

Five Steps to an Economical, Bulletproof Infrastructure for Microsoft® Exchange Server

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WHITE PAPER

Network Appliance, a pioneer and industry leader in data storage technology, helps organizations understand and meet complex technical challenges with advanced storage solutions and global data management strategies.

Abstract

Microsoft Exchange Server has evolved into a critical application for many companies. Legacy storage infrastructures based on traditional direct-attached storage (DAS) are insufficient for meeting service level requirements associated with data availability, recoverability, manageability, and scalability. Leveraging an iSCSI-based storage network, Snapshot™ technology-based recovery mechanisms, and storage virtualization technologies provides an appropriate infrastructure for meeting the increasingly demanding requirements of Exchange—at a cost structure appropriate for Microsoft Windows® environments.

Introduction

Today more than ever, business is dependent on the constant availability of e-mail systems like Microsoft Exchange. The explosion of e-mail content, its business-critical nature, and the force of new compliance regulations have created a renewed interest in examining storage infrastructures that service messaging systems. The increasingly stringent requirements of Exchange are a substantial challenge to IT organizations, as they struggle with how to maintain and improve Exchange quality of service while operating with tight IT budgets, an already lean IT staff, and limited time available to perform extensive Exchange data management functions.

Direct-attached storage (DAS) systems are a common storage infrastructure for Exchange. However, DAS has fundamental limitations that make it very difficult to meet customer requirements for demanding Exchange environments. This paper identifies five key steps that can be taken to transform a DAS-based Exchange infrastructure to a new network storage-based architecture that meets the availability, scalability, and manageability requirements of Exchange environments, with the cost structure and ease of use appropriate for Windows.

The Challenges of Exchange on DAS Infrastructures

Legacy DAS-based storage infrastructures for Exchange typically consist of multiple servers, each with direct-attached storage. Typical DAS-based Exchange environments utilize tape for backup and recovery, with tape drives connected either directly or via a network (see Figure 1 below).

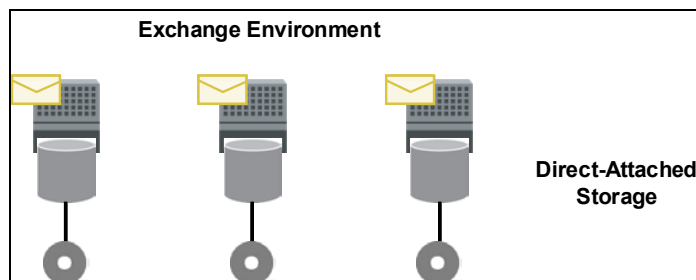


Figure 1) Legacy Exchange infrastructures typically incorporate direct-attached storage and backups to tape.

Direct-attached storage infrastructures present inherent issues for meeting cost and service level requirements for Exchange:

Poor scalability and capacity utilization. Administrators face a frequent need to increase the capacity of their Exchange-related storage to accommodate both rapid growth in e-mail stores and the demanding I/O requirements of Exchange. Storage utilization with DAS is often as low as 30%, implying substantial customer investment in unused capacity.

Disruptive backups and long recovery times. Administrators struggle with compressed or nonexistent Exchange backup windows. Perhaps more importantly, it can take several hours to several days to recover either the contents of individual user mailboxes or entire message stores from tape, a factor that makes tape-based recovery times inconsistent with user requirements.

Disaster Recovery infrastructure is problematic. For many customers utilizing DAS, advanced disaster recovery capabilities such as remote mirroring are impractical to implement due to the inherent complexity of replicating and managing the DAS/tape infrastructure.

Complexity surrounding e-mail retention and regulatory compliance. With the continued growth of e-mail stores, the importance of retaining emails as business records for reference and legal protection, and new regulatory requirements that put added focus on preserving critical e-mail trails, administrators are compelled to deploy more costly storage while managing retention policies that require more planning and manual intervention to assess when e-mail messages should be deleted, moved, or archived to other platforms.

For many customers, including those that are migrating from previous releases to Exchange 2003, it is appropriate to consider whether to upgrade their Exchange storage infrastructure to better support business goals.

The Five Steps to a Bulletproof Exchange Infrastructure

Companies wanting to overcome the limitations of DAS and tape can quickly move their Exchange operations to a new quality of service level by implementing the five basic steps outlined in the following pages. Based on extensive experience working with customers and supporting millions of Exchange mailboxes, this five-step process can transform a DAS-based Exchange infrastructure into an environment that effectively addresses key business requirements.

The five steps are

1. Deploying either an IP SAN or an FC SAN
2. Leveraging Snapshot technology for simple, fast backup and recovery
3. Virtualizing storage for faster provisioning and better capacity utilization
4. Implementing low-overhead remote mirroring for DR
5. Implementing tiered storage for archival and compliance

Depending on the needs of their environment, some companies will take only the first few steps, while those that have demanding requirements including compliance and DR will complete all of the steps.

Step One: Deploy a Storage Network Based on Either iSCSI or Fibre Channel (FC) SAN

Many organizations needing to simplify and improve their Exchange environment will realize substantial benefit by consolidating their DAS infrastructures to a storage area network (SAN), based on either the iSCSI or FC data transfer protocol. These storage networks allow storage to be decoupled from each Exchange server for more centralized and efficient management and control of disk resources, as shown in Figure 2.

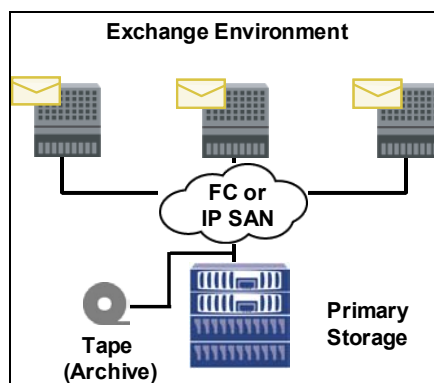


Figure 2) Consolidating Exchange data onto a storage network.

For Microsoft Windows in general, and Exchange environments in particular, many companies consider IP SANs (i.e., Storage Area Networks based on the iSCSI protocol) to be a particularly good fit. Offering a more affordable option for upgrading to a networked storage architecture, IP SANs use low-cost, standards-based commodity components and enable IT organizations to leverage both existing investments in IP infrastructure and their current IP expertise. A SAN based on Fibre Channel (FC) also provides the benefits of storage networking, and will be suitable for those who prefer FC technology or have already deployed FC.

NetApp and iSCSI. With over 2000 iSCSI customer deployments and 10 years of experience in the IP storage space, NetApp has substantial experience with IP SANs in Windows environments. NetApp IP SANs benefit from simple, robust data management software that allows Exchange administrators to quickly increase storage capacity and speed system backups and recoveries. With its unique unified storage architecture, NetApp systems can simultaneously support the storage needs of such applications as Microsoft Exchange, SQL Server, and user home directories—simultaneously, with the same storage system—whether the data transfer protocol required is iSCSI, FC, NFS, or CIFS. This unified architecture gives IT environments enormous flexibility and substantially simplifies the storage infrastructure.

Step Two: Leverage Snapshot Technology for Simple, Fast Recovery

Tape media is often used when backing up Microsoft Exchange environments. While tape is a low-cost means of data protection, tape backup has fundamental limitations that make it suboptimal for environments requiring nondisruptive backup and rapid restore. A minor recovery from tape can take hours, while recovery from a more catastrophic failure can often take days. The use of Snapshot technology addresses these issues by allowing administrators to take point-in-time copies of data and save them to disk.

NetApp Snapshot, SnapRestore® and SnapManager® for Exchange. NetApp was one of the first to market with its innovative, patented Snapshot technology. NetApp Snapshot technology is uniquely efficient in its use of disk space compared to other snapshot implementations in the industry, which tend to consume large quantities of storage. This is because NetApp Snapshot copies consist of only data updates and additions, not full copies of the data. More importantly, and unique to NetApp, is that NetApp Snapshot incurs no I/O or performance penalties on Exchange. NetApp SnapManager for Exchange (SME), in conjunction with SnapRestore, further automates and streamlines the coordination of backups and restores from earlier snapshots. Fully integrated with Microsoft Volume Shadow Copy Service (VSS), SnapManager for Exchange ensures that snapshots taken of the Exchange database will be consistent and able to be fully restored. NetApp solutions enable an entire Exchange system to be restored in just minutes.

Step Three: 'Virtualize' Storage to Enable Rapid Provisioning and Increase Capacity Utilization

Facing both exponential growth of Microsoft Exchange message stores and Exchange's high I/O requirements, administrators in DAS environments often find themselves bringing Exchange offline in order to add a new server with additional disk storage. The actual issue with adding more storage for Exchange is not only the *amount* of additional disk space required, but *how many* physical disk spindles Exchange requires to support its high I/O demands. To meet I/O needs, DAS-based Exchange customers often acquire sufficient disk spindles but then underutilize much of the acquired disk capacity. This sizing for performance and cumbersome provisioning result in DAS environments often having capacity utilization as low as 30%. While promising better utilization than DAS, many traditional SAN solutions often suffer from the same inability to maximize the use of all available disk spindles and all available storage.

Virtualization technology can address this issue by allowing the administrator to manage a set of physical storage devices as one large logical pool of storage. This type of technology can accelerate provisioning and increase capacity utilization.

NetApp FlexVol™ and SnapDrive™. NetApp Data ONTAP™ 7G offers both FlexVol and SnapDrive software functionality that lets administrators add new storage—rapidly and nondisruptively—to their Exchange environments. NetApp FlexVol technology allows the creation of one simplified, logical pool of storage, known as an "aggregate." Once the logical aggregate is in place, provisioning storage to an Exchange server can be performed in minutes, with just a few mouse clicks. The administrator just creates a "flexible volume" from the aggregate, sized as required. A single command can also be used to increase the size of an existing flexible volume in real-time, without incurring any Exchange application downtime or IT staff overtime. Since FlexVol allows storage to be provisioned dynamically, when and where it's needed, disk capacity utilization can be increased to 70% or greater. On the server, a simple NetApp application called SnapDrive, integrated with Windows MMC, nondisruptively maps the new flexible volume to a drive letter on the Exchange server. No rebooting is required.

Step Four: Implement Low-Overhead Remote Mirroring for DR

Ensuring business continuity is one of the more challenging tasks faced by today's Exchange administrator. DAS architectures with a reliance on tape backup usually require additional functionality to ensure application availability in the event of some type of catastrophic failure at the main data center. Remote mirroring to an off-site DR location is the main method Exchange environments adopt to ensure application availability after a site disaster or some type of catastrophic failure. While these types of solutions are available, many are impractical to deploy for the average Exchange environment, due to their complexity and extensive bandwidth requirements. Many even require expensive and proprietary software, not to mention ongoing professional services to aid in the design, installation, and ongoing management of these types of systems.

NetApp SnapMirror® and SnapManager for Exchange. Using NetApp SnapMirror technology, NetApp storage systems provide a flexible, affordable way to perform remote mirroring of Exchange data to another NetApp system over an existing IP-based LAN, MAN, or WAN architecture. Compared to other alternatives, this solution is quick to deploy and very cost effective, making it an excellent fit for Windows environments. SnapMirror is designed to utilize as little bandwidth as possible, since only changed blocks are transmitted over the network. With SnapMirror, Exchange data can be mirrored in one of three modes: synchronously, semisynchronously, or

asynchronously, based on an automated schedule set by the administrator. To further minimize costs, NetApp gives IT organizations the flexibility to install a smaller, cost-effective ATA disk-based NetApp target system at the secondary site to minimize costs for the infrastructure at the DR site. Some sites may choose to deploy a NetApp FC-SAN at their primary site, while they choose a more cost-effective IP SAN for their DR location. Management and integration of SnapMirror simply requires selecting a single checkbox within SnapManager for Exchange.

Step Five: Implement Tiered Storage for Archival and Compliance

Many administrators have begun to consider e-mail archival to lower-cost tiers of storage as a practical way to extend the use of e-mail and gain better utilization from their underlying storage. With the continued decrease in cost per megabyte of disk drives, disk-based e-mail archiving gives IT organizations and end users rapid access to archived e-mail content. Companies seeking to archive e-mails in compliance with new regulations can also benefit from disk-based archival solutions that preserve e-mail records from further edits or revisions, via write-once, read-many (WORM) technology. This approach combines the retention capabilities of WORM, with the ease of use and rapid access of disk storage.

NetApp Unified Storage, NearStore® and SnapLock™. NetApp archival and compliance solutions offer distinct advantages to Exchange environments. Based on the same unified storage architecture, NetApp solutions offer the benefit of the same operating environment and a single, simple architecture across multiple tiers of storage. With NetApp, Exchange production environments can utilize high-performance NetApp FAS systems using Fibre Channel disks (or ATA drives with unique RAID-DP™) while deploying NetApp NearStore for online archival with cost-effective ATA disk drives. In either case, the unified storage approach provides the same tool set, and the same data management interface, for all tiers in the infrastructure.

For compliance-driven environments that need the retention capabilities of WORM, NetApp SnapLock can be added to existing NetApp systems via a simple software license key. With SnapLock, administrators just need to configure one additional attribute setting during the provisioning process that turns a NetApp flexible volume into a WORM volume. A SnapLock volume can hold snapshots, files sent to it, or—in the case of Exchange—can provide a natural repository for archival applications from third-party providers like VERITAS, Open Text-IXOS, and others. Based on open protocols, no extra API integration is required. This means upgrades to Data ONTAP software or third-party archival software will have no negative effect on standing archival procedures.

Conclusion—Achieving a Bulletproof Exchange Infrastructure with NetApp

Following the five steps outlined in this paper, many companies have been able to reap the benefits of moving Exchange from a DAS/tape architecture to a NetApp storage network with NetApp software products. Typically taking advantage of the affordability and simplified data management capabilities found in iSCSI-based NetApp storage environments, these customers have been able to quickly realize higher levels of Exchange availability, faster system recoverability, and a new agility that lets them quickly add new storage when needed to accommodate the growth demands of their environment.

Today's Exchange customers are finding that NetApp has a powerful, cost-effective solution that provides high flexibility for meeting both their short-term needs for data protection and rapid recovery and their long-term needs for e-mail archival, compliance, and remote data mirroring.

Exchange Data Management Criteria	Alternative Storage Architectures	
	DAS + Tape Environments	NetApp iSCSI Environments
Recovery time, corruption	Hours	Minutes
Recovery time, catastrophic failure	Days	Minutes
Capacity utilization	Often ~30%	~70%
Storage provisioning	Disruptive and time-consuming	Nondisruptive, takes seconds
Remote mirroring/DR	Costly and complex, with high bandwidth requirements	Cost-effective and simple, with minimal bandwidth requirements
Retention and compliance	Slow access; complicated, manual process	Fast access; simple process with tiered storage

Table 1) Comparing Exchange data management with DAS and Tape vs. NetApp iSCSI environments.

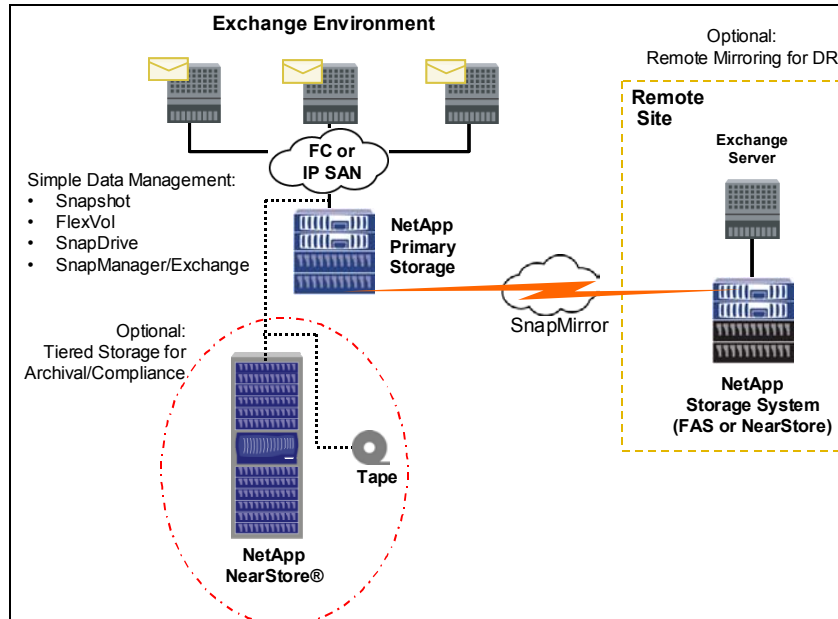


Figure 3) Building a simple, powerful Exchange architecture with NetApp.

Compared to DAS environments, the benefits of NetApp IP SAN solutions are substantial. In addition, note that the unique software capabilities highlighted in this paper also represent advantages over SAN products from other suppliers. This has been validated by multiple third-party organizations that have compared NetApp IP and FC SAN products to other alternatives and have concluded that NetApp delivers substantial advantages in TCO, ease of use, and other areas.^{1,2}

By leveraging powerful base technologies, and unique software capabilities such as those provided by NetApp, companies can transform their storage infrastructure into a simple, powerful environment that effectively meets the increasing demands of Microsoft Exchange users.

¹ "Network Appliance FAS3020 and EMC CX500: Comparison of Usability and Performance Report," based on a study conducted by VeriTest, a division of Lionbridge Technologies Inc., May 2005, <http://www.netapp.com/news/feature/2005/veritest.html>.

² "Total Cost Comparison: IT Decision-Maker Perspectives on EMC and Network Appliance Storage Solutions in Enterprise Database Environments," a study published by Mercer Management Consulting, November 2004, http://www.netapp.com/tech_library/ftp/analyst/ar1027.pdf.

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