

Application Brief



Storage Virtualization
What is it and where it belongs?

IMPORTANT INFORMATION

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Overview

In the context of storage, virtualization is an abstraction that enables the management of physical disk resources to be separated from the management of the logical storage that is used by applications. While Virtualization can bring many cost and productivity advantages to heterogeneous environments; the key benefit is the ability to centralize the administration of a highly flexible, easy to manage, and highly available storage system for server networks.

Virtualization can deliver a number of benefits to business, including:

- Provisioning storage on demand
- Higher data availability, which translates into greater productivity due to reduced downtime
- Storage centralization to increase administrator productivity, with each administrator easily managing 300 GB of DAS, 1 TB of SAN storage, or 3-40 TB of virtualized SAN storage
- Increased storage utilization, delivering 80% usage instead of a typical 30-50%

But as we see it, a more compelling value proposition is the delivery of storage virtualization as a foundation function that is leveraged by data management services such as snapshot, replication and backup. This combination of both storage resources and data management services results in centralized management to help further eliminate the business risk associated with planned and unplanned downtime.

Who Benefits from Storage Virtualization, and How to Quantify the Value of Storage Virtualization

Everyone should care. Let us repeat that: everyone. Enterprises large or small that regard IT organizations as business units that should provide investment return -- not as cost centers -- should care. The benefits of storage virtualization translate directly into greater efficiency in storage usage, higher productivity of administrators, increased data availability and positive return on investment. Virtualization is another way to increase competitiveness.

In the effort to quantify the value of storage virtualization, there are several ways to measure the impact of the technology. From a financial perspective, we see the metrics of ROI and TCO as a way to value storage virtualization, where ROI measures investment return beyond the cost of technology, and TCO measures costs

over the life of the technology. From a storage perspective, other useful metrics that can be applied after the adoption of storage virtualization include: the increased amount of storage managed per administrator; mean time to data recovery; and the increased data availability after implementing storage virtualization.

An interesting approach to consider is the value in terms of the costs of not having the higher data availability that storage virtualization provides. When you factor in the typical costs of downtime -- in most enterprises ranging from \$10,000 to \$1,000,000 per hour -- the logical question becomes how can you afford NOT to have storage virtualization?

**Virtualization
Simplifies Life
for the Storage
Administrator**

Virtualized storage becomes much easier to manage because it masks the physical complexity of a data storage infrastructure. As we have mentioned earlier, virtualization enables management of all volumes from a centralized location, allowing administrators to minimize the time spent on physically attaching, moving and configuring hardware devices.

But to get the full benefit of virtualized storage, on-line storage management activities must include advanced features with abilities to:

- Provision storage to a server instantly by creating a new virtual disk
- Delete unused virtual disks and reassign the capacity for another application to eliminate waste
- Expand available storage on-line to avoid application outages
- Configure individual host's access to storage resources on-line (i.e. via LUN masking and LUN mapping)
- Copy data from one virtual disk to another to replicate volumes of data for testing or backup
- Mirror volumes of data from one virtual disk to another for disaster recovery and fault tolerance
- Migrate data from one virtual disk to another for application and OS upgrades
- Create, change or mix RAID levels without bringing the system down

A key point to realize is that virtualization greatly enhances the ability of a storage administrator to deliver immediate service, while saving a lot of time.

**Where to
Implement
Storage
Virtualization**

Instead of asking where virtualization should be implemented, we think the better question is to ask where virtualization should be located to best meet the needs of the target customer at the right price and performance. The important thing to keep in mind is that customers do not just buy features or technology. They buy solutions that address their business challenges at an affordable price.

Large enterprise organizations may find the complexity and cost of switch-based virtualization appropriate for their heterogeneous environment. Small to mid-size business, with a minimal IT staff, will find all-in-one storage solutions with integrated virtualization as the way to better meet their financial constraints. So it is our belief that virtualization will continue to occur at all levels (storage array, network, and servers).

**Virtualization
is the Array
vs. on the
Switch**

A recent survey by Infostor magazine shows 44% of users believe that storage virtualization should be on the storage array while 37% voted for a switch. So locating virtualization on a switch is just one option.

However, when virtualization is located in a FC switch, any potential failure would bring down the fabric, and this is unacceptable. For that reason, the two key issues – redundancy and performance -- should be addressed. Because of its central role, the virtualization that resides in a switch platform needs to provide built-in enterprise level reliability and availability, which substantially raises costs.

Further, users need to ensure that the virtualization at the switch level does not become a performance bottleneck. This is important because the latency of the virtualization switch can also impose a significant bandwidth penalty.

Remember, our view is that the benefits of storage virtualization can be provided at different levels and locations and that users need to ensure that the storage virtualization approach adopted addresses their business challenges. Enterprise organizations may find the complexity and cost of switch-based virtualization to be appropriate for their heterogeneous environment. On the other hand, small to mid-size businesses with minimal IT staff, will find all-in-one storage solutions with integrated virtualization to be a better match for their financial constraints.

**Providing High
RAS (Reliability,
Availability,
Serviceability)
with Storage
Virtualization**

Virtualization is only one component out of many that impacts RAS, with other components required to achieve five 9s including investments in power and IT infrastructure, high availability software and redundant hardware, and business continuity processes, among others. Virtualization contributes to RAS by increasing data availability through such features as on-line storage provisioning, automated storage expansion and data management. The combination of virtualization with advanced data services such as automated replication and snapshots greatly increase the availability of data.

**Avoid the Pit-
falls of Storage
Virtualization with
Interoperable,
Multi-service,
High Performance
Solutions**

The key point to realize is that storage virtualization is not a standalone product. To be valuable, we believe that virtualization must be the foundation of a highly integrated storage solution, and that value will be maximized when the functions of storage virtualization are easily leveraged by data management services such as replication, snapshots, backup, data migration, caching, security and policy driven automation.

Another potential pitfall of storage virtualization is redundancy. Because of its central role, storage virtualization needs to reside on a platform that provides enterprise level reliability and availability, i.e. redundancy must be built-in.

In addition, users need to ensure that the virtualization platform itself does not become a performance bottleneck. This is important since the latency of the virtualization platform can also impose a significant bandwidth penalty that is especially visible in database applications.

Lastly, since the benefits of storage virtualization can be provided at different levels, users need to ensure that any storage virtualization solution that is adopted provides interoperability to avoid vendor lock-in issues.

**Storage
Virtualization is
Evolving, and
iQstor Believes
in Shaping the
Debate**

We believe that there will not be a winner in the debate of where storage virtualization should reside. Storage virtualization exists, and will continue to evolve at all levels – in the storage array, network, appliances, and servers. The challenge will be to control

the functionality at each level so that management tools can do a better job of managing the storage networks.

This is where standards-based storage management is extremely important. Over time, virtualization may not exist separately as a product. We believe that the benefits of virtualization in the SAN infrastructure will evolve into a standards-based storage management environment, and that a standards-based storage management infrastructure will be able to harness the functionality at each level and make storage management even more powerful.

Also just as NAS and SAN are converging, so will volume- and file-based virtualization. This convergence will most likely result in a single network that merges the NAS and SAN approaches to virtualization, resulting in a single environment that combines the strengths of each.



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Data Protection