



Highlights

- Manage heterogeneous storage from a single point of control
 - Move data among virtualized storage systems without disruptions
 - Store up to five times¹ as much active data in the same physical disk space using IBM Real-time Compression
 - Simplify storage infrastructure with support for Fibre Channel over Ethernet (FCoE) protocol
 - Optimize solid-state storage deployments automatically with IBM System Storage® Easy Tier®
 - Allow for non-disruptive scalability from the smallest configuration to the largest
 - Implement stretched configurations for high availability and data mobility between data centers
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IBM System Storage SAN Volume Controller

Simplified and centralized management for your storage infrastructure

Are your storage requirements growing too fast? Are the costs of managing this growth taking more and more of your IT budget? Would you like to make a better use of existing storage without adding more complexity to the infrastructure? IBM System Storage SAN Volume Controller can help solve these problems and get you on the road toward a more flexible, responsive and efficient storage environment. SAN Volume Controller is designed to deliver the benefits of storage virtualization in environments from large enterprises to small businesses and midmarket companies.

The world is becoming smarter every day. What's making it smarter?

Today's businesses are facing explosive data growth every day. Every moment or action is a transaction, which creates data that is stored, copied, analyzed, classified and audited. Therefore, IT infrastructure has a new challenge: Store more with limited or less resources. This challenge means growing capacity without complexity while controlling capital and operational expenses and improving the efficiency of your storage environment.

Toward that end, many businesses have pursued strategies such as consolidation, tiering and virtualization to optimize their resources, simplify the environment and scale to support information growth.



These strategies help to get the most from your storage resources, and achieve a simpler, more scalable and cost-efficient IT infrastructure that aligns more flexibly with your business goals.

Originating at IBM some 40 years ago, virtualization has taken on new life in a variety of contexts: Virtual servers to virtual storage, optimized networks, workstations in virtualized environments and application virtualization. The potential benefits are far reaching, ranging from increased utilization, business flexibility and improved productivity to lower total costs of computing and improved reliability. Depending on the starting point, type and extent of the virtualization implemented, clients can quickly achieve many of these benefits.

Storage and server virtualization are complementary technologies that help enable you to build a completely virtualized infrastructure. When used together, server and storage virtualization are intended to enable you to derive greater benefit from each technology than if you deployed them alone.

SAN Volume Controller is a storage virtualization system that enables a single point of control for storage resources to help support improved business application availability and greater resource utilization. The objective is to manage storage resources in your IT infrastructure and to make sure they're used to the advantage of your business—and do it quickly, efficiently and in real time, while avoiding increases in administrative costs.

SAN Volume Controller supports attachment to servers using iSCSI protocols over IP networks at 1 Gbps or 10 Gbps speeds, which can help reduce costs and simplify server configuration. SAN Volume Controller also supports FCoE protocol, enabling

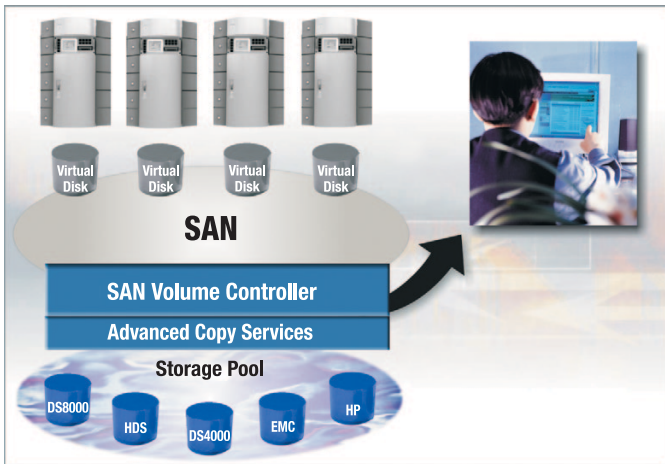


use of converged data center infrastructures; this new capability simplifies data center and ease management by using the same network for storage, WAN and LAN.

Scalability and performance

SAN Volume Controller combines hardware and software into an integrated, modular solution that is highly scalable. An I/O group is formed by combining a redundant pair of storage engines based on IBM System x® server technology with an Intel Xeon 5600 2.5 GHz quad-core processor, 24 GB of cache, four 8 Gbps Fibre Channel ports, two 1 Gbps iSCSI ports and optionally, two 10 Gbps iSCSI/FCoE ports. Highly available I/O groups are the basic configuration element of a SAN Volume Controller cluster. Adding I/O groups to the cluster is designed to increase cluster performance and bandwidth.

An entry-level SAN Volume Controller configuration contains a single I/O group, can scale out to support four I/O groups and can scale up to support 1024 host servers, up to 8192 volumes and up to 32 PB of virtualized storage capacity. This



IBM System Storage SAN Volume Controller is designed to virtually consolidate capacity from different storage systems, help provide common copy functions and enable data movement without server disruption, while supporting management of diverse storage from a single point.

configuration flexibility means that your SAN Volume Controller implementation can start small with an attractive price to suit smaller environments or pilot projects, and then grow with your business to manage very large storage environments.

A new performance dashboard provides at-a-glance access to key high-level, real-time system performance information, which helps you monitor and optimize the virtualized environment. IBM Tivoli® Productivity Center provides access to—and analysis of—historical performance data.

Innovative solid-state drive support

SAN Volume Controller supports up to four solid-state drives (SSDs) per node delivering up to 3.2 TB of raw SSD capacity per I/O group or 12.8 TB of raw capacity per SAN Volume Controller system, enabling scale-out high performance SSD support. The scalable architecture of this solution and the tight integration of SSDs enable businesses to take advantage of the high throughput capabilities of the SSDs. The scalable architecture is designed to deliver outstanding performance with SSDs for critical applications: up to 800,000 read I/Os per second with response times around 1ms, approximately one-tenth the typical response time of traditional disk storage.

SAN Volume Controller also includes the System Storage Easy Tier function, which is designed to help improve performance at lower cost through more efficient use of SSDs. The Easy Tier function automatically identifies highly-active data within volumes and moves only the active data to an SSD. In this way, the Easy Tier function targets use of an SSD to the data that will benefit the most, helping deliver the maximum benefit even from small amounts of SSD capacity. SAN Volume Controller also supports a variety of RAID protection schemes for internal SSDs.

SAN Volume Controller support of SSDs is highly flexible with a minimum configuration of only two SSDs, helping to make the dramatic performance of SSD technology more affordable. Easy Tier supports both internal SSDs within SAN Volume Controller engines as well as SSDs in virtualized disk systems for tremendous configuration flexibility.

Because SAN Volume Controller's solid-state support is tightly integrated, functions such as data movement, replication and management all may be used with SSDs in the same way as for other storage. SAN Volume Controller helps move critical data to and from SSDs as needed without application disruption.

Increase utilization

SAN Volume Controller is designed to help increase the amount of storage capacity that is available to host applications. By pooling the capacity from multiple disk systems within the SAN, it helps enable storage administrators to reach beyond traditional islands of SAN storage and deploy storage in ways that can help best meet the needs of host applications.

In addition, SAN Volume Controller combines together a variety of IBM technologies including thin provisioning, automated tiering, storage virtualization, Real-time Compression, clustering, replication, multi-protocol support and a next-generation graphical user interface (GUI). Together, these technologies are designed to enable SAN Volume Controller to deliver extraordinary levels of storage efficiency.

Newest of these technologies is IBM Real-time Compression, which is designed to improve efficiency enabling you to store up to five times¹ as much data in the same physical disk space by compressing data as much as 80 percent. Unlike other approaches to compression, IBM Real-time Compression is designed to be used with active primary data such as production databases and e-mail systems, which dramatically expands the range of candidate data that can benefit from compression. As its name implies, IBM Real-time Compression operates immediately as data is written to disk meaning that no space is wasted storing uncompressed data awaiting post-processing.

The benefits of using IBM Real-time Compression together with other efficiency technologies are very significant and include reduced acquisition cost (because less hardware is required), reduced rack space, and lower power and cooling costs throughout the lifetime of the system. Real-time Compression can significantly enhance the usable capacity of your existing storage systems, extending their useful life even further.

By significantly reducing storage requirements with IBM Real-time Compression, you can keep more information online, use the improved efficiency to reduce storage costs or achieve a combination of greater capacity and reduced cost.

Because IBM Real-time Compression can be applied to a much wider range of data—including primary online data—the benefits of compression with SAN Volume Controller can be much greater than with alternative solutions, resulting in much greater savings.

Improve application availability

Because it hides the physical characteristics of storage from host systems, SAN Volume Controller is designed to help insulate host applications from physical changes to the storage pool. This ability can help applications continue to run without disruption while you make changes to your storage infrastructure, which can help your business increase its availability to customers.

Moving data is one of the most common causes of planned downtime. SAN Volume Controller includes a dynamic data migration function that is designed to move data from one storage system to another while maintaining access to the data. The data migration function might be used, for example, when replacing older storage with newer storage, as part of load balancing work or when moving data in a tiered storage infrastructure.

The SAN Volume Controller Volume Mirroring function is designed to store two copies of a volume on different storage systems. This function helps improve application availability in the event of failure or disruptive maintenance to an array or disk system. SAN Volume Controller is designed to automatically use whichever copy of the data remains available.

Replication services

With many conventional SAN disk arrays, replication operations are limited to in-box or like-box-to-like-box circumstances. Functions from different vendors can operate in different ways, which makes operations in mixed environments more complex and increases the cost of changing storage types. But SAN Volume Controller is designed to enable administrators to apply a single set of advanced network-based replication services that operate in a consistent manner, regardless of the type of storage being used.

The IBM FlashCopy® function is designed to create an almost instant copy of active data that can be used for backup purposes or for parallel processing activities. Up to 256 copies of data may be created.

SAN Volume Controller supports incremental FlashCopy operations, which copy only the portions of the source or target virtual disks that have been updated since the FlashCopy function was last used. This solution also supports cascaded operations where the target of one FlashCopy relationship is itself further copied. These abilities can be used to help maintain and update a test environment based on production data.

The Multiple-Target Reverse FlashCopy function is designed to enable FlashCopy targets to become restore points for source volumes without breaking the FlashCopy relationship and without having to wait for the original copy operation to complete. This capability helps enable disk backup copies to be used to recover almost instantly from corrupted data, significantly speeding application recovery.

The Metro Mirror and Global Mirror functions operate between SAN Volume Controller systems at different locations to help create copies of data for use in the event of a catastrophic event at a data center. For even greater flexibility, Metro Mirror and Global Mirror also support replication between SAN Volume Controller systems and IBM Storwize® V7000 Unified systems. Metro Mirror is designed to maintain a fully synchronized copy at “metropolitan” distances of up to 300 km, whereas Global Mirror is designed to operate asynchronously and so helps maintain a copy at much greater distances up to 8,000 km. Both functions are designed to support VMware vCenter Site Recovery Manager to help speed disaster recovery. Enhancements to Global Mirror can provide new options to help administrators balance network bandwidth requirements and recovery point objectives for applications, helping to reduce operating costs for disaster recovery solutions.

The Multiple Cluster Mirror function is designed to enable a SAN Volume Controller cluster to have remote mirror relationships with more than one other cluster. For example, this function helps support a single consolidated disaster recovery location supporting up to three production locations, which can help reduce overall costs for implementing a business continuance strategy.

IBM Tivoli Storage FlashCopy Manager is designed to perform near-instant application-aware snapshot backups using SAN Volume Controller FlashCopy but with minimal impact to IBM DB2®, Oracle, SAP, Microsoft SQL Server and Microsoft Exchange. FlashCopy Manager also helps reduce backup and recovery times from hours to a few minutes.

Enhanced data mobility for high availability

Clients are increasingly deploying virtualized servers using IBM PowerVM®, VMware and other technologies in high availability configurations, including multisite clustered implementations. Such configurations provide attractive options for high availability and load balancing.

To enhance this capability, a SAN Volume Controller cluster can also be installed in a stretched configuration where a single cluster supports storage and servers in two data centers. In this configuration, the solution enables a highly-available stretched volume to be concurrently accessed by servers at both data centers. When combined with server data mobility functions such as VMware vMotion or PowerVM Live Partition Mobility, a SAN Volume Controller stretched cluster enables non-disruptive storage and virtual machine mobility between the two data centers. Depending on application performance requirements, SAN Volume Controller stretched clusters may be deployed between data centers up to 300km apart.

These stretched clusters may be combined with Metro Mirror or Global Mirror to support a third data center for applications that require both high availability and disaster recovery in a single solution.

Non-disruptive volume migration among nodes is also enabled by SAN Volume Controller, maximizing configuration flexibility. This means that this solution now allows organizations to move volumes between I/O groups to use the entire virtualized infrastructure, improving utilization and optimization.

Improve productivity

SAN Volume Controller provides an easy-to-use graphical interface for central management. With this single interface, administrators can perform configuration, management and service tasks in a consistent manner over multiple storage systems, even from different vendors. SAN Volume Controller is designed to allow administrators to map disk storage volumes to virtual pooled volumes to help them use their storage more efficiently. Users have as much as doubled the productivity of storage administration, helping their storage grow with their businesses while reducing the need for additional manual management.

The thin provisioning function helps automate provisioning as described above and helps improve productivity by enabling administrators to focus on overall storage deployment and utilization, and longer-term strategic requirements, without being distracted by routine everyday storage provisioning.

Simplify management

SAN Volume Controller uses a completely new graphical user interface modeled on the IBM XIV® Storage System, which has been very well received by customers. The user interface is designed to be easy to use and includes many built-in IBM recommendations to help simplify storage provisioning so new users can get started quickly. At the same time, the new interface preserves access to all the functional richness that experienced users have come to expect from SAN Volume Controller.

Plugins to support Microsoft System Center Operations Manager and VMware vCenter help enable more efficient consolidated management in these environments.

SAN Volume Controller uses the IBM System Storage Productivity Center, an advanced management console that can provide a view of both IBM and non-IBM storage environments. As a common management console supporting IBM System Storage DS8000® and SAN Volume Controller, this console is designed to facilitate a greater degree of simplification for growing organizations.

Complement server virtualization

As described above, storage virtualization with SAN Volume Controller complements server virtualization with technologies such as VMware vSphere.

Server virtualization helps speed provisioning of new server images because provisioning becomes a software operation rather than one requiring hardware changes. Similarly, provisioning with SAN Volume Controller is achieved with software and with thin provisioning, and is designed to become an almost entirely automated function. Without SAN Volume Controller, server provisioning could be slowed by the need to provision storage.

Functions such as VMware vMotion support application mobility between physical servers. Similarly, SAN Volume Controller is designed to support non-disruptive data migration between storage systems. In addition, this solution helps make storage potentially available to all attached servers, greatly increasing the flexibility for using vMotion. Without SAN Volume Controller, use of vMotion could be limited by storage being dedicated to specific servers.

Support for VMware vStorage APIs enables SAN Volume Controller to take on some storage-related tasks that were previously performed by VMware, which helps improve efficiency and frees up server resources for other more mission-critical tasks.

Because SAN Volume Controller appears to servers as a single type of storage, virtual server provisioning is also simplified because only a single driver type is needed in server images, which also simplifies administration of those server images. Similarly, this solution eases replacing storage or moving data from one storage type to another because these changes do not require changes to server images. Without SAN Volume Controller, changes of storage type could require disruptive changes to server images.

Server virtualization helps increase flexibility and reduce costs for disaster recovery by enabling the use of different physical configurations at production and recovery sites. Common virtual server configurations are used on these different physical infrastructures. Similarly, SAN Volume Controller supports the use of different physical storage configurations at production and recovery sites, yet helps create the same virtual configuration at each site. Without SAN Volume Controller, production and recovery site physical storage configurations would need to be similar, potentially increasing costs.

The FlashCopy snapshot replication function can be used to help reduce storage requirements when cloning boot drives for multiple virtual servers. When using this function, additional storage is used only for differences among servers instead of needing storage for each boot drive.

Many organizations run mixed environments with a variety of virtualized and non-virtualized servers and expect to do so for years to come. SAN Volume Controller provides an external storage virtualization function that operates in a consistent manner and provides consistent services for all attached servers, regardless of whether or not those servers are virtualized. In contrast, server-based storage virtualization techniques differ from server to server and make mixed environments more complex rather than less.

Virtualized foundation for cloud deployments

Improving efficiency and delivering a flexible, responsive IT infrastructure are essential requirements for any cloud deployment. Key technologies for delivering this infrastructure include virtualization, consolidation and automation.

With its storage virtualization capabilities and tight affinity with technologies such as PowerVM and VMware, SAN Volume Controller complements virtualized servers that are at the heart of cloud deployments. The high availability characteristics of SAN Volume Controller, including its ability to move data among storage systems and move volumes between SAN Volume Controller engines without disruption to applications, reinforces this role.

IBM Real-time Compression and thin provisioning help deliver levels of storage utilization higher than ever, lowering infrastructure costs. Finally, automated tiering technologies such as IBM Easy Tier and IBM Tivoli software help make the best use of the storage resources available.

Tiered storage

Deploying tiered storage is an important strategy for controlling storage cost, where different types of storage with different performance and cost characteristics are used to match different business requirements. Until now, however, management and functional differences among different types of storage—even from the same vendor—have made implementing tiered storage operationally complex, thereby limiting deployments. SAN Volume Controller is designed to make it much easier to implement tiered storage because it helps deliver consistent management and function across all tiers of storage, and helps support movement of data between tiers without disrupting applications. Because SAN Volume Controller also has cache, it can improve the performance of lower tier storage, enabling it to be used more widely in a data center which can further reduce costs. With its support for solid-state drives, this solution adds a new ultra-high-performance tier for critical application data.

Next-generation networking

As organizations evolve towards a dynamic infrastructure, they need new ways to reduce the complexity of their environments. To address this challenge, clients are turning to Converged Enhanced Ethernet (CEE) networks, which help enable them to combine storage, messaging traffic, VoIP, video, and other data on a common data center Ethernet infrastructure.

In this environment, FCoE helps enable highly efficient block storage over Ethernet for consolidating server network connectivity. As a result, you can deploy a single server interface for multiple data types, which can simplify both deployment and management of server network connectivity, while maintaining the high availability and robustness required for storage transactions.

SAN Volume Controller systems with 10Gbps Ethernet ports now support attachment to next-generation Converged Enhanced Ethernet networks using Fibre Channel over Ethernet. This support enables you to connect SAN Volume Controller to servers and to other SAN Volume Controller systems for clustering or mirroring using Fibre Channel or FCoE interfaces using these networks. The same ports may also be used for iSCSI server connections.

Improve energy efficiency

Many data centers today are focusing on reducing their energy usage to reduce costs and demonstrate concern for the environment. SAN Volume Controller can be a key tool to help you improve the energy efficiency of your data center. This solution can help improve energy efficiency in several ways. For example, IBM Real-time Compression with SAN Volume Controller can help by significantly increasing the effective capacity of

storage and reduce requirements for additional storage in the future. This can help reduce the total amount of physical storage required by up to 80 percent, helping reduce energy use. The thin provisioning and snapshot functions are designed to extend this benefit even further.

IBM services

IBM offers services to help speed implementation and improve return on investment. IBM storage specialists are available to conduct storage solution and infrastructure reviews that can help prepare and speed installation. And IBM Global Services can examine your infrastructure to help determine sizing and performance needs. In addition, you can choose from a range of service and subscription offerings designed to keep your infrastructure up-to-date and running smoothly.

IBM System Storage SAN Volume Controller supported environments

The table below provides a summary of SAN Volume Controller supported environments. For the most current, and more detailed, information, please visit ibm.com/systems/storage/software/virtualization/svc/ and click on Interoperability.

IBM System Storage SAN Volume Controller supported environments at a glance

Storage systems support

- Specific models of the following storage systems:
- IBM TotalStorage Enterprise Storage Server®, IBM System Storage DS3000, DS4000®, DS5000, DS6000™, DS8000, N series
 - IBM XIV Storage System
 - Storwize V7000 Unified
 - EMC Symmetrix VMAX, DMX and 8000-series models
 - EMC VNX
 - EMC CLARiiON CX-series models and FC4700
 - Hitachi Data Systems Thunder, Lightning, TagmaStore, AMS, WMS, Universal Storage Platform
 - Sun StorEdge systems, Sun StorageTek systems, FlexLine 200
 - Hewlett Packard MA8000, EMA12000, EMA16000, EVA family, MSA family, XP family, 3Par
 - NetApp FAS
 - Bull StoreWay
 - Fujitsu Eternus
 - NEC iStorage
 - Pillar Axiom
 - Texas Memory Systems RamSan
 - Xiotech Emprise 5000
 - Nexsan SATABeast
 - Compellent Fluid Data
 - Violin Memory

Host multipathing software

- System Storage Multipath Subsystem Device Driver (SDD)
 - Veritas Storage Foundation from Symantec 3.5 MP3, 4.0, 4.1, 4.3, 5.0, 6.0
 - PVLinks for HP-UX
 - MPIO for Windows and IBM AIX®
 - MPxIO for Solaris
 - Native NetWare multipathing driver
 - Native VMware multipathing driver for VMware ESX 2.5 and later
 - Native multipathing drivers for OpenVMS, Tru64, SGI Irix
 - RDAC multipathing software for certain DS4000 environments
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IBM System Storage SAN Volume Controller supported environments at a glance

Operating systems support	<ul style="list-style-type: none"> • AIX V4.3.3 • IBM AIX 5L™ V5.1, V5.2, V5.3 • AIX V6.1 • IBM z/VSE® V4.2 • IBM PowerVM Virtual I/O Server 1.2, 1.3, 1.4, 1.5 • Microsoft Windows 2000, 2003 and 2008 • Microsoft Hyper-V • Novell NetWare V6.5 • Solaris 8, 9, 10, 11 • VMware ESX 2.1, 2.5.2, 2.5.3, 3.0.2, 3.5, 3i • VMware vSphere 4, 5 • HP-UX 11.0, 11i V1, V2, V3 • Red Hat Enterprise Linux, Advanced Server 2.1, 3.0, 4.0, 5.0, 6.0 • SUSE Linux Enterprise Server 8, 9, 10, 11 • Citrix Xen Server • HP Tru64 5.1A, 5.1B • HP OpenVMS 7.3-2, 8.2, 8.3 • SGI Irix 6.5.28, Altix SLES 9 • Mac OS X Server 10.5
Support for SAN switches—selected models from the following suppliers	<ul style="list-style-type: none"> • BNT • Brocade • McDATA • Cisco • Qlogic
Service	<ul style="list-style-type: none"> • Customer engineer installation • Hardware warranty, one year parts and labor • One year of software maintenance included • Software upgrades and fix packs available through web download, may be installed non-disruptively
IBM Global Services storage services	<ul style="list-style-type: none"> • Consult and design <ul style="list-style-type: none"> – Backup and continuity planning – Performance utilization and capacity planning • Integrate and deploy <ul style="list-style-type: none"> – Installation, cabling and site preparation – Migration and consolidation – Education and training • Operate and manage <ul style="list-style-type: none"> – System support and maintenance

For more information

To learn more about the IBM System Storage SAN Volume Controller, please contact your IBM marketing representative or IBM Business Partner, or visit the following website:

ibm.com/systems/storage/software/virtualization/svc/

For information on HBAs and clustering support with the operating systems listed in the table above, visit:

ibm.com/systems/storage/software/virtualization/svc/

and click on Interoperability.

For the complete and latest support information, visit: ibm.com/storage/support/2145

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