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 Triplelevel 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 hotswappable. 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

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	• DG5000 controller enclosure: 7DE4 • DG240N expansion enclosure: 7Y62
Form factor	• DG5000: 2U rack mount • DG240N: 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	• NAS (File access): NFS, CIFS/SMB. • SAN (Block access): iSCSI, FC, NVMe/FC, NVMe/TCP

Attribute	Specification
Host connectivity	Base ports (per controller enclosure): • 2x 10GBASE-T ports ◦ Ports can be used for iSCSI, CIFS, and NFS. Optional ports via HIC adapters (2 per controller): • 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) The following host connectivity HIC combinations are supported in each controller: • 25GbE + 25GbE • 32Gb FC + 32Gb FC • 25GbE + 32Gb FC The following combinations of storage expansion HIC in port 1 and host HIC in port 2 are supported in each controller: • 100GbE (port 1) + 25GbE (port 2) • 100GbE (port 1) + 32Gb FC (port 2) **Note**: ONTAP does not support host direct attach for FC protocol.
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 ony). 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‡	• 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):
	  ◦ 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	• 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: • 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: • 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	• 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 theLenovo Data Center Support website: http://datacentersupport.lenovo.com

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