



Highlights

- Address almost any workload or business use case with an IBM all-flash storage solution
 - Leverage the combined advantages of software-defined and flash storage technologies
 - Build agile, powerful hybrid cloud solutions with all-flash storage from IBM
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Enabling the future of your business

IBM flash storage solutions accelerate applications that power the future of your business

Where will the future take your business? What will stand in your way? The World Economic Forum sees data as an economic asset, like currency or gold.¹ The future success of your business depends on how well you leverage your data assets to capture or maintain competitive advantage.

Extreme high availability, simplified management, easy deployment and reliable storage services aren't bells and whistles—they are business-critical requirements. To gain the most value from your data, to detect and prevent fraud before it occurs, to make decisions before the markets move or to provide the best possible customer experience, you need insights quickly. For all these reasons, 21st-century businesses are turning to IBM flash storage.

Comprehensive IBM flash storage portfolio

If it's your responsibility to manage your company's information systems, you know how complex the choices can be. Even when you narrow your focus to one vendor and one area, such as data storage, the choices may seem overwhelming. IBM offers a comprehensive portfolio of clearly-defined flash-optimized storage solutions that can be tailored to address your individual requirements.



Each IBM storage product line offers differentiated, market-leading features that address specific enterprise storage requirements, application workloads and business use cases:

- **IBM® FlashSystem®** is a marketplace leader among all-flash arrays.
- **The IBM Storwize® family** offers all-flash systems for entry-level and midrange workloads.
- **The IBM DS8880 family** provides all-flash configurations designed to support mainframe and other business-critical environments where peak availability is non-negotiable.
- **IBM DeepFlash™** solutions are tailored to handle large, unstructured data sets where performance must go hand in hand with the lowest possible cost.
- **VersaStack™**, a converged infrastructure solution jointly developed by IBM and Cisco, offers multiple high-performance all-flash configuration options.

Flash your way

Each member of an individual IBM storage product line shares basic technology DNA. For example, all members of the IBM FlashSystem family are built using IBM FlashCore® technology, the ever-expanding suite of storage engineering innovations that essentially define the IBM FlashSystem platform. But IBM flash storage solutions can also be viewed from the perspective of the storage and business challenges each is designed to help you solve. For example:

- In some cases, accelerating the performance of a single or related suite of business-critical applications or even individual workloads is exactly what you need your flash storage to accomplish.

- You may have high-volume, high-velocity, big-data analytics that require an optimized ratio of performance, capacity and cost.
- Or you may have mid-sized workloads where budget constraints demand lower capital investments.
- Many businesses provide critical services to their customers; these enterprises require the highest system availability possible.
- More and more organizations are seeking ways to virtualize their storage infrastructure in the most nondisruptive ways possible in order to increase efficiency and agility while lowering costs and management overhead.
- In the 21st century, almost everyone wants to take advantage of the cost and agility benefits offered by cloud computing environments, especially hybrid cloud storage.

Software-defined storage technologies play a key role in maximizing the capabilities of storage solutions for particular workloads and use cases. The market-leading IBM Spectrum Storage™ family includes members that have been deeply integrated with IBM storage product technologies to produce systems designed to help you solve a wide range of storage and business challenges. IBM Spectrum Accelerate™, for example, provides a rich set of features such as multi-tenancy and quality-of-service (QoS) capabilities that help enterprises deploy and manage cloud solutions. When IBM Spectrum Accelerate and IBM FlashCore® technologies are integrated, the results include powerful new cloud-enabling flash-storage solutions in the forms of IBM FlashSystem® A9000 and IBM FlashSystem A9000R.

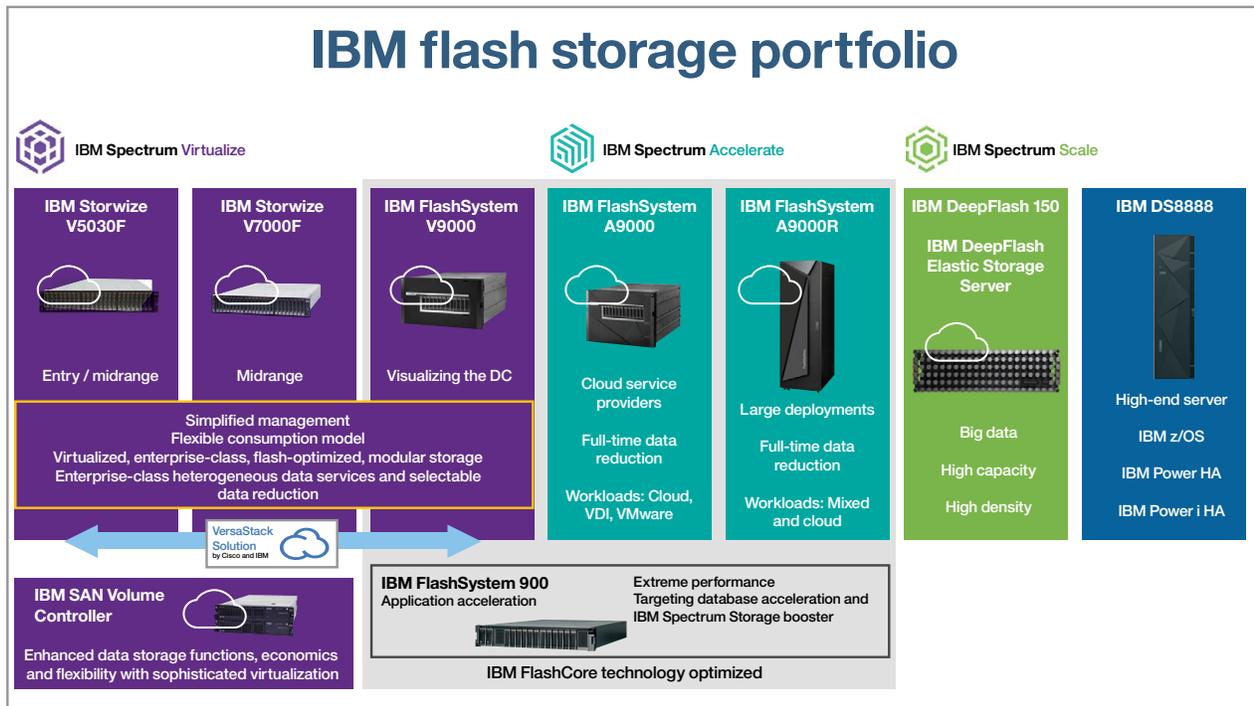


Figure 1. IBM flash storage portfolio.

Figure 1 introduces each of the current IBM storage systems, positioned by product family, IBM Spectrum Storage component and business use case—ranging from entry-level on the left to mission-critical on the far right. Cognitive businesses depend on speed because their 21st-century customers won't wait. Whether handling thousands of online customers or sifting through millions of data points from the Internet of Things (IoT) to thwart cyber attacks, enterprises looking to gain competitive advantage are increasingly turning to IBM flash storage.

Application acceleration

Some businesses rely on certain applications that demand extreme storage performance with the lowest response times (latency) possible. For nearly a decade, enterprises with the need to accelerate specific business-critical applications have turned to IBM FlashSystem 900. IBM FlashSystem is a family of all-flash storage arrays that offer a comprehensive feature set and are engineered to address the most demanding enterprise performance, reliability and cost requirements.

IBM FlashSystem 900

Powered by IBM FlashCore technology, IBM FlashSystem 900 delivers the extreme performance, enterprise reliability and operational efficiency required to accelerate business-critical applications.



IBM FlashSystem 900.

IBM FlashSystem 900 is composed of up to 12 IBM MicroLatency® modules that provide high storage density, enterprise-grade data protection and extremely high performance. At the heart of IBM FlashSystem 900 lies IBM FlashCore technology. Its hardware-accelerated architecture provides consistent microsecond latency, which increases reliability and efficiency by removing most software from the data path. IBM FlashCore technology enables the integration of lower-cost, higher-density multi-level cell flash chips by leveraging IBM-engineered flash management features such as enhanced wear leveling (spreading data evenly among flash cells to increase flash life) and garbage collection (reclaiming flash capacity by aggregating valid data in the flash chips). Advanced flash management features also include IBM Variable Stripe RAID™ technology, which maintains system performance and capacity in the event of partial or full flash chip failures, helping reduce downtime and forestall system repairs.

Because IBM FlashSystem 900 does not introduce any additional complex software layers, it is extremely simple to deploy in a wide range of storage environments. This makes it an especially effective solution for enterprises looking to accelerate specific business-critical applications without impacting the larger application ecosystem.

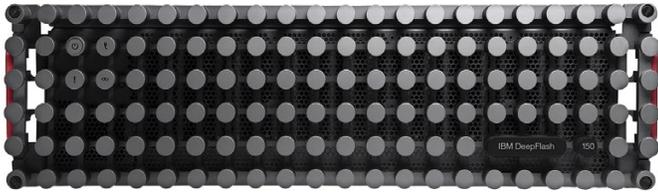
Big data storage

“Big data” refers to a class of technologies and architectures that enable high-volume, high-velocity data capture and analysis. In the 21st century, much of this information is unstructured data coming from sources such as mobile and social systems of engagement, medical imagery, email, and the IoT. Big-data analysis is used by enterprises in many different industries to improve decision-making, detect and prevent cyber attacks, discover customer trends, and power basic scientific and commercial research and innovation.

Storage systems designed for big-data workloads must be able to handle very large volumes of data as rapidly and economically as possible. Big data is an ideal environment for flash storage such as DeepFlash solutions, which are optimized for cost-effective capacity and performance scalability.

IBM DeepFlash 150

IBM DeepFlash 150 is an exabyte-scale all-flash array designed for cloud and big-data workloads. It provides an essential big-data building block for cost-constrained, high-density and high-performance storage environments. DeepFlash 150 delivers the response times of an all-flash array with extraordinarily competitive cost benefits. It makes an ideal choice to accelerate systems of engagement, unstructured data, big data and other workloads requiring very low latency, high performance and sustained throughput.



IBM DeepFlash 150.

DeepFlash 150 does not use conventional solid-state drives. Instead, this innovative new storage system relies on a larger, systems-level approach that enables organizations to manage much larger data sets without having to manage individual storage modules. The DeepFlash 150 system comes complete with the hardware necessary for enterprise and hyper-scale storage, including up to 64 purpose-engineered flash cards in a 3U chassis and 12-Gbps SAS connectors for up to eight servers. The wide range of IBM Spectrum Storage and other software-defined storage solutions available for DeepFlash 150 provide flash-optimized scale out and management along with large-capacity block, file and object storage interfaces designed to help ease administration and save time.

IBM DeepFlash Elastic Storage Server

DeepFlash 150 provides the underlying flash building block for big-data storage solutions. And for enterprises that want a complete software-defined storage solution, IBM DeepFlash Elastic Storage™ Server combines the IBM Spectrum Scale™ data management system, the grid-based IBM Elastic Storage Server configuration option and DeepFlash 150 all-flash arrays into one comprehensive big data storage solution.

IBM DeepFlash Elastic Storage Server provides optimal workload flexibility, an extraordinarily low cost-to-performance ratio, and the data lifecycle management and storage services required by enterprises grappling with high-volume, high-velocity data challenges. The platform offers an ideal choice to accelerate systems of engagement, unstructured data, big data analytics, and any workload requiring high capacity, high performance and comprehensive file and object storage capabilities.

Business-critical storage

Business-critical applications are always on and always crucial to business success. Quite often, they're running on mainframe processors. It has been said, in fact, that mainframes such as IBM z Systems® “keep the world going.”² The payroll, accounts receivable, transaction processing, database management and other applications critical to the world's largest businesses often run on IBM mainframes. In fact, 96 of the world's top 100 banks, 23 of the top 25 US retailers and nine out of 10 of the world's largest insurance companies run z Systems.³

The IBM DS8880 family of data systems is the number-one storage solution used with System z mainframes.⁴ The reasons are simple: The DS8880 line offers the deepest integration available for the IBM z/OS® operating system and provides the levels of reliability, capability and extremely high availability demanded in mission-critical environments.

DS8880 family

IBM DS8880 storage systems are where you turn when your mission-critical applications require the highest availability and system reliability possible, especially in mainframe environments. DS8880 systems provide extremely high availability, offer an industry-leading spectrum of data management and storage services features, and enable special integration with z/OS.



IBM DS8880.

The DS8880 family is designed to manage the full spectrum of storage workloads that exist in today's complex data infrastructure—and do it while offering superior performance. The arrays provide better than “six-nines” (99.9999 percent) availability with industry-leading data protection and disaster-recovery features.

The DS8880 family continues to innovate, offering new features and capabilities without compromising the systems' proven dependability. Now DS8880 arrays are moving to RAID 6 data protection and denser, higher performance flash configurations. Plus, the DS8880 family serves a much wider marketplace than just z Systems users. In fact, half of DS8880 systems are deployed in distributed environments.

Virtualized storage

Storage virtualization technologies can combine separated capacity and systems in mixed storage environments into a consolidated virtual resource—and then extend a range of enterprise data services to all virtualized capacity, whether the underlying systems support the functionality natively or not. Storage virtualization can reduce capital investment by helping extend the life of existing assets, simplifying storage management, maximizing storage utilization and lowering operating costs.

IBM Spectrum Virtualize™ is a proven, dependable storage virtualization and data management solution that has been improving infrastructure flexibility and data economics for more than a dozen years. It serves as the block data plane backbone for the IBM Spectrum Storage family of software-defined storage solutions. Its innovative data-virtualization capabilities help organizations achieve better data economics by supporting new workloads that are critical to their success. It offers a rich set of storage features such as IBM Real-time Compression™, dynamic tiering, thin provisioning and data copy services. Spectrum Virtualize systems can handle the massive volumes of data from mobile and social applications, enable rapid and flexible cloud services deployments, and deliver the performance and scalability needed to gain insights from the latest analytics technologies.

A number of IBM storage systems leverage the capabilities of Spectrum Virtualize technology. These systems, including IBM FlashSystem V9000 and IBM Storwize V5030F and IBM Storwize V7000F, combine the benefits of flash with the powerful advantages of software-defined storage technologies to help enterprises solve a wide range of storage challenges that demand rich feature-sets, heterogeneous virtualization and maximized data economics.

IBM FlashSystem V9000

IBM FlashSystem V9000 offers the advantages of software-defined storage at the speed of flash memory. This all-flash storage array combines the high performance, ultra-low latency, superior efficiency and extreme reliability of IBM FlashCore technology with the powerful storage virtualization and data services of IBM Spectrum Virtualize.



IBM FlashSystem V9000.

IBM FlashSystem V9000 is designed as a comprehensive storage solution for active data sets. By accelerating a wide range of applications and infrastructures, IBM FlashSystem V9000 can help reduce costs, increase revenue and improve customer satisfaction. And with powerful data reduction capabilities such as IBM Real-time Compression, you may be able to get the advantages of flash for less than the cost of a conventional enterprise storage array.

IBM FlashSystem V9000 can function as a feature-rich, software-defined storage layer that virtualizes all managed storage. In this capacity, it acts as the virtualization layer between the host and other external storage systems, extending functionality and flexibility to the external systems. A single IBM FlashSystem V9000 array can manage up to 32 PB of external storage—and because the storage is virtualized, volumes can be moved between external and internal storage capacity without disrupting operations. This functionality enables very agile integration into existing storage environments with seamless data migration between IBM FlashSystem V9000 and legacy storage systems.

IBM Storwize all-flash solutions

Not only can application workloads vary dramatically from one business to the next, but they can also vary across divisions within a single company. The IBM Storwize family is designed specifically to meet the unique data storage requirements of business groups or organizations with entry-level to midsized application workloads and limited IT budgets who still need all of the features and capabilities demanded in business-critical environments.



IBM Storwize V7000F.

The Storwize family offers enhanced Storwize V7000F and Storwize V5030F systems as all-flash, virtualized, enterprise-class storage systems designed to deliver the high performance needed to derive real-time insights from business data combined with advanced management capabilities. These systems exemplify the Storwize focus on enterprise-grade functionality, performance and reliability at affordable prices.

Low-cost flash for entry-level and midsized workloads

The V5000 members of the Storwize family are highly flexible, easy-to-use storage solutions that enable organizations of all types and sizes with midrange application workloads to efficiently and affordably meet the challenges of rapid data growth and constrained IT budgets. The next-generation Storwize V5000 system is built around a new hardware platform that provides increased performance and affordable, nondisruptive upgrade paths across three second-generation models that deliver a range of performance, scalability and functionality.

Storwize V5030F is the entry-level priced all-flash solution. It leverages the cost advantages of new flash drive options for low deployment costs and features an enhanced, intuitive user interface, synchronous/asynchronous replication, more than 600 Storwize application program interfaces (APIs), thin provisioning, snapshots and flash-optimized data compression. Storwize V5030F also provides enterprise-grade system availability and data security, including the nondisruptive data migration and remote mirroring using IBM HyperSwap® technology shared by all IBM Spectrum Virtualize-based systems, plus five-nines availability, data-at-rest encryption and a new distributed RAID technology that can reduce disk rebuild times up to 10 times over current RAID solutions. For organizations that need affordable all-flash storage that provides Fortune 500-level functionality plus storage virtualization capabilities, Storwize V5030F offers an outstanding choice.

Cost-optimized flash for midsized workloads

Storwize V7000 is the platform within the Storwize family that offers the greatest functionality, performance and reliability. Enterprises looking to implement an all-flash solution with a comprehensive range of storage services and virtualization capabilities—plus very affordable initial deployment costs—turn to Storwize V7000F. It's now even faster, with a new 10-core CPU plus a data compression accelerator card, which together can significantly improve storage performance. Storwize V7000F can also leverage the cost advantages provided by new flash drives to create a solution with competitive deployment costs coupled with very powerful storage capabilities.

Grid-scale cloud storage

Already, the cloud storage marketplace has become highly competitive. Customers are pushing service providers to meet new demands created by virtualization and the exponentially increasing volume of data that needs to be managed while facing almost flat IT budgets. Because of these shifts, service providers are forced to look for new storage solutions and new ways to differentiate their businesses with high-performance offerings. Providing reliable storage with consistent performance while reducing operational costs—not just for one service customer, but for all customers—can be a formidable task.

A global study of 500 IT decision makers reveals that organizations are increasingly integrating cloud resources with traditional IT to accommodate dynamic needs and specific business priorities. This is hybrid cloud. Today, 64 percent of cloud adopters are using some form of hybrid cloud, and more than 80 percent of enterprise IT organizations are expected to commit to hybrid cloud architectures by 2017.⁵ To meet these challenges and take advantage of the opportunities, leading enterprises are turning to a new class of all-flash storage solutions from IBM.

IBM FlashSystem A9000 and IBM FlashSystem A9000R are purpose-engineered to extend IBM FlashSystem leadership to hybrid cloud workloads, virtual desktop infrastructures and big-data analytics at the largest scales. IBM FlashSystem A9000 integrates the extreme performance of IBM FlashCore technology, highly parallel architecture and comprehensive data reduction in one powerful solution. IBM FlashSystem A9000R is a grid-scale, rack-based solution that provides an excellent platform for rapidly growing cloud storage in large, mixed-workload environments.

IBM FlashSystem A9000

Whether you are a service provider requiring highly efficient management capabilities or an enterprise implementing cloud on a budget, IBM FlashSystem A9000 provides the fast, efficient storage you need. IBM FlashSystem A9000 and IBM FlashSystem A9000R are built using IBM Spectrum Accelerate software-defined storage technology. In order to achieve all of the benefits inherent in grid storage architectures, IBM FlashSystem A9000 utilizes a modular configuration of three grid controllers plus one flash storage enclosure, all tightly integrated behind an 8U bezel.



IBM FlashSystem A9000.

The IBM FlashSystem A9000 highly parallel architecture eliminates many traditional storage management tasks and costs. The system introduces a new graphical user interface and IBM Hyper-Scale Manager, designed with cloud-optimized QoS features that enable agile scale-out and orchestration of multi-tenant cloud storage solutions. Additional IBM FlashSystem A9000 systems can be added and managed from a single IBM Hyper-Scale interface. And thanks to its mature IBM Spectrum Accelerate foundation, the system also integrates well with VMware and other leading application virtualization technologies. In addition to cost and operational advantages, its solution design and customer support through IBM Flash Centers of Competency across the globe help reduce deployment risk and optimize storage investments.

IBM FlashSystem A9000R

IBM FlashSystem A9000R offers all the advantages of IBM FlashSystem A9000 in a rack configuration. The self-tuning, flash-optimized grid storage architecture delivers consistent high performance and rich management capabilities for cloud, virtualized and big-data analytics workloads. The new user interface simplifies cloud resource provisioning, while industry-leading software-defined storage capabilities provide the full range of management and data protection features.



IBM FlashSystem A9000R.

IBM FlashSystem A9000R employs from two to six grid elements within a single rack, each composed of two grid controllers and one flash storage enclosure. The system comes as a preconfigured, fully-integrated, rack-based platform with InfiniBand switches to enable ultra-low latency scale-out plus a “white glove” support model to revolutionize the solution design and deployment experience.

With its grid storage architecture that enables multiple-copy, multi-site data protection while providing easy scale-out capabilities, IBM FlashSystem A9000R is an excellent platform for rapidly growing cloud storage and desktop virtualization environments. The system gives cloud service providers and organizations in industries such as healthcare, financial services, transportation, telecommunications, e-commerce, rich media, high-performance computing, government and utilities the storage performance, cost-effectiveness and simple scalability they need to effectively deploy cloud-based business solutions.

Converged infrastructure

For enterprises moving to integrated infrastructure but still needing the efficiency and performance of flash storage, [VersaStack](#) is a pretested and prevalidated converged infrastructure solution from IBM and Cisco. It is designed for fast deployment and rapid time to value as well as versatility, efficiency and ease of management. VersaStack is based on the Cisco Unified Computing System integrated infrastructure—some of the most highly regarded server and network components in the industry⁶—and offers multiple, all-flash IBM storage configurations based on

IBM FlashSystem and Storwize built with IBM Spectrum Virtualize. VersaStack integrated infrastructure solutions can produce faster return on investment because they are pretested and validated, help reduce downtime thanks to built-in redundancy features, and help simplify administration through centralized management interfaces.

Storage for the future of your business

Every enterprise has its own unique business and information system requirements and IT architects understand that these requirements are deeply intertwined. Dynamic factors such as business objectives, growth targets, budgets, risk tolerance and market conditions mean that “one-size-fits-all” storage platforms no longer work. That’s why IBM offers multiple options. You can support your mainframes with industry-leading storage solutions, scale out as quickly and easily as your unstructured data does, start small and grow with your business, embrace the cloud, and gain the strategic advantage required to outpace your competition. If you bring IBM storage along as your partner, no matter where your next steps lead, you won’t go there without plenty of cost-effective, market-leading, globally-supported options for moving *fast*.

For more information

To learn more about the IBM portfolio of flash products, please contact your IBM representative or IBM Business Partner, or visit the following website: ibm.com/systems/storage/flash/

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



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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.

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