



Highlights

- Reduce performance bottlenecks on critical IT workloads, such as backup and restore
 - Run Hadoop and other big-data applications directly on enterprise storage
 - Share data across applications with unified storage for file and object data
 - Designed for five nines of availability¹ with faster rebuild of failed disks and erasure coding for declustered Redundant Array of Independent Disks (RAID) technology
 - Deliver performance with automatic load balancing and a parallel file system
 - Scale capacity smoothly in building from terabytes (TBs) to petabytes (PBs) and beyond
 - Deliver consistent performance for IBM® Spectrum Scale built on input/output (I/O)-intensive [IBM Power servers](#) and flash.
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IBM Elastic Storage Server

Modern software-defined storage system

Today's exponential growth of data, transactions and digitally-aware devices is demanding larger and larger amounts of unstructured data storage and management across diverse workloads. As each department or division attempts to satisfy its own storage and performance needs, your organisation can find itself with many disparate systems isolated from each other. This can result in expensive resource duplication, complicated management and isolated pools of data. In addition, the resulting islands of information may hold valuable insights that may not be accessible in such a fragmented environment.

Traditional RAID is no longer an effective mechanism for data protection for modern disk drives (DDs), since it can take several hours or even days to rebuild a failed drive. Advanced erasure coding to spread the data and shorten recovery time is required to avoid the catastrophic results of multi-disk failures with traditional RAID.

Software-defined storage for your business

IBM Elastic Storage Server is a modern implementation of software-defined storage, combining IBM Spectrum Scale software with IBM POWER8 processor-based I/O-intensive servers and robust, dual-ported storage enclosures. IBM Spectrum Scale is the parallel file system at the heart of IBM Elastic Storage Server. IBM Spectrum Scale scales system throughput as it grows while still providing a single namespace. This ability eliminates data silos, simplifies storage management and



delivers high performance. By consolidating storage requirements across your organisation onto IBM Elastic Storage Server, you can reduce inefficiency, lower acquisition costs and support demanding workloads.

Unique to IBM Elastic Storage Server is IBM Spectrum Scale RAID software that utilises erasure coding instead of traditional RAID for data protection. By using erasure coding techniques, IBM Elastic Storage Server can rebuild disks in minutes, which can minimise the effects of multi-disk failures. IBM Spectrum Scale RAID is implemented completely in software, distributing data across the available physical storage. Requiring less overhead than traditional RAID, IBM Spectrum Scale RAID increases data capacity and data integrity. The software-defined storage solution has been tuned specifically to deliver the high performance and low latency sought with all-flash scale-out storage. IBM Elastic Storage Server is a building-block solution from IBM designed for high-performance shared storage to handle modern workloads driven by unstructured data.

The capabilities of IBM Elastic Storage Server include:

- **Declassified data:** IBM Spectrum Scale RAID distributes client data, redundancy information and spare space uniformly across disks. This distribution reduces the rebuild or disk-failure recovery process overhead compared to traditional RAID. Critical rebuilds of failed multi-TB drives full of data can be accomplished in minutes – rather than hours or even days when using traditional RAID technology
- **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 three-way and four-way replication

- **Tuned performance:** Software-defined IBM Spectrum Scale RAID software, explicitly coupled with large memory cache in the IBM Power server, allows IBM Elastic Storage Server to mask the inefficiencies and long latency times of nearline-serial attached SCSI (SAS) drives with low-latency flash storage, while still leveraging the high density of the drives themselves
- **Simplified management:** The intuitive graphical user interface (GUI) for software and systems for management and monitoring of IBM Elastic Storage Server also integrates into IBM Spectrum Control
- **Superb streaming performance:** The system can deliver more than 36 gigabyte (GB)/s of sustained performance
- **Scalability and extensibility with multi-site and cloud support:** Multiple deployment options for software-defined storage to scale in performance and capacity while still providing a single namespace. This means installations can start small and grow as data needs expand.

Designed for rapid deployment

IBM Elastic Storage Server is easy to deploy and ships pre-assembled and pre-configured with the right hardware and software. The complete IBM Elastic Storage Server hardware stack is fully validated with the various hardware drivers and IBM Spectrum Scale. Once the system arrives on-site, services are available from IBM for fast configuration and integration into your data centre's (DCs) Ethernet or InfiniBand network.

Designed to scale

In today's world, data capacity needs rarely decrease. However whether you need more or less storage, IBM Elastic Storage Server is designed to scale using a building-block approach that also includes other storage. Each snap-together expansion block

can add or reduce capacity, bandwidth, files or objects. Customer experience has shown near-linear scaling of performance as new IBM Elastic Storage Server nodes are added to form an IBM Spectrum Scale cluster.

Designed for a variety of workloads

IBM has implemented IBM Elastic Storage Server configurations for a variety of workloads – from high-velocity ingest through high-density (HD) cloud storage usage models, deploying the latest all-flash, SAS and nearline-SAS drives. Now in its second generation, IBM Elastic Storage Server is offered with all-flash storage (for latency-oriented workloads) and with disk for higher-capacity storage. IBM offers configurations that can support more than five PB of raw, deployable storage in a single industry-standard 42U rack. For mixed workloads, the server supports varied configurations of building blocks, with placement rules for the creation and management of all data on the appropriate storage tier.

High-performance, data efficiency and multi-site redundancy make IBM Elastic Storage Server an ideal target for primary backup. You can meet demanding backup and restore objectives with support for multiple backup servers and the high-performance IBM Elastic Storage Server. IBM Spectrum Scale is supported by independent software vendors (ISVs) including Commvault and Veritas, as well as by IBM Spectrum Protect. Deployment with IBM Spectrum Protect is simple with IBM Spectrum Protect blueprints to guide you. With the user-experience approach common to IBM Spectrum Storage Suite, IBM Spectrum Protect administrators can quickly adapt to the IBM Elastic Storage Server GUI.

The Hadoop connector to IBM Spectrum Scale allows you to run your Hadoop applications directly on IBM Elastic Storage Server for in-place analytics and thereby avoid the overhead of copying data to isolated Hadoop Distributed File System (HDFS) storage. This ability to run Hadoop applications directly on IBM Elastic Storage Server not only eliminates lost time in copying data to HDFS but also prevents running analytics on stale data. With HDFS transparency federation in IBM Spectrum Scale, IBM Elastic Storage Server can now co-exist with HDFS storage. IBM and Hortonworks is a certified solution with reference architectures available, expanding the Hortonworks Data Platform (HDP) with IBM Data Science Experience and IBM Big SQL – providing new integrated solutions designed to help everyone from data scientists to business leaders better analyse and manage mounting data volumes and accelerate data-driven decision-making.

For a wide variety of workloads, including SAP HANA, IBM Elastic Storage Server is easy and seamless to scale on demand; IBM Elastic Storage Server provides superb bandwidth for database startup and recovery and provides a fully high-availability (HA) disaster recovery (DR) and scalable (parallel) environments. Data protection includes end-to-end (E2E) snapshot integration (including with SAP HANA DB Studio). IBM Elastic Storage Server is a certified Tailored DC Integration (TDI) solution.

Designed for performance

Storing PBs of data is of no value to business unless that data can be accessed, analysed and retrieved quickly. Sustained streaming performance of data can reach 40 GB/s in each

building block, growing as more blocks are added to a configuration. By combining the superb data movement capability of IBM Power Systems servers with the enhanced I/O subsystem, as well as adding the disk-management capability of IBM Spectrum Scale RAID, a complete storage solution can be deployed to support diverse workloads. With support for multiple 10 gigabit Ethernet (GbE), 40GbE or 100GbE Ethernet and EDR or fourteen data rate (FDR) InfiniBand, IBM Elastic Storage Server has the architecture to deliver high data throughput to meet the demands of high-performance workloads, now common across *every* computing workload.

An integrated solution for IBM Spectrum Scale:

- Comes as an integrated system, preloaded with IBM Spectrum Scale software and IBM Spectrum Scale RAID
- Fully validated hardware and software stack ships pre-assembled
- Includes [IBM Systems Lab Services](#) on-site services at installation.

Enabled to support data service workloads:

- Apache Hadoop workloads with certified Hortonworks support
- Technical computing and analytics
- High-performance backup and restore target
- Shared infrastructure for file and object data.

IBM Power Systems are designed for data:

- Massively parallel with 96 hardware threads: 12-core processor and 8 threads per core
- Up to five times the I/O bandwidth of typical x86 systems: 96 GB/s per socket
- Up to three times the cache of typical x86 systems
- As much as six times the memory bandwidth of typical x86 systems: 410 GB/s (peak) memory bandwidth to CPU
- Up to two times better per-core performance over Intel for Java™
- Compression offload for simplification.

Scalable networking with IBM and other networks:

- High-bandwidth: 10GbE, 40GbE or 100GbE Ethernet and EDR or FDR InfiniBand Remote Direct Memory Access (RDMA), low-latency networking Ethernet (RDMA over Converged Ethernet [RoCE])
- Storage allocation flexibility for analytic zones
- [OpenPOWER Foundation](#)-developed technologies combined with system optimisations for high-speed networks.

Why IBM?

IBM invests in solutions that put data to work, helping organisations realise the full potential of big data and analytics to better serve their customers while improving competitive advantage. IBM has the expertise and solutions to help businesses exploit advanced analytics to enable growth, mitigate risk and improve operational efficiency.

IBM Elastic Storage Server at a glance

Models	GS1S, GS2S, GS4S	GL2S, GL4S, GL6S
Systems	IBM Power 5148-22L (2) storage servers IBM Power 5148-21L ESS management server (one per installation)	
Interconnects	10GbE, 40GbE, 100GbE Ethernet FDR, EDR InfiniBand	10GbE, 40GbE, 100GbE Ethernet FDR, EDR InfiniBand
Storage units	IBM 5147-024 2U JBOFs	5147-084 5U JBODs
Operating system (OS)	Red Hat Enterprise Linux (RHEL) Little Endian	
Cluster management software	IBM Spectrum Scale for ESS (5765-ESS), xCat	
Number of JBODs	1, 2 or 4 2U, 24 drive 2.5-inch solid state drives (SSDs)	2, 4 or 6 5U, 84 drive 3.5-inch hard disk drives (HDDs)
Drive capacity	4 TB or 15 TB SSDs	4 TB, 8 TB or 10 TB nearline-SAS HDDs
Maximum number of drives	96 SSDs	502 HDDs
Maximum usable capacity per ESS	1.0 PB usable	3.7 PB usable
Supported RAID levels	RAID-1 (8+2P) or (8+3P) with IBM declustered RAID technology	
Performance	See SPEC SFS 2014 version results: https://www.spec.org/sfs2014/results/sfs2014.html	

Rack cabinets

42U rack cabinet	2,020 mm H x 640 mm W x 1,100 mm D (79.5 in. H x 25.2 in. W x 43.3 in. D); 261 kg (574.2 lb)
Power	IBM Ultra Density Enterprise 60A/208V/3ph (US)
Scalability	IBM Elastic Storage Server scales in a building block approach – capacity, bandwidth and the single namespace increases as more building blocks are added to scale out the entire solution. If the solution is sold as standalone, the POWER8 processor-based IBM Elastic Storage Server management server will act as the quorum node.
Services	<ul style="list-style-type: none"> • IBM Elastic Storage Server 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 labour, limited warranty, with individual nodes retaining the warranty and service upgrade offerings for that IBM machine type; optional warranty service upgrades. Support is 09:00 to 17:00, next business day. Optional warranty service upgrades to 24x7.

For more information

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

- ibm.com/systems/storage/spectrum/ess/
- ibm.com/storage

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.

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IBM United Kingdom Limited

PO Box 41
North Harbour
Portsmouth
Hampshire
PO6 3AU
United Kingdom

IBM Ireland Limited

Oldbrook House
24-32 Pembroke Road
Dublin 4

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¹ As reflected in field reports for production systems, reflecting millions of hours of total system operation over a two-year period.