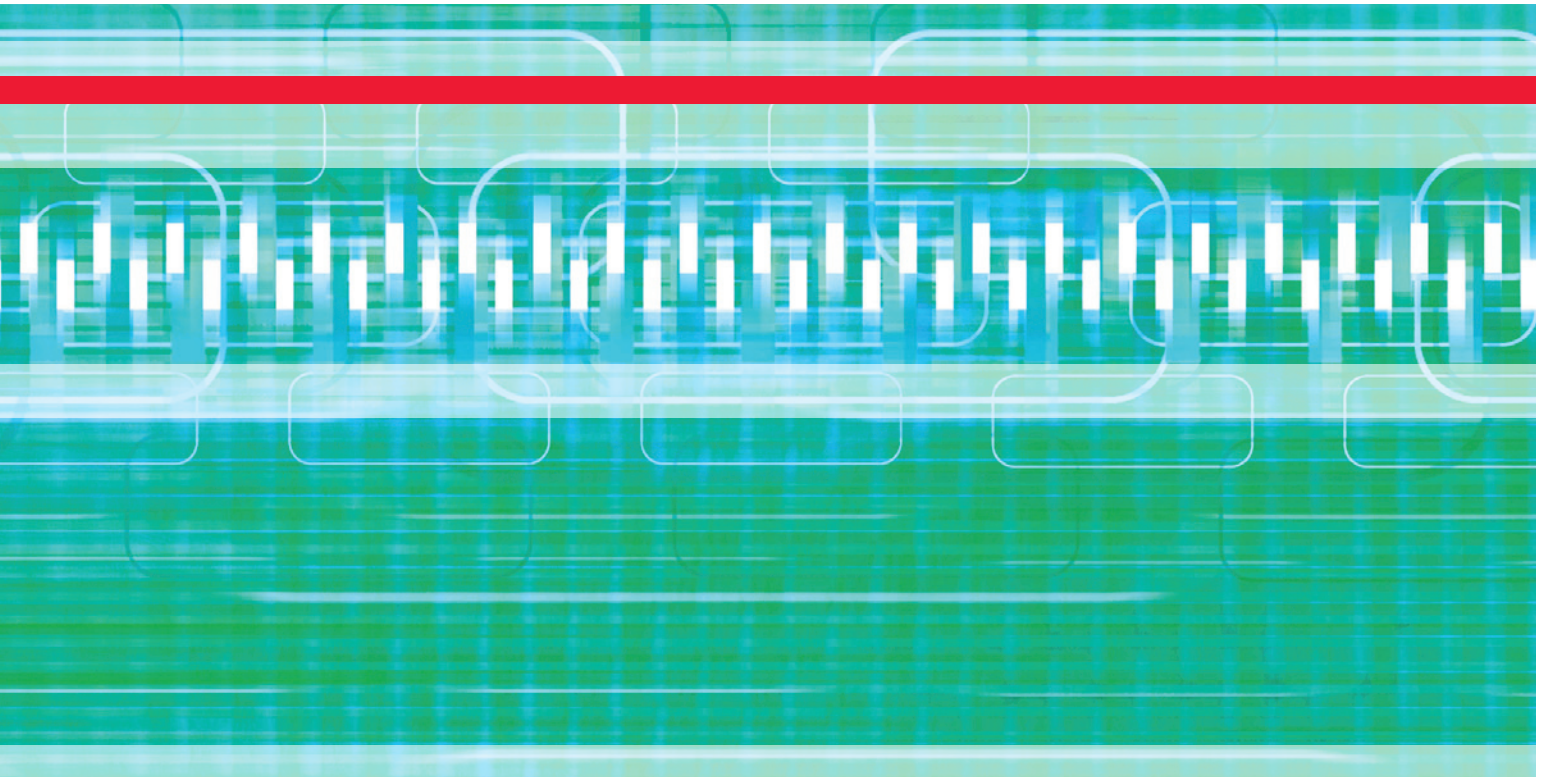SOLUTION PROFILE

Storage's Pivotal Role in Microsoft® Exchange Environments: The Important Benefits of SANs

Making the Optimal Storage Choice for Performance, Resiliency in Microsoft Exchange Environments

Today, business collaboration, business workflow and other critical sales processes depend heavily, and in some cases entirely, on e-mail. When e-mail — or, more specifically, Microsoft Exchange — goes down or its performance degrades, businesses suffer. Internal and external communication channels are interrupted, which can affect user productivity, internal processes and, more importantly, revenue streams.

However, while most organizations understand the critical nature of Exchange and its increasingly expansive role in supporting day-to-day and strategic business objectives, many still make the serious mistake of running Exchange on internal or direct attached storage (DAS) versus in a storage area network (SAN) environment, thinking it is more cost effective to do so.

The type of storage that organizations implement to support Exchange environments (like SAN or DAS) and how that storage is ultimately leveraged across the data center can have a huge impact on business and IT operations over the short and long term. Implementing Exchange in a SAN versus DAS environment can mean the difference between meeting or not meeting basic service level agreements. It can also affect an organization's resiliency in a disaster recovery situation as well as its ability to meet future requirements, control costs, maximize return on investment (ROI) and, as noted above, optimize current and future revenue generation by allowing multiple applications to share a pool of storage and eliminating siloed environments.

Overview: SAN versus DAS

While multiple factors influence Microsoft Exchange Server 2007 performance and availability, storage is certainly one of the biggest. Deploy the right storage environment and the Exchange environment will run smoothly and efficiently; deploy the wrong storage environment and performance and management issues can abound, resulting in unexpected capital and operating costs, especially as e-mail environments scale.

Two of the most common mistakes organizations make when deploying or upgrading Exchange environments are:

- Not paying enough attention to the storage environment supporting the application
- Trying to force fit Microsoft Exchange into an internal, DAS environment when a SAN is necessary to meet business demands

While the addition of Exchange Service Pack 1 and the move to 64-bit technology with the release of Exchange Server 2007 does allow for significant improvements to Exchange's overall scalability, I/O performance and cache

utilization, these enhancements do not fully address the fundamental issues of deploying Exchange in a DAS environment. For optimized performance, resiliency, scalability and ease of use, SAN environments are essential.

Benefits of SANs

In an effort to better understand the potential powerful impact moving from a DAS to a SAN environment can have on Exchange deployments, let's take a look at five key benefits:

Scalability

Because storage capacity can be shared among multiple applications, SANs allow users to more easily meet escalating Exchange demands, including increasing number of mailboxes, rising user concurrency rates, larger mailbox quotas, regulatory and compliance driven retention requirements, and greater number of Windows Mobile and BlackBerry users.

In contrast, scalability in a DAS environment is limited to the internal or direct attached disk capacity of the physical server, which can present problems when e-mail capacity requirements outgrow the server environment. In these situations, organizations are forced to enact stricter mailbox policies (such as reduce mailbox quotas), which can affect the efficiency of business operations; separate Exchange roles (like mailbox, client access, hub transport, etc.) if they are not already separated; or migrate mailboxes to other storage groups on existing or potentially new servers.

Of course, the scalability of the SAN environment also depends on a number of other factors, including the performance specifications and features or functions of the storage systems themselves, whether the storage environment is virtualized and other infrastructure components. However, the bottom line is that internal and direct attached storage limit scalability while SANs do not.

Capacity Utilization

Closely linked to scalability is capacity utilization. With SAN storage, capacity is shared among multiple applications, and with thin provisioning technology, it can be allocated to applications on an as-needed basis. Compare this to DAS environments in which a "fixed" amount of capacity is allocated upfront to Exchange — whether the application needs it at that point in time or not. This results in an overallocation of capacity, low utilization rates and, as explained above, scalability issues when the e-mail environment outgrows internal capacity supplies.

Also, the lower the utilization rate, the less efficient the environment will be from a power and cooling perspective. "Inactive" drives still must be powered on and kept cool like "active" drives. Depending on the IT environment and business considerations, this can be a small or big factor in resource planning.

Just How Widespread Is DAS Use for Exchange?

As a barometer, 22 percent of respondents to a recent survey of existing midrange networked storage users conducted by the Enterprise Strategy Group (ESG) said they were running Exchange on internal storage. Poll all Exchange users, not just those with networked storage, and the number is believed to be significantly higher, particularly among small and medium businesses (SMBs). IDC, meanwhile, estimates that about 34.5 percent of Windows-based e-mail workloads are DAS-based.

	SAN	DAS
Scalability	Provision from a central pool of storage; allows users to grow pool based on demand without affecting applications	Results in siloed storage environment, which creates capacity limitations and necessitates planned downtime
Capacity Utilization	Capacity is shared among multiple applications	Poor allocation, planned downtime and capacity limitations
Manageability	Centralized, common tool set; unified management through a single pane of glass	Multiple management "touch points"; increased capital and operational costs
High Availability, Backup and Disaster Recovery	Facilitates instantaneous (rapid) recovery while preserving backup copy and recovery points; can also shorten backup windows and improve overall disaster recovery preparedness	Difficult to replicate; lengthy backup and recovery time; application downtime
Server Virtualization	Provides platform for a number of advanced features, including data mobility, high availability and disaster recovery	Limits feature support; requires application downtime

Table 1: Advantages of SAN versus DAS Environments

Management

DAS has significant drawbacks from a management perspective. Due to its siloed nature, DAS environments have more management touch points — that is, individual, isolated pools of storage to manage. Compare this to SAN environments, which share disk capacity and bandwidth among multiple applications, allowing organizations to centrally manage resources. The larger the number of management touch points, the greater the potential associated operational and capital costs.

High Availability, Disaster Recovery and Backup

Exchange is a demanding application. New uses of Exchange and additional demands, such as remote messaging, virus protection and spam prevention, can task a 64-bit environment (with new cache resources) and push DAS environments beyond their limitations.

DAS environments are not nearly as well suited to the rigors of Exchange as SAN environments. DAS environments are not as reliable as SAN environments because they create single points of failure, and they can't provide the same performance (I/O throughput) as a SAN. One good example is the use of Microsoft's Cluster Continuous Replication (CCR) capability. While Microsoft CCR can be run in a DAS or SAN environment, organizations that implement it in a SAN environment will see more improved reliability, scalability and availability than those that stick to DAS. Also, to leverage CCR, redundant infrastructure and management resources are needed at the target site (in a multisite scenario), which can increase capital and operational costs significantly. In doing so, they negate any perceived cost savings derived from staying in a DAS environment. This type of redundant

infrastructure can also make for a much more complex and error prone environment, which can have a significant drag on IT productivity and efficiency.

To take advantage of advanced availability and disaster recovery capabilities in an Exchange environment, a SAN is needed (see Table 1). For example, DAS environments cannot take advantage of solutions such as Hitachi Storage Cluster for Microsoft Hyper-V.

Server Virtualization

As the use of server virtualization becomes more widespread and more Exchange environments are virtualized, networked storage will become an increasing necessity in Exchange and other applications. While DAS environments can be virtualized, a SAN is a necessary building block for an optimized virtualized Exchange environment. Without it, organizations cannot expect to realize the full benefits of a virtualized Exchange server environment — notably, data mobility, high availability and disaster recovery, as pointed out above.

Hitachi SAN Storage and Exchange

The Hitachi storage family, consisting of the Hitachi Universal Storage Platform™ and Hitachi Adaptable Modular Storage families, is well matched to the specific demands of Exchange 2007 environments, providing improved availability, scalability and ease of management in both dedicated and shared environments. In the case of the Hitachi Universal Storage Platform users gain the ability to virtualize the storage supporting their Exchange deployments for added efficiency.

Hitachi Universal Storage Platform

The Hitachi Universal Storage Platform is ideal for enterprise environments with demanding Exchange workloads. In testing, the Universal Storage Platform has been validated to easily support up to 100,000 users.[1] The platform also provides a number of advanced features and functionality that are particularly important, especially in larger Exchange environments, including:

[1] Internal testing using Microsoft Jetstress, January 2009.

- *Internal and external storage virtualization.* By virtualizing or pooling disk capacity (Hitachi and non-Hitachi) organizations can improve capacity utilization, ease management and apply other technologies, such as Hitachi TrueCopy® Synchronous replication software more broadly across their environments.

- *Hitachi Dynamic Provisioning.* Hitachi Dynamic Provisioning software enables organizations to take advantage of the thin provisioning and wide striping across the virtualized storage environment for added efficiency.

Specifically, Dynamic Provisioning can be leveraged to drive down costs in the Exchange environment by maximizing disk capacity and performance. Dynamic Provisioning software's wide striping capability allows for the precise allocation (versus rounding) of capacity, which reduces disk waste common with "next best fit" approaches. Wide striping also allows organizations to leverage different types of drives (denser and slower) to meet application demands. This type of tiered environment can help organizations further reduce the operational and capital costs of SAN storage.

It should be noted that while thin provisioning is an important feature of SAN storage, its impact in Exchange environment is minimal where disk consumption is determined by both IOPS and physical capacity requirements. In some cases, drives are allocated to Exchange based on performance requirements first and capacity requirements second. In these cases, the "extra" capacity goes unused as the additional spindles are required to meet the IOPS needs of the environment, although the capacity needs are achievable with fewer drives.

- *Tiered storage:* The ability to move data among tiers of disk storage based on the type of data (that is, how important the data is to the organization). Doing so ensures that organizations' most critical and frequently accessed data is on Tier 1 disk and less important, less frequently accessed data is on Tier 2 or even Tier 3 disk for cost savings purposes.

Hitachi Adaptable Modular Storage 2000

The Hitachi Adaptable Modular Storage 2000 family has a level of performance and flexibility that makes it an excellent storage platform for Exchange 2007. The 2000 family brings enterprise-class features and availability to the modular storage space, making it easier and more cost effective to deploy and manage storage resources for Microsoft Exchange Server 2007.

One of the key features of the 2000 platform is its active-active controller design, which dynamically load balances resources. This is hugely important in Exchange environments in which workloads constantly change.

Active-active controllers simplify SAN design and improve availability as well as performance by transparently shifting workloads among controllers based on application demands and usage patterns. Also, support for native MPIO enables simplified SAN design, improves basic availability and can help improve performance in heavy workload environments (such as I/0 traffic from multiple Exchange servers) or when it is necessary to share ports with other applications. This means Exchange administrators no longer have to be concerned about controller ownership of logical units or access through preferred paths.

For more information, see these documents:

- Planning for Microsoft® Exchange Server 2007 Deployments on the Hitachi Adaptable Modular Storage 2000 Family Reference Architecture and Best Practices Guide

- Monitoring and Managing Microsoft® Exchange Server 2007 on the Adaptable Modular Storage 2000 Family Solution Cookbook

Conclusion

While many factors can influence Exchange performance and availability, storage support is clearly a big one. As Exchange environments become more complex and demanding and server virtualization becomes more widespread, SAN storage will become an absolute requirement in most user environments.

Understanding the benefits of a SAN over direct attached storage as well as the features and functions of the storage systems used, will be critical to ensuring that organizations not only meet business goals around Exchange today but also are able to leverage Exchange data for revenue generating purposes over the longer term.

◎ **Hitachi Data Systems Corporation**