



STORAGE VIRTUALIZATION – THE NEXT STEP IN CONTROLLING SPIRALING COSTS

“Once storage is consolidated, the job is only half done. You still need a centralized, flexible method of management that masks the complexity of the storage environment and reduces administrative overhead. That’s where virtualization fits in.”

Early generation virtualization does little to improve ease-of-use:

- Increases components to manage
- Only consolidates storage
- Tasks remain complex and obtrusive

Next generation virtualization simplifies storage administration:

- Decreases components to manage
- Provides pool of storage, not just disks
- Masks complexity of tasks
- Operations are transparent to users

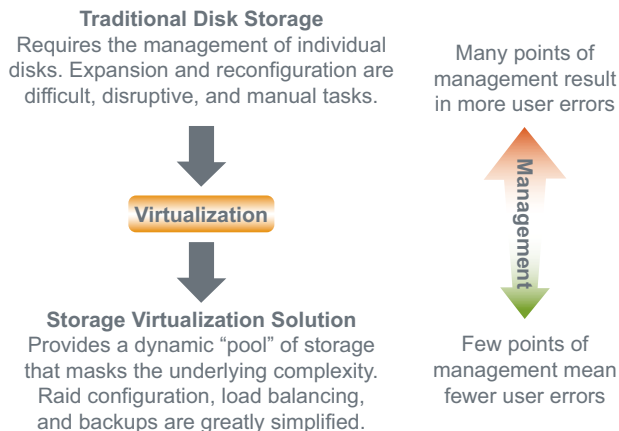
Although hardware storage prices have come down, storage administration and software expenses still run about seven times the cost of storage hardware. For many businesses, controlling these costs is crucial to lowering the total cost of ownership. Storage consolidation provides a partial solution by expanding device connectivity and reducing points of management. However, once storage is consolidated, the job is only half done. You still need a centralized, flexible method of management that masks the complexity of the storage environment and reduces administrative overhead. That’s where virtualization fits in.

FOCUS ON THE TASK – NOT THE TECHNOLOGY

Operating system technologies have moved toward virtualization in a variety of areas, but the goal is the same: to make a complicated task easy to perform. Thus, memory management has evolved from having to manually assign a fixed amount of memory for each process to a virtual memory subsystem that dynamically allocates memory as needed. Likewise, e-mail communication was once restricted to individuals who could understand arcane network routing schemes. Today, you simply type the destination address; switches and routers make sure the e-mail reaches the correct server.

As with memory management and e-mail, storage virtualization seeks to simplify cumbersome tasks—like allocating storage, load balancing, configuring RAID, and backing up and restoring data. Optimally, the physical disks and complex underpinnings of the storage are concealed from administrators and servers. Disk space is presented to the operating system as a “logical volume” that appears to be a normal disk or partition.

With a layer of abstraction between storage and hosts, administrators are no longer bound to the physical dimensions of a disk or forced through complex steps to perform basic storage management tasks. Not only does virtualization improve efficiency and productivity, it reduces the time, effort, and knowledge needed to manage storage.



NOT ALL SOLUTIONS ARE CREATED EQUAL

If the objective of virtualization is to make the life of a storage administrator easier, not all solutions effectively meet this goal. Early generation virtualization products provide flexibility, but they are essentially consolidated storage solutions that do little to reduce complexity. Some actually increase the number of components to manage, and load balancing, RAID configuration, and provisioning remain difficult, manual operations.

To address these inadequacies, next generation virtualization solutions mask the underlying complexity of the storage environment by providing one or more “pools” of protected storage, not just a set of consolidated disks. Loads can be balanced and logical volumes created and expanded—on demand and with no user impact. RAID configuration and backup, replication, and snapshot capabilities are integrated and transparent to applications.

THE FUTURE IS HERE

As shown in the above table, a storage subsystem-based product that can span arrays represents the ideal virtualization solution—providing a scalable “pool” of storage, in addition to technology that hides the underlying configuration, regardless of its complexity. EqualLogic is delivering such a product with its PS Series array, which combines the best of storage consolidation and virtualization in an iSCSI-based SAN. By leveraging existing network infrastructure and personnel skills, EqualLogic provides a cost-effective, high-performing, scalable storage solution. Just what businesses need to decrease the cost—and the complexity—of managing storage.

To view other Coffee Break Bulletins or to learn more about EqualLogic, visit us at www.equallogic.com.

Virtualization Method	Benefits	Deficiencies
Host-based (volume manager) *	Supports multi-vendor storage systems.	Many points of management. Single software vendor. Difficult to deploy, especially with mixed platforms. Must install and manage software on each host. Steals bandwidth from host. Slow snapshot capabilities. Storage pool limited to a single host.
In-band appliance (located in I/O path) * *	Supports multi-vendor storage systems. Optimizes performance if a dedicated switch.	Additional point of management. Single switch vendor (difficult network upgrades). No knowledge of device capacity or status. All I/O must flow through appliance. Steals bandwidth from host. Slow snapshot capabilities.
Out-of-band appliance (located out of I/O patch, except for snapshots) * *	Supports multi-vendor storage systems. Optimizes performance.	Additional point of management. Single switch vendor (difficult network upgrades). No knowledge of device capacity or status. May not support all platforms. Must install software on host (or HBA). Steals bandwidth from host. Slow snapshot capabilities.
Storage subsystem * * * *	Reduces management complexity. Standard network hardware. Optimizes performance. Integrated RAID management. Fast snapshot capabilities. Can co-exist with other solutions.	Some products limit storage pool to a single array. Single storage vendor.
* Degree to which solution meets next generation virtualization criteria (4 stars is the maximum score).		



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