Lenovo ThinkSystem DM5000F Unified and DM5000F SAN Flash Storage Array

Product Guide

Lenovo ThinkSystem DM5000F is an all-flash storage system, available as either unified or SAN, that is designed to provide performance, simplicity, capacity, security, and high availability for medium enterprises. Powered by the ONTAP software, ThinkSystem DM5000F delivers enterprise-class storage management capabilities with a wide choice of host connectivity options and enhanced data management features. The ThinkSystem DM5000F is a perfect fit for a wide range of enterprise workloads, including big data and analytics, artificial intelligence, engineering and design, enterprise applications, and other storage I/O-intensive applications.

ThinkSystem DM5000F models are 2U rack-mount controller enclosures that include two controllers, 64 GB RAM and 8 GB battery-backed NVRAM (32 GB RAM and 4 GB NVRAM per controller), and 24 SFF hot-swap drive bays (2U24 form factor). Controllers provide universal 1/10 GbE NAS/iSCSI or 8/16 Gb Fibre Channel (FC) ports, or 1/10 GbE RJ-45 ports for host connectivity.

A single ThinkSystem DM5000F Storage Array scales up to 144 solid-state drives (SSDs) with the attachment of Lenovo ThinkSystem DM240S 2U24 SFF Expansion Enclosures.

Figure 1. Lenovo ThinkSystem DM5000F

Up to 12 DM5000F Storage Arrays can be combined into a clustered system in a NAS environment, or up to 6 DM5000F Storage Arrays can be combined into a clustered system in a SAN environment.

Did you know?

A single ThinkSystem DM5000F scales up to 2.2 PB of raw storage capacity. A cluster of the DM5000F storage systems scales up to 26.5 PB for NAS or up to 13.2 PB for SAN environments.

The ThinkSystem DM5000F offers unified file and block storage connectivity with support for 1 GbE or 10 GbE NAS and iSCSI, and 8 Gb or 16 Gb Fibre Channel protocols at the same time.

Key features

The ThinkSystem DM5000F offers the following key features and benefits:

- Available as a Unified storage platform - allowing NAS, SAN, and Object workloads or as a SAN storage platform that serving only SAN workloads.
- Both platform options, Unified and SAN are available with either the Fundamentals or Premium software feature offerings which provide feature flexibility.
- 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.
- 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 GbE NAS and iSCSI, and 8/16 Gb Fibre Channel connectivity.
- 12 Gb SAS drive-side connectivity with multipathing with up to 24x 2.5-inch small form factor (SFF) drives in the 2U24 SFF enclosures.
- Scalability to up to 144 SFF drives with the attachment of the ThinkSystem DM240S 2U24 SFF expansion enclosures to satisfy growing needs for storage capacity 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.

- Optional licensed functions, including WORM (write once, read many) data protection (SnapLock) and object storage tiering (FabricPool).
- Scale-out clustering of up to 12 ThinkSystem DM Series storage systems for NAS connectivity or up to six DM Series storage systems for SAN connectivity.
- Intuitive, web-based GUI for easy system setup and management.
- Lenovo XClarity support for centralized systems management of Lenovo x86 servers, switches, and storage, which provides automated agent-less discovery, inventory, monitoring, and additional platform-specific functions across multiple systems.
- Designed for 99.9999% availability with redundant hot-swap components, including controllers and I/O modules, power supplies, and non-disruptive firmware upgrades.
- Certified Enterprise Storage for SAP HANA Tailored Data center Integration (TDI).
- Certified storage for Oracle VM.
- Certified storage for Citrix XenServer: http://hcl.xenserver.org/storage/910/Lenovo_DM_Series.

The ThinkSystem DM5000F supports the 2.5-inch 960 GB, 3.84 TB, 7.68 TB, and 15.36 TB capacityoptimized SAS SSDs. All drives are dual-port and hot-swappable.

The ThinkSystem DM5000F supports attachment of up to five ThinkSystem DM240S 2U24 SFF expansion enclosures. More drives and expansion enclosures are designed to be dynamically added with virtually no downtime, which helps to quickly and seamlessly respond to ever-growing capacity demands.

The ThinkSystem DM5000F 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
- Dual-port SAS SSDs with automatic drive failure detection and rebuild
- Redundant, hot-swappable and customer replaceable hardware components, including SFP+ 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 DM5000F storage system specifications.

Note: The supported hardware options, software features, and interoperability listed in this product guide are based on the ONTAP software version 9.7. 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 DM5000F that can be found at: http://datacentersupport.lenovo.com

Table 1. ThinkSystem DM5000F system specifications

Attribute	Specification
Form factor	• DM5000F controller enclosure (machine types 7Y41, 7D7W): 2U rack mount. • DM240S 2U24 SFF expansion enclosure (machine types 7Y58, 7D7Y): 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 10 GbE SFP+ ports (DAC cables or SW fiber optics [LC]) (2 ports per controller).
RAID levels	RAID-4, RAID-DP, RAID-TEC.
Controller memory	64 GB RAM per system (32 GB per controller). 8 GB battery-backed NVRAM per system (4 GB per controller) mirrored between the controllers.
Drive bays	Up to 144 SFF hot-swap drive bays (1x 2U24 controller enclosure + up to 5x 2U24 SFF expansion enclosures). **Note**: The Fundamentals software bundles only support up to 84 drives.
Drive technology	12 Gb SAS SSDs.

Attribute	Specification
Drive expansion connectivity	• 2x 12 Gb SAS x4 (Mini-SAS HD SFF-8644) expansion ports on each of two controllers in the controller enclosure for the attachment of the expansion enclosures. • 4x 12 Gb SAS x4 (Mini-SAS HD SFF-8644) expansion ports on each of two I/O modules in the expansion enclosure for the attachment to the controller enclosure and daisy chaining of the expansion enclosures.
Drives	960 GB, 3.84 TB, 7.68 TB, and 15.36 TB SAS SSDs (1 DWD).

Storage capacity	Up to 2.160PB
Storage protocols	• NAS (File access): NFS and CIFS/SMB. • SAN (Block access): iSCSI and FC.
Host connectivity	Base ports (per controller enclosure): • 8x 1 GbE (RJ-45 UTP)/10 GbE (DAC cable or SW fiber optic cable, LC) or 4/8/16 Gb FC (SW fiber optic cable, LC) SFP+ host ports (4 ports per controller); or 8x 1/10 GbE • RJ-45 UTP host ports (4 ports per controller). **Note:** ONTAP does not support host direct attach for FC protocol.
Host operating systems	Microsoft Windows Server 2012 R2, 2016, and 2019; Red Hat Enterprise Linux (RHEL) 6, 7, and 8; SUSE Linux Enterprise Server (SLES) 11, 12, and 15; VMware vSphere 6.0, 6.5, 6.7, and 7.0.
Performance*	Up to 148 000 random read IOPS (8 KB blocks).

Configuration maximums**	• Maximum raw storage capacity: 2.2 PB
	• Maximum aggregate size: 400 TB
	• Maximum number of FlexVol volumes per controller: 1000
	• Maximum volume size: 100 TB (The maximum size will be increased up to 300TB in ONTAP 9.12.1P2 and later.)
	• Maximum number of LUNs per controller: 8192
	• Maximum number of LUNs per FlexVol volume: 512
	• Maximum LUN size: 16 TB (The maximum size will be increased up to 128TB in ONTAP 9.12.1P2 and later.)
	• Maximum number of drives in a RAID group (data + parity drives):
	  ◦ RAID 4: 14 (13 + 1 SAS SSDs)
	  ◦ RAID-DP: 28 (26 + 2 SAS SSDs)
	  ◦ RAID-TEC: 29 (26 + 3 SAS 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 (DM5000F and DM240S 2U24 SFF enclosures).
Power supply	Two redundant hot-swap 913 W (100 - 240 V) (DM5000F and DM240S 2U24 enclosures) Platinum AC power supplies.
Hot-swap parts	Controllers, I/O modules, drives, power supplies, and SFP+ 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; optional Lenovo XClarity.
Security features	Secure Socket Layer (SSL), Secure Shell (SSH), user level security, role-based access control (RBAC), LDAP authentication.
Warranty and support	1-year or 3-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.
Attribute	**Specification**

Dimensions	Controller enclosure: • Height: 85 mm (3.4 in.) • Width: 447 mm (17.6 in.) • Depth: 483 mm (19.0 in.) 2U24 SFF expansion • enclosure: Height: 85 mm (3.4 • in.) • Width: 449 mm (17.7 in.) Depth: 484 mm (19.1 in.)
Weight	• Controller enclosure (fully configured): 27.6 kg (60.8 lb) • 2U24 SFF expansion enclosure (fully configured): 24.4 kg (53.8 lb)

* 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 Support website: http://datacentersupport.lenovo.com