IBM

IBM System Storage SAN Volume Controller

Highlights

- *Designed to combine storage capacity from multiple disk systems into a reservoir of capacity that can be managed more efficiently*

- *Designed to help increase storage utilization by providing host applications with more flexible access to capacity*

- *Designed to help improve storage administrator productivity by automating provisioning and enabling management of heterogeneous storage systems using a simple common interface*

- *Designed to support improved application availability by practically eliminating storage-related causes of application downtime*

- *Designed to enable a tiered storage environment in which the cost of storage can be better matched to the value of data*

- *Designed to support advanced copy services from higher- to lower-cost devices and across storage systems from multiple vendors*

- *Designed to reduce costs and improve flexibility with iSCSI host attachment*

- *Designed to enable greater flexibility in storage acquisitions*

- *Designed to deliver ultra-high performance for critical workloads with innovative and tightly integrated support for solid-state devices (SSDs)*

Building a simpler, more flexible and responsive IT infrastructure

In IT today, the only constant is change. Achieving best business results from a complex enterprise-class IT infrastructure means more than simply deploying new solutions; it means redefining IT as a versatile instrument of business strategy, which can change in parallel with changing demands.

Toward that end, many businesses have pursued strategies such as consolidation to reduce the number of servers or storage systems required to support IT services, and virtualization to unchain those services from specific implementations and redeliver them in a more flexible form.

Consolidation and virtualization can help you achieve a simpler, more scalable, more cost-efficient IT infrastructure that aligns more flexibly with your business goals.

Originating at IBM about 40 years ago, virtualization has taken on new life in a number 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 and business flexibility, improved productivity, to lower total costs of computing and improved reliability. Depending on the starting point and the type and extent of the virtualization implemented, clients can achieve some or many of these benefits quickly.

Server virtualization technologies can help improve server utilization, simplify and speed server provisioning, streamline application migration, and deliver greater flexibility in disaster recovery strategies.

Storage virtualization can help deliver similar benefits for your storage. 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.

The IBM System Storage™ SAN Volume Controller (SVC) 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
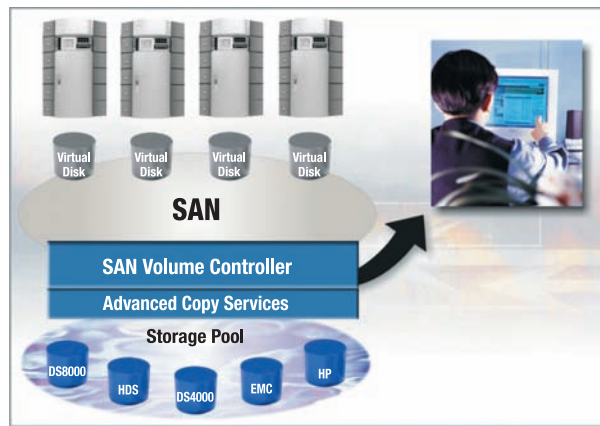

Figure 1. SVC is designed to virtually consolidate capacity from different storage systems, help provide common copy functions and enable data movement without server disruption, while supporting management of diverse storage from a single point.

storage resources in your IT infrastructure and to make sure they're used to the advantage of your business—and do it quickly, efficiently, in real time, while avoiding administrative cost.

SVC supports attachment to servers using iSCSI protocols over IP networks, which can help reduce costs and simplify server configuration. iSCSI attachment avoids the cost of fibre channel host bus adapters (HBAs) in servers and reduces the need for fibre channel switch ports. This new capability may be particularly attractive for IBM BladeCenter server configurations.

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®

5500 2.4 GHz quad-core processor, 24 GB of cache, and four 8 Gbps Fibre Channel ports. Highly available I/O Groups are the basic configuration element of a SAN Volume Controller cluster, as shown in Figure 1. 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 and up to 8192 virtual disks. This configuration flexibility means that SAN Volume Controller configurations can start small with an attractive price to suit smaller environments or pilot projects and then can grow with your business to manage very large storage environments (up to eight petabytes).

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Innovative Solid State Device (SSD) support

Building on IBM's Quicksilver technology demonstration, SAN Volume Controller now introduces support for solid state devices (up to four per SVC node delivering up to 584 GB of usable SSD capacity per I/O Group or 2.4 TB of usable capacity per SVC system) enabling scale-out high performance SSD support with SVC. The SVC scalable architecture and the tight integration of SSDs helps enable businesses to take advantage of the high throughput capabilities of the SSDs. The SVC 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.

SVC 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.

Because SVC's innovative solid-state support is tightly integrated, SVC functions such as data movement, replication and management all may be used with SSDs in the same way as for other storage. SVC helps move critical data to and from SSDs as needed without application disruption. IBM Tivoli® Storage Productivity Center contains new functions to help identify "hot spots" in storage that may be candidates for movement to SSD.

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 storage area network (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.

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 enable applications to continue to run without disruption while you make changes to your storage infrastructure, which can help your business increase its availability to its customers.

Moving data is one of the most common causes of planned downtime. SVC 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 Virtual Disk Mirroring function is designed to store two copies of a virtual disk on different storage systems. This function helps improve application availability in the event of failure or disruptive maintenance to an array or disk system: SVC is designed to automatically use whichever copy 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 type. 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 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.

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

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

The Metro Mirror and Global Mirror functions operate between SVC systems at different locations to help create copies of data for use in the event of a catastrophic event at a data center. Metro Mirror is designed to

maintain a fully synchronized copy at "metropolitan" distances (up to 300 km) whereas Global Mirror is designed to operate asynchronously and so helps maintain a copy at much greater distances (up to 8000 km). Both functions are designed to support VMware vCenter Site Recovery Manager to help speed disaster recovery.

SVC now includes Multiple Cluster Mirror function that is designed to enable an SVC cluster to have remote copy 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.

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

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. SAN Volume Controller users have as much as doubled the productivity of storage administration, helping enable their storage to grow with their businesses while reducing the need for additional manual management.

The Space-Efficient Virtual Disks function helps automate provisioning as described above and so helps further 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 the IBM System Storage Productivity Center (SSPC), an advanced management console that can provide a view of both IBM- and non-IBM storage environments. As a common management console initially supporting IBM System Storage DS8000® and SVC, SSPC is designed to enable 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 requiring hardware changes. Similarly, provisioning with SVC is achieved with software and with thin provisioning, and is designed to become an almost entirely automated function. Without SVC, server provisioning could be slowed by the need to provision storage.

Functions such as VMotion support application mobility between physical servers. Similarly, SVC is designed to support nondisruptive data migration between storage systems. In addition, SVC helps make storage potentially available to all attached servers, greatly increasingly the flexibility for using VMotion. Without SVC, use of VMotion could be limited by storage being dedicated to specific servers.

Because SVC 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, SVC eases replacing storage or moving data from one storage type to another because these changes do not require changes to server images. Without SVC changes of storage type could require disruptive changes to server images.

Server virtualization helps increase flexibility and reduce cost 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, SVC supports the use of different physical storage configurations at production and recovery sites yet helps create the same virtual configuration at each site. Without SVC, production and recovery site physical storage configurations would need to be similar, potentially increasing costs.

The SVC Space-Efficient FlashCopy 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 customers run mixed environments with a variety of virtualized and non-virtualized servers and expect to do so for years to come. SVC 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 so make mixed environments more complex rather than less.

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 and have limited 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 SVC also has cache, it can improve the performance of lower tier storage, enabling it to be used more widely in a data center further reducing costs. With its support for solid-state devices, SVC adds a new ultra-high-performance tier for critical application data.

Improve energy efficiency

Many data centers today are focusing on reducing their energy usage to reduce costs and out of concern for the environment. SAN Volume Controller can be a key tool to help you improve the energy efficiency of your data center. SVC can help improve energy efficiency in many ways, one of which is that SVC can help increase the utilization of storage and reduce requirements for additional storage in the future, which can help reduce the total amount of storage required and so helps reduce energy use. The Space-Efficient Virtual Disks and Space-Efficient FlashCopy functions are designed to extend this benefit even further.

Designed for mid-sized businesses

SAN Volume Controller Entry Edition delivers the full efficiency, flexibility and simplicity benefits of SVC with new price options to better suit mid-sized businesses. SVC Entry Edition supports storage configurations containing up to 60 disk drives and is designed to grow smoothly with your business; SVC Entry Edition configurations may easily be converted to the full SAN Volume Controller offering for even greater growth potential if required.

IBM services

IBM offers services to help speed implementation and improve return on investment (ROI). IBM storage specialists are available to conduct storage solution and infrastructure reviews to 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 help keep your infrastructure up-to-date and running smoothly.

IBM System Storage SAN Volume Controller supported environments at a glance

The table below provides a summary of SVC 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 • EMC Symmetrix DMX and 8000-series models • 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 • NetApp FAS • Bull StoreWay • Fujitsu Eternus • NEC iStorage • Pillar Axiom • Texas Memory Systems RamSan-500 • Xiotech Emprise 5000
Host multipathing software	• IBM System Storage Multipath Subsystem Device Driver (SDD) • Symantec/Veritas Volume Manager 3.5 MP3, 4.0, 4.1, 4.3, 5.0 • 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

IBM System Storage SAN Volume Controller supported environments at a glance

Operating system support	• IBM AIX V4.3.3 • IBM AIX 5L™ V5.1, V5.2, V5.3 • IBM 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 • Sun Solaris 8, 9, 10 • VMware ESX 2.1, 2.5.2, 2.5.3, 3.0.2, 3.5, 3i • VMware vSphere™ 4 • HP-UX 11.0, 11i V1, V2, V3 • Red Hat Enterprise Linux®, Advanced Server 2.1, 3.0, 4.0, 5.0 • 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 • IBM N series Gateways • NetApp V-Series • ONStor Clustered NAS Gateway For information on HBAs and clustering support with these operating systems, visit **ibm.com**/systems/storage/software/virtualization/svc/ and click on "Interoperability."
Support for SAN switches—selected models from the following suppliers	• Brocade • McDATA • Cisco • CNT
Service	• Customer engineer (CE) 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 nondisruptively

IBM Global Services storage services	• Consult and design
	  — Backup and continuity planning
	  — Performance utilization and capacity planning
	• Integrate and deploy
	  — Installation, cabling and site preparation
	  — Migration and consolidation
	  — Education and training
	• Operate and manage
	  — System support and maintenance

For the complete and latest support information, visit:

ibm.com/storage/support/2145

For more information
To learn more about the IBM System Storage SAN Volume Controller or IBM Global Financing, please contact your IBM marketing representative or IBM Business Partner, or visit the following Web sites: **ibm.com**/systems/storage/software/virtualization/svc/

Additionally, IBM Global Financing can tailor financing solutions to your specific IT needs. For more information on great rates, flexible payment plans and loans, and asset buyback and disposal, visit: **ibm.com**/financing

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Recyclable, please recycle.