



Highlights

- Enable exceptional, scalable performance with the latest hardware advancements and innovative software
 - Provide extraordinary system availability with full hardware redundancy built on the market-proven IBM Power Systems™ architecture
 - Dynamically optimize performance for single- and multi-tiered systems with IBM System Storage® Easy Tier® and other self-tuning features
 - Allow systems to scale to more than 2.3 petabytes and support different drive tiers
 - Address the broad scope of storage workloads that exist in today's complex data center
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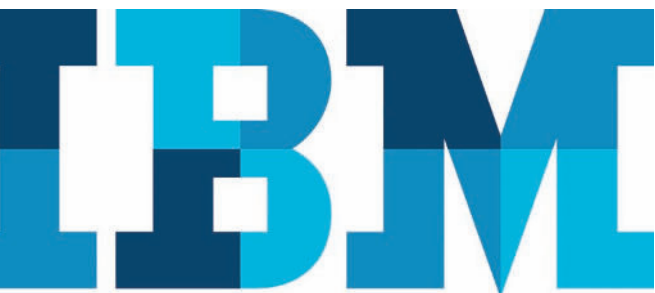
IBM System Storage DS8000 series

High performance and superior reliability for the most demanding storage environments

Virtually every organization in the private and public sector struggles to manage the exponential growth of stored data and the increasing complexity of their IT environments. Managing this extraordinary growth is complicated by the variety of server environments spread across data centers, and for most clients, each server environment can have a distinct storage environment that must be managed separately. As the number of servers grows, managing these disparate storage systems can significantly increase storage costs.

Through its extraordinary flexibility, the IBM System Storage DS8000® series is designed to effectively and efficiently manage a broad scope of storage workloads that exist in today's complex data centers. This flagship IBM disk system can bring simplicity to your storage environment by supporting a mix of random and sequential I/O workloads, and interactive and batch applications, regardless of whether they are running on one of today's popular distributed server platforms or on the mainframe. With the ability to manage all these workloads simultaneously, this dynamically self-tuning system can greatly reduce the challenge of managing your increasingly complex storage environment as requirements change.

The DS8000 series delivers these capabilities with a range of features that provide self-tuning performance through automated storage tiering, automated quality-of-service (QoS) management, as well as broad server support and outstanding scalability. The I/O Priority Manager feature, for example, can dynamically manage the performance of the various applications running on the system through a very easy and intuitive approach. This is especially helpful when you want to consolidate storage



workloads and need to ensure that system resources are aligned to the priority of your applications. These advanced features can help your business manage more data for more applications in a smaller footprint, without the constant oversight and manual performance tuning that other high-end storage vendors require.

Reduce cost and complexity

The DS8000 series offers tremendous scalability and flexibility. The physical capacity of the DS8000 series can range from less than 5 terabytes (TB) to more than 2 petabytes on a single system that can support a combination of traditional spinning drives of varying rotational speeds and ultra-fast solid state drives (SSDs).

While the performance attributes of SSDs have made them increasingly attractive to support performance-hungry applications, SSDs still remain considerably more expensive than traditional spinning disks. Many organizations have successfully combined these expensive drives with lower-cost spinning drives to create a multi-tier system that can address the performance needs of the variety of applications running on the system.

Easy Tier is the most advanced and easiest-to-use tiering solution available today, and provides automated performance tuning for both single- and multi-tier systems. As one of the primary DS8000 series optimization features, Easy Tier is designed to dynamically move data around the system to help keep performance tuned, while optimizing capacity across the various drive tiers. Easy Tier also rebalances data within a single tier to help maintain optimal performance for clients who have not yet deployed SSDs or nearline drives. With this capability, Easy Tier enables more efficient use of all drive tiers within the system, so clients can rest assured that they are getting the most value from their disk system.



Easy Tier also automatically rebalances performance when storage capacity is added or removed. Easy Tier recognizes when new capacity has been added and automatically redistributes existing data to take advantage of this new capacity. Data rebalancing can also be done when data is deleted or “depopulated” from the system. As a result, Easy Tier helps keep performance optimized by rebalancing data across all tiers whenever the amount of storage capacity in the system changes, and it does it automatically without disrupting access to data.

Easy Tier can also dynamically move entire volumes across tiers or to another RAID group within a tier. In addition, administrators can change a volume’s RAID type, from RAID-5 to RAID-6 for example, as well as change the way data is striped within the system. A volume that was configured to stripe data

across a single RAID array can be changed to stripe data across multiple arrays to further avoid hotspots. Easy Tier dynamic volume relocation also does this without disrupting your applications.

The DS8000 Storage Tier Advisor Tool can help you easily determine which volumes are likely candidates for Easy Tier optimization by analyzing the performance of your current application workloads. Even if you have not activated the Easy Tier feature on the system, you can use the advisor tool to help identify which volumes in the system can benefit from additional SSD capacity, as well as other drive classes. This capability can also help prevent unnecessary and costly over-provisioning of capacity.

Also, to help increase data security for customers with single- or multi-tier systems, and to help them still achieve high system performance, Easy Tier has enhanced its support of full disk encryption (FDE) drives. Easy Tier can perform volume migration, auto performance rebalancing in both homogenous and hybrid pools, hot spot management, rank depopulation and thin provisioning on both encrypted and non-encrypted systems.

These advanced capabilities can help you simplify your burgeoning storage environment and reduce overall costs, while helping to ensure that your applications are getting the performance and high availability they require.

Assure world-class performance

The DS8000 series is built on innovative and market-proven IBM POWER® microprocessors in dual two-way or dual four-way shared symmetric multiprocessor (SMP) complexes. With dual IBM POWER6+™ controllers, 8 gigabits per second (Gbps) host and device adapters, and 6 Gbps serial-attached SCSI (SAS) disk drives, the DS8800 model delivers breakthrough performance in a design that condenses a tremendous amount of data into a small footprint.

The POWER6+ controllers are complemented by two additional tiers of high-performance processors within the system's host and device adapters. These three processor tiers work together to deliver the DS8000 series' extraordinary, balanced performance.

Also, the new DS8800 400 gigabyte (GB) SSDs provide additional price, performance and capacity flexibility to help address business requirements for performance-intensive applications and business requirements. The new drives provide 33 percent more raw capacity than the existing 300 GB SSDs, increasing the total capacity of high-performance drives supported in a DS8800 system.

The efficiency of a storage system's cache can greatly improve I/O performance, as well as reduce the system's overall cache requirements. The caching algorithms in the DS8000 series are designed to intelligently and dynamically adapt system caching to the specific needs of the current workload. This is intended to help the system deliver an unimpeded flow of information for outstanding throughput. One example is the Intelligent Write Caching algorithm that combines and balances the benefits of existing read/write caching algorithms to determine how the write cache should be managed for optimal throughput. Another example is the Adaptive Multi-stream Prefetching algorithm that is designed to dramatically improve performance for sequential and batch processing applications, such as data backup, business analytics and data warehouse workloads.

In addition to the exceptional value it provides for all server environments, the DS8000 series offers special value for select IBM server environments. The Cooperative Caching and I/O Priority functions can help enable greater cache efficiency and performance for higher priority IBM DB2® applications running on IBM Power Systems with the IBM AIX® operating system. The DS8000 series integration with IBM Open HyperSwap® can provide an outstanding high-availability

solution for AIX environments. The DS8000 series also excels in optimizing storage for IBM System z® environments with a variety of unique performance, availability and scalability features that can help you maximize the potential of your mainframes. System z optimization functions include I/O Priority Manager to support System z volumes and innovative capabilities to support IBM High Performance FICON® for System z, HyperSwap and IBM Geographically Dispersed Parallel Sysplex (GDPS®), as well as Extended Address Volumes support for up to 1 TB volumes. With its superior System z support, it's no wonder the DS8000 series is far and away the market share leader for business-critical mainframe environments.

Despite their distinct hardware components, both the DS8800 and DS8700 models ship with a common microcode built on more than ten years of market-proven reliability. This microcode, common across multiple DS8000 generations, enables clients to enjoy the interoperability of remote mirror and copy functions across older DS8300, DS8100 and IBM TotalStorage Enterprise Storage Server® models. You want long-term value—and that is what the DS8000 series delivers.

Experience exceptional flexibility and scalability

The DS8000 series is known for its unique combination of flexibility, resiliency, performance and scalability, which can help address the many challenges stemming from the exponential growth of data across the enterprise. Savvy businesses are looking for innovative ways to manage and adapt in today's increasingly competitive, global business environment. The DS8000 series is designed to manage a broad scope of storage workloads that exist in today's complex data center—and do it effectively and efficiently.

To help simplify management and accommodate real-time workload fluctuations, administrators can easily add, delete and dynamically expand storage capacity to address sudden spikes in demand or to react to other environmental changes. Dynamic Volume Expansion and Thin Provisioning are two features that can significantly reduce the time administrators spend provisioning new storage while keeping applications online, which is a key requirement for mission-critical applications.

If your organization needs the flexibility to run a mixture of performance-optimized workloads alongside those that might require less performance, yet still provide the reliability that a high-end disk system affords, the DS8000 series can help with that, too. With the capability to adeptly balance workloads across different tiers of drives (for example, SSDs and spinning drives of different rotational speeds), you have the flexibility to consolidate a variety of disk platforms on a single DS8000 system, and the Easy Tier feature makes workload optimization even easier. Another example of DS8000 series flexibility and modularity is the ability to add expansion frames and increase physical storage capacity within a frame without disrupting your applications.

The DS8000 series also supports a variety of major server platforms, including IBM z/OS®, IBM z/VM®, Linux on System z, IBM i, IBM OS/400®, IBM i5/OS® and AIX operating systems, as well as Linux, HP-UX, Oracle Solaris, Novell NetWare, VMware and Microsoft Windows environments, among many others. With such broad platform support, the DS8000 series can easily accommodate a wide array of applications and their distinct service levels.

Make business continuity a reality

The DS8000 series is designed to help address the needs of dynamic enterprise environments requiring the highest levels of availability. It is designed to support dynamic system changes, such as online system microcode updates and online hardware upgrades. This flagship, high-end system also features redundant, hot-swappable components to help support continuous operations and is designed for greater-than-five-nines availability,¹ which makes the DS8000 series an ideal storage platform for supporting today's around-the-clock global business environment.

All disks are RAID-protected, such that multiple spare disks are configured in a RAID group to allow a failed disk to be rebuilt quickly and automatically to maintain access to information. The DS8000 series supports RAID-5, RAID-6 and RAID-10 configurations for added flexibility. In addition, each DS8000 system is built to monitor its own internal functions, so it can “call home” automatically to alert service personnel if it detects a potential problem arising. Sophisticated Light Path Diagnostics facilitate system maintenance. The DS8000 series also offers an audit log security function designed to log changes made by administrators to aid in root cause analysis.

In addition to its exceptionally resilient architecture, the DS8000 series offers an array of advanced functions for data backup, remote mirroring and disaster recovery. The IBM FlashCopy® feature addresses a key requirement for continuous data availability by quickly and efficiently creating asynchronous point-in-time copies without impeding the related application server. That is, when a copy of data is requested, both the source data and its copy are available for use almost immediately. These copies can be used for backup, application or quality-assurance testing or other purposes. The optional IBM Tivoli® Storage FlashCopy Manager can help deliver the highest levels of data protection for mission-critical DB2, SAP, Oracle, Microsoft Exchange and Microsoft SQL

Server applications via integrated application-aware, point-in-time backup and restore capabilities. This is achieved through the exploitation of the DS8000 series' advanced FlashCopy technology to create a high-performance application data protection solution.

The DS8000 series also includes advanced two-site and three-site business continuity capabilities to give you the peace of mind of knowing your business-critical applications will be available when you need them during both planned and unplanned system outages. IBM Metro Mirror is designed to provide a no-data-loss remote mirroring environment for metropolitan distances up to 300 kilometers. IBM Global Mirror is designed to minimize data loss at the recovery site to as low as five seconds or less, relative to the production site at virtually any distance. IBM Metro/Global Mirror combines these two capabilities to support a three-site configuration designed for no data loss, regardless of distance. With this type of resiliency and high availability, it's no wonder the DS8000 is considered superior to other high-end disk systems when it comes to business continuity—and this is why clients insist on the DS8000 to support their most important business applications.

Simplify systems management

The DS8000 series includes powerful management capabilities that can help IT administrators more effectively control their storage environments as capacity grows. An updated graphical user interface (GUI) enables easier, more effective management of the system and its advanced features. Inspired by the acclaimed IBM XIV® Storage System GUI, the updated DS8000 GUI includes redesigned navigation for more intuitive use, streamlined configuration processes and embedded links to relevant videos for quick access to useful DS8000 series information. In addition, it provides dynamic and customizable views, as well as interactive menus, tabs, charts and more.

IBM Tivoli Storage Productivity Center complements the GUI by providing advanced capabilities to manage the entire storage environment by supporting a variety of IBM and non-IBM storage systems and devices. This powerful and flexible solution is designed to more effectively manage the growing number of storage devices and their respective element managers across the IT infrastructure.

Clients have the option of deploying the comprehensive Tivoli Storage Productivity Center Standard Edition or IBM System Storage Productivity Center appliance, which includes Tivoli Storage Productivity Center Basic Edition software. Both versions provide single sign-on capability for the various devices they manage and the rich, user-friendly GUI provides a comprehensive view of the storage topology that enables administrators to inspect the real-time health of the environment at an aggregate or in-depth view. For advanced management, Tivoli Storage Productivity Center Standard Edition is also preinstalled on the System Storage Productivity Center appliance. This version can be licensed for more in-depth performance analysis, asset and capacity reporting and automation of the DS8000 series, as well as other resources, such as server file systems, tape drives and libraries. Tivoli Storage Productivity Center can automatically discover DS8000 systems to help simplify their initial configuration. In addition, Tivoli Storage Productivity Center supports a native interface connection to the DS8000 series, delivering improved management, performance and reliability. Both Basic and Standard Editions support a variety of IBM and non-IBM storage systems, devices and server platforms.

IBM Tivoli Storage Productivity Center for Replication helps manage the various DS8000 series advanced copy and mirroring functions. Tivoli Storage Productivity Center for Replication enables support for Open HyperSwap for select distributed server platforms and delivers the ability to swap DS8000 volumes in seconds (in both planned and unplanned scenarios) with no operator interaction and minimal disruption to applications. Tivoli Productivity Center for Replication and Tivoli Storage Productivity Center Standard Edition are

integrated to provide a single control point for simplifying the management of the DS8000 replication and configuration functions.

Adding to its management flexibility, the DS8000 series also supports a command-line interface and a Storage Management Initiative Specification conformant application programming interface. Furthermore, dynamic volume creation, volume deletion and LUN masking for RAID-5, RAID-6 and RAID-10 configuration capabilities can be performed by storage administrators themselves without requiring special assistance from IBM. These logical configuration changes can be made dynamically while the system remains online, a real benefit when supporting business-critical applications.

Increase security and data protection

The unrelenting tide of data breaches over the last several years has fueled an increasing interest in IBM self-encrypting storage, which automatically secures all information on a tape cartridge or disk drive when physically removed from a storage system. By having the entire system encrypted, you can rest assured that should a drive get lost, stolen or repurposed, the information cannot be read by unauthorized parties—anywhere. This self-encrypting storage solution also helps provide a simpler and more cost effective approach to cleansing sensitive data from storage systems that are being retired or repurposed through a cryptographic erasure.

The popularity of multi-tiered systems leads to a requirement for this type of data-at-rest security for all drive types, so Easy Tier clients can enjoy the same level of security. To that end, the DS8800 model introduces new self-encrypting drive options for 400 GB SSD drives and 3 TB 7,200 rpm nearline SAS drives, along with key management services supported by IBM Tivoli Key Lifecycle Manager software.

The DS8000 series is also designed to comply with the US Government standards profile for Internet Protocol. The advanced security capabilities of the DS8000 series make it the ideal choice to help keep your sensitive data secure.

IBM System Storage DS8000 series at a glance		
Models	DS8700 (941, 94E)	DS8800 (951, 95E)
Shared SMP processor configuration	IBM POWER6® dual 2-way or 4-way	POWER6+ dual 2-way or 4-way
Other major processors	IBM PowerPC®, application-specific integrated circuits (ASICs)	PowerPC, ASICs
Processor memory for cache and non-volatile storage (minimum/maximum)	32 GB/384 GB	6 GB/384 GB
Host adapter interfaces	4-port 4 Gbps and 4-port 8 Gbps Fibre Channel/FICON	4- and 8-port 8 Gbps Fibre Channel/FICON
Host adapters (minimum/maximum)	2/32	2/16
Host ports (minimum/maximum)	8/128	8/128
Drive interface	4 Gbps point-to-point switched Fibre Channel connection	6 Gbps point-to-point switched SAS-2 connection to an 8 Gbps Fibre Channel backbone
Number of disk drives (minimum/maximum)	8/1024	8/1536 (small form factor) 8/768 (large form factor)
Device adapters	Up to 16 4-port, 2 Gbps Fibre Channel	Up to 16 4-port, 8 Gbps Fibre Channel
Maximum physical storage capacity*	2048 TB	2304 TB
Disk sizes**	600 GB SSDs 300 GB (15,000 rpm) 450 GB (15,000 rpm) 600 GB (15,000 rpm) 2 TB (7,200 rpm)	300 GB SSDs 400 GB SSDs 146 GB (15,000 rpm) 300 GB (15,000 rpm) 450 GB (10,000 rpm) 600 GB (10,000 rpm) 900 GB (10,000 rpm) 3 TB (7,200 rpm and 3.5 in. form factor)
RAID levels	5, 6, 10	5, 6, 10
Dimensions (height x width x depth)	193 × 84.7 × 118.3 cm per frame, up to 5 frames total	193.4 × 84.8 × 122.7 cm per frame, up to 4 frames total
Maximum weight	1307 kg (2880 lb) base rack Add per expansion frame: 1089 kg (2400 lb)	1324 kg (2920 lb) base rack Add per expansion frame: 1307 kg (2880 lb)
Dry bulb temperature	16° - 32°C (60° - 90°F)	16° - 32°C (60° - 90°F)
Relative humidity	20% - 80%	20% - 80%
Power supply	Single-phase some configurations or three-phase 50/60 Hz	Single-phase some configurations or three-phase 50/60 Hz
Caloric value British thermal units/hr (maximum)	26,600 (941 rack) 22,200 (94E rack)	25,000 (951 rack) 24,600 (95E rack)
Electrical power kva (maximum)	7.8 (941 rack) 6.5 (94E rack)	7.3 (951 rack) 7.2 (95E rack)
Warranty	All models: Customer Replaceable Unit (CRU) and on-site service, same day, 24×7 4 years on type 2424 models 3 years on type 2423 models 2 years on type 2422 models 1 year on type 2421 models	All models: CRU and on-site service, same day, 24×7 4 years on type 2424 models 3 years on type 2423 models 2 years on type 2422 models 1 year on type 2421 models
Supported systems	For more details on supported servers, visit: ibm.com/systems/storage/disk	For more details on supported servers, visit: ibm.com/systems/storage/disk

Why IBM?

Whatever the requirements, IBM can help with a complete information infrastructure solution that includes storage hardware, application servers, software, services, support and equipment financing. The DS8000 series can also lower the total cost of ownership through the Enterprise Choice warranty, which allows customers to select one-, two-, three- and four-year warranty options that cover not only the hardware, but also all the advanced DS8000 series software features. Most vendors end software support at 90 days, which can add costs over the life of the system as updates are needed.

With more than 50 years of proven experience, IBM is a trusted leader in helping organizations optimize the value of their electronic data. IBM offers a vast portfolio of hardware, software and services that puts us in a unique position to help organizations of any size address their information infrastructure requirements in a comprehensive and integrated way. Turning to IBM as a trusted partner for managing your valuable information assets, your organization can create a more flexible, robust and resilient IT infrastructure that can translate into a more flexible, robust and resilient business.

For more information

To learn more about the IBM System Storage DS8000 series, please contact your IBM representative or IBM Business Partner, or visit: ibm.com/systems/storage/disk/ds8000
For information on availability of functions on the DS8800 model, please contact your IBM storage sales specialist.

Additionally, IBM Global Financing can help you acquire the IT solutions that your business needs in the most cost-effective and strategic way possible. We'll partner with credit-qualified clients to customize an IT financing solution to suit your business goals, enable effective cash management, and improve your total cost of ownership. IBM Global Financing is your smartest choice to fund critical IT investments and propel your business forward. For more information, visit: ibm.com/financing



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Actual available storage capacity may be reported for both uncompressed and compressed data and will vary and may be less than stated.

¹ "Five nines" is a term used to denote that a piece of equipment is functioning with 99.999 percent reliability

* Usable capacity depends on factors such as data format, RAID level and spare disks configured.

** 6 Gb/s SAS (SAS-2) drives available on DS8800 model only



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