

# Do more with what you have: Virtualization transforms storage management

Taking a comprehensive approach to simplifying IT can reduce complexity and lower costs, transforming IT infrastructures into more agile operations that can bring strategic advantages to the enterprise. Storage virtualization is a proven way to improve flexibility, resiliency and system performance—all while also boosting storage utilization.

Few would question the need to simplify IT infrastructures after years of growth in both servers and storage. With no end in sight, server and storage consolidation using virtualization has become an important way to reduce data center costs and complexity.

Clients are facing a dramatic growth in data, which in turn is driving growth in the number and type of storage systems they have to manage. This growth increases data center complexity and taxes limited storage administration staff. As a result, storage systems are often seriously underutilized, which just makes the problem worse. Mixed storage environments and attempts to control complexity have led to “siloes” storage implementations, seriously limiting flexibility especially when deploying applications in a virtualized server environment.

Traditional storage environments have many of the same problems as distributed server farms: applications are tied to physical devices, making any response to changing needs both disruptive and time-consuming; capacity utilization is low; and many maintenance activities require application downtime.

The simple and straightforward solution is storage virtualization, which decouples applications and data from the underlying physical devices. Storage virtualization simplifies storage management, as only a single set of tools are required for a given virtualized set of similar devices, such as managing a set of disk systems. As a result, the IT team can more effectively manage the infrastructure, including the assignment of the best devices to applications, without disrupting users.

For IT departments charged with delivering greater business value in the face of unprecedented data growth, storage virtualization is a very attractive way to control costs, improve performance and maximize resource utilization.

## Location matters

There are three basic approaches to providing storage virtualization without using host software:

1. **Disk System Approach:** Virtualization is built into a disk system, which can virtualize other disk systems.





## Circuit City boosts infrastructure effectiveness

“IBM storage virtualization has transformed our IT storage infrastructure so we can respond quickly to user needs,” says Nick Otto, director of IT infrastructure services at Circuit City, a worldwide retailer of consumer electronics, PCs and software. “IBM helped us create a storage environment where the administrators are no longer bogged down with maintenance tasks. Now they can focus on strategic initiatives.”<sup>1</sup>

### 2. Network-Based Virtualization

Approach: Virtualization is implemented in a dedicated system that is attached to the storage area network (SAN). (This is the approach followed by IBM.)

### 3. Switch-Based Virtualization

Approach: Virtualization is implemented using software and dedicated hardware within a SAN switch.<sup>2</sup>

Of the three approaches to storage virtualization, only the network-based approach used by IBM is independent of other components in the IT infrastructure. The other two approaches tie a choice of virtualization to a choice of another component in the infrastructure. Although one of the reasons for implementing storage virtualization is to increase choice, both of these approaches can increase interdependency and reduce options.

IBM System Storage™ SAN Volume Controller (SVC) is designed to virtualize the storage customers are already using and enables storage and virtualization decisions to be made separately, which helps to maximize choice. IBM SVC can be upgraded to the largest configuration without disrupting existing servers and applications, and it attaches to a very wide range of SAN switches, helping to ensure maximum flexibility.

### IBM System Storage SAN Volume Controller

IBM SAN Volume Controller (SVC) breaks through the complexity of multi-product storage environments by hiding

the differences between disk systems and presenting storage resources in a common pool of available capacity. IBM SVC is designed to collect storage volumes from IBM and non-IBM storage systems into a single reservoir of capacity for centralized management. It is also designed to hide the boundaries among disk systems, which helps customers focus on managing storage as a resource to meet business requirements and not as a set of boxes. The result is simplified management, improved utilization and faster and more flexible application deployment, as well as reduced costs and energy consumption.

IBM SVC helps increase storage utilization and the flexibility of an IT infrastructure by allowing changes to the physical storage with minimal or no disruption to applications. It enables a tiered storage environment that allows customers to match the cost of the storage to the value of their data, and can help to improve storage administrator productivity by as much as double.

Because of architectural differences, other approaches do not offer the functional richness of IBM SVC in comparable features<sup>1</sup> such as:

- “Copy on write” with IBM SVC FlashCopy®
- IBM SVC Space-Efficient FlashCopy
- IBM SVC multi-target FlashCopy (IBM SVC supports up to 256 targets whereas Invista supports 3 or 8 depending on implementation)



IBM has shipped more than 12,000 SVC “engines” running in over 4,000 IBM SAN Volume Controller systems worldwide<sup>9</sup>

These and other essential capabilities help explain why IBM has shipped over 12,000 SAN Volume Controller “engines” running in more than 4,000 SVC systems worldwide.

***Gain the agility to respond to changing business needs***

By residing within the storage network, IBM SAN Volume Controller provides exceptional flexibility to allocate the best storage resources to each class of application. In a storage environment controlled by IBM SVC, storage assignments can be made across many different physical devices. Administrators use one interface to control the entire environment, including assigning additional capacity to growing applications, migrating data to faster devices to improve response times seen by users and setting up disaster recovery configurations—all without disrupting users.

Storage costs also can be tailored to user applications. Data can be migrated to a storage tier that best matches the price/performance needs of the service level agreement. In this way, IT can better control performance and cost.

***Improve administrative productivity***

IBM SVC includes a wide range of features designed to help simplify storage management, even in multivendor environments. For example, to help meet the never-ending need to store more data for longer periods of time, administrators can perform storage management tasks across the entire pool, which helps make the staff much more productive. IBM SVC is also certified for use with VMware infrastructures.

***Reduce storage costs***

Many IBM SVC features can help contribute to lowering the total cost of storage. For example, adding IBM SVC functionality to midrange storage can often bring many benefits of enterprise storage. Since midrange storage can often cost considerably less per terabyte than enterprise storage, savings can be significant.

Also, offering users a choice of several levels of price/performance through tiered storage can help reduce the overall cost of storage—not every application needs the fastest, most expensive storage devices. With tiered storage, IT can provide a range of price/performance choices so that overall costs are lowered while service levels remain high.

At Circuit City, Nick Otto, director of IT infrastructure services, has experienced the benefits firsthand. “IBM SVC is standards-based, so I can incorporate any servers and disk systems into the IBM environment,” Otto explains. By implementing a tiered storage environment using IBM Storage products such as IBM DS4800, IBM SVC and IBM TotalStorage® Productivity Center, Otto’s team reduced its forecast for storage capital equipment spending by US\$1 million over 18 months simply by moving applications from Tier 1 to Tier 2 storage. “Since 2005, our Tier 1 storage has stayed relatively flat while Tier 2 and Tier 3 have experienced significant growth,” Says Otto.<sup>1</sup>



In traditional storage environments, upgrading storage systems, expanding storage capacity and even doing routine migration of volumes from one device to another can cause downtime. Through the IBM SAN Volume Controller capability to dynamically allocate storage to a task, all these activities can be performed without disrupting applications. Other reasons IBM SVC is a leader in the market include:

- IBM SVC supports more than 130 IBM and non-IBM storage systems<sup>4</sup>
- IBM SVC is designed to support 99.999 percent availability<sup>5</sup>
- IBM has more than 30 years experience with storage virtualization<sup>6</sup>

A central virtualization controller can help save software costs compared to purchasing software licenses for multiple device controllers. IBM SVC requires only one license of the copy services software for all attached storage systems. Plus, that license is retained even when you replace disk systems. Finally, the multipathing software is included at no additional charge. These cost savings, together with reduced training requirements for administrators, can greatly help to lower the total cost of ownership (TCO) while leveraging existing investments.

Even energy costs within the storage environment can be reduced as a result of greater capacity utilization enabled by IBM SVC: fewer total storage devices are needed when utilization is increased.

#### **Reduce complexity and improve choice**

The complexity introduced by having multiple storage vendors drives up costs in traditional storage environments. Because each brand of storage provides a different function and is managed in a different way, administrators need a wide range of skills. Automated tools designed for one brand may not work for others, which can prevent the easy movement of data from one system to another—and applications can become tied to the functions and systems of one vendor.

IBM SAN Volume Controller helps relieve these issues with a common set of functions that are designed to work the same way regardless of the type or brand of disk system. In this way, IBM SVC can help improve choice

when acquiring storage while facilitating reduced management complexity—both of which can help reduce storage costs.

With IBM SVC, customers can choose a combination of supported devices from EMC, IBM, HP, Hitachi and others, virtualize them, and manage them easily and with greater flexibility than ever before. Also, IBM SVC helps reduce downtime and disruption of daily operations as well as helping to remove the need for expensive migration services to replace storage controllers.

#### **Optimize performance**

The additional cache provided by IBM SVC can improve the performance of disk systems behind it. In most cases, for example, all writes and many reads are cached in IBM SVC, which helps boost storage performance for infrastructure and business applications.

The industry-leading performance of IBM SVC, with the fastest industry-standard benchmark measurements of any storage virtualization system<sup>7</sup>, can help organizations process more application data faster and at a lower cost to achieve enterprise goals.

#### ***IBM systems nearly triple storage performance for University of Calgary***

For the IT group at the University of Calgary, performance was a huge issue when it came to supporting a new PeopleSoft environment. Faced with the need to transform their on-campus support systems to support rapid growth, the university decided to



### **IBM SVC provides the high availability needed for healthcare environment**

For PHNS, a U.S.-based hospital services provider, implementing IBM SVC provided scalability for rapid growth, unmatched availability and disaster recovery functions. PHNS runs administrative, financial and clinical applications for hospitals, so downtime is not an option.

“As healthcare technology innovations lead our customers increasingly in the direction of electronic medical images, records and data, we realize it is imperative that our services are provided with 100 percent availability,” says Chris Walls, president of IT services for PHNS. “With IBM SVC, we feel confident in being able to supply our customers with this consistent uptime and availability while also being able to run our data centers efficiently, consolidate our storage capacity and reduce energy usage.”<sup>8</sup>

upgrade its administrative systems and build out a new, reliable infrastructure that would meet the high-performance demands of a large university. The IT staff chose IBM SVC and IBM storage systems, which delivered the required performance and reliability.

With the new infrastructure based on IBM SVC and IBM DS4800, performance speeds rose from 2 Gbps to 4 Gbps, resulting in an increase from 4,000 input/output operations per second (IOPS) to 13,000 IOPS. “In less than three years, the University of Calgary moved from mainframe-based applications for finance, supply chain, human resources and student services, to a completely new PeopleSoft environment,” says Harold Esche, university CIO. “With such an aggressive timeline, it was essential to ensure that technology issues didn’t derail the project. As expected, the IBM systems and storage performed flawlessly.”<sup>9</sup>

### **Boost storage utilization**

Many IT organizations use their storage assets at only about 25 to 40 percent of capacity.<sup>10</sup> Considering the size of the storage systems investment made by most enterprises, this represents a large opportunity to improve the return on IT investments. IBM SVC helps improve utilization by combining the capacity of many disk systems into a large storage pool, which administrators can manage from a central point. Pooling storage capacity also enables the use of shared spare space for growth rather than dedicating growth capacity to each server. This approach can result in significantly less storage held in reserve throughout the data center, and helps cut energy costs.

IBM SVC also supports copy services, such as point-in-time copies and remote replication across disparate storage arrays from multiple vendors, to further increase flexibility. For example, IT can use IBM SVC to create a backup copy of production data from an IBM DS8000 disk on an EMC CLARiiON networked storage system, providing flexibility in storage asset utilization.

The Richmond, Virginia city government uses IBM SVC to manage its EMC and IBM storage environment, and increased storage utilization by 45 percent.<sup>11</sup>

### **Enhance availability and lower the cost of disaster recovery**

IBM SVC helps provide access to data during disaster recovery with a cost-effective set of advanced copy services and remote replication services. These functions can help lower disaster recovery implementation costs. Typical disaster recovery configurations without SVC include a mirror image of the production environment, which can be costly.

The ability of IBM SVC to replicate between unlike disk systems enables the use of lower-cost storage devices at disaster recovery sites. For example, a low-cost, all—Serial ATA (SATA) disk system can be used as the replica repository for an expensive, high-end Fibre Channel disk system—whether or not the controllers are from the same vendor.



## For more information

To learn more about storage virtualization and moving to IBM System Storage solutions, contact your IBM representative or visit

[ibm.com/systems/migratetoibm/](http://ibm.com/systems/migratetoibm/)

For more stories of customers who have successfully moved to IBM System Storage, visit

[ibm.com/systems/migratetoibm/casestudies/index.html](http://ibm.com/systems/migratetoibm/casestudies/index.html)

For more comparisons of IBM and other vendor storage products, visit

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<sup>1</sup> [www-01.ibm.com/software/success/cssdb.nsf/CS/CCL-77NNV5?OpenDocument&Site=corp&cty=en\\_us](http://www-01.ibm.com/software/success/cssdb.nsf/CS/CCL-77NNV5?OpenDocument&Site=corp&cty=en_us)

<sup>2</sup> EMC Invista Specification Sheet [www.emc.com/collateral/software/specification-sheet/h1615-emc-invista-ss-ldv.pdf](http://www.emc.com/collateral/software/specification-sheet/h1615-emc-invista-ss-ldv.pdf)

<sup>3</sup> See [ibm.com/press/us/en/pressrelease/22628.wss](http://ibm.com/press/us/en/pressrelease/22628.wss)

<sup>4</sup> [www-1.ibm.com/support/docview.wss?rs=591&uid=ssg1S1003277](http://www-1.ibm.com/support/docview.wss?rs=591&uid=ssg1S1003277)

<sup>5</sup> Based on reported outages, IBM Systems Storage delivered 99.9995% availability worldwide to the installed base in 2007.

<sup>6</sup> The world's first virtualized disk system was the IBM 3850 Mass Storage System, announced in 1974. [www-03.ibm.com/ibm/history/exhibits/storage/storage\\_3850b.html](http://www-03.ibm.com/ibm/history/exhibits/storage/storage_3850b.html)

<sup>7</sup> Details of the IBM SAN Volume Controller SPC-1 Results are available at [www.storageperformance.org/results/benchmark\\_results\\_all#a00052](http://www.storageperformance.org/results/benchmark_results_all#a00052) and [www.storageperformance.org/results/benchmark\\_results\\_spc1#a00052](http://www.storageperformance.org/results/benchmark_results_spc1#a00052)

Details of the IBM SAN Volume Controller SPC-2 Results are available at [www.storageperformance.org/results/benchmark\\_results\\_all#b00024](http://www.storageperformance.org/results/benchmark_results_all#b00024) and [www.storageperformance.org/results/benchmark\\_results\\_spc2#b00024](http://www.storageperformance.org/results/benchmark_results_spc2#b00024)

"IBM System Storage SAN Volume Controller 4.1: Proven, Enterprise-Ready and Scalable Storage Virtualization Solution." The TANEJA Group, Inc. August, 2006. [ibm.com/systems/storage/software/virtualization/wpapers/taneja\\_svc.pdf](http://ibm.com/systems/storage/software/virtualization/wpapers/taneja_svc.pdf)

<sup>8</sup> [www-03.ibm.com/press/us/en/pressrelease/21856.wss](http://www-03.ibm.com/press/us/en/pressrelease/21856.wss)

<sup>9</sup> [www-01.ibm.com/software/success/cssdb.nsf/CS/CCL-7BJSFN?OpenDocument&Site=default&cty=en\\_us](http://www-01.ibm.com/software/success/cssdb.nsf/CS/CCL-7BJSFN?OpenDocument&Site=default&cty=en_us)

<sup>10</sup> "IBM Storage Virtualization—Value to you." May, 2006. [ibm.com/systems/storage/software/virtualization/wpapers/index.html](http://ibm.com/systems/storage/software/virtualization/wpapers/index.html)

<sup>11</sup> <http://www-03.ibm.com/press/us/en/pressrelease/7733.wss>

