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EMC Virtual Infrastructure for Microsoft Exchange 2010

Enabled by EMC Symmetrix VMAX, VMware vSphere 4, and Replication Manager

Reference Architecture

EMC Information Infrastructure Solutions

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Reference architecture overview

Document purpose

This document provides an overview of an architecture for a virtualized solution for Microsoft Exchange 2010 on EMC® Symmetrix® VMAX™. The solution includes local high-availability (HA) using database availability groups (DAG) and backup and recovery of the Exchange 2010 databases using VMAX snapshots and EMC Replication Manager (RM).

Solution purpose

This solution demonstrates how to leverage EMC expertise and proven technologies to protect your Exchange 2010 environment in a cost-effective and flexible manner. The solution combines Exchange 2010 new DAG functions with VMAX snapshot capabilities. EMC Replication Manager was used to coordinate the snapshot backups of the Exchange data.

The purpose of this solution is to:

- Validate the process of creating virtualized Exchange 2010 building blocks for the VMAX storage array with VMware vSphere. Multiple building blocks were validated to better highlight the flexibility of the design methodology.
- Show how virtual provisioning can successfully and easily be used on a VMAX with Exchange 2010 mailbox database volumes to provide unlimited mailbox growth.
- Provide best practices and recommendations as well as performance details about implementing and using DAGs to provide local HA for Exchange 2010 with VMAX.
- Provide best practices and recommendations as well as performance details about using RM and VMAX snapshots to back up and restore Exchange 2010 on VMAX.

In this solution all of the key components have been integrated and leveraged to provide a highly scalable storage solution for Exchange 2010. In addition, EMC has added RM, which generates online snapshots of the passive copy to automate the recovery of the active database.

The business challenge

Today, customers are striving to provide users with larger mailboxes while reducing their organizations' Exchange backup data storage requirements and complexity. With current trends, Exchange users' mailbox sizes are growing rapidly, thus making it more challenging, if not impossible, to back up all of the Exchange data within the nightly backup windows.

Businesses also consider reducing the server and storage cost and footprint for the Exchange servers and storage to be of vital importance. With the use of vSphere and VMAX Virtual Provisioning™, users can achieve significant reduction in these areas without performance degradation.

The technology solution

This enterprise Microsoft Exchange 2010 solution provides:

- Improved manageability of Exchange servers with VMware vSphere and EMC Symmetrix VMAX, which significantly reduces hardware requirements.
- Reduced total cost of ownership (TCO) by reducing initial allocation of storage capacity and simplifying management. Thin provisioning provided by the EMC Symmetrix Virtual Provisioning feature allows the application to consume space only as needed, without reallocation or reconfiguration.
- Minimal to no impact on the Exchange servers during the backup with RM and VMAX TimeFinder® software, which creates Microsoft Volume Shadow Copy Service (VSS) space-efficient snapshots for logical protection. This requires much less disk space than tape or full clone copies.
- Exceptional backup and recovery performance so that data remains highly available. Once a snapshot of the Exchange data is taken and presented to the mount host, you can use backup software to take a backup from that copy, which is isolated from the production environment.

Key components

Introduction

This section briefly describes the key solution components. For details about all of the components that make up the solution, see Hardware resources and Software resources.

EMC Symmetrix VMAX

EMC Symmetrix VMAX is built on the strategy of simple, intelligent, modular storage and incorporates a new Virtual Matrix™ interface that connects and shares resources across all nodes. This allows the storage array to seamlessly grow from an entry-level configuration into a large storage system. The storage array provides the highest levels of performance and availability featuring:

- Up to 2 petabytes (PB) usable capacity
- Up to 128 Fibre Channel (FC) front-end (FE) ports for host connections
- FE ports
- Up to 64 FICON FE ports
- Up to 64 GbE / iSCSI FE ports
- Up to 1 terabyte (TB) global memory (512 GB usable)
- 48 to 2,400 drives
- Enterprise Flash Drives (EFDs), 200/400 GB
- FC drives
- 146/300/450 GB, 15k rpm
- 300/400/450/600 GB,10k rpm
- SATA drives, 1 TB, 7.2k rpm

An integrated Symmetrix array feature, **Virtual Provisioning,** enables organizations to present a certain amount of virtual capacity to a host, allowing the application to consume space as needed, for both thin and thick (fully provisioned) pool LUNs. This technology lowers TCO by reducing the initial allocation of storage capacity and simplifies management by reducing administrative tasks required to support growth.

VMware vSphere

VMware vSphere is the market-leading virtualization hypervisor that thousands of IT environments around the world use. The VMware ESX server can transform or "virtualize" the hardware resources of an x64-based computer—including the CPU, RAM, hard disk, and network controller—to create a fully functional VM that can run its own operating system (32- and 64-bit), and applications just like a physical computer.

Microsoft Exchange Server 2010 Enterprise Edition

Microsoft Exchange Server 2010 is an enterprise e-mail and communication system that allows businesses and customers to collaborate and share information. EMC enhances Exchange Server 2010 with the industry's broadest choice of storage platforms, software, and services.

With the new version of Exchange 2010, Microsoft presents a number of new features including, but not limited to:

- Database Availability Groups for database high availability
- Online mailbox moves
- Larger mailboxes (10 GB mailboxes)

Users can now implement mailbox servers in database resiliency configurations with database-level replication and failover. Major improvements with the application database structure and I/O reduction include support for a larger variety of disk and RAID configurations including FC and SATA drives.

EMC Replication Manager

Replication Manager automates and simplifies management of disk-based replicas. It orchestrates critical business applications, middleware, and underlying EMC replication technologies to create and manage replicas at the application level for a variety of purposes, including operational recovery, backup, restore, development, simulation, and repurposing.

Customers interested in reducing manual scripting efforts, improving recovery, and creating parallel access to information, can implement Replication Manager to put the right data in the right place at the right time.

EMC Replication Manager also helps customers safeguard their business-critical applications—such as Microsoft Exchange Server 2010, using either point-in-time disk-based replicas or continuous data protection sets that can be restored to any significant point in time that falls within the protection window.

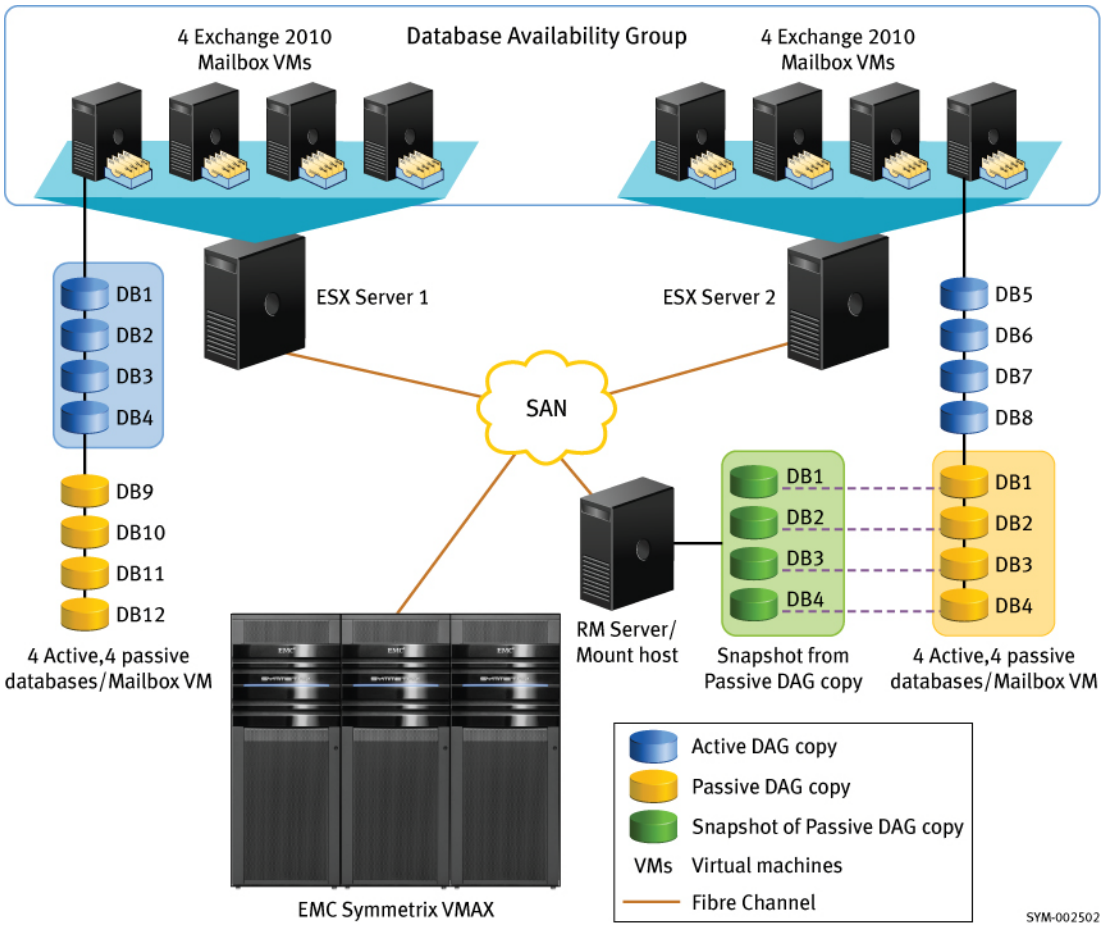
At the same time, Replication Manager can be thoroughly integrated with Microsoft Exchange Server 2010. Replicas are created by coordinating with Microsoft Volume Shadow Copy Service (VSS) to ensure a consistent copy of active Exchange databases with minimal impact to the production Exchange environment.

Physical architecture

Architecture diagram

The following illustration depicts the solution's overall physical architecture for one of the two validated profiles (Profile 1).

Note Details for both validated profiles (Profile 1 and Profile 2) are provided in the Validated environment profiles section.



Validated environment profiles

Profile characteristics EMC validated the solution with the following environment profiles.

Profile characteristic	Value
Number of Exchange 2010 users	Profile 1: 20,000 users Profile 2: 7,200 users
User profiles	Profile 1: Very Heavy 150 messages sent\received Profile 2: Heavy 100 messages sent\received
Mailbox sizes	Unlimited with Virtual Provisioning, 1 GB tested
Number of databases per server	8 (4 active 4 passive)
RAID type	Profile 1: RAID 5 7+1 Profile 2: RAID 5 3+1
Disk type	Profile 1: 600 GB 10k FC drives Profile 2: 1 TB 7.2k SATA drives
Number of ESX servers for mailbox VMs	Profile 1: 2 Profile 2: 2
Number of users/VMs	Profile 1: 5000 Profile 2: 3500
Total number of Exchange mailbox VMs	Profile 1: 8 Profile 2: 2
Number of DAGs	Profile 1: 1 Profile 2: 1
Number of database copies (mailbox resiliency)	2 (1 active 1 passive)

Hardware and software

Hardware The following table lists the hardware used to validate the solution.

Equipment	Quantity	Configuration
VMAX	1	Microcode version 5874.207.166 Qty 480 600 GB 10k FC disks Qty 240 1 TB 10k SATA
Storage connectivity (FC, SAS, SATA, iSCSI)		FC
SAN switch	1	Cisco® MDS 9509
IP switch	1	Cisco Catalyst 3560
ESX server	4	Dell PowerEdge R900 8 core, 128 GB RAM 2 dual-port, 4 Gb/sQLogic HBA Each will host 4 Exchange Mailbox VM Servers
Host Bus Adapter (HBA) and firmware	8	2 dual-port, 4 GB HBAs (QLA2562)
Number of HBAs/host	2	
Total number of disks tested in the solution		Profile 1: 128 600 GB 10k FC disks Profile 2: 64 1 TB 7.2k SATA disks
RM Server & Mount host	1	Dell R900

Software The following table lists the software used to validate the solution.

Software	Version
HBA driver	QLogic 9.1.7.16 2/15/2008
VMAX microcode	5874.207.166
Multi-pathing	EMC PowerPath®/VE 5.4 (64 bit)
Host OS	Microsoft Windows Server 2008 Enterprise Service Pack 2
Exchange 2010	14.0.639.19
VMware vSphere	Version 4.0, Update 1, Build 208111
Replication Manager	5.2.3

Conclusion

Summary

The virtualized Exchange 2010 building-block approach, used to design the test environment, is easy to create and scales well, producing consistent performance results.

Users can achieve a 4:1 server consolidation ratio by incorporating VMware vSphere as the server virtualization platform.

The Symmetrix VMAX Virtual Provisioning technology is true virtual provisioning for Exchange 2010. Unlike DAS virtual provisioning, which involves building new servers, provisioning new storage, and performing mailbox moves to the new servers, EMC Virtual Provisioning eliminates this operational overhead.

With EMC Virtual Provisioning, customers purchase only the storage required for the initial mailbox size. As user mailboxes grow, more storage can be seamlessly added with no effect on the users or Exchange server performance. The only additional cost is the purchase of additional disk space.

With EMC Replication Manager, users can gain a very small backup window regardless of the database size with little to no impact on the production Exchange mailbox servers. A small percentage of the production space is required for the snap space compared to clones. During testing, with a heavy Exchange 2010 load, as little as 2% of production storage was required to protect the databases for a 24-hour period.

The automated and rapid recovery capabilities that the Replication Manager through Symmetrix snapshots provides are unmatched. A typical storage group restore and recovery takes only 6 minutes regardless of the size of the mailbox.

Next steps

EMC can help to accelerate assessment, design, implementation, and management while lowering the implementation risks and costs of a backup/recovery solution for a Microsoft Exchange 2010 environment.

To learn more about this and other solutions contact an EMC representative or visit the Solutions for Microsoft page on EMC.com.