IBM DeepFlash Elastic Storage Server

Exabyte-scale, software-defined flash storage that provides market-leading data economics

Highlights

- Implement exabytes of high-performance flash at extremely competitive pricing, even before data reduction

- Unify file, object and analytics support under one management domain

- Accelerate big data, the Internet of Things, rich-media streaming and other hyper-scale workloads

- Gain nearly unlimited performance and capacity scalability thanks to the powerful grid architecture of IBM® Spectrum Scale™ Elastic Storage™ Server technology

- Leverage the advantages of advanced storage virtualization, integrated high availability, automated tiered storage management and high-performance configurations

The volume, velocity and value of data continue to increase at exponential rates. The cloud, mobile and social systems of engagement, big-data analytics, and the Internet of Things (IoT) are poised to accelerate data volumes and velocities ever faster.

You want much more for your business than simply to react; you want to lead and thrive in this rapidly changing 21st century business environment IBM calls the Cognitive Era. But to innovate at the speed of cognitive business, you need data storage that transforms massive data challenges into manageable, cost-effective business opportunities.

Historically, enterprise-grade storage arrays were expensive, inflexible and difficult to share among multiple systems and applications. Today, however, these systems are quickly being replaced by software-defined storage systems that use lower-cost components in a flexible, highly scalable architecture that enables enterprises to easily expand and re-target storage across diverse systems and workloads.

IBM DeepFlash™ Elastic Storage Server is a software-defined storage solution that provides optimal workload flexibility, an extraordinary low cost-to-performance ratio, and the data lifecycle management and storage services required by enterprises grappling with high-volume, high-velocity data challenges. IBM DeepFlash Elastic Storage Server is an ideal choice to accelerate systems of engagement, unstructured data, big data analytics, and other workloads requiring high-capacity, high-performance and comprehensive file and object storage capabilities.

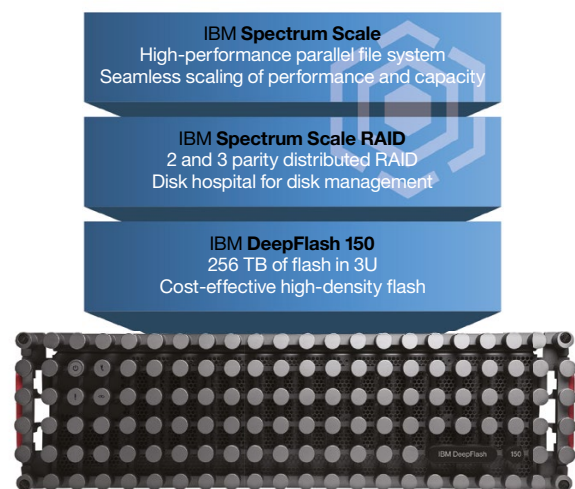## Introducing IBM DeepFlash Elastic Storage Server

IBM DeepFlash Elastic Storage Server is a software-defined flash storage solution composed of high-density, cost-effective IBM DeepFlash 150 all-flash storage integrated with the award-winning IBM Spectrum Scale Elastic Storage Server massively scalable architecture.

IBM DeepFlash 150 provides an essential big-data building block for exabyte-scale, cost-constrained, high-density and high-performance storage environments. It delivers the response times of an all-flash array coupled with extraordinary cost advantages to support workloads that span the life sciences, media and entertainment, oil and gas, and high-performance computing (HPC), among other unstructured data use cases.

IBM Spectrum Scale is a software-defined storage solution with unified file, object and analytics support that provides superior resiliency, scalability and data management. With roots in high performance computing, IBM Spectrum Scale—the file management member of the IBM Spectrum Storage™ family of market-leading software-defined storage solutions—is an ideal choice for 21st-century file and object storage use cases.

IBM Spectrum Scale Elastic Storage Server combines the performance of IBM Power® servers with IBM Spectrum Scale software to offer a high-performance, scalable building-block approach to modern file and object storage needs. IBM Elastic Storage Server technology allows organizations to start with a configuration that meets their current needs and expand capacity and bandwidth with each additional IBM Elastic Storage Server to meet future needs.

The building blocks of IBM DeepFlash Elastic Storage Server

IBM **Spectrum Scale**
High-performance parallel file system
Seamless scaling of performance and capacity

IBM **Spectrum Scale RAID**
2 and 3 parity distributed RAID
Disk hospital for disk management

IBM **DeepFlash 150**
256 TB of flash in 3U
Cost-effective high-density flash

An IBM DeepFlash Elastic Storage Server implementation is constructed by deploying multiple IBM Elastic Storage Server nodes, each of which runs IBM Spectrum Scale software, shares storage management duties and is connected to IBM DeepFlash 150 all-flash storage. This building block or grid architecture approach offers great resiliency to the overall IBM Spectrum Scale implementation, as well as other advantages such as linear scaling of both capacity and performance as additional IBM Elastic Storage Server and IBM DeepFlash 150 building blocks are added.

Exabyte-scale storage without compromise

The IBM DeepFlash 150 all-flash storage array is a building block for software-defined storage infrastructures. It is a key element of software-defined storage solutions primarily targeted at big data, media and entertainment streaming, virtual desktop, high-speed database and hyper-scale environments. IBM DeepFlash 150 provides highly scalable capacity and performance plus market-leading economics surpassing that of conventional enterprise-grade storage systems.

IBM DeepFlash 150 introduces breakthrough economics for active data sets. The basic IBM DeepFlash 150 hardware platform breaks cost-per-gigabyte barriers, even when using IBM Spectrum Scale Elastic Storage Server stack software. Additionally, IBM DeepFlash 150 has been designed to optimize reliability, availability and serviceability. Compared to the spinning disk-based systems used in many large-scale storage environments, flash requires less redundancy, has a significantly lower failure rate and consumes much lower power. For serviceability, IBM DeepFlash 150 components are hot-swappable, making the entire system an easy, field-replaceable unit.

High-performance file and object solution

IBM Spectrum Scale offers many advantages over conventional file system storage solutions for big data and analytics environments. It is a proven, highly scalable, high-performance data and file management solution that provides simplified data management and integrated information lifecycle tools capable of managing exabytes of data and billions of files. It includes a full-featured set of file data management tools, including advanced storage virtualization, integrated high availability, automated tiered storage management, and high-performance configurations that help enterprises effectively manage the very large quantities of file data being consumed by massive unstructured data and analytics applications.

IBM Spectrum Scale is designed to support a wide range of application workloads using a variety of access protocols. Its transparent cloud tiering feature connects IBM on-premises storage directly to cloud or object storage, enabling 21st-century cognitive businesses to leverage the benefits of cloud storage with the simplicity of legacy data access protocols and a common view of data across all storage platforms.

IBM Spectrum Scale is a centralized storage solution ideal for distributed analytics computing over network. It does not rely on conventional file system protocols and provides all the advantages of distributed data when deployed in the IBM Elastic Storage Server configuration. The lack of file system overhead and the benefit of highly parallel IBM Elastic Storage Server performance and throughput eliminate traditional storage bottlenecks as well as add significantly to the ability to scale high-volume, high-velocity analytics environments.

Unlike in other storage solutions that must implement separate, add-on systems to handle files or objects, all data—regardless of the way it is accessed—is stored in the IBM Spectrum Scale file system. Once part of the core file system, block-, file- and object-based data can be accessed and managed in essentially the same ways. And an impressively wide range of data storage services and features can be applied across all the data as appropriate, including snapshots, information lifecycle management, storage tiering, asynchronous or synchronous data replication, and some unique data protection strategies.

And unlike other software-defined storage products, especially those in the object-storage market, IBM Spectrum Scale offers native, high performance and scalable access to block, file and object data via almost all the standard object storage protocols, including OpenStack Swift, Amazon S3, CIFS, NFSv3 or POSIX.

Advantages of IBM DeepFlash Elastic Storage Server

IBM DeepFlash Elastic Storage Server implementations provide a number of advantages to unstructured data and big data analytics environments. Perhaps the most powerful advantage is simplified infrastructure. Essentially, IBM DeepFlash Elastic Storage Server implementations render complex storage area network (SAN) configurations obsolete. IBM DeepFlash Elastic Storage Server solutions operate in a grid-like architecture leveraging standard Ethernet connectivity. Instead of building a separate SAN to meet big data storage requirements or adding network-attached storage (NAS) filer after NAS filer as data volumes and velocities grow, the entire analytics solution can be composed of IBM Elastic Storage Server nodes integrated with IBM DeepFlash 150 all-flash storage.

Your IBM DeepFlash Elastic Storage Server solution can start small and grow as your needs expand. You can directly connect IBM Elastic Storage Server nodes using IBM General Parallel File System (GPFS™) over Ethernet protocol, iSCSI 10/40 GbE or even FDR InfinBand—greatly accelerating both performance and bandwidth over Ethernet, while IBM Spectrum Scale allows you to utilize network file system (NFS) and server message block (SMB) protocols, as well as others, as needed.

This leads to another powerful advantage—scalability. With each IBM Elastic Storage Server node you add, overall system performance, bandwidth and resilience all simply scale linearly. For example, one IBM DeepFlash Elastic Storage Server implementation can support up to 32 productive SAP HANA databases, with each SAP HANA client leveraging up to 10 GB/s of throughput.

NAS solutions have inherent disadvantages. They don't scale easily, they are bound to a single network socket, and NFS labors under a substantial protocol overhead, all of which result in very limited data throughput. Deploying IBM Spectrum Scale to support big-data analytics environments can change the paradigm by simplifying storage configurations, eliminating the limits on capacity and performance scalability, and greatly simplifying system management, all while substantially lowering costs and complexity. In fact, IBM testing confirmed that IBM Spectrum Scale Elastic Storage Server solutions outperformed conventional systems by a substantial margin.

As your IBM DeepFlash Elastic Storage Server deployment grows, so do both system utilization and resilience, thanks to the grid architecture that not only enables highly parallel data access but also spreads both management functions and data storage across all available resources. The IBM DeepFlash Elastic Storage Server grid provides inherent high availability for business-critical applications, with availability, performance, data protection and capacity increasing linearly with each added IBM Elastic Storage Server node. No matter the number of IBM Elastic Storage Server nodes, system utilization always remains at 100 percent. In fact, the whole concept of worrying about storage utilization becomes obsolete in an IBM DeepFlash Elastic Storage Server solution.

In terms of data protection and system resilience, IBM Spectrum Scale goes beyond the natural benefits of grid architecture by providing multiple disaster-recovery capabilities. For example, IBM Spectrum Scale offers asynchronous data replication to remote sites. And each individual analytics application can be separately backed up by IBM Spectrum Scale snapshot facilities.

The advantages of deploying IBM DeepFlash Elastic Storage Server also include:

- *Data redundancy:* IBM Spectrum Scale RAID supports highly reliable 2-fault-tolerant and 3-fault-tolerant Reed-Solomon-based parity codes (erasure coding) as well as 3-way and 4-way replication. Cross node mirroring/replication is also embedded in IBM Spectrum Scale.
- *Innovative graphical user interface (GUI):* The intuitive IBM Elastic Storage Server GUI allows global management and monitoring of the system, locally and remotely.

With lower risk, greater confidence, less infrastructure, simplified scaling, higher performance and bandwidth, multi-dimensional data protection and disaster-recovery options, plus all the system functionality and data lifecycle monitoring and management capabilities offered by IBM Spectrum Scale, IBM DeepFlash Elastic Storage Server is an unstructured data storage solution that brings plenty of advantages.

IBM Elastic Storage Server at a glance

Systems	IBM Power S822L (2) storage servers IBM Power S821L management server (one per installation)	
Interconnects	Ethernet adapters InfiniBand switches and adapters	10 G, 40 G EDR InfiniBand
Storage units	IBM DeepFlash 150	
Operating system	Red Hat Enterprise Linux (RHEL)	
Cluster management software	IBM Spectrum Scale for Linux	
Number of JBOFs	2	
Drive capacity	8 TB Flash Module	
Maximum number of drives	64 per array	
Maximum usable capacity	360 TB	
Supported RAID levels	RAID-1, -6 (8+2P or 8+3P) with IBM declustered RAID technology	
Scalability	IBM Elastic Storage Server scales in a building block approach—capacity, bandwidth and the single name space increases as more building blocks are added to scale out the entire solution. If the solution is sold as standalone, the POWER8 processor-based maintenance server will act as the quorum node. An IBM Elastic Storage Server license is required.	
Services	• Intelligent cluster hardware installation is included at no charge. • IBM Lab Services is available for customer configuration and enablement support.	
Warranty	3-year parts, customer-replaceable unit (CRU) or on-site labor, limited warranty, with individual nodes retaining the warranty and service upgrade offerings for that IBM machine type; optional warranty service upgrades. Support is 9 x 5, next business day.	

Why IBM?

IBM provides industry-leading flash and software-defined storage solutions that address the full range of application workloads, business use cases and budgetary requirements. IBM all-flash storage solutions provide enterprises of all types and sizes with the high performance, agility and flexibility they need to compete, innovate and grow.

For more information

To learn more about IBM Elastic Storage Server, please contact your IBM representative or IBM Business Partner, or visit:

- **ibm.com**/systems/storage/flash/deepflash-ess/
- **ibm.com**/systems/storage/software-defined-storage

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