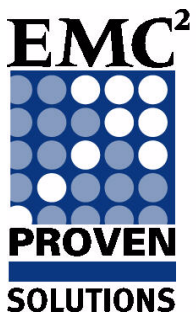




# EMC Virtual Infrastructure for Microsoft Applications—Data Center Solution

## Enabled by EMC Symmetrix V-Max and VMware ESX 3.5

Reference Architecture



EMC Global Solutions

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# Contents

## About this Solution

Purpose.....	5
Business challenge .....	6
Technology solution .....	6
Solution details .....	7
EMC Symmetrix V-Max .....	7
VMware ESX Server .....	8
Microsoft Windows Server 2008 Enterprise edition .....	8
Microsoft SQL Server 2008.....	8
Microsoft Office SharePoint Server 2007 .....	8
Microsoft Exchange Server 2007 .....	9
EMC Replication Manager .....	9
Environment architecture .....	10
Hardware resources .....	11
Software resources .....	11
Environment profile .....	12
SharePoint farm profile.....	13
Microsoft Exchange Server 2007 profile.....	13
Microsoft SQL Server 2008 profile.....	14
EMC management profile.....	15
Conclusion .....	15
Summary of benefits.....	15



# About this Solution

This document describes a reference architecture of an Enterprise solution tested and validated in the EMC Global Solutions Centers (GSC).

The Global Solutions Center labs reflect real-world deployments in which solutions are developed, designed, tested and documented to address customer challenges. Customers can reduce the complexity, costs, and risks of deploying new technology with EMC Proven Solutions.

Before implementing a solution in your enterprise, you can leverage this reference architecture, which combines:

- Well-documented technology options
- Recommended technology products
- Characterization of the technology results

The reference architecture will help you turn plans for your data center into reality. If you're seeking to deploy your applications in a virtual, consolidated platform, this reference architecture should be your first point of reference.

## Purpose

The purpose of this solution is to demonstrate a scalable, fully integrated virtualized Microsoft data center solution, incorporating Microsoft Office SharePoint Server 2007, Microsoft SQL Server 2008, and Microsoft Exchange Server 2007.

The EMC<sup>®</sup> Symmetrix<sup>®</sup> V-Max<sup>™</sup> storage array is leveraged to address storage and consolidation. EMC brings the power of EMC Symmetrix V-Max advanced virtualization mechanisms coupled with VMware virtual server technology to maintain efficiency across multi-application environments. This solution integrates the EMC Symmetrix Management Console (SMC) for centralized storage management. Additionally, EMC Replication Manager provides seamless backup of Microsoft SQL Server and Microsoft Exchange 2007 databases.

## Business challenge

In every business segment today, customers are impacted by budgetary constraints, yet required to maintain robust, efficient multi-application data centers. Server and storage virtualization technologies are proving to be the most cost-effective solution for a vast majority of customers, allowing them to more effectively leverage existing IT resources.

In addition to cost savings, many customers are now required to develop a plan to proactively address accelerated application deployments and user-data growth. By choosing to implement virtual servers versus physical servers, indeterminable growth is no longer a barrier. A virtualized data center allows customers to achieve optimum scalability and flexibility as resource needs change.

EMC meets the business challenge for a virtualized data center by providing a reference architecture for a highly available environment using EMC Symmetrix V-Max storage.

## Technology solution

This solution demonstrates a powerful, highly efficient consolidated Microsoft applications data center on a virtualized infrastructure. Full integration and high availability (HA) features of VMware Virtual Infrastructure and the EMC Symmetrix V-Max innovative storage system formulate the basis of the solution.

More specifically, the solution presents findings and build considerations around how Microsoft SharePoint Server 2007, Microsoft SQL Server 2008, and Microsoft Exchange 2007 share the same infrastructure, while maintaining:

- Efficiency of server hardware and data center infrastructure resources through virtualization enabled by VMware
- Fast and simplified provisioning using Autoprovisioning Groups and virtually provisioned LUNs
- Improved data tiering capabilities
- HA achieved by Symmetrix V-Max provides storage redundancy and VMware HA clusters
- Local data protection that integrates rapid cloning and recovery in a virtual environment automated by EMC Replication Manager
- A streamlined backup and restore process for multi-application data centers
- Simplified application protection using Replication Manager to rapidly back up and recover SQL Server 2005, SQL Server 2008, and Exchange 2007 databases

- Granular item-level recovery of SharePoint and Exchange objects from Replication Manager replicas through Kroll Ontrack PowerControls

## Solution details

This section briefly describes the key solution components. For details about all of the components that make up the solution, see [“Hardware resources” on page 11](#), and [“Software resources” on page 11](#).

### EMC Symmetrix V-Max

The EMC Symmetrix V-Max storage system provides unsurpassed availability, consolidation, performance, application integration, power efficiency, and information-centric security. The future-proof architecture and full complement of powerful virtualization software define the requirements for today’s high-end networked storage systems.

The Symmetrix V-Max reaches beyond the industry standard for high-end information storage systems by integrating new technologies for your virtualized environment, including:

- **Autoprovisioning Groups**—The Autoprovisioning Groups feature provides an easier, faster way to provision storage in Symmetrix V-Max arrays. In virtual server environments applications running on V-Max arrays require a fault-tolerant environment with clustered servers as well as multiple paths to devices for guest Virtual Machines (VMs). Autoprovisioning Groups were developed to make storage allocation easier and faster, especially with multi-application environments.
- **Advanced Tiered Storage Management**—The Virtual Provisioning™ component allows you to present a large amount of capacity to a host and then consume space only as needed from a shared pool. This improves total cost of ownership (TCO) by reducing initial overallocation of storage capacity and simplifies management by reducing the steps required to support growth.
- **Virtual LUNs**—Enhanced Virtual LUN Technology enables data migration within an array without host or application disruption. Virtual LUN brings a tiered storage strategy to life by easily moving information throughout the storage system as its value changes over time. It can assist in system reconfiguration, performance improvement, and consolidation efforts while helping maintain vital service levels.

## VMware ESX Server

VMware ESX is the market-leading virtualization hypervisor in use across thousands of IT environments around the world. 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.

VMware ESX Server enables maximized scalability and efficient use of server hardware in a robust, fault-tolerant environment by utilizing:

- Single server resources across multiple VMs
- Cluster ESX servers for VMware high availability (HA) of servers for VM failover

## Microsoft Windows Server 2008 Enterprise edition

Microsoft Windows Server 2008 Enterprise edition delivers an enterprise-class platform for deploying business-critical applications. It improves hot-add processor capabilities and enhances security with consolidated identity management features. It reduces infrastructure costs by consolidating applications with virtualization licensing rights. Windows Server 2008 Enterprise edition provides the foundation for a highly dynamic, scalable IT infrastructure.

## Microsoft SQL Server 2008

Microsoft SQL Server 2008 delivers on Microsoft's Data Platform vision by helping organizations to manage any data, any place, any time. It allows you to store data from structured, semi-structured, and unstructured documents, such as images and rich media, directly within the database. SQL Server 2008 delivers a rich set of integrated services that enables organizations to do more with their data, such as query, search, synchronize, report, and analyze.

## Microsoft Office SharePoint Server 2007

Microsoft Office SharePoint Server (MOSS) 2007 is a server program that is part of the 2007 Microsoft Office suite. MOSS 2007 provides an integrated group of server capabilities, which provides a single, integrated location, and helps improve organizational effectiveness by providing comprehensive content management and enterprise search, accelerating shared business processes, and facilitating information sharing across boundaries.

## Microsoft Exchange Server 2007

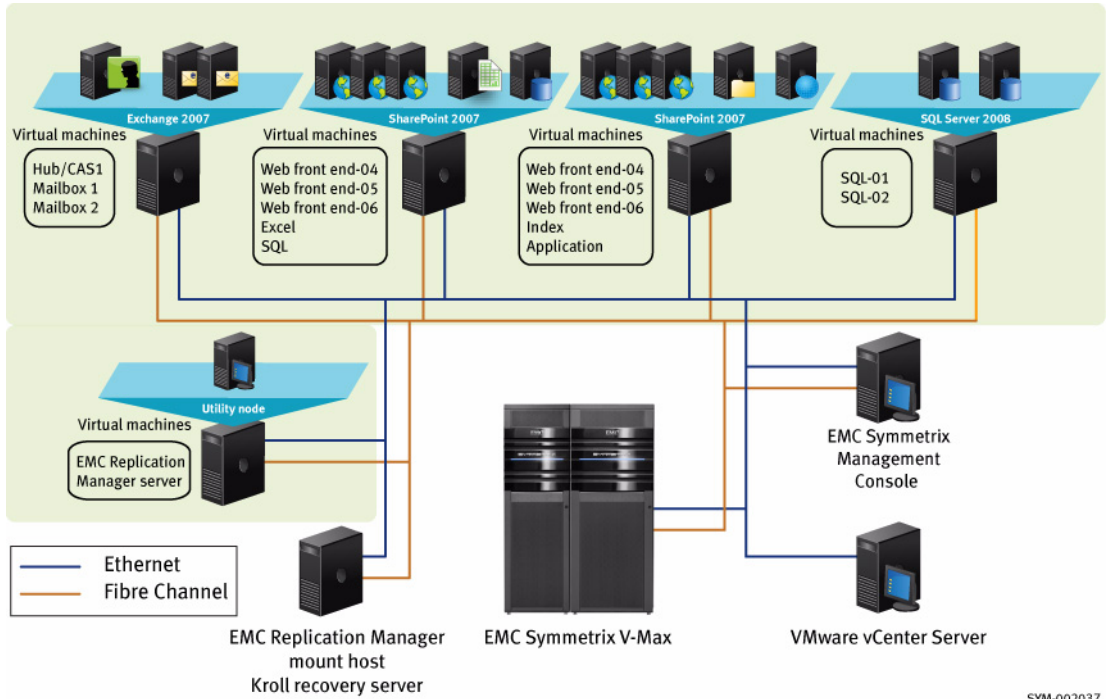
Microsoft Exchange Server 2007 is designed to meet today's communication and collaboration challenges. It provides advanced e-mail and scheduling while delivering new methods of access for employees, greater productivity for IT administrators, and increased security and compliance capabilities for organizations.

## EMC Replication Manager

EMC Replication Manager manages EMC point-in-time replication through a centralized management console. Replication Manager coordinates the entire data replication process—from discovery and configuration to the management of multiple application consistent disk-based replicas. It allows data center administrators to auto-discover replication environments and enable streamlined management by scheduling, recording, and cataloging replica information including auto-expiration.

## Environment architecture

Figure 1 illustrates the overall physical architecture of the environment.



**Figure 1** EMC Virtual Infrastructure for Microsoft Applications—Data Center Solution Enabled by EMC Symmetrix V-Max and VMware ESX 3.5

## Hardware resources

Table 1 lists the hardware resources used in this solution.

Equipment	Quantity	Configuration
Storage	1	EMC Symmetrix V-Max <ul style="list-style-type: none"> <li>• 222 x 300 GB, 15k rpm Fibre Channel disks</li> <li>• 18 x 1 TB, 7.2k, SATA disks (These drives were used to extend backup capabilities, and are not a requirement for this solution.)</li> </ul>
Fibre Channel switch	2	4 Gb/s Enterprise Class Fibre Channel switch, (requires a minimum of 48 ports)
Enterprise network switch	2	Gigabit Ethernet network switch (requires a minimum of 32 ports)
Servers	5	4 Socket, quad core per socket, 16 core processors, 64 GB RAM

## Software resources

Table 2 lists the software resources used in this solution.

Title	Version
Microsoft Windows Server 2003 R2	SP2 Enterprise edition (64-bit)
Microsoft Windows Server 2008	SP1 Enterprise edition (64 bit)
Microsoft Exchange 2007 Enterprise edition	SP1
VMware ESX	3.5, Update 3
Microsoft SQL Server 2008	SP2 Enterprise edition (64-bit)
Microsoft Office SharePoint Server 2007	SP1 + Dec CU
Kroll Ontrack PowerControls	5.1.0
EMC Solutions Enabler	7.0
EMC Symmetrix Management Console (SMC)	7.0

**Table 2** Software resources (continued)

Title	Version
VMware VirtualCenter	2.5.0, Update 4
EMC PowerPath®	5.1, SP2
EMC Replication Manager	5.2, SP1

## Environment profile

This solution bases its validated build design and test results on the following enterprise-level, mixed Microsoft workload environments:

- Microsoft SQL 2008—75,000 users
- Microsoft Exchange 2007—8,000 Very Heavy (0.50 IOPs) users
- Microsoft SharePoint 2007—168,000 Heavy user load (1% concurrency) as defined in <http://technet.microsoft.com/en-us/library/cc261795.aspx>

The virtualized enterprise applications are comprised of VMs, including:

- Microsoft SQL Server 2008
  - Two SQL servers
- Microsoft Exchange 2007
  - Two mailbox servers
  - One HUB/CAS
- Microsoft SharePoint 2007
  - Six WFEs
  - One SQL server
  - One application server
  - One Excel server
  - One Index server

## SharePoint farm profile

Table 3 lists the parameters and assumptions for the SharePoint farm.

**Table 3** SharePoint farm details

Parameter	Value
SharePoint farm user data	1.0 TB
Concurrency	1%
Site collections	One
Sites	15
ESX Servers	Two (Active/Active)
VMs	<b>Ten VMs that include:</b> One SQL 2008 server Six WFEs (running query role) One Index Server One Application services One Excel services (also running central admin)

## Microsoft Exchange Server 2007 profile

Table 4 lists the parameters and assumptions for Microsoft Exchange Server 2007.

**Table 4** Microsoft Exchange Server 2007 details

Parameter	Value
Number of Exchange 2007 users	8,000
Exchange 2007 IOPs per user	0.50 IOPs (Very Heavy)
Read/Write ratio	1:1
Number of Exchange 2007 users per server	4,000
Number of ESGs per server	10
Number of Exchange 2007 mail databases per ESG	1
Number of Exchange 2007 users per mail database	400

**Table 4 Microsoft Exchange Server 2007 details (continued)**

Parameter	Value
Exchange 2007 user mailbox size	400 MB
Size of ESG mailbox database LUN to accommodate the specified number of databases and the deleted item retention on defrag space	210 GB database LUN (400*400 MB = 160 GB * 130%)
ESG log LUN size	30 GB log LUNs
Production Exchange 2007 databases RAID type, physical drive size, and speed	RAID 1, 300 GB, 15k rpm
Production Exchange 2007 clone RAID type, physical drive size, and speed	RAID 5 (3+1), 300 GB, 15k rpm

## Microsoft SQL Server 2008 profile

Table 5 lists the parameters and assumptions for Microsoft SQL Server 2008.

**Table 5 Microsoft SQL Server 2008 details**

Parameter	Value
SQL 2008 VMs	4vCPU 32 GB RAM each VMs
Instance number	Two (one instance per VM)
TPC-E database	Two (75,000 users each)
TPC-E database size	Two (1.3 TB each)
SQL Production data RAID type, physical drive size, and speed	RAID 1, 300 GB, 15k rpm
SQL Production clone RAID type, physical drive size, and speed	RAID 5 (3+1), 300 GB, 15k rpm

## EMC management profile

Table 6 lists parameters and assumptions to support EMC management software.

**Table 6** EMC management details

Infrastructure servers	Value
ESX Server 1x VM - Replication Manager server	One
Replication Manager Mount Host	One
EMC Symmetrix Management Console (SMC) Server	One

## Conclusion

This reference architecture depicts a validated, virtualized Microsoft data center solution for business continuity and application consolidation within IT environments. The EMC Symmetrix V-Max storage system provides a scalable and dynamic storage infrastructure providing the ability to dynamically migrate storage resources between tiers as business and application needs change.

## Summary of benefits

This solution provides the following benefits:

- **Minimizes operational and management costs**—Consumes space only as needed from a shared pool, improving total cost of ownership (TCO) by reducing overallocation of storage.
- **Ease of management**—The combination of VirtualCenter and EMC SMC provides centralized management of the server infrastructure as well as the storage.
- **Reduces the amount of physical servers**—Promotes a more eco-friendly environment through the use of virtualization technology.
- **Protection against equipment failures**— Utilizes VMware and Symmetrix V-Max HA features for extended VM protection via quick restart on hardware failure.

EMC can help accelerate assessment, design, implementation, and management while lowering the implementation risks and cost of creating a virtualized multi-application data center.

To learn more about this, and other validated solutions, visit the Resource Library on <http://www.emc.com>.

