

IBM FlashSystem 900

Overview

The IBM FlashSystem solid-state storage systems are a family of all solid-state technology systems with the latest models being the 900, the Spectrum Virtualize based V9000 and the Spectrum Accelerate based A9000. The FlashSystem storage systems come from the IBM acquisition of Texas Memory Systems in 2012. The 900 has custom designed flash devices with special software to manage wear and lifespan called MicroLatency Modules. The FlashSystem systems come from a heritage of systems designed for solid-state technology with the original systems based on DRAM technology. The all solid-state systems benefit from the memory – based performance designs.

The FlashSystems have embedded software called Ramsan OS for the control and interface support. Currently, advanced features such as replication and snapshots require an IBM Spectrum Virtualize or Spectrum Accelerate software on nodes to be installed in front of the FlashSystem 900 systems or integrated in the form of FlashSystem V9000 and A9000.

The features provided with the FlashSystem 900 without the added software used in V9000 and A9000 include:

- Performance response time of 95 microseconds consistently
- Seven year wear guarantee for MicroLatency modules
- Compression – inline with flash module hardware
- Encryption with SKLM key management
- NVMe over Fabric using InfiniBand for high performance, RDMA fabric access

The flash-based solid state modules are RAID protected with two methods: RAID 5 within the module (or optionally RAID 0 in the case of model 900) to protect from cell failures and RAID 5 across the modules called Variable Stripe RAID to protect from module failures. The RAID protection method is called 2D Flash RAID. In addition to redundant power, data paths, and control paths, ECC is used in the flash modules. A hot spare flash module is included and hot swap of the module allows for non-disruptive operation.

Highlights

- All Flash storage system
- Fibre Channel & IB Block access
- NVMeoF with FC and InfiniBand
- HA system
- 3D TLC with advanced cell management
- Encryption with SKLM support
- 900: inline compression in MicroLatency modules
- Advanced GUI for FlashSystem 900 configuration and management
- 7 year wear guarantee for MicroLatency modules

The FlashSystem 840 was introduced in December 2013 and with additional capabilities or changes compared to the earlier model 820. The FlashSystem 900 (and V9000) were announced in February of 2015.

The update with TLC 3D NAND technology for the MicroLatency modules was announced in October of 2017.

Usage

The IBM FlashSystem 900 storage system is designed for high performance block access to data with limited advanced features. Enterprise features are achieved with the FlashSystem 900 and added software on nodes for the FlashSystem V9000 and FlashSystem A9000. The high performance, low latency of the FlashSystem 900 has targeted usage referenced for database applications with storage for Indexes, logs, and temporary databases. Other performance demanding applications such as virtual desktops should benefit from the performance of FlashSystem. With 16 Gb/s Fibre Channel and 40 Gb/s InfiniBand for the FlashSystem 900, the FlashSystem is high performance enterprise block storage. The addition of NVMe over Fabric support with both Fibre Channel and InfiniBand moves the 900 system to the next generation of fabric access.

The FlashSystem 900 would be used in environments for application acceleration. The FlashSystem V9000 and A9000 would be used as primary or tier 1 storage with the scaling and advanced features from the added software.

Evaluator Group EvaluScale™: FlashSystem 900 - SAN Storage

Evaluator Group product review methodology “EvaluScale” assesses each product within a specific technology area. The definitions of the criteria and explanations of how products are reviewed can be found in the [Evaluation Guides](#).

	Criteria	Description	Requirement	EG View of FlashSystem	Explanation for FlashSystem
1	Capacity	Current capacity of system to meet demand	Must have enough capacity to meet current demand and have ability to scale-up – adding more capacity up to a practical limit.	Meets requirements	Different MicroLatency module models to meet different cost versus capacity needs.
2	Price – including data reduction	Cost of system. This includes data reduction effect – compression/ deduplication	Must be competitive with other leading solutions in this space meaning prices have no more than 20% variance from an average of the other solutions. This includes the effect of data reduction according to the Evaluator Group Data Reduction Estimator tool.	Area for development	FlashSystem 900 has inline compression. High list prices give impression of uncompetitive pricing.
3	Performance	Latency IOPs Bandwidth	The performance requirement can vary based on high-end, mid-tier or entry-level usage. Requirements are that the system be within 10% of the top numbers for products in this class using SPC or IOMARK benchmarks.	Exceeds requirements	Leading low latency for FlashSystem 900. Addition of NVMeoF support on InfiniBand or FC adds to performance.
4	Scaling – performance and capacity	Ability to increase to meet future demands	Scale-out means scaling both performance and capacity to meet demands up to a practical limit – more capacity without sacrificing performance by crippling the access density.	Meets requirements	900 scales with up to 12 modules and is used in scale-out systems.
5	Security – encryption	Data at rest encryption and key management	Data encryption is a perceived requirement across different usage categories for many industries and applications. The high-end enterprise requires an external key manager. A key	Meets requirements	Have encryption with SKLM or internally managed keys.

			manager also is a positive factor for the mid—tier.		
6	Data protection	Snapshots – R/W, large number Synchronous replication Asynchronous replication Tiering to clouds	Read/write snapshots are a requirement with a number that roughly equals the number of LUNs supported. The high-end enterprise requirement for remote replication is for both synchronous and asynchronous technology while mid-tier and entry usage require asynchronous. Tiering to clouds may be a benefit to all segments but would only be a requirement in the high-end enterprise.	Area for development	FlashSystem 900 does not have native features in this area – depends on added software for V9000 and A9000
7	Business continuity	Active-active stretched clusters	The high-end enterprise generally requires active-active stretched clusters. Some mid-tier environments will need that as well but would not be a current requirement but could be a differentiator.	Area for development	FlashSystem 900 does not have native features in this area – depends on added software for V9000 and A9000
8	Economic considerations	Warranty Evergreen updating Environmentals – power & space Simplicity for admin	The overall environmental footprint being roughly on par with other leading systems in this area is the requirement measure. An extended warranty period for devices and an evergreen program for the controllers in the case of an all-flash system is now a requirement given the competitive nature.	Exceeds requirements	Excellent GUI for simplicity. Low power, space requirements. MicroLatency modules have 7-year guarantee.
9	Storage technology	Use of solid state technology as storage devices and for caching	The requirement is for the system to support solid-state technology for at-rest storage and to have an extension cache using solid-state storage technology.	Meets requirements	Uses latest technology in MicroLatency modules for capacity and longevity.
10	Application / system integration	VMware VAAI, VASA, SRM, etc. and Microsoft ODX, SCOM integration	Given the pervasiveness of hypervisor use in server virtualization, the integration for storage primitives and management is a requirement.	Meets requirements	FlashSystem 900 has full integration with major application / system software. However, VASA 2 provider is external in a VM.

Evaluator Group Opinion: Differentiating elements for IBM FlashSystem 900

The IBM FlashSystem 900 is a solid-state system supporting block storage. The systems are typically used in environments with high performance requirements or multiple workloads where high speed random I/Os are required. High availability is designed into the systems with redundancy of components and access paths. Advanced features such as replication and snapshot are not included but are offered with the FlashSystem A9000 and FlashSystem V9000, which used the FlashSystem 900 as the underlying storage.

The extremely low latency of the FlashSystem 900 is a leading reason for selecting the system for block storage application acceleration. IBM continues to invest in advancing the technology of the MicroLatency modules, which removes the risk for customers of having system from a company that may not be around to support or update the product.

Evaluator Group has tested the performance of the FlashSystem and believe it will be a good solution for customers in enterprise environments, primarily for acceleration of critical applications.

Information that is more detailed is available at <http://evaluatorgroup.com>

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