data Management, Storage, ThinkSystem

Published: 2024-09-10

Length: 60 minutes

Start the training:

Employee link: [Grow@Lenovo](#)

Partner link: [Lenovo Partner Learning](#)

Course code: DDMO103

3. **Partner Technical Webinar - Commvault Data Protection and Resiliency**

2024-06-25 | 60 minutes | Employees and Partners

In this 60-minute replay, Nate Saunders, Commvault Solution Director for Global Partners, reviewed the Commvault solutions for Data Protection and Resiliency and the Lenovo ThinkSystem offerings that support those solutions.

Tags: Data Management

Published: 2024-06-25

Length: 60 minutes

Start the training:

Employee link: [Grow@Lenovo](#)

Partner link: [Lenovo Partner Learning](#)

Course code: 062124

4. **Lenovo Data Center Product Portfolio**

2024-05-29 | 20 minutes | Employees and Partners

This course introduces the Lenovo data center portfolio, and covers servers, storage, storage networking, and software-defined infrastructure products. After completing this course about Lenovo data center products, you will be able to identify product types within each data center family, describe Lenovo innovations that this product family or category uses, and recognize when a specific product should be selected.

Tags: Advanced DataCenter, DataCenter Products, ThinkAgile, ThinkEdge, ThinkSystem

Published: 2024-05-29

Length: 20 minutes

Start the training:

Employee link: [Grow@Lenovo](#)

Partner link: [Lenovo Partner Learning](#)

Course code: SXXW1110r7

5. **Partner Technical Webinar - Fibre Channel and DG Updates**

2024-04-23 | 60 minutes | Employees and Partners

In this 60-minute replay, Mike Easterly, Broadcom, reviewed Lenovo solutions for Fibre Channel (FC) including Emulex FC Adapters and Brocade FC switches. Next, Mark Clayton, Lenovo Storage Architect, reviewed the latest on the Data Management portfolio with updates on DG, HS350x Ready Nodes and Data Protection.

Tags: Data Management

Published: 2024-04-23

Length: 60 minutes

Start the training:

Employee link: [Grow@Lenovo](#)

Partner link: [Lenovo Partner Learning](#)

Course code: 041924

6. **VTT Data Management How to sell storage - April 2024**

2024-04-10 | 60 minutes | Employees Only

In this course, you will know:

- Why do we sell storage?
- What are the basics you need to get an opportunity rolling?
- Why Lenovo for Storage?
- What is happening in the market today?
- How to determine traction?

Tags: Data Management, Storage

Published: 2024-04-10

Length: 60 minutes

Start the training:

Employee link: [Grow@Lenovo](#)

Course code: DVDAT209

7. **ONTAP Technical Positioning**

2024-03-14 | 45 minutes | Employees and Partners

This course focuses on enabling you to interpret the technical market trends and challenges that ONTAP customers face. You also learn to ask qualifying questions that identify which industries, companies, and customer contacts are appropriate targets for ONTAP software. Module two covers explaining ONTAP features and functionality and enabling you to strengthen ONTAP marketing claims with technical details.

Learning Objectives:

- Interpret the technical market trends and challenges that ONTAP customers face
- Ask qualifying questions that identify which industries, companies, and customer contacts are appropriate targets for ONTAP software
- Explain ONTAP features and functionality
- Strengthen ONTAP marketing claims with technical details

Tags: Data Management, Sales, Storage, Technical Sales, ThinkSystem

Published: 2024-03-14

Length: 45 minutes

Start the training:

Employee link: Grow@Lenovo

Partner link: [Lenovo Partner Learning](#)

Course code: DDMT200r2

8. **Data management Overview**

2024-03-14 | 25 minutes | Employees and Partners

After completing this course you will be able to:

1. Know more about the data management trends and challenges
2. Understand the data management portfolio
3. Find out how data drives business value

Tags: Data Management, Storage, ThinkSystem

Published: 2024-03-14

Length: 25 minutes

Start the training:

Employee link: Grow@Lenovo

Partner link: [Lenovo Partner Learning](#)

Course code: DSTOO201

9. **VTT ONTAP 9.14.1 and Bundle Change Update - February 2024**
2024-03-07 | 25 minutes | Employees and Partners

In this course, you will know more about:

- The new Features of ONTAP 9.14.1 update
- ONTAP Bundle Update

Tags: Data Management, Storage

Published: 2024-03-07

Length: 25 minutes

Start the training:

Employee link: Grow@Lenovo

Partner link: [Lenovo Partner Learning](#)

Course code: DVDAT207

10. **Family Portfolio: Storage**
2024-02-02 | 15 minutes | Employees and Partners

This course covers products in the Lenovo storage portfolio, from storage servers to direct-access storage through storage systems.

After completing this course about the Storage family, the learner will be able to identify products within the family, describe the features of this product family, and recognize when a specific product should be selected.

Tags: DataCenter Products, Storage, ThinkSystem

Published: 2024-02-02

Length: 15 minutes

Start the training:

Employee link: Grow@Lenovo

Partner link: [Lenovo Partner Learning](#)

Course code: SXSW1201r16

11. **VTT ONTAP 9.13.1 and Bundle Change Update - November 2023**
2023-11-14 | 60 minutes | Employees Only

In this course, you will know more about:

- The new Features of ONTAP 9.13.1 update
- ONTAP Bundle Update

Tags: Data Management, Storage

Published: 2023-11-14

Length: 60 minutes

Start the training:

Employee link: Grow@Lenovo

Course code: DVDAT205

12. **VTT The Benefits of Scale Out Clustering with DM/DG - September 2023**

2023-09-12 | 60 minutes | Employees Only

In this course, you will know more about:

- What is scale out?
- Hardware benefits
- Administrative benefits
- Scale out Features

Tags: Data Management, ThinkSystem

Published: 2023-09-12

Length: 60 minutes

Start the training:

Employee link: [Grow@Lenovo](#)

Course code: DVDAT204

13. **VTT The new ThinkSystem DG storage product - August 2023**

2023-08-16 | 60 minutes | Employees Only

Introduce and explore the new ThinkSystem DG storage product based on the NetApp DM. This product features QLC SSDs focused on improved sustainability standards and workload consolidation.

Tags: Data Management, Storage, ThinkSystem

Published: 2023-08-16

Length: 60 minutes

Start the training:

Employee link: [Grow@Lenovo](#)

Course code: DVDAT203

Related publications and links

For more information, see the following resources:

- Lenovo ThinkSystem DG and DM Series product page
<https://www.lenovo.com/us/en/c/data-center/storage/unified-storage>
- Lenovo Data Center Solution Configurator
<http://dcsc.lenovo.com>
- ThinkSystem DG and DM Series documentation
http://thinksystem.lenovofiles.com/help/topic/ontap_software/overview.html
- ThinkSystem DG Series datasheet
<https://lenovopress.lenovo.com/datasheet/ds0170-thinksystem-dg-series>
- ONTAP Ransomware Protection
https://thinksystem.lenovofiles.com/storage/help/topic/ontap_anti-ransomware/anti-ransomware.pdf
- ThinkSystem DM Series Installation Videos and Video Tutorials
https://www.youtube.com/playlist?list=PLLQclfVNrqzcBW55-7IAe7_Our6nMQxak
- Lenovo Data Center Support
<http://datacentersupport.lenovo.com>

Related product families

Product families related to this document are the following:

- [DG Series Storage](#)
- [External Storage](#)
- [Lenovo SAN Storage](#)

Notices

Lenovo may not offer the products, services, or features discussed in this document in all countries. Consult your local Lenovo representative for information on the products and services currently available in your area. Any reference to a Lenovo product, program, or service is not intended to state or imply that only that Lenovo product, program, or service may be used. Any functionally equivalent product, program, or service that does not infringe any Lenovo intellectual property right may be used instead. However, it is the user's responsibility to evaluate and verify the operation of any other product, program, or service. Lenovo may have patents or pending patent applications covering subject matter described in this document. The furnishing of this document does not give you any license to these patents. You can send license inquiries, in writing, to:

Lenovo (United States), Inc.
8001 Development Drive
Morrisville, NC 27560
U.S.A.
Attention: Lenovo Director of Licensing

LENOVO PROVIDES THIS PUBLICATION "AS IS" WITHOUT WARRANTY OF ANY KIND, EITHER EXPRESS OR IMPLIED, INCLUDING, BUT NOT LIMITED TO, THE IMPLIED WARRANTIES OF NON-INFRINGEMENT, MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE. Some jurisdictions do not allow disclaimer of express or implied warranties in certain transactions, therefore, this statement may not apply to you.

This information could include technical inaccuracies or typographical errors. Changes are periodically made to the information herein; these changes will be incorporated in new editions of the publication. Lenovo may make improvements and/or changes in the product(s) and/or the program(s) described in this publication at any time without notice.

The products described in this document are not intended for use in implantation or other life support applications where malfunction may result in injury or death to persons. The information contained in this document does not affect or change Lenovo product specifications or warranties. Nothing in this document shall operate as an express or implied license or indemnity under the intellectual property rights of Lenovo or third parties. All information contained in this document was obtained in specific environments and is presented as an illustration. The result obtained in other operating environments may vary. Lenovo may use or distribute any of the information you supply in any way it believes appropriate without incurring any obligation to you.

Any references in this publication to non-Lenovo Web sites are provided for convenience only and do not in any manner serve as an endorsement of those Web sites. The materials at those Web sites are not part of the materials for this Lenovo product, and use of those Web sites is at your own risk. Any performance data contained herein was determined in a controlled environment. Therefore, the result obtained in other operating environments may vary significantly. Some measurements may have been made on development-level systems and there is no guarantee that these measurements will be the same on generally available systems. Furthermore, some measurements may have been estimated through extrapolation. Actual results may vary. Users of this document should verify the applicable data for their specific environment.

© Copyright Lenovo 2025. All rights reserved.

This document, LP1754, was created or updated on March 7, 2025.

Send us your comments in one of the following ways:

- Use the online Contact us review form found at:
<https://lenovopress.lenovo.com/LP1754>
- Send your comments in an e-mail to:
comments@lenovopress.com

This document is available online at <https://lenovopress.lenovo.com/LP1754>.

Trademarks

Lenovo and the Lenovo logo are trademarks or registered trademarks of Lenovo in the United States, other countries, or both. A current list of Lenovo trademarks is available on the Web at <https://www.lenovo.com/us/en/legal/copytrade/>.

The following terms are trademarks of Lenovo in the United States, other countries, or both:

Lenovo®

ThinkAgile®

ThinkSystem®

The following terms are trademarks of other companies:

Microsoft®, Excel®, Internet Explorer®, Windows Server®, and Windows® are trademarks of Microsoft Corporation in the United States, other countries, or both.

Other company, product, or service names may be trademarks or service marks of others.