



# EMC Virtual Infrastructure for Microsoft Exchange 2007 Enabled by EMC Replication Manager, EMC CLARiiON AX4-5, and iSCSI

Reference Architecture



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# About this Solution

This document describes the reference architecture of the EMC® Virtual Infrastructure for Microsoft Exchange 2007 enabled by EMC Replication Manager, EMC CLARiiON® AX4-5, and iSCSI solution, tested and validated by EMC's Global Solutions organization.

The purpose of this solution is to integrate all of the components required to run a complete virtualized Microsoft Exchange messaging system on the EMC CLARiiON AX4 platform. The solution validates the performance of all aspects of the solution and also provides guidelines and best practices for building similar solutions.

This reference architecture document is not intended to be a comprehensive guide to every aspect of the Virtual Infrastructure for Microsoft Exchange 2007 enabled by EMC Replication Manager, EMC CLARiiON AX4-5, and iSCSI solution.

## The business challenge

Now more than ever, organizations need to maximize the storage investments they make, based on their business needs. This reference architecture provides a solution that is an affordable *plug and play* solution for an Exchange administrator looking at direct attached storage. To maximize the effectiveness of the servers required, this solution integrates the components required to run a virtualized messaging system. Should the Exchange administrator require more than 2,000 mailboxes, additional building blocks of 2,000 additional mailboxes can be added.

## The technology solution

The key components of this solution are:

- EMC CLARiiON AX4 networked storage
- VMware
- Replication Manager

### EMC CLARiiON AX4 networked storage

EMC CLARiiON AX4 offers affordable storage while also providing ease of use. The system has several product advantages that separate it from all other entry-level storage offerings.

CLARiiON AX4 offers:

- Ease of use for dynamic virtualized infrastructures.
- Simple wizard-based installation and management.
- Highest availability for virtualized IT environments based on CLARiiON technology with proven five 9s (99.999 percent) availability.

### VMware ESX 3.5 virtualization software

The deep VMware integration provided with the CLARiiON AX4 platform helps to extend the benefits of a virtual infrastructure on a number of levels.

#### **Cost-effectiveness**

VMware offers the significant, tangible benefits of server consolidation including increased resource utilization, energy savings, and reduction of operational costs.

#### **High availability**

VMware offers High Availability (HA) and VMotion to provide resiliency in the server layer. These technologies depend on networked storage to function. Virtualization basically turns physical servers into files that are eventually stored on a disk.

#### **Simple scalability**

With metaLUNs, capacity can be added as virtual machine (VM) deployments grow. The associated volumes dynamically expand while the VMs are online. Features associated with both metaLUN and virtual LUN technologies are non-disruptive and completely invisible to VMware and the guest operating systems.

The purpose for CLARiiON AX4 and VMware integration is that it complements and facilitates ease of management of a dynamic, virtualized, information infrastructure.

## Replication Manager

EMC's Replication Manager offers an easy to use, wizard-driven replica management tool for virtual, physical Raw Device Mapping (RDM), and Microsoft iSCSI initiator discovered disks for in-guest replicas for backup acceleration, business continuity, and repurposing.

### Benefits

Replication Manager software delivers point-and-click replica management for business continuity:

- Creates a “gold” copy of production data for an instant restore should corruption occur.
- Streamlines the backup of production data without impacting performance, which is ideal for backup acceleration.
- Copies of production data can be created for testing, development, and reporting to minimize the impact to production.

### Features

Replication Manager is designed for ease of use through the following features:

- Management and automation of snapshots and clones for EMC's point-in-time replication products on CLARiiON using SnapView™ and SAN Copy™.
- Auto-discovery of applications, their associated storage, the replication technology available, VMFS datastores, VMs, and their replication configuration during each replica cycle.
- Intelligence to place applications in the proper state for application-consistent replicas such as Volume Shadow Copy Service (VSS) for Microsoft Exchange Server.
- Instant recovery back to production application data for Exchange, SQL Server, and Oracle running on VMs using virtual disks, physical RDM, or Microsoft iSCSI initiator discovered disks. For VMFS containing VMs, create replicas for backup and instant restore through Replication Manager or perform a simple restore via VirtualCenter of a single VM from a mounted replica created by Replication Manager.

## Solution details

A consolidated Microsoft Exchange infrastructure is the first step towards meeting the challenges of managing e-mail. This solution demonstrates the value of virtualizing the Microsoft Exchange environment. The solution described in this reference architecture utilizes EMC's CLARiiON AX4-5i, which is a simple, easy to manage, iSCSI storage system. The solution validates the performance of the array and the functionality and performance of the VMware ESX Server 3.5.

The VMware ESX 3.5 server hosted five VMs:

- One Microsoft Windows Domain Controller
- One Microsoft Exchange Hub/CAS server
- One Microsoft Exchange Mailbox server
- One EMC Replication Manager server
- One EMC Replication Manager mount host

A physical domain controller also exists here and this host also runs the VMware VirtualCenter. In the event of any problems within the VMs, a host is available for managing the VMware ESX 3.5 server.

EMC's Replication Manager was also used to protect the data and allow for two rolling backups to disk. This was also validated from both a functionality and performance standpoint.

Results of performance testing and the scripts used to configure the array can be found in the Integration Guide for this solution. These scripts are for the exact configuration in this solution but they can be modified to suit other configuration requirements.

All hardware, including the storage array, the servers, and two network switches, was physically located in the same rack as shown in [Figure 1](#).

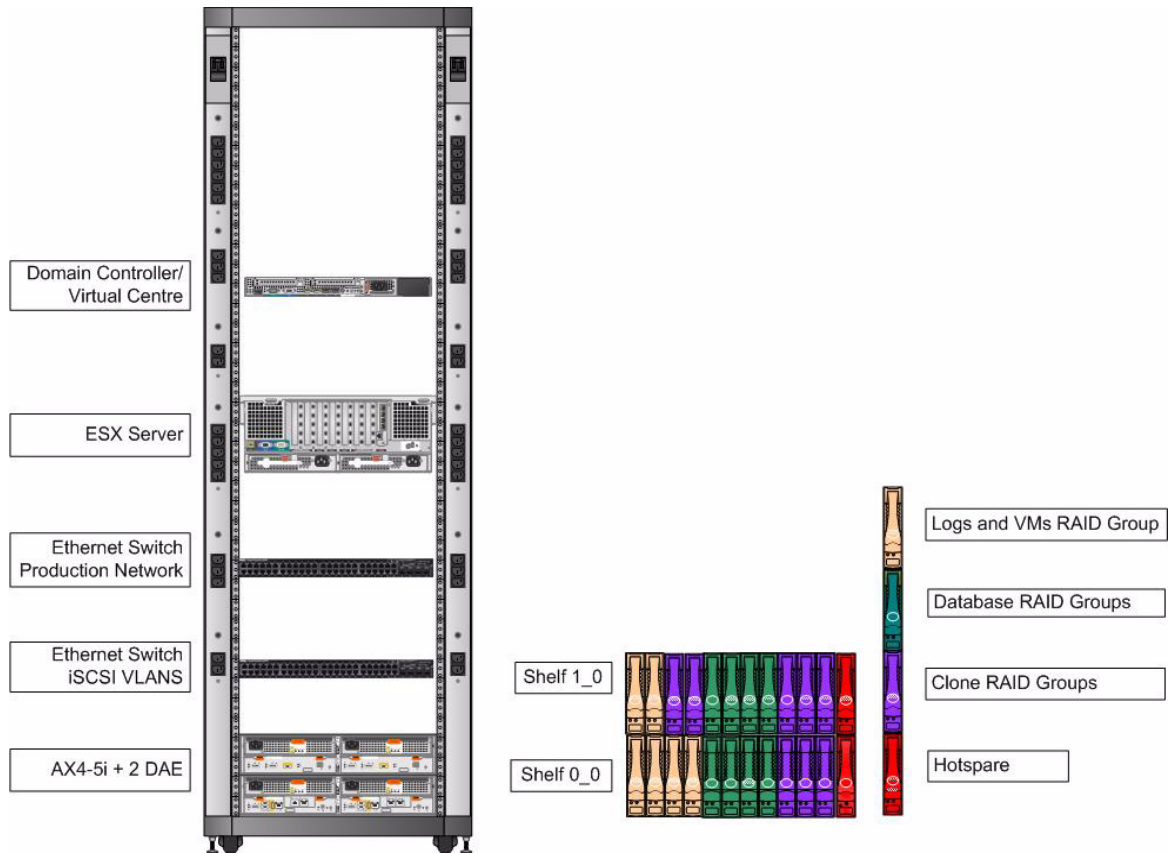


Figure 1 Hardware layout used in this solution

## Environment profile

This solution is described by the parameters and assumptions listed in [Table 1](#)

**Table 1**      **Environment profile**

Parameter	Value
Number of Exchange 2007 users	2000
Exchange 2007 servers	1
Number of Exchange 2007 users per server	2000
Number of Exchange 2007 storage groups per server	8
Number of Exchange 2007 mail databases per storage group	1
Number of Exchange 2007 users per mail database	250
Size of Exchange 2007 user mailbox	300 MB
Exchange 2007 production data RAID type, physical drive size, and speed	1/0, 300 GB, 15k

The configuration of the array was based on the values listed in [Table 1](#). Microsoft Exchange was not installed during the Jetstress testing. Jetstress was configured to run performance testing, not a specific mailbox profile number. This allowed for a variation in the above configuration.

For more information, refer to "[Summary of testing](#)" on page 12.

## Hardware resources

The hardware resources used in this environment are listed in [Table 2](#).

**Table 2 Hardware configuration**

Equipment	Quantity	Configuration
42 rack	1	
CLARiiON AX4-5i array	1	2 service processors 2 disk array enclosures 24 x 300 GB 15k hard disk drives
ESX Server	1	4 quad-core E7310 Xeon, 1.6 GHz, 4M cache, 80W, 1066 MHz FSB, 32 GB RAM 4 fully integrated Broadcom 5708 Gigabit NICs, TOE capable
Physical Domain Controller	1	6 GB RAM Quad-core AMD Opteron 2352, 2.1 GHz, 4 X 512k cache 1 GHz HyperTransport
Ethernet switches	2	24-port copper Gigabit Ethernet Layer 3 switch with 4 combo ports (SFP or 10/100/1000) with resilient stacking and 10 Gigabit Ethernet capabilities

## Software resources

The software resources used in this solution are listed in [Table 3](#).

**Table 3**      **Software configuration**

Software	Version
Microsoft Windows Server 2008	x32 Enterprise
Microsoft Windows Server 2008	x64 Enterprise
Microsoft Windows Server 2003	x32 Standard
Microsoft Exchange Server 2007	Service Pack 1
Microsoft iSCSI Initiator	6.0 (Build 6000)
EMC PowerPath® x64	5.1 (Service Pack 2)
EMC Replication Manager	5.2
VMware ESX Server	3.5
VirtualCenter	2.5
Jetstress	08.02.0060
LoadGen	08.02.0045

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**Note:** Microsoft Windows Server 2003 is required for the virtual Replication Manager server. Microsoft Windows Server 2008 is required for all other virtual machines.

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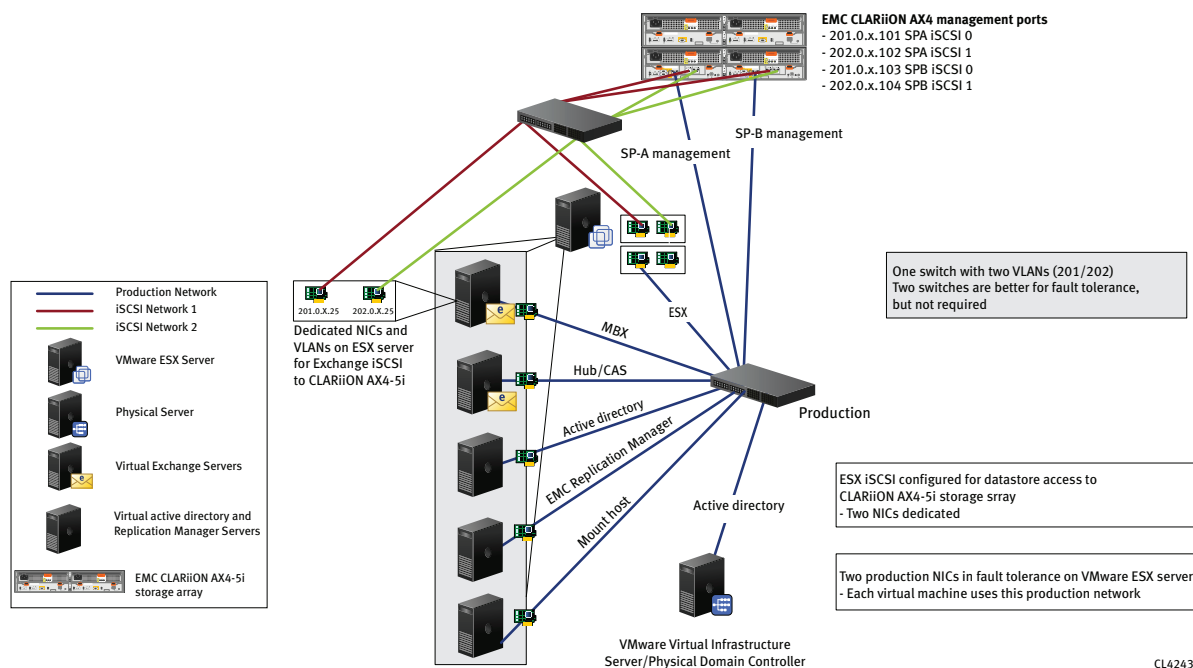
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**Note:** In this solution, Microsoft Windows Server 2008 x32 was used for the mount host but 64-bit could also be used.

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## Physical architecture

Figure 2 illustrates the overall physical architecture of this solution.



**Figure 2 Physical architecture of the solution**

## Conclusion

This solution uses VMware for consolidation of the server and Replication Manager for protecting Microsoft Exchange data, providing the commercial customer with a disaster recovery solution that allows for fast point-in-time recovery of data.

Consolidation using VMware also provides a reduced cost solution for the data center while still maintaining high availability of the infrastructure.

### Summary of testing

Jetstress testing was completed to ensure the array performed as expected. The configuration of this test was to achieve the maximum performance from the array while maintaining required Microsoft response times. Using Jetstress in this way allows for a breakdown of various configuration options, based on the known throughput from this configuration.

Table 4 presents a number of options available with the configuration of this solution. For more information about the storage array configuration, refer to the Integration Guide for this solution

**Table 4 Configuration options**

Number of User Mailboxes	Profile	User Mailbox Size
2000	User Profile .5 IOPS	300 MB
1500	User Profile .5 IOPS	400 MB
1000	User Profile .5 IOPS	600 MB
500	User Profile .5 IOPS	1.2 GB
250	User Profile .5 IOPS	2.4 GB
125	User Profile .5 IOPS	5 GB

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