IBM FlashSystem V9000

Gain the advantages of software-defined storage at the speed of flash

The competitive landscape of the 21st century demands agility, efficiency and performance. Business lines such as yours must change direction essentially overnight—or get left behind. You must gain every insight possible from all available data assets, or lose competitive advantage. You look to your information technology to help you move quickly, lower costs, respond more rapidly than competitors and seize new opportunities. These modern, hyper-competitive, high-performance environments are where IBM FlashSystem V9000 thrives:

Highlights

- Harness the advantages of software-defined storage at the speed of flash

- Deploy storage services to transform and modernize existing systems

- Accelerate applications with IBM FlashCore technology and NVMe-oF

- Help lower costs with comprehensive data reduction technologies

- Increase storage density with 3D triple-level cell (3D TLC) flash

- Easily scale capacity and performance to millions of IOPS

- Need to do more with less? The all-flash storage systems leverage the multiple cost advantages of IBM enhanced 3D TLC NAND flash and comprehensive data reduction—without sacrificing performance.

- Need the agility to address all your application workloads with one solution, then add new workloads—unstructured data from the Internet of Things (IoT), real-time analytics, cloud resources or cognitive systems—without performance or scalability restrictions? IBM FlashSystem V9000 combines microsecond flash latency with market-leading IBM software-defined storage technologies to enable capacity and performance scale-up and/or scale-out to many petabytes and millions of IOPS.

- Need to modernize your data center without forklifting out existing systems and wasting substantial investments? The IBM Spectrum Virtualize capabilities of IBM FlashSystem V9000 enable you to virtualize more than 440 heterogeneous external storage systems into one integrated resource and extend a rich set of features and functionality to all. You gain ongoing value from existing systems while simply and nondisruptively

modernizing your IT infrastructure.

This is 21st-century data-storage innovation at its best. This is IBM FlashSystem V9000.

Performance and efficiency at the core

IBM FlashCore technology provides the high-performance, extremely efficient storage foundation for IBM FlashSystem V9000. IBM FlashCore technology refers to the IBM innovations that enable IBM FlashSystem solutions to deliver consistent microsecond latency, extreme reliability, and a wide range of operational and cost efficiencies. IBM FlashCore innovations include a hardware-accelerated non-volatile memory (NVM) architecture and advanced flash management features such as IBM Variable Stripe RAID technology; IBM-engineered error correction codes; and proprietary garbage collection algorithms that not only increase flash endurance, but also accelerate performance while reducing latency.

IBM FlashSystem V9000 leverages the advantages of IBM FlashCore-enhanced 3D TLC storage media that provides three times greater flash density and storage capacity than previous IBM FlashSystem solutions.[1] Along with the move to 3D TLC flash media, the purpose-engineered IBM MicroLatency modules at the heart of IBM FlashCore technology utilize powerful inline, hardware-accelerated data compression technology that provides more consistent data reduction performance across an even wider range of workloads.[1] The MicroLatency modules also support an off-load AES-256 encryption engine with IBM Security Key Lifecycle Manager centralized key management, high-speed internal interfaces, and full hot-swap capabilities that enable organizations to achieve lower cost per capacity with even better data security and flash reliability than before.[1]

IBM FlashSystem V9000 supports the NVMe-oF protocol via the fibre channel adapters. This support accelerates the connectivity between devices and the IBM FlashSystem V9000, allowing you to better realize the superior performance of the IBM MicroLatency modules.

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A full spectrum of advantages

IBM FlashSystem V9000 offers the advantages of IBM FlashCore technology deeply integrated with the software-defined capabilities of IBM Spectrum Virtualize. This means that along with ultra-low latency and multi-dimensional data protection at the storage media level, the systems also provide a wide range of storage services, including virtualization, data migration, synchronous and asynchronous copy services, high-availability configurations, storage tiering, and data reduction technologies.

IBM FlashSystem V9000 accelerates the full range of applications and infrastructures. It can function as a feature-rich, software-defined storage layer that expands the capabilities of managed storage. This allows you to extend the value of your existing storage investments while consolidating them under one management console. And, volumes can be nondisruptively moved between external and internal storage, enabling agile integration into existing storage environments and seamless data migration between IBM FlashSystem V9000 and legacy storage systems.

Powerful data reduction and scalability

IBM FlashSystem V9000 offers powerful data reduction pools. When applied to new or existing storage, they can significantly increase usable capacity while maintaining consistent application performance. This can help eliminate or drastically reduce costs for storage acquisition, rack space, power, and cooling, and can extend the useful life of existing storage assets. Capabilities include:

- Block deduplication that works across all the storage in a data reduction pool to minimize the number of identical blocks

- New compression technology that provides consistent performance across application workload patterns

- New SCSI UNMAP support that deallocates physical storage when operating systems delete logical storage constructs such as files in a file system.

IBM FlashSystem V9000 also offers a very wide range of scale-up and scale-out options. Additional IBM FlashSystem V9000 arrays can be integrated into high-performance scale-out solutions offering more than five million IOPS. Scale-up options involve adding IBM Flash enclosures as well as 2U and 5U SAS drive enclosures that can supply up to 6.7 PB of capacity in Tier 0 storage configurations and up to 32 PB in Tier 1 configurations. With the IBM Easy Tier functionality of IBM Spectrum Virtualize, overall storage costs can be reduced further by automatically migrating hot data to Tier 0—maximizing the workload performance—while the majority of the data is stored on cost-efficient Tier 1 storage.

Simplified management

IBM FlashSystem V9000 delivers a modern user interface (UI) with the same look and feel as other IBM FlashSystem solutions, for a consistent management experience across all platforms. The UI has an overview dashboard that provides all information in an easy-to-consume format and allows visualization of effective capacity. Along with the IBM Comprestimator tool, which estimates data compression rates for targeted workloads, the new UI enables much easier storage planning and management.

IBM FlashSystem V9000 features IBM Electronic Customer Support (ECS) services, that allows remote interaction with IBM support technicians. These operatives can perform secure, nondisruptive diagnostics, software updates, troubleshooting, and—in many cases—problem resolution. Plus, the data collected from deployed systems can help drive product enhancements and future innovation. This powerful capability can help lower costs, increase system availability and streamline maintenance and updates for thousands of enterprises around the planet.

Gain Storage Visibility, Insight, and Control

As the resource on which your business depends, data is paramount. Your storage systems take on even greater importance. IBM Storage Insights and Storage Insights Pro provide critical capabilities that enhance your experience throughout its lifetime:

- A single dashboard so you can see the status of all your IBM block storage at a glance

- Trend information about capacity and performance so you can make better and more informed decisions

- Storage health information that helps you bring your configuration in line with best practices

- When support is needed, the ability to easily open a ticket, upload log information, and view open tickets

- Detailed configuration data available to IBM specialists to help close tickets quickly.

Delivered as a service from IBM Cloud at no charge, Storage Insights is quick and easy to set up and requires no ongoing software maintenance. IBM Storage Insights Pro is an upgrade that provides more detailed information and additional capabilities.

Agile integration

Once you deploy an IBM FlashSystem V9000 solution, IBM Spectrum Virtualize technology enables simplified access to the entire IBM Spectrum Storage family of industry-leading software-defined storage solutions. IBM Spectrum Storage solutions allow you to build hybrid cloud architectures, increase system efficiency with copy data management, implement comprehensive data protection and disaster-recovery solutions, leverage the advantages of cloud-based object storage, and much more. IBM FlashSystem V9000 integrates well with leading host-side virtualization and container platforms such as IBM PowerVM, Microsoft Hyper-V, VMware, Kubernetes and Docker. The systems support VMware vStorage application programming interfaces (APIs) for Array Integration (VAAI) and VMware vSphere APIs for Storage Awareness (VASA), as well as VMware Virtual Volumes (VVols). This agile integration with virtualization technologies can enable enterprises of all sizes and types to derive greater value at lower cost from their information assets.

Containers are an open-source technology that lets software be packaged with everything it needs to run the same in any environment. Containers offer the versatility of virtual machines, but at a much smaller footprint and cost. As a result, containerization is a key enabling technology for flexibly delivering workloads to private and public cloud and DevOps. Using the IBM Storage container plug-in framework, IBM FlashSystem V9000 enables any supported storage to be used as persistent storage in Docker and Kubernetes container environments, improving flexibility, simplifying deployment and helping to lower costs while offering clients the confidence of deploying stateful containers using highly available storage with enterprise capabilities.

IBM FlashSystem V9000 provides a single platform to address the full spectrum of 21st-century data storage requirements. From all-flash performance and IBM FlashCore reliability, through easy integration and almost unlimited scalability, to virtualization that can transform and modernize existing systems, IBM FlashSystem V9000 provides extraordinary value—and much more.

IBM FlashSystem V9000 at a glance

Models	• 9846/9848 AC3 controllers • 9846/9848 AE3 flash enclosure drawers
System size	• Minimum: (1 x AE3 and 2 x AC3) • Maximum scaled-out system: (8 x AE3 and 8 x AC3)
Flash type	IBM-enhanced 3D TLC
Flash module configuration	For each AE3: • 6, 8, 10 or 12 3.6 TB modules; • or 8, 10 or 12 8.5 TB modules; • or 8, 10 or 12 18 TB modules Up to 8 AE3 expansions; Up to 4 AC3 pairs
Maximum internal flash capacity	43 TB to 219 TB (effective, assuming 2.5:1 or better hardware compression) • 900 TB (effective, assuming 5:1 data reduction) Up to 1.7 PB (effective, assuming 2.5:1 or better hardware compression) • 6.7 PB (effective, assuming 5:1 data reduction)
Maximum external storage capacity	External virtualization: Up to 32 PB usable capacity
Maximum performance (100% read, cache miss)	Minimum latency (4K) • 180 µs • 180 µs IOPS (4K) with h/w compression • 1,300,000 • 5,200,000 Bandwidth (256K) • 10 GB/s • 80 GB/s
RAS features	Two-dimensional flash RAID • Module-level Variable Stripe RAID • System-level RAID 5 across modules • Hot-swappable flash modules • Tool-less module installation/replacement • Concurrent code load • Redundant and hot-swappable components
Encryption	Data-at-rest AES-XTS 256
Host connectivity options per building block	16 x 16/8/4 Gb Fibre Channel with NVMe-oF support • 8 x 10 Gb Fibre Channel over Ethernet (FCoE) • 8 x 10 Gb iSCSI 64 x 16/8/4 Gb Fibre Channel with NVMe-oF support • 32 x 10 Gb Fibre Channel over Ethernet (FCoE) • 32 x 10 Gb iSCSI
Virtualization software model	5639-RB8
Tiered solution models	9846/9848 12F, 24F and 92F SAS expansion drawers, with each drawer adding up to a further 1.3 PB of storage
Controller CPU	• Four Intel Xeon E5 v4 Series 8-core 3.2 GHz processors • 16 Intel Xeon E5 v4 Series 8-core 3.2 GHz processors
Controller memory	• 128 GB standard, up to 512 GB • 512 GB standard, up to 2,048 GB

Dimensions (height x width x depth)	6U in a standard 19 in. rack • 288 mm x 445 mm x 801 mm 4 x 6U blocks in a standard 19 in. rack • 1,066 mm x 445 mm x 801 mm • Additional AE2 units add 2U or 44.5 mm in height Weight • 82 kg (181 lb) fully loaded • Up to 736 kg (1623 lb) fully loaded

Why IBM?

Building on decades of storage leadership, IBM offers a comprehensive portfolio of integrated, flash-optimized storage solutions that can propel organizations into the next era of IT. These proven, easily integrated flash solutions accelerate critical applications for faster decision making, come with best-in-class reliability and deliver new efficiencies across the entire business environment for a faster return on investment. IBM flash storage solutions can provide enterprises with the application performance they need to compete, innovate and grow.

For more information

To learn more about IBM FlashSystem V9000, please contact your IBM representative or IBM Business Partner, or visit: **ibm.com**/us-en/marketplace/flash-storage-virtualization

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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