NETAPP WHITE PAPER

STORAGE CONSOLIDATION: OVERCOMING INHIBITORS TO SIMPLE AND EFFECTIVE DATA MANAGEMENT IN SMALL AND MEDIUM ENTERPRISES

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March 2007 | WP-7016-0307

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1 INTRODUCTION

As IT infrastructures grow and become more complex over time, IT managers discover that the cost of storage management far outweighs the cost of the storage itself. One of the recent trends among small and medium enterprises is the planning and implementation of consolidation strategies to reduce the complexity and cost of management. Two of the largest areas for consolidation are server consolidation and storage consolidation. Server consolidation can include virtualizing multiple servers into one physical box; it can also include consolidation of file servers into a single networked storage device. Storage consolidation typically involves replacing internal or direct-attached storage for applications with networked storage; it can also cover the consolidation of file- and block-level storage into a single multiprotocol storage device.

The purposes of this paper are to look at some of the issues facing small and medium-size enterprises[1] and to provide an overview of typical storage consolidation methodologies. The paper will also point out some tips on what to look for as you develop the consolidation strategies and plans that are right for your business.

Many small and medium enterprises say that their storage requirements are doubling every one to two years.[2] This is driven partly by the amount of electronic traffic between businesses and their partners, customers, suppliers, and employees and partly by the increase in business complexity and the demands placed on applications to solve business issues. Even more data will be created as information workers are given tools such as Windows® Vista and Office 2007 that enable and encourage communications through even richer media. Application data is growing to reflect increases in business pace and changes to corporate and regulatory requirements that demand more data be held for longer periods of time.

2 POTENTIAL INHIBITORS TO CONSOLIDATION

When looking at consolidation, common key inhibitors across this segment include the complexity of server upgrades, the difficulty and risk of data migration, the need for new IT staff skills, changing the backup infrastructure, and the cost and complexity of SAN implementation.

SERVER UPGRADE

As companies expand and their data requirements grow, they often add capacity or performance by adding another server; it might be another file server to extend file services, or another Exchange server to cope with additional loads. With storage that is internal or directly attached to the server, adding storage involves the following steps:

1. Performing a full backup
2. Taking the server offline
3. Breaking any RAID setup
4. Adding or replacing disk drives or entire arrays
5. Reestablishing the RAID group
6. Migrating the data back to the expanded server
7. Testing to ensure data was not lost and that the new setup works as planned
8. Finally, bringing the updated server back online

With this level of complexity and potential threat to data integrity, it is no wonder that IT managers often opt for the “quick fix” of adding another server with its own storage.

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[1] Small and medium-size enterprises include companies that have enterprise-class IT requirements but without the IT budgets of large enterprises. It can be thought of as the next step up from small and medium business, or SMBs. Companies typically have:

- Between 500 and 1,000 “information workers” or networked PCs (occasionally, there may be as few as 100 employees if the company is extremely data intensive)
- More than 20 application servers
- A high dependence on Windows applications

[2] IDC June 2006.

While this approach avoids the difficulty of adding storage to an existing server, it actually increases the complexity of management. As more servers are added to the infrastructure, the effort required to keep track of the license fees and updates to applications increases dramatically. Managing the storage and backups becomes much more difficult, and utilization decreases.

MIGRATION OF DATA

In order for a business to progress to a more secure, flexible, and manageable network attached storage environment, data must be migrated to the new storage. Among IT professionals, data migration has been compared to open-heart surgery: it is common, but potentially risky and should happen as few times as possible. Changing from direct attached storage to a SAN solution is something that many IT people fear even though they know it's ultimately the right thing to do. It is partly this fear that has driven server proliferation and complexity of infrastructure management.

IT STAFF SKILLS AND TRAINING NEEDS

As part of the perceived cost of SAN, IT managers worry that new skill sets are required to manage the SAN. There is often a reluctance to invest in the additional training or, more often, a lack of funding to hire storage specialists with Fibre Channel skills.

BACKUP INFRASTRUCTURE

Although tape backup is widely regarded as being unreliable (tape technology itself is unreliable compared to disk technology, and human intervention in changing, labeling, and moving tapes is prone to error), many IT managers are reluctant to change their backup practices. In a direct-attached storage environment, the storage for each server must be backed up individually. This can involve a tape drive directly attached to the server, or several servers being backed up, one at a time, over the LAN to a tape library. This approach is very inefficient in time and consumption of network bandwidth. Each time a server is added, the problem is compounded, and the backup process gets more complex.

SAN IMPLEMENTATION SEEMS TOO EXPENSIVE OR COMPLEX

IT managers frequently look at the acquisition costs of a SAN solution and believe that their company cannot afford the cost. While there is an initial investment, the overall cost savings and efficiency benefits of networked storage in use are compelling. There are a number of case studies available that illustrate the ongoing cost benefits that offset the investment in SAN. One of those studies, by Forrester Consulting, "The Total Economic Impact™ of Network Appliance™ IP SAN Solutions," clearly shows how quickly a SAN solution pays for itself.

3 OVERCOMING THE INHIBITORS

While the challenges facing you on a daily basis may seem insurmountable at times, there are solutions that can make your life easier, while delivering cost and efficiency benefits to the company.

AN END TO SERVER UPGRADES

With the storage separated from the processing power, you can allocate storage from a centralized pool on the fly, with no disruption to users or applications. Many companies have plenty of storage; but because it is distributed through the IT infrastructure as direct-attached storage, the utilization is typically in the 30% range. By consolidating application data for multiple servers, storage can be allocated from a central pool of storage, dramatically improving utilization rates.

NetApp FlexVol® technology can further double utilization over conventional SAN implementations by using a technique called thin provisioning. Thin provisioning enables users, groups, or applications to be allocated however much storage they say they want; but underneath, the system is actually only giving out storage as it is actually consumed. Having higher utilization rates enables you to use the storage you actually purchased and reduces the total amount of storage you need to buy.

SIMPLIFIED DATA MIGRATION

NetApp SnapManager® and SnapDrive® make the migration process pain free and highly reliable. The host-based utilities incorporate wizards to simplify and speed the migration process and to set up storage containers for the application. As the application data is migrated to the NetApp storage system, the configuration information is seamlessly updated. There is very tight integration of SnapManager with the Microsoft® stack, ensuring that everything happens as Microsoft recommends. NetApp SnapManager ensures accuracy throughout by checking consistency of the database and all of the configuration information.

CONSOLIDATE WITH THE STAFF AND CABLING YOU HAVE

You have the opportunity to upgrade your storage infrastructure without investing in the cost and complexity of a Fibre Channel network. An IP-based SAN can deliver all of the benefits of networked storage and often with negligible performance impact. Your IT staff already understands Ethernet networking, so the learning curve is very short. Your existing Gigabit Ethernet cabling and routers can be used for storage networking, eliminating the need for expensive Fibre Channel switches. NetApp storage products are capable of running either iSCSI or Fibre Channel, and they can both run concurrently on the same box, providing you with maximum flexibility and future-proofing your SAN.

BACKUP WINDOW ELIMINATED

If a regular Snapshot™ copy schedule is implemented, backups can be made virtually instantaneously. Because the Snapshot copy is a stable read-only image of the file system, it can be used as a source for backup in the background at any time, not just nights and weekends.

With space-efficient, low-overhead Snapshot copies, tape backup can become a thing of the past. Instant backups can be made at any point in time you choose. Using a disk array as a target for your backup application further pushes tape away from the backup and restoration cycle to the archival position to which it is more suited.

With almost instant restore available from Snapshot copies, going back to data restoration from tape becomes a last resort, required only in the event of disaster recovery. Most restore incidents are for recovery of a single file or directory – even end users can be authorized to retrieve their own lost, deleted, or corrupted files, freeing IT staff for more productive work. With remote replication or disk-to-disk backup, tape is completely eliminated from all but the direst situations.

SIMPLIFIED MANAGEMENT

Consolidating direct-attached storage onto networked storage makes storage provisioning much easier. Instead of managing the storage for every server, adding storage to individual servers and managing allocation locally, central storage on the SAN allows administrators to manage greater numbers of servers with ease.

Backups are much easier to manage; even if you elect to maintain backup to tape, the tape library attached to the SAN provides a single target for backing up multiple applications.

The NetApp tools for storage management are built around simplicity but with powerful capabilities. Storage can be allocated on the fly in minutes, not hours, from a single pane of glass. Self-diagnosing systems with predictive analysis can order their own replacement parts before the system even reports a fault. Everything is designed to work together to provide you with simple yet powerful tools to manage your business information.

4 TYPICAL CONSOLIDATION SOLUTIONS

Microsoft Windows application storage consolidation and Microsoft Exchange infrastructure upgrade are two key areas where a SAN solution is an ideal replacement for direct-attached storage. The data in Windows applications, including Exchange, has been growing significantly and is likely to be a key area of focus as you develop your consolidation strategies.

Either low-cost iSCSI SAN or high-performance Fibre Channel SAN can deliver significant benefits in ease of use, performance, and reliability. Multiple Windows file servers can be easily consolidated onto a single NAS device to simplify management, improve utilization, and reduce costs. If you also have a requirement for UNIX® or Linux® file services, multiprotocol NAS can offer further consolidation.

WINDOWS APPLICATION STORAGE CONSOLIDATION

Many application servers in small and medium enterprises still use internal or direct-attached storage. This means that every server needs to be managed independently, and each server's storage is available only to applications on that server. This leads to very low levels of utilization and labor-intensive management.

With Longhorn or Windows Vista Server on the horizon, there are likely to be some significant changes coming to the IT infrastructure as companies begin to upgrade. While you are thinking about upgrading servers and server operating systems, it is worth thinking about modernizing your storage from direct attached to a networked structure. Replacing the direct-attached storage with either iSCSI- or Fibre Channel-based SAN enables a simplified infrastructure with typically a 75% reduction in backup administration overhead.

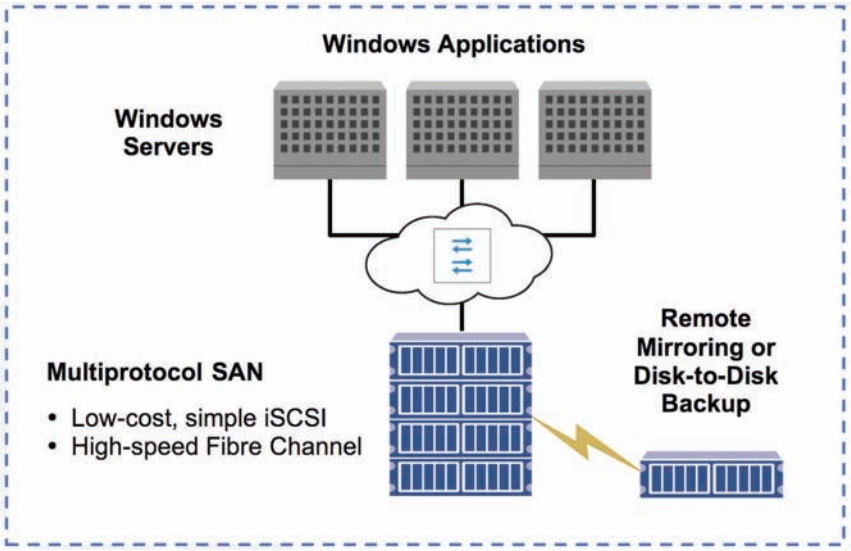

Figure 1) Windows application storage consolidation.

Reliable data recovery is available in minutes, not days, and storage utilization rates usually soar. As you need to add storage, additional capacity can be added on the fly and with no interruption to applications or users—unthinkable with direct-attached storage. Additionally, that extra storage can be provisioned in minutes, again while applications are running and without disruption.

Being able to recover quickly after a server outage is essential to minimize the business impact. The ability to tolerate component failures is critical; you should look for storage solutions that protect data even if two disk drives fail in the same RAID group.

MICROSOFT EXCHANGE STORAGE INFRASTRUCTURE UPGRADE

Microsoft Exchange databases are among the fastest growing areas in any IT organization. With the release of Windows Vista and Outlook 2007 along with Exchange 2007, end users will have even more opportunity to create and communicate with richer media, swelling the size of attachments and Exchange databases further. Whether you are considering an upgrade to Exchange 2003 or Exchange 2007, you should take the opportunity to upgrade your storage away from a direct-attached model to networked storage.

NetApp storage solutions for Microsoft Exchange significantly improve the mail environment through delivery of cost-effective, robust, and high-performance capabilities that are simple to manage. The NetApp software suite that simplifies management has a very useful component; Single Mailbox Recovery does exactly what its name suggests. A single user's mailbox can be restored almost instantaneously without resorting to an Exchange recovery environment – an enormous time saving.

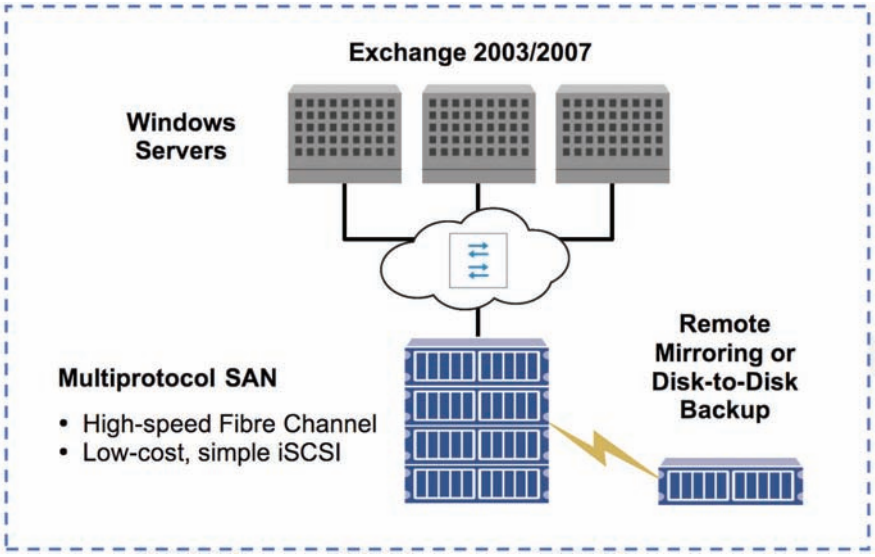

Figure 2) Microsoft Exchange infrastructure upgrade.

Depending on your needs, you can choose from either low-cost iSCSI or high-speed Fibre Channel protocols to develop your SAN strategy. Because NetApp storage solutions are based on a unified architecture and can support FC SAN or IP SAN or both concurrently, you can even change your mind after implementation. IP SAN has the added advantage of being able to be easily managed by your existing IT staff that understand Ethernet networking.

WINDOWS FILE SERVER CONSOLIDATION

The most common Windows server proliferation is in the area of file serving. Many individual Windows file servers can be consolidated onto a single NAS device. With file services consolidation you can:

- Eliminate client access licenses (CALs)
- Add storage and allocate additional space without disruption to users
- Instantly back up and restore with no downtime
- Simplify your tape backup and archival process

The NAS device is attached to the network via Ethernet, and clients can store and access files and folders in exactly the same way as if they were on their own hard drive or on the Windows file server. Additionally, multiprotocol NAS devices can provide consolidated file services for UNIX and Linux clients through NFS at the same time as serving CIFS.

5 CONCLUSION

As your business grows and your data management becomes more complex, consider moving from direct-attached storage to networked storage. Separating the processing power from the storage in your application servers provides enormous gains in manageability. You may never again need to go into the office to dismantle and rebuild a server over a long weekend.

As you put together your plans for consolidation, think about the requirements for the future and how you will cope with sustained growth. The simplicity and low cost of iSCSI-based SAN enable your existing network team to implement IP SAN with no additional training; the flexibility of the NetApp storage systems enables you to change at will to Fibre Channel and even support both protocols concurrently.

Your consolidation plans may be modest or far-reaching; you may be considering consolidation of file-level, block-level, or all data. Consolidation of storage into a networked model provides significant benefits over direct-attached storage. Consolidating onto NetApp storage can deliver even further benefits in cost, reliability, and simplicity of management.

NetApp can provide advice through our Professional Services organization to help you develop your storage consolidation strategy. The simplicity and ease of management of NetApp technology are available to you even if you have no plan to change your existing storage: Open Systems SnapVault®, NearStore® VTL, and V-Series virtualization can all help simplify your storage management.

More information about how NetApp can help improve your quality of life, by giving back your nights and weekends, is available at www.netapp.com.

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