



# **Storage Consolidation**

**Considerations when Utilizing Modular Storage Systems**

A White Paper

by Jeff Coffed

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## Executive Summary

Information is the most valuable asset to an enterprise of any size. As a result, the amount of data that is being stored and the amount of time it is kept online is growing rapidly, while the resources to manage it are not. This presents a considerable challenge to companies striving to exploit information for competitive advantage and storage administrators tasked with storing, managing, and protecting that data.

Consolidation of storage systems is being considered by more and more companies as a way to address this challenge. However, because of their massive scalability, monolithic storage systems have been thought of as the primary migration target when consolidating data storage, with modular storage systems remaining an afterthought.

The purpose of this paper is to illustrate the benefits of storage consolidation, discuss the different approaches to accomplishing it, and highlight some considerations when using modular storage as the consolidation target.

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# Storage Consolidation

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#### The Storage Management Challenge

Turning information into knowledge has headlined the agendas of enterprises of all sizes for quite some time. What's new is today's frenetic pace of data amassment and movement—storage requirements that grow at unpredictable rates—fueling a heightened urgency to accommodate and manage data without bottlenecks or downtime.

Competitive pressures, market globalization, customers, partners, users, and technological advances are all changing the way enterprises do business and use technology. As information becomes key to the success of any enterprise, the amount of data that is being collected (about 250MB per person, per year) and electronic transactions are increasing rapidly, and many companies are losing ground in the race to turn available data into valuable business knowledge. Indeed, for some companies, storage requirements are doubling or tripling every three-to-six months. Storage-intensive applications are driving much of this rapid growth, with no letup to be seen on the horizon. Furthermore, the amount of time information is kept online is also growing, from months to years.

Beyond just the pure growth in data storage requirements, nonstop access to information by internal and external users is more important than ever before. While it has been widely acknowledged that unscheduled downtime is unacceptable, companies are becoming more and more aware that performance is equally important in shaping their position in the competitive landscape. In fact, recent studies indicate that the average Web site visitor will wait only six seconds for a response before clicking away to another site.

Unfortunately, this unprecedented storage growth and need for improved performance is not accompanied by a surge in management resources. In most cases, adding storage buys the enterprise some room for growth but takes its toll by overtaxing IT administrators and increasing storage-related expenses. The add-a-box approach to expanding storage capacity has often proved to be ineffective and cumbersome. In fact, just adding additional capacity often complicates matters because of the extra burden to manage that additional storage.

Existing storage administrators either have to become much more productive (manage many more terabytes) or many more administrators will have to be hired. For example, according to IDC, storage administrators have to become 60 percent more efficient every year just to keep up with the growth. If the average administrator is responsible for 2TB of storage and nothing is done to make them more efficient, it is estimated that there will be a need for more than 1.35 million administrators by 2004. Even supposing that there were enough administrators to go around, we should remember that they are expensive resources.

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As indicated above, a large portion of storage costs are associated with managing it—and these costs can dramatically increase if it is not managed properly. According to a study by IBM Strategic Research Corp., improper storage management can raise yearly costs by three to ten times. This does not take into account other storage-related expenses, including manpower, floor space, electricity, etc.

Adding to the storage management challenge is the fact that storage resources can be widely distributed throughout an organization and can be server-based or external. Internal or server-based storage, as the name suggests, is storage that is located within a server. External storage encompasses all disk storage systems located separately from the server/system—from JBODs to RAID storage systems. When storage is widely distributed throughout an enterprise, managing it is difficult. For example, if storage is a mix between internal and external and spread throughout an organization, how is information shared? How are storage procedures standardized?

Here's the challenge. How do companies keep pace with growing volumes of information and demand for always-on, instantaneous access, while the resources to manage that information are not even close to increasing at the same rates?

Will adding more storage systems solve the problem? This concept is only effective at sites with smaller capacities. It also leads to greater decentralization that generally increases overall costs, which include bringing on more administrators to manage performance, availability, and security. Instead, the goal should be to reduce complexity, automate tasks, and eliminate human error, which is so often the cause of downtime. More enterprises are looking to storage consolidation as an answer.

## **Storage Consolidation**

One reason that storage consolidation is emerging as a solution to the information influx is because it holds the promise of not only supporting increased storage needs but also simplifying operations and improving resource utilization and efficiency. It enables re-centralization and increases open floor space through the reduction in the number of storage systems needed to support applications. Consistent policies and procedures, such as a single backup and restore platform can be employed. And consolidation rewards IT managers with a potentially reduced bottom line. Operating costs can be lowered through improved storage administrator productivity (managing fewer systems but increased terabytes), reduced environmental expenses, and diminished software license and hardware and software maintenance expenditures.

By consolidating or re-centralizing storage capabilities into fewer storage systems, IT administrators can realize the advantages of centralized management along with a single backup and restore platform. Storage consolidation delivers budget benefits that add up as:

- Storage is used more efficiently
- Server capabilities are maximized
- Open floor space is increased
- Management costs are lowered
- The number of storage devices are reduced
- The number of software licenses are reduced
- Hardware and software maintenance costs are decreased

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The benefits of storage consolidation are being realized by more and more companies and seen as a way to streamline many storage-driven applications.

## **Consolidating Server-based versus External Storage**

Storage consolidation is defined as consolidating storage onto fewer or larger storage systems, independent of server type, operating system type, or application. But what are the different types of consolidation? Storage consolidation centralizes storage and allows it to be shared by multiple hosts. That being stated, the process of consolidating onto an external storage system takes two basic forms: direct attachment of multiple servers to a single storage device or consolidation onto a storage area network (SAN).

The approach of attaching multiple servers to a single storage device was made possible and attractive by the introduction of carrier-class storage systems, such as the Hitachi Freedom Storage™ Lightning 9900™ V Series. The high performance, connectivity, and scalability of the Lightning 9900 V Series systems make it possible for various types of servers to connect to a single storage source. Reduced costs and simplified management are often mentioned as primary drivers to connecting many heterogeneous servers to a monolithic storage system.

Storage consolidation can also be accomplished by utilizing a SAN architecture. This approach allows for a pool of storage resources to be created and shared amongst heterogeneous hosts. This method also improves scalability, availability, and management, while reducing the storage management burden.

Existing resources that are typically considered consolidation candidates are either server-based or external storage. Typically, the RAID technology utilized for server-based storage resides on the host bus controller (also known as a RAID controller) or can be a RAID software utility. The hard disk drives (HDDs) are housed within the server enclosure. However, the server sees the disk storage as a peripheral. Server-based storage has limited high-availability features and is limited in its ability to support enterprise-wide applications.

External storage is defined as all disk storage systems located separately from the server or system. It includes storage with a RAID controller located in the external cabinet and storage elements located external to the server but connected to an embedded storage controller. According to Gartner Dataquest, from 1998 through 2000, the external RAID controller-based storage model represented in excess of 50 percent of the total RAID-based disk storage market. The analysts project that the market share for the external RAID controller-based storage model will swell to over 75 percent by 2005. Some of the reasons cited for this shift include the superior capacity, performance, scalability, and features of external RAID storage systems. Gartner Dataquest states that part of this transition is being fueled by storage consolidation projects.

## **Distributed Consolidation versus Massive Consolidation**

The type of storage system that is the target for storage consolidation projects is largely dependent upon an enterprise's existing storage infrastructure. However, the benefits that can be reaped are similar, if not the same: reduced total cost of ownership (TCO), improved storage management, better staff utilization, etc.

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An existing environment that consists of older monolithic storage systems (e.g. EMC<sup>®</sup> Symmetrix<sup>®</sup> and IBM<sup>®</sup> TotalStorage<sup>™</sup> Enterprise Storage Server) could benefit from migrating data onto a higher performing, higher scalability storage system, such as the Hitachi Freedom Storage Lightning 9980V<sup>™</sup> system. (For a discussion of the benefits of using the Lightning 9980V system for consolidation read “Lightning 9980V<sup>™</sup>: Built to Consolidate.”)

Typically, most highly distributed storage architectures could benefit from using a modular storage system as the consolidation candidate. As described earlier, existing storage resources in this environment can be server-based, external, or a mix of both. In this environment, storage was often added as a “band-aid.” That is, as a need for additional capacity arose, additional storage was added to meet that need. However, this approach can make managing these ad hoc resources difficult and lead to a strain on storage administrators.

As the name implies, modular storage offers a building block or buy-as-you-go solution. They scale from less than 1TB to well over 20TB, compared to monolithic storage, which can scale in excess of 70TB. Most modular storage systems allow components to be removed or added without bringing the systems down. Many of the features that were previously only found on monolithic systems are now available on modular storage systems.

## **Elements to Look for in a Modular Storage System**

When considering modular storage as a storage consolidation strategy, there are a number of factors to contemplate. Although there are many options and vendors to choose from in the modular storage market, certain features of modular storage are better suited for storage consolidation projects.

### **Scalability**

A storage solution should be able to scale not only to meet the current demand for storage, but also to accommodate future growth. Look for high availability and ease with which capacity can be added. However, remember that performance should not be overlooked. How will additional capacity affect the performance of a modular storage system? The bottom line is that scalability must be thought about in two dimensions: capacity and performance.

### **Connectivity**

The nature of storage consolidation means that more hosts will access fewer storage devices. Most organizations have a mix of platforms and operating systems supporting the various business-critical applications they run. It is imperative in a storage consolidation project that all the desired hosts are supported by the storage system. What happens if one mission-critical application can't connect to the now centralized storage? Or, what if future applications can't be supported? To overcome this issue, choose the modular storage device with the widest connectivity.

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### **Footprint**

The amount of “real estate” a storage system requires should be considered in terms of terabyte capacity per footprint. One of the benefits of consolidation is not only reducing the management burden associated with storage, but also reducing environmental constraints (power consumption, floor space, etc.). When considering a modular storage system for consolidation projects, the amount of data that can be stored within a physical space (footprint on the floor, capacity in a rack, etc.) should be taken into account.

### **Data Migration**

Storage consolidation is more than just replacing old storage systems with new ones; all existing data has to be moved. For a data consolidation project to be successful, careful data migration planning must be undertaken. Prior to the installation of the new storage systems, the existing storage and operating environment needs to be analyzed, and an effective plan for migrating data needs to be developed.

A successful plan will ensure that the migration project is accurate and efficient, reduce the frustration involved with the migration of data between dissimilar environments, and decrease the risk of data loss or corruption during the migration process.

## **Storage Consolidation using the Hitachi Freedom Storage Thunder 9500™ V Series Thunder 9570V™ System**

The new, modular Thunder 9570V system is recognized as the perfect fit for data-intensive industries, which require capacity and performance for applications that demand rapid access to data. The Thunder 9570V was built to consolidate and should be the logical choice for consolidation projects requiring modular storage.

The Thunder 9570V storage system is an easy-to-manage option for consolidation strategies. Consolidating onto the Thunder 9570V system enables scalable capacity and high performance, accompanied by significant savings. In many instances, enterprise storage systems can be replaced with just one Thunder 9570V storage system, lowering IT costs and extending capital investment by consolidating storage resources and sharing information across disparate platforms.

The Thunder 9570V system has a raw capacity of over 30TB and can scale easily, not only to meet current demand for storage, but also to accommodate future growth. The Thunder 9570V system incorporates the Hi-PER Architecture™, which allows for scalability of performance. The Hi-PER Architecture delivers high performance as capacity increases by incorporating a superior hardware RAID design and ultrahigh-speed interconnects. The Thunder 9570V system is able to scale in terms of both capacity and performance.

The Thunder 9570V system enables easy storage consolidation with Host Storage Domains (HSDs) by virtualizing connectivity and allowing each physical port to be seen as up to 128 logical ports. Each logical port can be used to define a different HSD. This allows multiple hosts to connect to the Thunder 9570V system (up to 512) and provides maximum flexibility for consolidation projects.

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Additionally, Hitachi Data Systems Global Solution Services offers an Open Systems Data Migration service. This service facilitates a customer's productive use of new Hitachi Freedom Storage systems by analyzing the existing storage and operating environment to develop an effective plan for migrating data to the new storage, and then implementing that plan to affect the transfer. As outlined above, data migration should be part of any storage consolidation project.

## Summary

Around the globe, users, partners, suppliers, and customers, along with applications and databases to support transaction processing, all push a storage infrastructure to its limits. While the amount of data that needs to be stored is growing, the resources to manage it are not. This presents a considerable challenge both to companies striving to gain a competitive edge and storage administrators tasked with storing, managing, and protecting that data.

Consolidating storage resources with modular storage systems can help meet the challenges of efficient management of rapid data growth and improving an administrator's productivity, without impacting availability and performance. Consolidating onto modular storage systems can simplify operations, reduce TCO, and improve productivity and resource efficiency.

With Thunder 9570V storage, the enterprise gains the capability to consolidate current storage systems into one footprint. By consolidating storage resources and sharing information across disparate platforms, the enterprise gains scalable capacity and high performance, accompanied by significant savings.

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