Designed as reliable, powerful, scalable modular storage systems offering a unified storage architecture—with exceptional value—for data center and business applications

IBM System Storage N7000 Modular Disk Storage System

Highlights

- ***Reliable—Designed to address the needs of business- and mission-critical applications through high data availability and system-level redundancy features***
- ***Application Availability—N7000 systems with Data ONTAP® enable application-level recovery in minutes, not hours, upon failure or user error.***
- ***Versatile—Single, integrated architecture designed to support concurrent block I/O and file serving over Ethernet and Fibre Channel SAN infrastructures***
- ***Performance—Delivers high, consistent performance for the mission critical applications***
- ***Flexible—Fibre Channel and SATA disk-drive capabilities allow for deployment in multiple solution environments, including data retention, near-line storage, disk-to-disk backup scenarios and high-performance, mission-critical I/O intensive operations***

The challenge: Managing data for business advantage

In an increasingly demanding and competitive business landscape, effective data management is essential to the success of the enterprise. Data availability from any location gives employees, partners, and customers the up-to-the-minute information they need to work productively, make timely decisions, and meet business goals. Across industries, enterprises of all types and sizes face similar data storage challenges. They need intelligent data and storage management capabilities to manage growth with limited administration resources. They must consolidate storage and improve resource utilization for many applications across multiple server and storage platforms. When they deploy storage and data management systems to address their needs, they must reduce both acquisition and management costs.

The solution: IBM System Storage N7000 series

The IBM System Storage™ N7000 series offers additional choice to organizations facing the challenges of enterprise data management. The N7000 series is designed to deliver high-end enterprise storage and data management value with midrange affordability. Built-in enterprise serviceability and manageability features help support your efforts to increase reliability, simplify and unify storage infrastructure and maintenance, and deliver exceptional economy.

N7000 systems are easy to configure, manage, expand and upgrade. Add these general characteristics to the performance, capacity and remarkable versatility of the N7000 series, and you have an ideal platform for large-scale applications and storage consolidation.

Designed to support high availability, reliability and scalability with outstanding value

The N7000 can serve as the foundation for a comprehensive data management solution consisting of hardware, software and services. With an appliance architecture and built-in backup and recovery software, an N7000 solution is designed to address the entire spectrum of data availability challenges while offering value in price/performance and scalability.

N7000 systems combine a variety of features to meet the need for continuous availability. Complementing the high-availability hardware design is the proven reliability of the Data ONTAP operating system and RAID-DP™ (N series implementation of RAID 6), which uniquely provides double-level RAID data protection to help ensure data is not lost in the event of multiple disk drive failures. In addition, RAID-DP has negligible performance impact. The N7000 also supports simple yet powerful synchronous and asynchronous mirroring as well as disaster recovery options.

Ultimately what matters is application-level availability, and this is where N series systems excel. Snapshot™, a standard feature of Data ONTAP, makes it possible to instantly revert to a previous version of data upon failure or user error. N series Snapshot copies are unique in that they can be created frequently during production, because they use only a small amount of incremental storage and have virtually no impact on performance.

Performance. High performance and massive storage capacity are characteristics that make the N7000 systems ideal for large-scale applications and storage consolidation. An N7000 system completes jobs more quickly and handles more users via a powerful, high-bandwidth architecture with scalability to over 1,000 disk drives. With large cache memory configurations, expandable high-performance I/O, 4 Gbps FC SAN support, 4 Gbps disk drive support and support for 10 Gbps Ethernet, the N7000 delivers exceptional enterprise-class system performance. Also, N7000 storage systems provide a high degree of I/O expandability, with up to 32 Fibre Channel ports or 48 Gigabit Ethernet ports.

Agility. Storage provisioning can take hours on other storage systems but requires only seconds with N series systems. With policy-based space reservations, provisioning can be done automatically, without disruption to applications.

The unified storage architecture of a N7000 system eliminates the need to manage separate NAS and SAN storage because it provides concurrent support for both file and block

protocols and interfaces. With support for Fibre Channel and SATA hard drives, the N7000 product line also has the flexibility to be used for primary and secondary tiered storage.

Another feature of the Data ONTAP operating system, FlexClone® enables the instant creation of clones without requiring incremental storage. FlexClone can dramatically accelerate test and development cycles for IT projects.

The N7000 offers a unified storage architecture designed to help you address midrange to enterprise-class storage requirements and help you scale to support storage grids as enterprise requirements evolve.

Addressing TCO and ROI concerns through simplified, unified storage

An IBM System Storage N7000 system with its versatile and industry leading unified storage architecture is designed to provide integrated block- and file-level data access, allowing concurrent operation in IP SAN (iSCSI), FC SAN, NFS and CIFS environments. Other storage vendors may require the operation of multiple systems to provide this functionality. FlexVol® and FlexClone technologies are designed to offer flexibility in storage management and help you optimize the use of storage resources. These technologies accomplish this through use of a simplified, unified infrastructure that facilitates management and maintenance operations. N7000 systems are designed to avoid costly downtime, both planned and unplanned, and improve your access to mission-critical data, thereby helping you gain a competitive advantage.

N7000 near-line storage capabilities

The N7000 is well suited for near-line storage configurations. An N7000 system populated with Fibre Channel disk drives that backs up to another N7000 system populated with SATA disk drives offers disk-to-disk backup capabilities that are designed to help you fill the price/performance gap between fast but costly primary storage and less-costly but slow archival (tape and optical) storage. Utilizing SATA disk drive technology, you may achieve near-primary storage performance at near-tape storage costs. A disk-based, secondary storage device for enterprise applications, N7000 disk-to-disk environments are designed to complement and dramatically improve existing tape backup, archiving, and data protection schemes. They do so by inserting economical and simple-to-use disk-based storage between application storage and tape libraries in a three-tier storage architecture.

This arrangement is designed to provide economical storage and rapid disk-based access to reference data to

help address business and regulatory requirements. It can serve as a key component in an information lifecycle management process by storing less-critical data on a device whose cost and performance stand between primary and tape storage.

N7000 capabilities can support your efforts to enhance existing operations by acting as a large data cache or by replacing tape backup devices altogether. Combined with SnapVault®, the N7000 disk-to-disk backup environments are designed to serve as a robust and fully integrated appliance that makes backing up and restoring data rapid and reliable. In addition, with a low cost of acquisition and better performance than tape, the system offers an economical, high-capacity, remote storage device for multi-site replication.

Backing up directly to an N7000 system in a near-line storage configuration and then to tape can help your organization enhance data protection management, improve primary storage and tape library performance, and reduce backup resource requirements and costs. Two N series systems operating in a disk-to-disk backup scenario are designed to be faster and to consume less application-server CPU processing power than direct backup to tape. SnapVault software can be used to help reduce network bandwidth consumption by supporting incremental block transfers to backup data across a LAN or WAN. SnapMirror® software, which replicates data at high speeds over a LAN or a WAN, is designed to provide high data availability and fast recovery for mission-critical applications.

IBM N series systems using NearStore® software can leverage the Advanced Single Instance Storage (A-SIS) software feature for better storage utilization. A-SIS software enables N series systems to deduplicate stored data at the block level in order to conserve physical disk space when making disk to disk copies of primary data. Traditionally when copies of volumes are created, every duplicate data string is also copied, resulting in an inefficient use for secondary storage. A-SIS deduplication helps remove this inefficiency.

N7000 data retention capabilities

The N7000 offers multiple capabilities in the area of data retention. It can serve as a high performance device used to store mission-critical production data or as a single purpose device utilizing SATA disk drive technology running SnapLock® software. The N7000 with SnapLock software is designed to deliver high-performance and high-security data permanence to disk-based near-line and primary N series storage. An optional feature of the proven Data ONTAP operating system, SnapLock software supports the accuracy, integrity and security of data. It helps prevent the alteration of business records and allows data to be rapidly accessible online for long periods of time.

SnapLock is available in two versions:

- *SnapLock Compliance: Designed to help organizations address strict records-retention regulations such as SEC Rule 17a-4 (broker-dealers), HIPAA (healthcare), Sarbanes-Oxley (public companies), 21CFR Part 11 (life sciences), and DOD 5015.2 (government).*
- *SnapLock Enterprise: Designed to help organizations adhere to rigorous organizational best practices through functionality similar to that of SnapLock Compliance but provides administrators with the ability to delete entire SnapLock Enterprise volumes. This can help avoid a SnapLock Enterprise user or administrator deleting or modifying individual SnapLock Enterprise WORM records or undermining SnapLock Compliance WORM volumes.*

Support for data retention through WORM and security capabilities

SnapLock offers capabilities to help you address regulatory and best-practices records retention requirements by supporting the creation of non-rewritable, non-erasable WORM volumes on IBM N series systems. This functionality is designed to prevent critical files from being altered or deleted until a specified retention date.

SnapLock is also designed to replicate WORM data securely and automatically between multiple N7000 systems using SnapMirror software. The WORM-to-WORM replication of data at remote sites can help your organization address regulatory concerns or best practices, resulting in a highly robust WORM data protection solution. WORM data can also be backed up to tape for an additional level of data protection.

To help you address the security and confidentiality of data, the N7000 system as well as other N series systems support an advanced set of security features, including authentication (Kerberos, Active Directory, NTLM, NIS, LDAP), access controls (CIFS ACLs, NFS Permissions), server- or network-based access restrictions, transmission encryption (SecureAdmin™ software option) and audit logs (CIFS logging).

IBM System Storage N7000 series at a glance

Operating system	Data ONTAP 7.2.1 or later
Standard software features	Integrated automatic RAID manager, Snapshot, Fast Boot, telnet, e-mail alerts, NIS, DNS, SNMP, FilerView®, NDMP, SecureAdmin, FlexVol, AutoSupport, FlexShare™, SSH
Network protocol support	NFS V2/V3/V4 over UDP or TCP, PCNFSD V1/V2 for (PC) NFS client authentication, Microsoft® CIFS, VLD, FTP, HTTP 1.0, HTTP 1.1 Virtual Hosts
SAN protocol support	iSCSI; Fibre Channel Protocol (FCP) fabric-attached and direct-attached configurations
Optional licensed functions	NFS, CIFS, HTTP, Fibre Channel Protocol (FCP), iSCSI Protocol, FlexClone, MultiStore®, Clustered Failover (CFO), SnapMirror, SnapRestore®, SnapVault, LockVault™ Compliance, LockVault Enterprise, SnapLock Compliance, SnapLock Enterprise, SyncMirror, SnapValidator®, SnapDrive® for Windows®, SnapDrive for UNIX®, SnapDrive for AIX®, SnapDrive for HPUX, SnapDrive for Linux®, AIX multipathing, Single Mailbox Recovery for Exchange, SnapManager® for Exchange, SnapManager for SQL Server, SnapManager for Oracle, SnapManager for SAP, MetroCluster, Operations Manager, Disk Sanitization, NearStore, Advanced Single Instance Storage (A-SIS), Protection Manager™
Hardware features	Full-duplex 10/100/1000Base-T Ethernet onboard console, diagnostic LED/LCD, Remote Management Card standard, redundant hot-plug cooling fans, redundant hot-plug power supplies, Compact Flash, 19" rack-mount enclosure, optional 220 V 42U 19" system cabinet
Default/min./max. RAID group sizes	RAID4 (single parity) and RAID-DP (double parity) RAID4 support on FC disks are: Default 7 data + 1 parity/Min. 1 data + 1 parity/Max. 13 data + 1 parity; RAID4 support on SATA disks are: Default and Max. 7 data + 1 parity/Min. 1 data + 1 parity; RAID-DP support on FC disks is: Default 14 data + 2 parity/Min. 1 data + 2 parity/Max. 26 data + 2 parity; RAID-DP support SATA disks are: Default 12 data + 2 parity/Min. 1 data + 2 parity/Max. 14 data + 2 parity

IBM System Storage N7000 series at a glance

Disk storage expansion units supported	EXN4000—4 Gbps Fibre Channel Disk Storage Expansion Unit EXN1000—Serial Advanced Technology Attachment (SATA) Disk Storage Expansion Unit Legacy support for Expansion Unit EXN2000—Fibre Channel (FC) Disk Storage Expansion Unit
Disk drive capacities supported	EXN4000—4 Gbps 15 K RPM FC disk drives (144 GB, 300 GB); 2 Gbps 10 K RPM 2 Gbps FC disk drives (144 GB, 300 GB), EXN1000—7200 RPM SATA 3 Gbps disk drives (250 GB, 500 GB, 750 GB) Legacy support for disk drives EXN2000—10 K RPM 2 Gbps FC disk drives (144 GB, 300 GB), 15 K RPM 2 Gbps FC disk drives (144 GB)

Specifications

	N7600	N7600	N7800	N7800
IBM machine types – models	2866-A10	2866-A20	2867-A10	2867-A20
Storage configuration	Single storage controller	Dual (active/active) storage controllers	Single storage controller	Dual (active/active) storage controllers
Processors				
Processor Types	2.6 GHz AMD Opteron	2.6 GHz AMD Opteron	2.6 GHz AMD Opteron	2.6 GHz AMD Opteron
Number of Processors	2	4	4	8
Max. raw capacity[a]	420 TB	420 TB	504 TB	504 TB
Max. number of disk drives	672	840	672	1008
Max. number of storage enclosures	48	60	48	72
Volumes (min./max.)	2/200	2/200	2/200	2/200
Max. volume size[a]	16 TB	16 TB	16 TB	16 TB
Memory				
Random Access memory	16 GB	32 GB	32 GB	64 GB
Nonvolatile memory	512 MB	1 GB	2 GB	4 GB
Integrated I/O				
Onboard 2 Gb Fibre Channel ports (fibre)	8	16	8	16
Onboard GbE ports (copper)	6	12	6	12

I/O expandability

	N7600-A10 Single storage controller	N7600-A20 Dual storage controller active/active configuration	N7800-A10 Single storage controller	N7800-A20 Dual storage controller active/active configuration
PCI Express Expansion Slots	5	10	5	10
PCI-X Expansion Slots	3	6	3	6
Maximum number of optional adapters	Not to exceed 8	Not to exceed 16	Not to exceed 8	Not to exceed 16
Quad-port GbE TOE (copper) adapter	3	4	2	4
Single 10 GbE TOE (fibre) adapter	2	4	2	4
Dual-port 10 Gbps NIC Fibre	3	6	3	6
Dual GbE (copper or fibre) adapter	5	10	5	10
Dual iSCSI (copper or fibre) host adapter	3	6	3	6
Dual 4 Gbps FC Target adapters	4	8	4	8
Single dual-channel SCSI LVD for tape	3	6	3	6
Dual-port SCSI Ultra320 Card	3	6	3	6
Dual 4 Gbps FC HBA for disk	4	8	4	8
Dual 4 Gbps FC HBA for tape	3	6	3	6
Quad-port 4 Gbps FC HBA for Disk	3	6	3	6
Dual-port FC HBA for SnapMirror over Fibre Channel	3	6	3	6
Dual-port MetroCluster VI FC HBA		2		2

Environmental specifications

	Dual storage controller Active/active configuration (2866-A20 and 2867-A20)	Single storage controller (2866-A10 and 2867-A10)
AC Power/Current (line voltage for standalone systems dependent on local power distribution; system cabinets are 200 to 240 V only)	100 to 240VAC, 22 to 10A (typical) 24A (max.) @ 100VAC 200 to 240VAC, 11 to 5A (typical) 12A (max.) @ 200VAC	100 to 240VAC, 11 to 5A (typical) 12A (max.) @ 100VAC 200 to 240VAC, 5.5A to 2.8A (typical) 6A (max.) @ 200VAC
Thermal rating	6142 BTU/hr.	3071 BTU/hr.
Weight (max.)	242 lb (109.6 kg)	121 lb (54.8 kg)
Height	20.8" (52.8 cm), fits into 12U space	10.3" (26.2 cm), fits into 6U space
Width	19" IEC rack-compliant (17", 44.53 cm)	
Depth	23.5" (59.7 cm), 29.05" (73.8 cm) with cable management bracket	
Operating temperature, altitude, and relative humidity	10°C to 40°C (50°F to 104°F); at </= 3,000THSPACEm (at </= 10,000') elevation; 20% to 80% relative humidity, non-condensing (28° C wet bulb temperature)	
Non-operating temperature and relative humidity	-40° C to 65° C (-40° F to 149° F); 10% to 95% relative humidity, non-condensing, in original container	
Operating acoustic noise	56.5 dBA sound pressure (LpA) @ normal operating conditions (at 22°C and at sea level)	
Min. cabinet clearances	1.85" (4.7 cm) for bezel, 3" (7.6 cm) for cable radius	
Min. service clearances	25" (63.5 cm) from front of cabinet; 40" (76 cm) from rear of cabinet	
Maximum altitude	3050 m (10,000 ft.)	

Storage Expansion Unit specifications

Disk storage expansion units	EXN4000—4 Gbps Fibre Channel Disk Storage Expansion Unit EXN1000 SATA disk storage expansion unit (MTM 2861-001) Each with 14 low-profile slots for fibre channel and SATA disk drives Legacy Support for Expansion Unit EXN2000 FC disk storage expansion unit (MTM 2863-001)
Disk drive storage shelf interface	PCI-x or PCI-e-based Fibre Channel-Arbitrated Loop (FC-AL)
Disk shelf interface	Electronically switched hub (ESH2) modules
Power supply/cooling fans	Dual, redundant, hot-pluggable, integrated power supply/fan assemblies (220V/110V)
AC power/max. current	100 to 120 VAC/4.4A; 200 to 240 VAC/2.3A 100 to 120 VAC/7A; 200-240 VAC/3.5A; 50/60 Hz
Operating temperature maximum range	10°C to 40°C (50°F to 104°F)
Recommended operating temperature range	20°C to 25°C (68°F to 77°F)
Operating relative humidity range	10% to 95% relative humidity, non-condensing 10% to 95%
Recommended operating relative humidity range	40% to 55% non-condensing
Non-operating temperature range	-40°C to 65°C (-40°F to 149°F)
Non-operating relative humidity range	10% to 95% relative humidity, non-condensing
Thermal rating	1,215 Btu/hr (fully loaded disk storage expansion unit)
Operating acoustic noise	56.4 dBA @ 1m at 23°C, 5.64 bels @ 23°C
Dimensions (height/width/depth)	3U EIA (5.25", 13.3 cm)/19" IEC rack-compliant (17.6", 44.7 cm)/20" (50.85 cm)
Weight	EXN4000 – 35 kg (77 lbs) fully loaded with disk drives, 23 kg (50.6 lbs) empty EXN1000 – 35.8 kg (78.8 lbs) fully loaded with disk drives, 23 kg (50.6 lbs) empty EXN2000 – 35 kg (77 lbs) fully loaded with disk drives, 23 kg (50.6 lbs) empty

Regulations

Filer safety	EN 60950:2002, CE, CSA 60950 and NRTL (UL) CB (all national deviations), EN60825-1:1994, IRAM, GOST-R
Disk shelf safety	UL/C-UL; CE
Emissions	FCC Class A, EN 55022:1998, EN 61000-3-2, EN 61000-3-3, CE, BSMI, AS/NZ 3548, VCCI
Immunity	EN 55024:1998

N7000 series tape drive support (refer to interoperability matrix on external website)

N7000 Gateway supported backup methods

Disk-based backup	SnapVault, SnapMirror
Host-based backup	NDMP/NFS/CIFS/iSCSI
GbE-attached tape support	**ibm.com**/storage/nas, refer to System Storage N series interoperability matrix
Direct-attached tape support	**ibm.com**/storage/nas, refer to System Storage N series interoperability matrix
SAN-attached tape support	**ibm.com**/storage/nas, refer to System Storage N series interoperability matrix
iSCSI initiator, IP fabric and host-attached support	**ibm.com**/storage/nas, refer to System Storage N series interoperability matrix

For more information

Contact your IBM representative or IBM Business Partner or visit:

ibm.com/storage/nas/

IBM Systems and Technology Group
Route 100
Somers, NY 10589
U.S.A.

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MB, GB and TB equal 1,000,000, 1,000,000,000 and 1,000,000,000,000 bytes, respectively, where referring to storage capacity. Actual storage capacity will vary based upon many factors and may be less than stated. Some numbers given for storage capacities give capacity in native mode followed by capacity using data compression technology.

[a] Max. capacity is derived based on the type, size, and number of the drives. Max. capacity and volume size are calculated using Base10 arithmetic (i.e., 1 TB = 1,000,000,000,000 bytes).

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