Lenovo ThinkSystem DM Series storage features and specifications

Product features, technical specifications

Data protocols, ports, and interfaces

The purpose of a storage system is to manage the flow of read/write requests from users to and from the disk drives. Those requests are communicated over multiple protocols:

- NFS
- CIFS
- iSCSI
- FC
- FCoE
- SAS

Each protocol might be sent over a mix of copper and optical cables. Each cable type must connect to a specific hardware port or interface on the storage controller.

Product features

The ThinkSystem DM Series hardware features are as follows:

- Dual controller HA systems
- Scale-up and scale-out architecture
- Multiprotocol I/O (MPIO) support
- High performance and low latency

The ThinkSystem DM Series software features are as follows:

- Unified block and file support
- Comprehensive data reduction
- Synchronous replication
- Application-awaresnapshots
- Centralized management GUI
- Software data encryption
- Industry-leading data protection
- Volume performance management
- Cloud tiering
- Storage virtualization
- Certified data compliance management

Specifications – controllers

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Items	DM3000H	DM5000H	DM5000F
Form factor	2U chassis with two HA controllers and 12 HDD slots	2U chassis with two HA controllers and 24 HDD slots	2U chassis with two HA controllers and 24 SSD slots
Performance	Up to 148 k IOPS <1 ms 8 KB random read		
Drive form factor	3.5-inch	2.5-inch	2.5-inch
Drive quantity configuration	12 HDD pack	• 12 SSD pack • 24 SSD or HDD pack	• 12 SSD pack • 24 SSD pack
Scale up: maximum drives	• Up to 144 LFF hot-swap drive bays (one 2U12 controller enclosure and up to 11 2U12 or up to two 4U60 LFF expansion enclosures) • A combination of 2U12 LFF and 4U60 LFF	• Up to 144 SFF hot-swap drive bays (one 2U24 controller enclosure and up to five 2U24 SFF expansion enclosures) • Up to 120 LFF and 24 SFF hot-swap drive bays (one 2U24	Up to 144 SFF hot-swap drive bays (One 2U24 controller enclosure and up to five 2U24 LFF expansion enclosures)

Specifications – controllers

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Scale up: maximum drives (internal + external)	• A combination of 2U12 LFF and 4U60 LFF enclosures is supported	SFF hot-swap drive bays (one 2U24 controller enclosure and up to two 4U60 LFF or up to 10 2U12 LFF expansion enclosures) • A combination of 2U24 SFF, 2U12 LFF, and 4U60 LFF enclosures is supported	
Scale-out: clustering	• Dual active-active controller configuration (HA pair) • Up to six HA pairs can be combined into a single SAN cluster • Up to 12 HA pairs can be combined into a single NAS cluster		
Onboard I/O: UTA2 (8 Gb FC/16 Gb FC/FCoE/10 GbE/1 GbE)	Eight Optional	Eight Standard	Eight Standard
Onboard I/O: 10GBASE-T (10 GbE, 1 GbE)	Eight Standard	Eight Optional	None
Onboard I/O: 12 Gb SAS (for			

Specifications – controllers

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Onboard I/O: 12 Gb SAS (for expansion enclosure)	Four		
Cluster Interconnect	Four 10 GbE		
CPU cores	12		
ECC memory	64 GB (32 GB per controller)		
NVMEM/NVRAM	8 GB		
ONTAP OS version	9.4 or later		
Differentiating factors	• 3.5-inch HDD only • Full enclosure only	• SSD and HDD • Flexible expansion	Low latency AFA
Protocols supported	FC, FCoE, iSCSI, NFS, pNFS, CIFS/SMB		
Host/Client OSs Supported	Microsoft Windows, Linux, VMware, ESX		
Expansion support	DM120S, DM600S	DM120S, DM240S, DM600S	DM240S
Target workloads	• Backup • File Services • ROBO	• VDI • Storage consolidation • Mixed workloads	• Databases • Virtualization • VDI

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Specifications – controllers

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Acronyms	Full name
IOPS	Input/Output Operations Per Second
ROBO	Remote office, branch office
VDI	Virtual Desktop Infrastructure

Specifications – controllers (DM7000 series)

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Items	DM7000H	DM7000F
Form factor	3U chassis with two HA controllers and no drive slots	
Performance	Up to 350 k IOPS <1 ms 8 KB random read	
Scale up: maximum drives	• Up to 480 LFF hot-swap drive bays (up to 40 2U12 or up to eight 4U60 LFF expansion enclosures) • Up to 480 SFF hot-swap drive bays (up to 20 2U24 LFF expansion enclosures) • A combination of 2U24 SFF, 2U12 LFF, and 4U60 LFF expansion enclosures is supported	• Up to 480 LFF hot-swap drive bays (up to 40 2U12 or up to eight 4U60 LFF expansion enclosures) • Up to 480 SFF hot-swap drive bays (up to 20 2U24 LFF expansion enclosures) • A combination of 2U24 SFF, 2U12 LFF, and 4U60 LFF expansion enclosures is supported
Scale-out: clustering	• Dual active-active controller configuration (HA pair) • Up to six HA pairs can be combined into a single SAN cluster • Up to 12 HA pairs can be combined into a single NAS cluster	
Onboard I/O: UTA2 (8 Gb FC/16 Gb FC/FCoE/10 GbE/1 GbE)	Eight	

Specifications – controllers (DM7000 series)

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Onboard I/O: 10 GbE	Four	
Onboard I/O: 10GBASE-T (10 GbE, 1 GbE)	Four	
Onboard I/O: 12 Gb SAS	Eight	
Cluster interconnect	Four 10 GbE	
CPU cores	32	
ECC memory	256 GB (128 GB per controller)	
Controller cache	4 TB (2 TB per controller) NVMe-based Flash Cache	None
NVMEM/NVRAM	16 GB (8 GB per controller)	
PCIe expansion slots	Four (two per controller)	
ONTAP OS version	9.4 or later	
Differentiating factors	Expandable I/O ultimate scalability	

Specifications – controllers (DM7000 series)

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ECC memory	256 GB (128 GB per controller)	
Controller cache	4 TB (2 TB per controller) NVMe-based Flash Cache	None
NVMEM/NVRAM	16 GB (8 GB per controller)	
PCIe expansion slots	Four (two per controller)	
ONTAP OS version	9.4 or later	
Differentiating factors	Expandable I/O ultimate scalability	
Protocols supported	FC, FCoE, iSCSI, NFS, pNFS, CIFS/SMB	
Host/Client OSs Supported	Microsoft Windows, Linux, VMware, ESX	
Expansion support	DM120S, DM240S, DM600S	DM240S
Target workloads	• Big data/Analytics • E-mail • Storage consolidation	• Mission critical databases • Hybrid cloud • Virtualization

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Specifications – expansion enclosures

Items	DM120S	DM240S	DM600S
Form factor	2U	2U	4U
I/O connectivity	12 Gb SAS		
Maximum drives	12	24	60
Drive quantity configuration	12 HDD pack	• 12 SSD pack • 24 SSD • 24 HDD pack	30 HDD pack
Drive form factor	3.5-inch 12 Gbps NL SAS hot-swap HDDs	• 2.5-inch 12 Gbps SAS hot-swap SSDs • 2.5-inch 12 Gbps SAS 10K RPM hot-swap HDDs	3.5-inch 12 Gbps NL SAS hot-swap HDDs

DM120S capacity configurable options

Capacity packs	Controller systems				
	DM7000F	DM7000H	DM5000F	DM5000H	DM3000H
48 TB HDD pack (Twelve 4 TB NL SAS)	N	Y	N	Y	Y
96 TB HDD pack (Twelve 8 TB NL SAS)	N	Y	N	Y	Y
120 TB HDD pack (Twelve 10 TB NL SAS)	N	Y	N	Y	Y

DM240S capacity configurable options

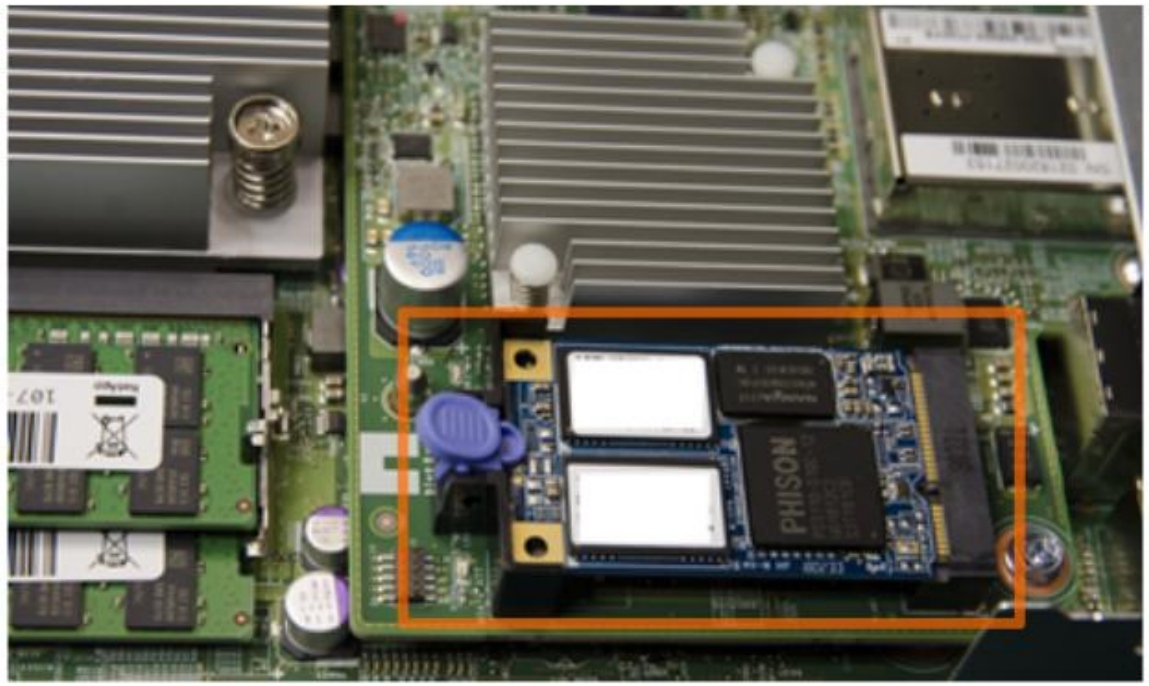
Capacity packs	Controller systems				
	DM7000F	DM7000H	DM5000F	DM5000H	DM3000H
12 TB SSD pack (Twelve 960 GB)	N	N	Y	Y	N
23 TB SSD pack (Twenty-four 960 GB)	Y	Y	Y	Y	N
46 TB SSD pack (Twelve 3.84 TB)	Y	Y	Y	Y	N
92 TB SSD pack (Twenty-four 3.84 TB)	Y	Y	Y	Y	N
184 TB SSD pack (Twenty-four 7.68 TB)	Y	Y	Y	Y	N
396 TB SSD pack (Twenty-four 15.36 TB)	Y	Y	Y	Y	N
22 TB HDD pack (Twenty-four 900 GB SAS)	N	N	N	Y	N
29 TB HDD pack (Twenty-four 1.2 TB SAS)	N	N	N	Y	N
43 TB HDD pack (Twenty-four 1.8 TB SAS)	N	N	N	Y	N

DM600S capacity configurable options

Capacity packs	Controller systems				
	DM7000F	DM7000H	DM5000F	DM5000H	DM3000H
120 TB HDD Pack (Thirty 4 TB NL SAS)	N	Y	N	Y	Y
240 TB HDD Pack (Thirty 8 TB NL SAS)	N	Y	N	Y	Y
300 TB HDD Pack (Thirty 10 TB NL SAS)	N	Y	N	Y	Y

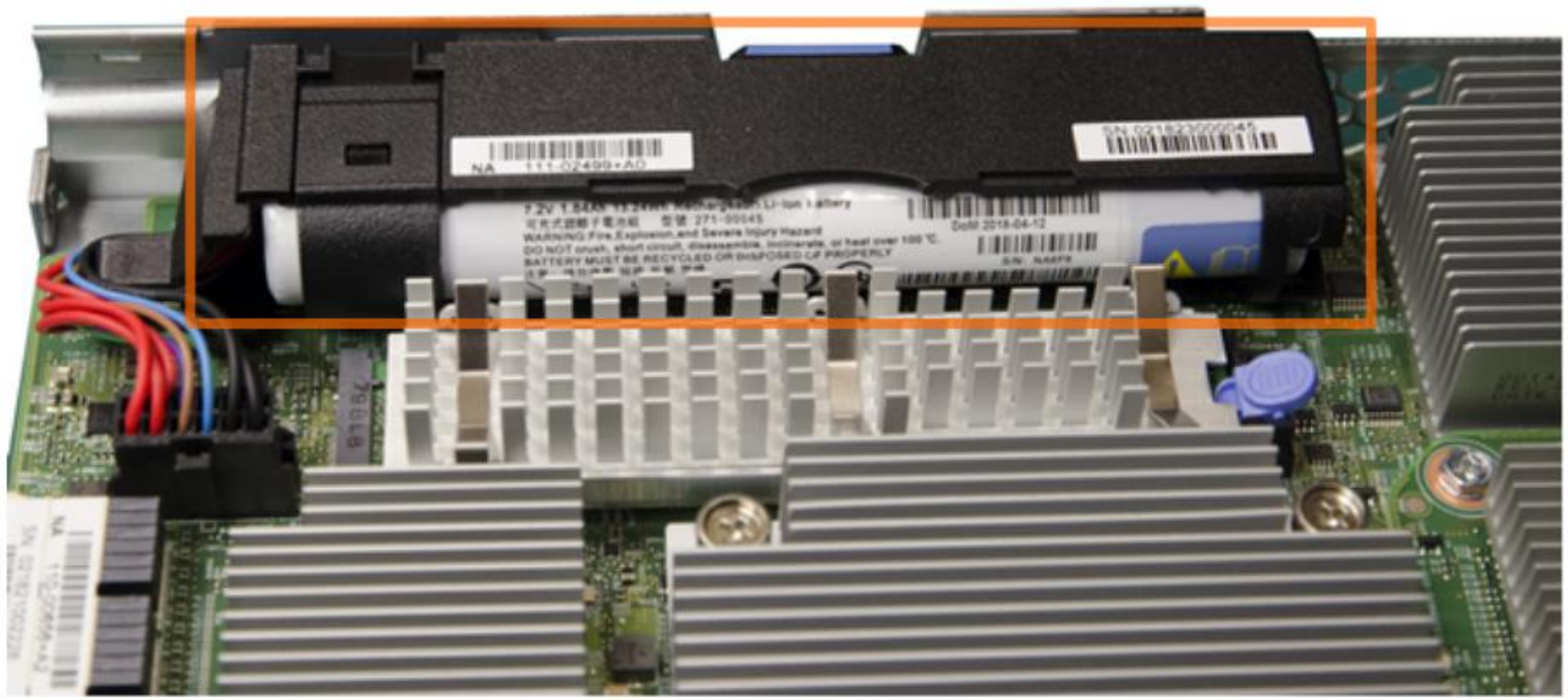
Flash boot media

- Each DM Series storage controller is equipped with an mSATA SSD boot media inside the controller.
- Storage controllers boot from the flash device regardless of whether a root volume is present and even if no disk shelves are attached.
- ONTAP will not load, so the system is unable to serve data, but the controller is operational.
- The Lenovo System Serial Number is written to the controller in the boot argument and read when the system starts up. It must be the same on both controllers.
    - This means that the boot drive also needs to be transferred on a controller replacement so that the serial number is maintained.



NVMEM

The DM Series controller module also has Non-Volatile Memory (NVMEM or NVRAM) connected to a battery to retain uncommitted write request data if there is a loss of power.



Service Processor

DM Series storage systems have an independent processor, called the Service Processor (SP), built into the controller module. The SP operates independently from ONTAP and does not share its resources. This allows it continue running even when critical conditions occur.

- Because the SP is independent, it primarily serves as a monitor of the system's health, which includes:
  - Keeping an NVRAM buffer log of up to 4,000 system events, FRU changes, and user transaction history
  - Decreasing delay before a takeover is initiated of a failed partner in an HA pair
  - Sending an AutoSupport email when ONTAP has crashed

The secondary function of the SP is to allow secure (SSH) remote access to the console for system management.

- It is powered by standby voltage, so it is accessible even when the storage controller is plugged in but not powered on.
- Storage admins can remotely restart or power the system off and on.
- It uses the admin account.

Scale up and scale out

- The DM Series offers scale-up and scale-out capabilities
- Scale up by adding an expansion enclosure to a storage controller to get more capacity and improve performance
- Scale out by intermixing your choice of flash and hybrid nodes
- Upgrade hardware or software or scale up without disrupting users
- Incorporate cloud and new flash technologies