



Top 10 Buying Considerations for Disk Storage Virtualization

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Defining the Terms

Storage virtualization has been a technology, buzzword, and trend in the enterprise storage industry for several years now.¹ In the public forum, it has swung like a pendulum between extremes of hype and under-appreciation. People today have different reactions to it. For some, it invokes the skepticism and indifference of a trend with too much exposure and promotion. For others, it causes some confusion because virtualization is a broad, abstract concept that pundits and vendors have applied to so many different products and technologies. For still others, it carries the curiosity and excitement of a better way to solve complex and costly storage challenges. All of these reactions have some merit.

In the first case, the industry seems to have reached a point of moderation and realism in discussions about storage virtualization. Virtualization is real and products are available. It is good and solves practical problems. It is *not* a panacea or magic elixir for whatever ails you.

In the second case, confusion arises from the fact that virtualization is a broad concept that has been applied everywhere in information technology – computing, networking, applications, and, yes, storage. **Virtualization is a technique for masking the physical complexity of an IT resource beneath a logical abstraction layer.** In other words, it makes complicated things simple and fixed assets more adaptable. Think about when you call somebody on the phone. You do not have to know how to route the call through the network of switches, routers, and cellular towers to reach the destination. You do not even have to know where the destination is. You just dial the number, connect, and talk – that is virtualization.

The subject of this bulletin is the block-level virtualization of multiple, heterogeneous storage arrays. Such a solution presents a unified but flexible pool of storage to host servers. This is different from virtualization in server-based volume managers and array-specific RAID controllers, whose scope is limited to the particular server or array. Here, we are talking about storage virtualization in the larger sense – with a scope that encompasses potentially the whole SAN infrastructure. These solutions also typically offer data migration and copy services.

Finally, **there is reason to be excited about how storage virtualization can solve costly and complex enterprise challenges.** Read on for details about why and what to consider in a solution.

¹ See [The Clipper Group Explorer](http://www.clipper.com/research/TCG2001002.pdf) dated April 9, 2001, entitled *Storage Virtualization in 2001: A Space Odyssey* and available at <http://www.clipper.com/research/TCG2001002.pdf>.

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Means to a Better End

A disk storage virtualization solution in a SAN is like an automatic transmission in a car. Sure, you could have a manual transmission and, if you are really good, you might get better acceleration, better mileage and, usually, spend less at the time of purchase. However, many drivers don't know how to drive a stick shift or do it so poorly that they don't get any of the economic benefits and also spend a lot of time worrying about whether their transmission is going to get them where they need to go. Similarly, **storage virtualization is about getting the enterprise where it needs to go, with less day-to-day concern and administration, with more confidence, and at a lower overall cost.** Like a transmission, storage virtualization, by itself, is not really useful, but when incorporated into a SAN environment, it clearly is a means to a better end. It empowers the infrastructure to meet - more effectively - the storage requirements of the business.

The capabilities and benefits storage virtualization delivers include:

- **Higher storage utilization** – Creating a single pool of storage as opposed to many disconnected islands improves utilization. It becomes easy to reallocate capacity, where needed, instead of over-provisioning individual volumes and systems to avoid out-of-space conditions. Capacity purchases can be deferred until the pool reaches a threshold, and the net effect is lower storage acquisition costs.
- **Single point of management** – Administrators can manage the storage pool and data services centrally, as opposed to using a different tool for each brand of storage. Therefore, each administrator can handle more terabytes, which lowers management costs, the largest component of storage total cost of ownership.
- **Non-disruptive data migration** – These solutions generally have the ability to migrate data without disrupting application access. This facilitates equipment upgrades, load balancing between platforms, and moving data between storage tiers as its value changes with time. The latter is a feature of information lifecycle management (ILM).² Non-disruptive

² See the March 10, 2007, issue of *Clipper Notes* entitled *Top 10 Things You Should Know About Information Lifecycle Management* and available at <http://www.clipper.com/research/TCG2007039.pdf>.

migration improves the productivity of both users (no downtime) and administrators (no need for off-hours scheduling).

- **Tiered storage** – Virtualized storage can be partitioned into tiers with different price/performance characteristics. These are the foundation of ILM and, in general, an infrastructure that can serve diverse enterprise requirements. Tiered storage lowers overall costs by providing less-expensive tiers for less-critical data.³
- **Universal copy services** – Many virtualization solutions also offer copy services (e.g., point-in-time copy, synchronous or asynchronous replication) applicable to all attached storage and available to all connected host servers. Data copying is part of many important activities like business continuity, data protection, data repurposing, and data distribution and consolidation.⁴ Universal copy services, including copies between dissimilar platforms, provide greater consistency, simplicity, cost-effectiveness, and value to the business.

As you can see, all of these capabilities have a positive economic impact, making them true business benefits.

Top 10 Buying Considerations

When considering a storage virtualization solution for your enterprise, keep in mind the following ten items.

1. **It should be a SAN-wide virtualization solution.** In other words, the virtualization layer should be able to span multiple, heterogeneous storage arrays and servers. There is nothing wrong with virtualization for individual arrays or servers. However, this bulletin is intended to help enterprises find solutions for their whole infrastructure.
2. **It should support your particular SAN assets.** The solution should work with the storage arrays, switches, and host operating systems in your environment, or at least the ones you want to virtualize. Remember: the broader the scope, the greater the benefit. The

³ See the March 1, 2007, issue of *Clipper Notes* entitled *Tiered Storage Classes Save Money – Getting The Most Out Of Your Storage Infrastructure* and available at <http://www.clipper.com/research/TCG2007032.pdf>.

⁴ See the March 10, 2007, issue of *Clipper Notes* entitled *Data Copying – A Toolbox of Business Solutions* and available at <http://www.clipper.com/research/TCG2007042.pdf>.

vendor should also have a credible development roadmap to support additional models and future versions of these SAN assets.

3. **It should satisfy the performance, availability, and recoverability requirements of your applications.** Regardless of architecture, the virtualization layer – by definition – is in the data path between servers and storage, so meeting these requirements is important for supporting business operations. Performance is expressed in terms of MB/s and IO/s, and ultimately response time for users. High availability implies built-in redundancy, especially a clustered virtualization controller if data access depends on it. Recoverability is expressed in terms of *RTO* (*recovery time objective*, or how long it takes to recovery from a failure) and *RPO* (*recovery point objective*, or how current the recovered system will be).
4. **It should scale n-dimensionally to meet projected future requirements.** The solution should be an appropriate match for the scale of your SAN environment and be able to handle future growth. N-dimensional scalability means not only adding capacity as needed, but also scaling the number of arrays and storage ports, the number of servers and host ports, and performance.
5. **Make sure it has the data migration and copy services you want.** Storage virtualization is the baseline capability and additional services are generally available too (e.g., data migration, full point-in-time copy, snapshot copy, remote replication). Enterprises get maximum leverage from services running in the virtualization layer, so there is an incentive to do it. At the same time, enterprises may have existing investments in services that they wish to preserve. Each will have to decide what makes the most sense in light of its situation.
6. **It should support open standards where available.** Since virtualization solutions interface with so many other devices, they should support relevant interface and management standards, such as SMI-S.
7. **Installation should be minimally disruptive.** There will be some effort required to bring existing storage assets into a virtualization scheme. The reconfiguration to the SAN and disruption to applications for the installation should be minimal.

8. **It should demonstrate a solid return on investment.** Enterprises have different methods for measuring the ROI of IT investments. Nevertheless, the bottom line is that the benefit derived from a storage virtualization solution should outweigh the acquisition and operations costs by some margin.
9. **The derived benefit should be greater than the risk assumed – in terms of product stability and vendor viability.** A product that has had time to mature in the market is less risky than a beta version of a new one. A large, established vendor is less risky than a small startup. Enterprises generally play it safe with technology investments, but sometimes a highly capable but riskier product comes along that confers a significant competitive advantage, which may be worth the investment. The point is that one should be aware of the adoption risk and make sure the benefits outweigh it.
10. **Do not become entangled in ideological debates about architecture.** Different storage virtualization solutions have different architectures, and there is much ado about which is best. *In-band or out-of-band? Array-, server-, switch-, or appliance-based?* Frankly, all of them work, though probably each has certain advantages. It is more important that an enterprise invest in a solution that meets its requirements as outlined above. Architecture is secondary to these pragmatic considerations.

Conclusion

In summary, **storage virtualization solutions are a means to make the infrastructure more efficient, adaptable, capable, and tightly aligned with the business.** They bring much to the table. These ten considerations will help you find the right one for your enterprise.



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