IBM DS8880

Business-critical hybrid-flash data systems designed to foster trust and growth in the digital economy

Highlights

- Accelerate insights to drive real-time decisions by reducing application response time up to 90 percent through IBM® zHyperLink technology[1]
- Improve business efficiency while reducing operating expenses with direct data transfer to hybrid cloud environments providing more than 50 percent savings in CPU utilization[2]
- Consolidate all your business-critical workloads for IBM Z®, IBM Power Systems™ and distributed environments under a single hybrid-flash data system
- Secure client and corporate data with data-at-rest encryption and a recovery solution with greater than six nines availability

Innovative IT leaders are becoming the trusted service providers for their enterprises, moving quickly to deliver value across the ecosystem, enabling new services and business models. Achieving these goals requires a new perspective on the critical capabilities needed to empower business leaders. As organizations start to move at an ever-faster pace, they are required to gain insights faster, protect critical data, eliminate downtime and avoid business risk—all at the same time.

IBM storage systems have become crucial to helping IT leaders manage the changing conditions in the modern enterprise, including the dynamic demands of cloud, mobile, social, analytics and cognitive strategies.

IBM offers two business-critical hybrid-flash data systems designed to support the most demanding application workloads.

Bulletproof data systems

The IBM® DS8880 hybrid-flash solutions are powered by the proven IBM DS8000® enterprise software platform and deliver mission-critical acceleration, uncompromising availability, unparalleled integration with IBM servers and transformational efficiency through industry-leading capabilities. The offerings include:

- **IBM DS8886:** Streamlines operations and improves customer serviceability with a hybrid storage solution, backed by 24x7 availability and extreme functionality for multi-site replication, and deep IBM Z, IBM Power®, or distributed systems integration—all provided in a dense yet expandable package
- **IBM DS8884:** Enables organizations to overcome storage challenges with advanced, easy-to-use functionality for running critical workloads on mainframes, IBM Power Systems or distributed systems, either as a dedicated platform for consolidated systems or for multiple platforms—delivered within an affordable, flexible and space-saving package

To support the most demanding, business-critical applications, the DS8880 data systems combine bulletproof resiliency and intelligent flash performance to deliver consistent microsecond application response times. The ability to select from hybrid-flash, all-flash or traditional disk configuration options gives the confidence needed to support the dynamic applications that sit at the heart of the business. To that end, each member of the DS8880 family delivers a range of self-tuning features—such as intelligent caching algorithms, automated quality-of-service management and advanced storage tiering that can optimize data placement between itself and the enterprise servers attached to it. DS8880 also boasts world-class high availability and special integration with IBM Z and IBM Power Systems that deliver extraordinary value. For organizations seeking an ideal combination of performance, high availability, resilience and agility, DS8880 is a logical choice.

Mission-critical acceleration

Designed to provide extraordinary performance for mission-critical applications, DS8880 is based on the same fundamental system architecture as the innovative IBM Watson® solution. DS8880 uses this to form the three-tiered architecture that balances system resources for optimal throughput. Intelligent caching algorithms accelerate performance even more, and by adding IBM DS8880 High-Performance Flash Enclosure Gen2 to the system, users can feel confident that high-end acceleration will be there when they need it with microsecond response time.

DS8880 delivers exceptional throughput and extremely low application response times. With extraordinary performance and more than six nines availability,[3] DS8880 can help users make real-time business analytics a reality.

Low latency helps organizations to improve customer satisfaction, generate revenue and address new business opportunities. The need for low latency drove the high adoption rate of input/output (I/O) technologies including IBM FICON® Express16S, Super Parallel Access Volume (Super PAV), IBM High Performance FICON (zHPF), and now zHyperLink.

zHyperLink is the result of an IBM research project created to provide extreme low latency links between the mainframe and associated storage. It dramatically accelerates the access to by reducing application response time up to 90 percent and cuts the elapsed time of IBM Db2® transactions in half, delivering outstanding business value for mainframe environments.

Hybrid-flash data systems

With the addition of High-Performance Flash Enclosure Gen2, DS8880 redefines what true enterprise hybrid data systems should be, with performance worthy of the most critical applications. Hybrid systems that combine flash and traditional spinning drives might be preferred to support a variety of mixed workloads in, say, private or public clouds. Hybrid configurations help enable consolidation of important workloads with the flexibility to deliver flash performance exactly where and when it is needed.

Intelligent IBM Easy Tier® technology helps transform IT efficiency by optimizing application performance dynamically across any DS8880 hybrid configuration without requiring administrators to manually tune applications. For hybrid configurations, Easy Tier automates data placement across tiers to meet performance objectives at the most reasonable cost by identifying and moving less-frequently accessed data to the most economical drive tier. Similarly, frequently accessed data for busy workloads is automatically migrated to flash storage to ensure the lowest response times for those applications that need it.

Easy Tier provides the flexibility to manually move entire volumes across tiers or to other storage pools through the Dynamic Volume Relocation feature. Users can also restripe data nondisruptively to change a volume's RAID type—for example, from RAID 5 to RAID 10. With these advanced features, Easy Tier offers tremendous flexibility for hybrid and single-tier data systems.

IBM DS8000 Storage Tier Advisor Tool helps users easily determine which volumes are likely candidates for Easy Tier optimization by analyzing the performance of the current application workloads. Even without activating Easy Tier, the advisor tool can identify which volumes can benefit from additional flash capacity and provides views and reports that show performance skew and data migration trends for each application volume, which can help ensure the optimal mix of drives for all workloads.

These advanced capabilities help simplify the data architecture and greatly reduce the amount of time administrators spend tuning servers and data systems.

Unparalleled integration

The IBM DS8880 family provides deep integration with IBM Z while supporting mainframe, IBM Power Systems, and distributed systems under a single management point.

At the heart of today's DS8880 is the advanced microcode that has been developed and enhanced in lockstep with the IBM mainframe I/O architecture over the past several decades. This is why DS8880 offers incredible value compared to other storage systems and why it is one of the most trusted storage platforms for mainframe environments.[4]

DS8880 also delivers excellent integration with IBM Power Systems running in IBM AIX®, IBM i and Linux environments. For performance, DS8880 end-to-end I/O Priorities

enables host adapters on the storage system to give preferential treatment to higher-priority database I/Os with Db2 software. What's more, DS8880 copy services are tightly integrated with IBM PowerHA® SystemMirror® for AIX and IBM i, which adds another level of assurance for users who need 24x7 business continuity for their critical applications.

DS8880 includes interoperability with VMware vStorage APIs for Array Integration, VMware vCenter Site Recovery Manager and a VMware vCenter plug-in that allows users to offload storage management operations in VMware environments to DS8880. DS8880 also supports IBM Storage Management Console for VMware vCenter to help VMware administrators independently monitor and control their storage resources on primarily from the VMware vSphere Client GUI.

DS8880 enables Transparent Cloud Tiering, allowing organizations to introduce hybrid cloud as a new storage tier for data archiving and disaster recovery operations on IBM Z environments. This solution does not require an additional server or gateway, but it is rather a software-defined storage feature that leverages existing DS8880 data systems, avoiding the need for additional hardware infrastructure.

Transparent Cloud Tiering offloads to DS8880 the responsibility for data movement required by data archiving operations, allowing IBM Z to free CPU resources to be used more efficiently in business-focused applications such as analytics, business intelligence and cognitive computing. Transparent Cloud Tiering integrates with IBM Cloud Object Storage and can also provide direct transparent connectivity to IBM Cloud™ and Amazon S3.

Container is a new, up-and-coming technology which allows for pre-packaged and configured software to be deployed easily in any environment. This simple, flexible technology fits perfectly with the advantages of private and public cloud computing environments.

DS8880 provides persistent storage with the ability to maintain the data separately from the container, making it always available to the application, regardless of container location, planned downtime or unexpected disruptions.

Uncompromising availability

DS8880 is designed to 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, and includes redundant, hot-swappable components and sophisticated data integrity features for 24x7 operations. The system supports RAID-5, RAID-6 and RAID-10 configurations for data protection and monitors internal system functions, so it can "call home" automatically to alert service personnel if it detects a potential problem. And sophisticated light path diagnostics facilitate system maintenance, while secure audit logs can help with root-cause analysis and problem determination.

In addition to its exceptionally resilient architecture, the system offers an array of advanced functions for data backup, remote mirroring and disaster recovery. The IBM FlashCopy® feature addresses a key requirement for nonstop data availability by quickly and efficiently creating point-in-time copies without impeding the application server. DS8880 also supports Cascading FlashCopy allowing a target volume/dataset in one mapping to be the source volume/dataset in another mapping creating a cascade of copied data. This provides the flexibility to obtain point-in-time copies of data from different places within the cascade.

DS8880 supports advanced multi-site business-continuity capabilities to give organizations the peace of mind of knowing that business-critical data will be available during planned and unplanned outages. Metro Mirror is designed to provide a no-data-loss remote mirroring solution for metropolitan distances. Global Mirror can be used to reduce data loss

to as low as three seconds or less at virtually any distance. The Metro/Global Mirror option combines these two capabilities to support various multi-site configurations for added protection. And with Multiple Target Peer-to-Peer Remote Copy (MT-PPRC), organizations can have two secondary mirror systems with different configuration options for world-class disaster recovery and greater than six-nines availability.[3]

With IBM Copy Services Manager, you can simplify copy services management for IBM DS8880 through a unique, easy-to-use interface that helps monitor and control copy-services configurations. Designed to scale for thousands of relationships, Copy Services Manager represents a single point of control to automate and simplify the recovery process in large replication environments, protecting your most valuable data and helping you to keep costs down.

For organizations that require more than six-nines availability, DS8880 is an ideal choice. The aforementioned deep integration between DS8880 disaster-recovery services and IBM enterprise server clustering provides high-availability solutions available only from IBM. This integration is what defines extreme high availability and is the reason the majority of the world's largest financial institutions rely on IBM Z and DS8000 business-continuity solutions for their mission-critical environments.[4]

Increased security, minimized risk

The unrelenting tide of data breaches is driving increased interest in IBM self-encrypting storage, which automatically secures all information on a drive when physically removed from a storage system. IBM Full Disk Encryption also provides a simple, cost-effective way to purge sensitive data from systems that are being retired or repurposed through a simple cryptographic erasure. Encryption drives are standard on every DS8880 system and provides support for the Key Management Interoperability Protocol (KMIP). This new standard enables encryption key lifecycle management across encryption-enabled devices and provides a new option to protect sensitive data.

DS8880 has a variety of other security features, such as role-based administration, multi-level authentication, tamper-proof audit logging and support for the Syslog protocol. It also is designed to comply with the US government standards profile for Internet Protocol version 6 (IPv6) and to support updated guidelines on cryptographic functions defined by the US National Institute of Standards and Technology (NIST). It also supports the T10 standard data integrity field (DIF) for SCSI to enable end-to-end data protection from the application or host adapter down to the drives. These and other advanced security capabilities make it an ideal choice to help keep sensitive data secure.

Transformational efficiency

DS8880 includes powerful management capabilities that can help IT administrators more effectively control their storage environments as capacity grows. DS8880 Storage Manager includes intuitive navigation, streamlined configuration processes and helpful links to video tutorials with pages that load in less than a second. In addition, it provides dynamic and customizable views, as well as interactive menus, tabs and charts, enabling administrators to be more productive. And the configuration wizard walks IT staff through the setup in just a few steps. DS8880 also supports a command-line interface (CLI) and a Storage Management Initiative Specification (SMI-S)-conformant API.

Easy Tier and other self-tuning features help simplify management further and accommodate real-time workload fluctuations, enabling administrators to manage storage capacity and react to other environmental changes. DS8880 thin

provisioning also helps reduce the time administrators spend provisioning new storage while keeping applications online—a key requirement for mission-critical environments.

Innovative DS8880 advanced function license packages help you easily order and install the necessary tools to manage, protect and secure data. This advanced software consolidation can help ensure you have the capabilities needed to get the most out of your hardware in mainframe, Power or distributed environments. IBM Spectrum Protect™ Snapshot provides advanced management capabilities, such as detailed performance monitoring and reporting, for DS8880 and the extended storage environment by supporting a variety of storage systems and devices from IBM and many other vendors. In addition, it 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.

Data systems for a greener planet

DS8880 includes an energy-efficient power supply designed to reduce energy consumption. Deploying High-Performance Flash Enclosure Gen2 also can have a tremendous impact on reducing energy costs further by replacing power-hungry spinning drives with more energy-efficient flash storage. And with Easy Tier, the story gets better, because it helps optimize the combination of flash and spinning drives for both performance and cost. With this kind of energy efficiency, DS8880 is ready to meet emerging IT energy-efficiency standards as they become available.

DS8880 complies with the Restriction of Hazardous Substances (RoHS) standard, also known as 2002/95/EC—a European Union directive being widely adopted around the world—which aims to restrict specific hazardous materials in the manufacture of various types of electronic and electrical equipment. If green IT is the goal, DS8880 can help organizations get there.

IBM DS8880 at a glance	
DS8880 hybrid-flash models	DS8884 (984, 84E) DS8886 (985, 85E) Single phase DS8886 (986, 86E) Three phase
Cores per processor complex (IBM POWER8®)	DS8884 – 6 DS8886 – 8, 16 or 24
Processor memory for cache and non-volatile storage (minimum/maximum)	DS8884 – 64 GB to 256 GB DS8886 – 256 GB to 2 TB
Host adapters (minimum/maximum)	2/8 host adapter pairs 4 and 8-port 8 Gbps, or 4-port 16 Gbps Fibre Channel/IBM FICON
Host ports (minimum/maximum)	8/128
Maximum physical storage capacity*	4,608 TB (HDD/SSD) + 1,459 TB (flash cards)
RAID levels	5, 6, 10
Host adapter interfaces	4- and 8-port 8 Gbps or 4-port 16 Gbps Fibre Channel/IBM FICON
Drive interface	6 Gbps point-to-point switched SAS-2 connection to an 8 Gbps Fibre Channel backbone

IBM DS8880 at a glance	
Device adapters	Up to 16 4-port, 8 Gbps Fibre Channel paths
HDD/SDD sizes	200 GB, 400 GB, 800 GB and 1.6 TB flash drives 300 GB and 600 GB (15k rpm); 600 GB, 1.2 TB and 1.8 TB (10k rpm); and 4 TB and 6 TB (7.2k rpm and 3.5-inch form factor)
Flash cards	High-Performance Flash Enclosure: 400 GB and 800 GB High-Performance Flash Enclosure Gen2: 400 GB, 800 GB, 1.6 TB, 3.2 TB, 3.8 TB and 7.6 TB
Dimensions (height × width × depth)	DS8884 1.91 m × 0.62 m × 1.38 m (6.27 ft × 2.03 ft × 4.53 ft) enclosure DS8886 expandable to 46U enclosure 1.91 m × 0.62 m × 1.38 m (6.27 ft × 2.03 ft × 4.53 ft) 40U enclosure 2.19 m × 0.62 m × 1.38 m (7.19 ft × 2.03 ft × 4.53 ft) 46U enclosure DS8884: up to three frames total DS8886: up to five frames total
Dry bulb temperature	16°C – 32°C (60°F – 90°F)
Relative humidity	20% – 80%
Power supply	Configurations: single-phase 50/60 Hz
Caloric value BTU/hr. (maximum)	DS8884 (984) 18425 BTU for Base Frame 18084 BTU for Expansion Frame DS8886 (985) Single Power 25249 BTU for Base Frame 22519 BTU for Expansion Frame DS8886 (986) Three Phase Power 22860 BTU for Base Frame 21837 BTU for Expansion Frame
Electrical power kVA (maximum)	DS8884 (984) 5.4 kVA for Base Frame 5.3 kVA for Expansion Frame DS8886 (985) Single Power 7.4 kVA for Base Frame 6.6 kVA for Expansion Frame DS8886 (986) Three Phase Power 6.7 kVA for Base Frame 6.4 kVA for Expansion Frame
Warranty	All models: onsite service, same day, 24×7 4 years on type 2834 models 3 years on type 2833 models 2 years on type 2832 models 1 year on type 2831 models
Supported systems	For more details on supported servers, visit: **ibm.com**/systems/support/storage/ssic/

Why IBM?

Whatever the requirements, IBM can help with an end-to-end infrastructure solution that includes data systems, application servers, software, services, support and equipment financing. The new DS8880 delivers uncompromising availability, mission-critical acceleration, unparalleled synergy with IBM servers and transformational efficiency for critical environments.

For more information

To learn more about IBM DS8880, please contact your IBM representative or IBM Business Partner, or visit: **ibm.com**/ds8000

For information on specific function availability, please contact your IBM storage specialist.

Additionally, IBM Global Financing provides numerous payment options to help you acquire the technology you need to grow your business. We provide full lifecycle management of IT products and services, from acquisition to disposition. For more information, visit: **ibm.com**/financing

[1] Compared to High Performance FICON. The projection was based on z14 and zHyperlink with DS8886 and z13 measurements that provided results for I/O interrupts and dispatching.

[2] Results are based on internal IBM data measurements on an IBM zEnterprise® EC12 when migrating data sets exceeding 6000 3390 tracks in size. Results will vary by customer based on particular workloads, configurations, software levels and the quantity and size of data sets being migrated.

[3] Six-nines is a term used to denote that a piece of equipment is functioning with 99.9999 percent availability (31.5 seconds of downtime per year), on average.

[4] Don't Believe the Myth-Information About the Mainframe; Janet L. Sun, SHARE Inc., July 2013

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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.

* Usable capacity depends on factors such as data format, RAID level and spare disks configured. Maximum capacity values are based on a fully populated DS8886 system

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