



Technical Report

Hybrid Solution for Microsoft Exchange Server on NetApp Storage

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1 Introduction

This document is based on a combination of the NetApp® E-Series storage system and the NetApp fabric-attached storage (FAS) array architectures. The E-Series storage system provides ultrahigh application performance and the NetApp FAS array provides NetApp Data ONTAP® manageability and efficiency features such as NetApp Snapshot® technology–based backups, recovery, and replication.

2 Audience

This document is intended for the following audiences:

- People familiar with NetApp FAS storage who want simple SANs with greater input/output per second (IOPS) and Dynamic Disk Pools (DDPs) to eliminate RAID management, need proven high availability (HA) for Microsoft® Exchange workloads, and are open to the idea of a NetApp storage solution based on FAS combined with NetApp's new E-Series storage controller
- People familiar with Microsoft Exchange Server technologies and features

3 Solution Components

The components of the hybrid solution for Microsoft Exchange Server are:

- NetApp E-Series storage system
- NetApp FAS array
- NetApp OnCommand® Insight

3.1 NetApp E-Series Storage System

The NetApp E-Series storage system delivers high reliability and performance for enterprises running mission-critical applications with low latency and high IOPS requirements while needing to keep costs equivalent to that of the direct-attached storage. E-Series is architected to provide high levels of reliability, availability, and serviceability and offers features such as a fully redundant I/O path with automated failover, hot-swappable components, advanced monitoring and diagnostic tools, and nondisruptive serviceability. Storage can be managed and provisioned using NetApp SANtricity® storage management software. For more information, refer to the [SANtricity Storage Manager Datasheet](#).

3.2 NetApp FAS Array

The NetApp Data ONTAP 8 architecture offers a storage OS platform that helps address the challenges of growing and dynamic businesses. The NetApp storage efficiency features help IT to easily define end-to-end data protection strategies. The unified storage architecture is one of the key design features in the NetApp FAS array that helps businesses consolidate IT operations, increase efficiency, and magnify data center savings in terms of power, cooling, and space utilization. NetApp Flash Cache™ intelligent caching also helps with savings by requiring fewer disk spindles without compromising application performance.

3.3 NetApp OnCommand Insight

OnCommand Insight enables customers to manage their multivendor storage environment as an integrated, end-to-end service. OnCommand Insight is open and integrates with third-party configuration management databases to extend value across solutions so that customers can better manage and optimize existing resources to drive greater IT efficiency and cost savings. OnCommand Insight lets customers:

- Achieve more accurate capacity forecasting with trending
- Perform cost reporting for showback and chargeback

- Plan for consolidation, virtualization, and cloud initiatives
- Set policies and best practices for operational excellence
- Gain visibility into and control of heterogeneous environments

4 NetApp Storage Options for Microsoft Exchange Server

Many factors can impact a decision when selecting storage systems for Microsoft Exchange Server. Microsoft recommends using SATA disks in simple JBOD (just a bunch of disks) direct-attached storage (DAS) enclosures to drive down costs; however, this recommendation might not be appropriate for all environments. Organizations that plan to implement Exchange Server must understand the pros and cons of Exchange Server's different storage options in order to make the decision that is best for their environment.

One of the first questions that a company might ask when planning a storage platform for Exchange Server is "How much is the storage solution going to cost?" Although cost is a valid concern, the better question might be "Are we making the best decision for the money in order for the solution to meet our performance needs?" Organizations should consider the following primary criteria when selecting a storage platform for Exchange Server:

- The total size of the installation in terms of users and capacity
- The degree to which infrastructure can be shared across multiple applications
- Expected growth rates
- The degree to which server virtualization is a fundamental strategy
- The backup and recovery requirements
- The HA requirements
- The disaster recovery (DR) requirements

Based on these criteria, NetApp recommends the following storage options:

- Option 1: A fabric-attached storage (FAS) solution
- Option 2: A hybrid solution that combines FAS systems and NetApp E-Series storage systems
- Option 3: An E-Series storage solution

This technical report describes a hybrid solution for Exchange Server deployments and examines the advantages of this option.

5 Hybrid Storage Option with FAS for Microsoft Exchange Server

The hybrid storage option for Microsoft Exchange Server provides extreme application performance with lower response times as well as ultraefficient storage manageability features with the price/performance parameter in mind. NetApp E-Series is designed to deliver performance efficiency with excellent price/performance, maximum disk I/O for minimum cost, and sustained high bandwidth and IOPS. The NetApp FAS storage array, in combination with the industry-leading Data ONTAP storage OS, lets customers define service layers in the context of data protection through Snapshot, NetApp SnapMirror[®], and NetApp SnapVault[®] technologies.

Placing all database copies but one on the E-Series storage system can help drive down costs, particularly in extreme user profile scenarios with abnormally high IOPS or low database sizes. The strategy is to place one copy on FAS to leverage the NetApp SnapManager[®] and Single Mailbox Recovery (SMBR) suite of products for backup, restore, and single-item recovery. In cases of high IOPS, the FAS database copy can be treated like a lagged database copy that is a backup and not a failover target. In this scenario, the read latency requirement increases from 20ms to 200ms. This can enable

larger, slower SATA disks and NetApp FAS Snapshot technology that restores a database in seconds to minutes regardless of the database size.

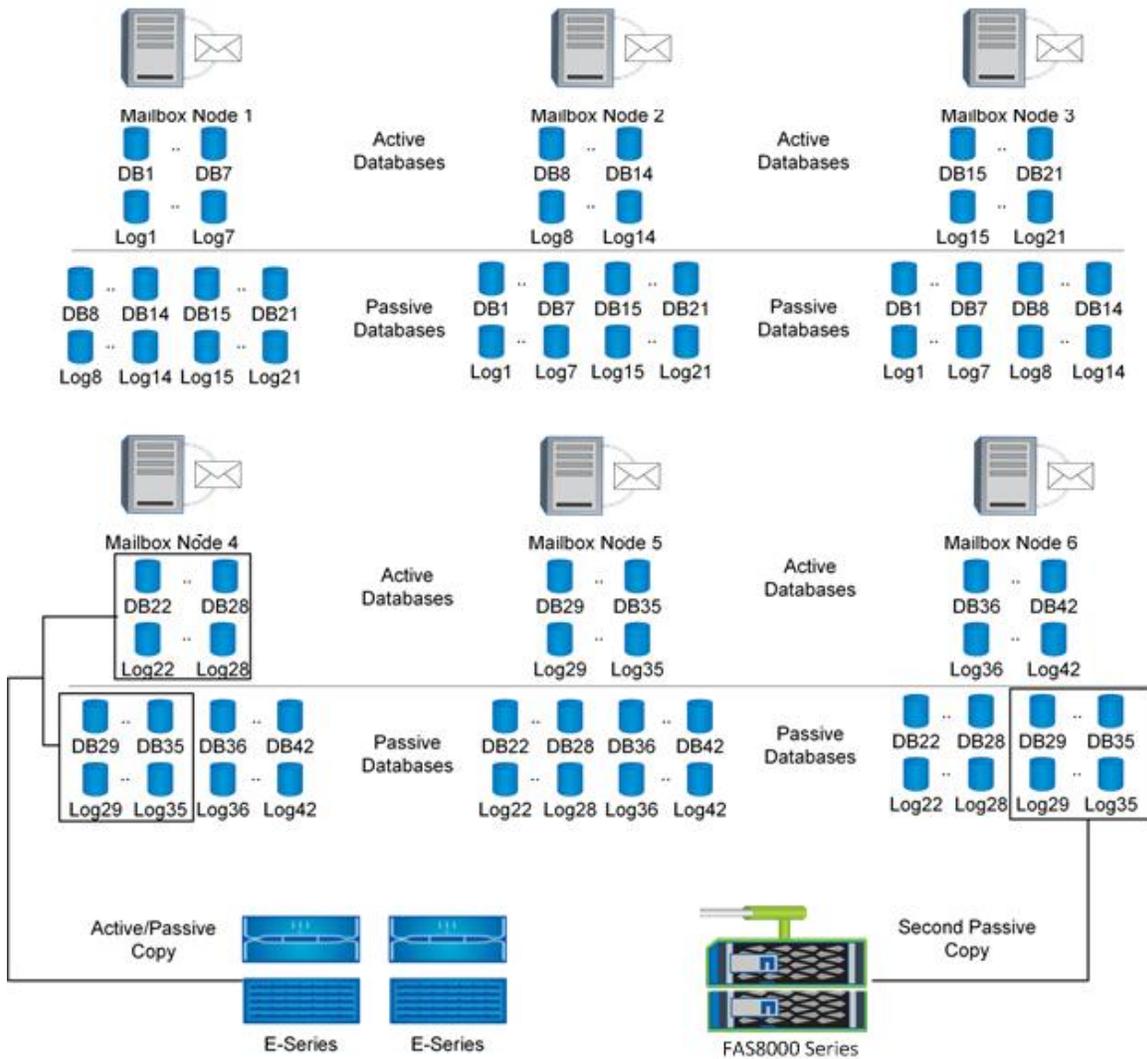
Capacity efficiency features such as thin provisioning, deduplication, and compression can be used to increase storage efficiency and reduce costs. In this scenario, NetApp FAS can also be part of the core storage for the entire customer environment used as shared storage infrastructure for multiple applications. The Exchange data hosted on E-Series is replicated to the FAS array using Microsoft Exchange database availability group (DAG) replication methodology. Based on the capacity and throughput and IOPS requirements, customers can choose any server and NetApp storage array while planning for this solution.

Note: In certain scenarios, in order to meet customer SLA requirements, one database copy per site on FAS might be required to enable backup site resiliency.

5.1 Database Layout

Figure 1 illustrates the database layout in hybrid option.

Figure 1) Database layout in hybrid option.



5.2 Solution Advantages

The hybrid solution for Microsoft Exchange Server offers the following advantages:

- The number of database copies and Exchange Servers is reduced (compared to a JBOD implementation).
- The solution provides Exchange Server virtualization capability (compared to JBOD).
- Customers can create application-consistent backups instantaneously in conjunction with NetApp SnapManager, which creates the Snapshot copies of the database copies residing on the NetApp FAS storage array.
- Database recovery and reseeding can be performed quickly through a NetApp SnapRestore[®] operation.
- With NetApp Snapshot technology, individual Exchange Server mailboxes, folders, e-mails, attachments, and calendar items can be restored securely in minutes versus hours. E-discovery with a dynamic set of criteria (date, subject, sender, recipient, or distinctive wording) can be performed without user disruption by using NetApp SMBR software. No separate recovery server or storage is required with this cost-effective solution.
- NetApp FAS storage can be configured to replicate data to a remote location by using SnapMirror or SnapVault.
- All the active databases are serviced from the E-Series storage system. This delivers both performance efficiency using the E-Series platform and intelligent data management using the FAS storage system.
- The solution is simple: It uses Microsoft Exchange out-of-the-box replication, which can be managed easily by Exchange administrators.

5.3 Deployment Options

The hybrid storage deployment is not limited to one option; it can be configured in different ways to meet specific requirements. Some of the other deployment options are:

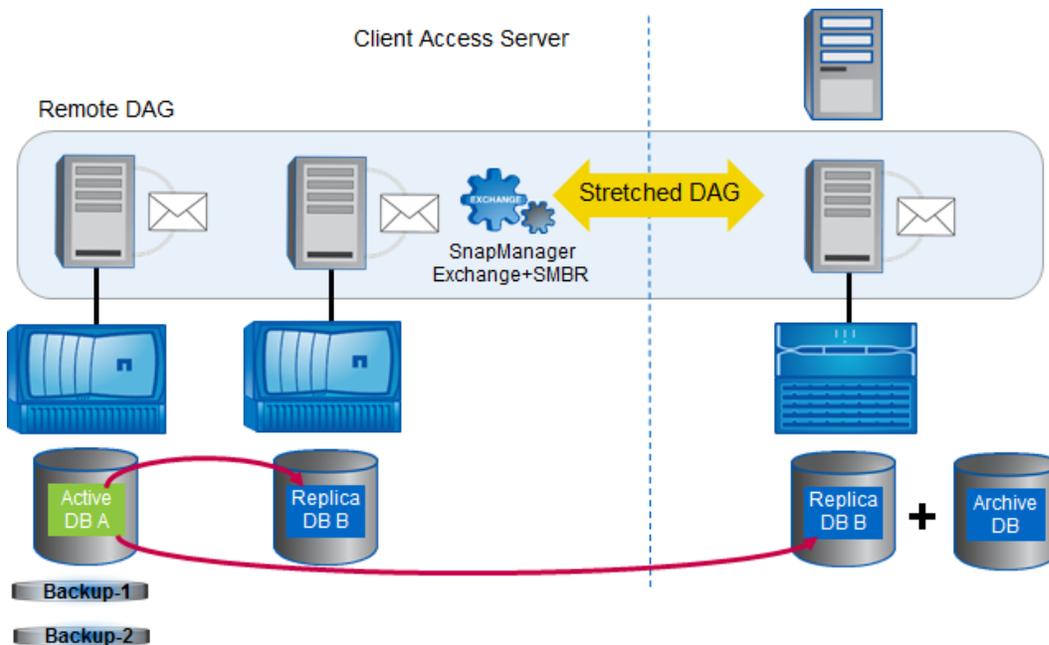
- Placing all primary mailbox database copies on FAS systems and placing passive copies and the archive mailbox database on E-Series storage
- Placing only the archive mailbox database on E-Series storage

Placing Primary Copy on NetApp FAS and Passive Copies on NetApp E-Series Storage

For this option, placing two or more database copies of each mailbox database on FAS in conjunction with NetApp Flash Cache and Flash Pool[™] technologies helps to meet the performance requirements in a high-IOPs Exchange environment. As always, storage efficiency technologies such as NetApp RAID DP[®] technology, thin provisioning, Snapshot technology, deduplication, and so on can be used to increase disk utilization and reduce costs. Also, the active database copy can be placed on SAS disks and the passive copies placed on low-cost SATA disks to meet the cost component. SnapManager and SMBR products can be leveraged to perform fast backup and recovery. This also helps to reduce to minutes the reseed time in the event of a database copy failure residing on FAS regardless of database size. The remaining database copies along with the archive mailbox databases are placed on NetApp E-Series, which leverages DDPs and implied administration, which provides better return on investment (ROI) than local storage. The E-Series can also be considered as a DR option in this scenario.

Figure 2 illustrates two database copies on FAS and passive database copies on E-Series.

Figure 2) Two database copies on FAS and passive database copies on E-Series.



Placing Archive Mailbox on NetApp E-Series Storage

The archive mailbox is a feature in Microsoft Exchange Server for which a second mailbox is tied to the user account. Mail that is older than a configured threshold is moved from the primary mailbox into the archive mailbox at a configured interval (usually nightly). The majority of mail that is older (>one year) is seldom accessed by the user again. The archive mailbox can be placed into a different database than the primary mailbox, enabling solutions for which the archive mailboxes are isolated in their own archive databases. The archive databases should require significantly less performance, and many customers consider fewer database copies, commonly just one database copy per site.

When the majority of the messages are moved into the archive mailbox, the primary mailbox can be a candidate for smaller and faster SAS disks in corner cases in which IOPS are heavier than normal.

For example, 22,000 5GB users with 5 database copies (3 in the primary site and 2 in the DR site) require 540TB of usable storage. By moving to a 2GB mailbox with a 3GB archive mailbox and reducing the number of archive databases to one per site, the storage requirement is reduced to 372TB, a savings of 168TB.

Table 1 lists the archive mailbox placement on E-Series and the storage capacity savings.

Table 1) Archive mailbox placement on E-Series and storage capacity savings.

Site	Size (GB)	Database Copies in Site	Raw TB
DR site			
Primary mailbox (old)	5GB	2	215
Primary mailbox	2GB	2	92
Archive mailbox	3GB	1	71
Savings:			52
Primary site			

Site	Size (GB)	Database Copies in Site	Raw TB
Primary mailbox (old)	5GB	3	322.5
Primary mailbox	2GB	3	138
Archive mailbox	3GB	1	71
Savings:			113.5
Total capacity savings:			165.5

6 Data Protection Strategy

One of the key challenges today is to provide high Exchange availability while reducing costs. Studies show that a majority of business-critical information resides in message stores and that the typical Exchange end user spends a significant part of the work day in the Exchange environment. As the amount of Exchange use and data grows, the challenge to meet stringent Exchange availability service-level agreements (SLAs) while providing an efficient and reliable backup mechanism also grows. NetApp SnapManager for Microsoft Exchange decreases the time required to complete both backup and recovery operations for Microsoft Exchange Server. Additionally, by leveraging the passive copy of the databases in the DAG, backups are performed with no interruption to the business, further improving e-mail service availability. The SnapManager for Exchange (SME) software and the FAS storage array allow the IT department to perform near-instantaneous backups and rapid restores. SnapManager for Microsoft Exchange is tightly coupled with Microsoft Exchange Server and integrates directly with the Microsoft Volume Shadow Copy Service (VSS). This allows consistent backups and also provides a fully supported solution from both NetApp and Microsoft. SME provides the flexibility to schedule and automate the Exchange backup verification, with additional built-in capabilities for nondisruptive and concurrent verifications.

NetApp Single Mailbox Recovery software delivers the ability to restore an individual mailbox or an individual e-mail message quickly and easily. It also enables the rapid recovery of Exchange data at any level of granularity—database, single mailbox, or single message—and restores folders, messages, attachments, calendar notes, contacts, and tasks from any recent Snapshot copy. Single Mailbox Recovery can directly read the contents of SnapManager Snapshot copies without the assistance of Exchange Server and rapidly search archived Snapshot copies for deleted messages that are no longer in the current mailbox. Using the Advanced Find feature, it is possible to search across all mailboxes in an archive EDB file by keyword or other criteria and quickly find the desired item.

SME can be installed in a hybrid storage environment that contains both NetApp FAS and E-Series storage. Within this environment, the following requirements must be met:

- All nodes in a Microsoft failover cluster must have NetApp SnapDrive[®] software installed, even if connected to E-Series storage. Make sure that there is proper network connectivity to the FAS storage system from all of the nodes.

Note: With SnapDrive 7.1 for Windows[®], SnapDrive should be installed only on the cluster node on which the dedicated disk was created. This is a change from previous releases in which SnapDrive for Windows was installed on every node in the cluster.
- SME does not need to be installed on every node. In this configuration, the backup must be made at the server/node level.

Note: In the previous scenario, SME cannot be used to connect to the DAG. The user must connect to individual mailbox servers on which SME is installed and perform tasks related to SME (this also includes migration of mailbox databases). This operation must be performed individually on each member node that uses FAS storage and has SME installed on it.

Furthermore, in this scenario, SME can be licensed on only those nodes on which it is installed.

7 Best Practices

NetApp recommends the following best practices:

- The sector sizes of the volumes hosting the databases and log files must be the same across all of the nodes in the DAG. This requirement is outlined in [Exchange 2013 Storage Configuration Options](#).
- Format the database and log volumes at 64k allocation unit size (as recommended by Microsoft).
- Use the same drive letters or mount points for the Microsoft Exchange data LUNs on all nodes of a DAG.
- Design identical storage for active and passive copies of the mailboxes in terms of capacity and performance. Provision the active and passive LUNs identically with regard to path, capacity, and performance.
- Enable read/write caching on all LUNS hosted on NetApp E-Series.

8 Summary

NetApp offers compelling storage solutions for Microsoft Exchange Server, and this combination of NetApp storage solutions helps meet the needs of customers with high-IOPS and necessary latency requirements.

Snapshot features integrated into the solution enable customers to perform faster backup and recovery operations to meet the needs of the enterprise. Customers can leverage SnapVault for longer retention of data, thereby meeting regulatory compliance requirements. Finally, OnCommand Insight and NetApp SnapManager offer customers the ability to monitor and manage storage array performance and automate all aspects of data protection.

References

The following documents were referenced in this report:

- Microsoft Exchange Server 2013 and SnapManager for Exchange—Clustered Data ONTAP
<http://www.netapp.com/us/media/tr-4221.pdf>
- Best Practice Guide for Microsoft Exchange 2013 with NetApp E-Series E2700
<https://fieldportal.netapp.com/?oparams=228965>

Version History

Version	Date	Document Version History
Version 1.0	February 2015	Initial release.

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