



Storage Is Not Just a Box Anymore — Managing the Data Path

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Networked Storage Is A Catalyst

Networked storage has vitally altered the IT landscape – for good - and for *the* good of the enterprise. It broke the iron chains of server-attached storage and paved the way for broad storage consolidation on a network. It reconfigured the economic equation by lowering total cost of storage ownership and gave enterprises leverage to keep up with the increasing data requirements of the Information Age. It also spawned new generations of more efficient products and technologies and new companies to develop them. To be sure, enterprises have only begun to tap the value of networked storage. Furthermore, **networked storage is causing a tectonic shift in our thinking; it is a slow but certain change that influences how enterprises perceive and manage storage.**

Storage Is A Service

First, **storage is not just a box anymore – it's a service.** This is like the difference between a power plant and a home electrical outlet, or a telecommunications network and a long-distance plan. As consumers, we appreciate and experience the service delivered to our doorstep. The infrastructure that provides it, including all of the points of manufacturing and distribution, are behind the scenes and taken for granted. We are not so concerned about the infrastructure's technical specifications, per se, but do notice if something goes wrong along the way and disrupts our service.

The enterprise is starting to see storage in a similar fashion – from the perspective of each application and user. **What matters is the overall quality of service delivered:**

- **Is it what the application needs?** Does it get the data where it needs to go, in a timely manner?
- **Is it reliable?** Does it provide the availability and recoverability that you require?
- **Is it affordable?** Does it meet your procurement, operational, and budgetary needs?

More specifically, performance and price are the first order of metrics for storage quality of service. In broad terms, *performance* encompasses the speed of data access in megabytes per second or input/outputs per second (IOPS), *availability* in percentage of uptime, and *recoverability* in time to restore. *Price* is measured per unit of capacity, and it reflects both acquisition and operating (especially management) costs. Ideally, users decide the storage quality they need based on application requirements and what they can afford¹, then the IT department delivers to the specification. The real world has not quite this ideal yet, but that is the direction and final objective.

¹ See *The Accounting Pendulum Swings at Storage (or, Why The Taxman Cometh?)* in **The Clipper Group Explorer** dated October 31, 2002, at www.clipper.com/research/TCG2002043.pdf.

The Data Path Delivers

A second realization is that **the end-to-end data path² delivers the service, not only the box of spinning disks.** From an individual disk drive to a RAID group, storage controller, cables, network switches, host bus adapters (HBA), volume manager, file system, and, finally, the application – **every point along the way affects the quality of service.**

It is not enough to manage just one point along the way. This is like assuming that if an electrical outlet is properly wired, then no one needs to look after the power plants and distribution lines that supply it. **It is also not enough to manage every point along the way in isolation, not considering the upstream and downstream effects.** Imagine a perfectly-maintained, four-lane highway that feeds into a single tollbooth. Even if every car that passes through the tollbooth has a radio-controlled identification device for assessing the toll, there will still be a line of cars stretching halfway across the state. **In fact, storage quality of service depends on the proper balance and maintenance of the entire data path, from start to finish.**

Manage the Data Path

This leads to the third realization: **the storage administrator is responsible for meeting qualities of service by managing the end-to-end data path.** It falls on his or her shoulders to coordinate the tangled web of networked storage, which is not trivial given the many devices, ports, paths, and interdependencies in the network.

So networked storage has generated an acute need for smart software that manages the entire data path and delivers to specified qualities of service. This can include monitoring, reporting, coordinating, configuring, and provisioning capacity at each point. Like conducting an orchestra of storage, the software directs the various infrastructure components (both logical and physical) to play particular quality-of-

² From the server or user to the disk(s) on which the data is stored.

service tunes. The good news is that this kind of storage management software is available today, even as vendors continue to develop and enhance it.³

It is important that any management software that you are considering for your enterprise interoperates with your enterprise's infrastructure components. This can be through proprietary⁴ or standard interfaces. For instance, the Storage Networking Industry Association is developing a standard management interface called the Storage Management Interface Specification (SMIS⁵). Products that support it are already coming to market. Moreover, smart devices can actually enhance the capability of management software, such as by reporting real-time performance and availability statistics at their particular point in the data path (e.g., for a switch port or HBA).

Conclusion

Networking is driving a shift in how we perceive storage. The classic focus on the storage box and its characteristics is taking a back seat to the strategic issues of service quality and comprehensive management. It is advantageous for an enterprise to make this mental and operational transition sooner rather than later.

Storage is critical – it helps keep applications running and the business humming, and it is worth taking the time to do well. So remember:

- Storage is a service,
- Delivered by a data path,
- That you must manage from end to end, and
- Smart, comprehensive storage management software can be your critical success factor.

Storage – it's not just a box anymore!



³ For more details, see *Storage Resource Management – Conducting a Symphony of Storage* in **The Clipper Group Explorer** dated June 30, 2002, at www.clipper.com/research/TCG2002024.pdf.

⁴ Such as an API or CLI.

⁵ Formerly called *Bluefin*.

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