EMC Integrated Infrastructure for VMware
Enabled by EMC Celerra NS-120
Reference Architecture
Copyright © 2009 EMC Corporation. All rights reserved.

Published February 2009

EMC believes the information in this publication is accurate as of its publication date. The information is subject to change without notice.

THE INFORMATION IN THIS PUBLICATION IS PROVIDED “AS IS.” EMC CORPORATION MAKES NO REPRESENTATIONS OR WARRANTIES OF ANY KIND WITH RESPECT TO THE INFORMATION IN THIS PUBLICATION, AND SPECIFICALLY DISCLAIMS IMPLIED WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE.

Use, copying, and distribution of any EMC software described in this publication requires an applicable software license.

For the most up-to-date listing of EMC product names, see EMC Corporation Trademarks on EMC.com

All other trademarks used herein are the property of their respective owners.

EMC Integrated Infrastructure for VMware Enabled by EMC Celerra NS-120 Reference Architecture
Part number: H5956
About this Document

Purpose ................................................................................................... 5
Audience ................................................................................................ 5
Scope ...................................................................................................... 5

Solution Overview

Business challenge .................................................................................. 8
Technology solution ............................................................................... 8
Solution components ............................................................................. 9
  EMC Celerra NS-120 ........................................................................ 9
  VMware ESX Server 3.5 ................................................................. 9
  EMC Avamar de-duplication ............................................................. 10
Solution features and advantages .......................................................... 10
  Simplified remote deployment ....................................................... 10
  Application deployment ................................................................. 11

Solution Details

Physical and logical architecture ......................................................... 14
Hardware resources ............................................................................ 17
Software resources ............................................................................... 18

Conclusion
Purpose

This document describes the reference architecture of the EMC Integrated Infrastructure for VMware Enabled by EMC Celerra NS-120 solution, tested and validated by EMC® Global Solutions Centers (GSC).

This document was produced as part of the EMC Total Customer Experience (TCE) program by the GSC TCE Customer Integration Labs working in collaboration with the EMC Virtualization Solutions Practice, EMC Engineering, and EMC technical field consultants.

Audience

This document is intended for technical staff interested in evaluating or implementing an integrated, virtualized data center infrastructure by leveraging EMC hardware and software. Executives evaluating such a solution will also find this document useful.

Scope

This document provides a high-level description of the EMC Integrated Infrastructure for VMware Enabled by EMC Celerra NS-120 solution. An architectural overview and descriptions of the hardware and software components used in the solution are also included.

Note: This document describes only the features and methodologies specific to this solution. For more detailed information on specific components of this solution, or other EMC solutions, consult the appropriate EMC and third-party documentation.
This chapter includes the following topics:

- Business challenge .................................................................8
- Technology solution ..............................................................8
- Solution components .............................................................9
- Solution features and advantages ..........................................10
**Business challenge**

Often, customers are being asked to deliver better data center performance and scalability while reducing costs. Virtualization is an essential technology to consider, since it enables customers to maximize the return on hardware and software investments.

Many customers have more than one data center to manage, including smaller, remote branch locations. Maximizing IT investments while delivering a consistent level of service across all locations is very difficult. Disparate locations increase maintenance and service costs, since infrastructures can vary across locations.

To meet these challenges, customers need a validated hardware and software solution to simplify the procurement, assembly, deployment, and management of their data centers. The EMC Integrated Infrastructure for VMware is designed to address these requirements by providing a blueprint for a standardized configuration that can be deployed in the data center and in remote branches. A standardized, proven infrastructure enables the consistent delivery of data center services and ensures application and data availability, even across multiple locations.

**Technology solution**

The EMC Integrated Infrastructure for VMware is a reference blueprint for an integrated “Data center in a rack.” The components are ordered by the customer. EMC Professional Services and certified partners assemble the components and run the appropriate configuration scripts to create the standard build.

The solution includes the following components:

- Dell 2950 servers
- EMC Celerra® NS-120 (NAS, iSCSI, FC) with easy virtual provisioning
- VMware for simplicity and efficiency
- EMC Avamar® de-duplication to minimize the amount of data to back up
- Infrastructure services to ensure that the solution is tied to and is manageable from internal systems

As part of the solution, custom scripting is used to facilitate:

- Baseline build and configuration
- Customer customization and deployment
In addition, the solution incorporates operational best practices for:

- Using the integrated infrastructure
- Managing system performance
- Performing backup and recovery

Solution components

A standalone, single-rack, “data center in a rack” provides the industry proven performance, scalability, and reliability of EMC Celerra unified storage platforms, VMware ESX server virtualization, and EMC Avamar data de-duplication.

This section briefly describes the solution's EMC and VMware components. For details about all of the components that make up the solution, see “Hardware resources” on page 17 and “Software resources” on page 18.

EMC Celerra NS-120

The EMC Celerra NS-120 brings high availability to multi-protocol environments. With the EMC Celerra NS-120, you can connect to multiple storage networks via NAS, iSCSI, and Fibre Channel SAN with an integrated package that includes dedicated EMC CLARiiON® networked storage. In this solution environment, NAS and iSCSI storage is used by the ESX servers. This mid-tier system gives you a standalone solution that can consolidate multiple file servers and/or Microsoft Exchange, SQL, or Oracle applications across multiple ESX servers for a virtualization solution that is robust and scalable.

VMware ESX Server 3.5

VMware ESX 3.5 is the market leading virtualization hypervisor in use across thousands of IT environments around the world. VMware ESX abstracts server processor, memory, storage and networking resources into multiple virtual machines, forming the foundation of the VMware Infrastructure 3 suite. VMware ESX is a “bare metal” hypervisor that partitions physical servers in multiple virtual machines. Each virtual machine represents a complete system, with processors, memory, networking, storage and BIOS. With the ability to share single server resources across multiple virtual machines, and cluster ESX servers for further sharing of resources, VMware ESX Server enables the most scalable and efficient use of server hardware in a robust fault-tolerant environment.
EMC Avamar de-duplication

EMC Avamar backup and recovery solutions utilize patented global data de-duplication technology to identify redundant data at the source, minimizing backup data before it is sent over the network. With Avamar, you can achieve new levels of data reduction and enable fast, secure backup for your VMware environments, remote offices, and data center LANs. In the process, you’ll reduce backup time, growth of secondary storage, and network utilization. Avamar deduplicated backups function like full backups and can be recovered in just one step, without restoring full backups and subsequent incrementals. In addition, Avamar verifies backup data recoverability and encrypts data for secure electronic backups.

Solution features and advantages

The features and advantages of the EMC Integrated Infrastructure for VMware are as follows:

- A “build” blueprint supports rapid configuration and deployment according to operational best practices.
- A common standard across a repeatable, automated deployment model reduces time to ROI.
- Common management tools and standard processes/training reduces management and support costs while enabling a consistent delivery of services and fulfillment of service level agreements.
- A single solution reduces deployment from weeks to days, reducing time to ROI.
- The EMC Integrated Infrastructure for VMware supports expansion. More storage trays and servers can be added to grow to the capacity of the rack.

Simplified remote deployment

EMC Integrated Infrastructure for VMware is ideally suited to support application and business needs in remote offices. The solution enables customers to deploy a consistent, virtualized infrastructure across all remote locations. At these sites, customers can use a single, integrated solution to consolidate applications into one infrastructure. With this level of consistency, customers are able to reduce maintenance costs while delivering consistently on service level agreements across all remote locations.
Application deployment

The solution is a general-purpose, virtualized data center built on a consolidated platform that enables the fast deployment of business applications. Customers can quickly deploy Microsoft Exchange, SharePoint, SQL Server and Virtual Desktop Infrastructure to quickly realize return on hardware and software investments. In addition, customers can consolidate multiple applications into a single environment to reduce management and maintenance costs.
This chapter includes the following topics:

- Physical and logical architecture .................................................. 14
- Hardware resources ........................................................................ 17
- Software resources ........................................................................ 18
Physical and logical architecture

This EMC Integrated Infrastructure for VMware reference architecture uses an integrated VMware ESX Server cluster design that includes:

- Dell 2950 servers
- EMC Celerra NS-120 storage
- Cisco Catalyst 3750-E switches
- EMC Avamar Data Store

The EMC Integrated Infrastructure for VMware solution facilitates the rapid deployment of a standard ESX Server cluster configuration for general purpose consolidation and branch office deployment.

The solution includes standard build and operating blueprints, which eliminate potentially time-consuming custom configuration and setup.

**Note:** This reference architecture uses Dell 2950 servers and Cisco Catalyst 3750-E switches, but hardware from other vendors can be used instead. If other vendors’ hardware is used, the configuration and deployment scripts that are provided as part of the solution must be modified to reflect the hardware being used.

Figure 1 on page 15 illustrates the overall physical architecture of the solution.
Figure 1  Solution physical architecture

- Two Cisco Catalyst 3750-E switches for fast and redundant network connectivity
- EMC Avamar Data Store for fast deduplicated backups in a self-contained infrastructure
- Five Dell 2950 servers with:
  - 32 GB RAM
  - Dual-socket quad-core CPUs
  - 10 1 Gigabit Ethernet ports for high I/O
- EMC Celerra NS-120, providing CIFS, NFS, and iSCSI protocol support
Figure 2 illustrates the logical architecture of the solution.
The hardware used in the solution is listed in Table 1.

<table>
<thead>
<tr>
<th>Equipment</th>
<th>Quantity</th>
<th>Configuration</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dell 2950 servers</td>
<td>5</td>
<td>Dual-socket quad-core processors 32 GB RAM Two 73 GB internal RAID 1 disks 10 network interfaces (1GigE)</td>
</tr>
<tr>
<td>EMC Celerra NS-120</td>
<td>1</td>
<td>Configured to support NFS and ISCSI protocols</td>
</tr>
<tr>
<td>NS Control Station</td>
<td>1</td>
<td>Configured using Celerra Startup Assistant</td>
</tr>
<tr>
<td>NS DAE storage enclosures</td>
<td>3</td>
<td>15 146 GB 15k drives per enclosure</td>
</tr>
<tr>
<td>NS storage processors</td>
<td>2</td>
<td>Four 1GigE interfaces per storage processor</td>
</tr>
<tr>
<td>NS battery backup</td>
<td>1</td>
<td>Standard configuration</td>
</tr>
<tr>
<td>EMC Avamar Data Store</td>
<td>1</td>
<td>Single-node deployment</td>
</tr>
<tr>
<td>Network cables</td>
<td>60</td>
<td>Standard Category-6 patch cables</td>
</tr>
<tr>
<td>Cisco Catalyst 3750-E switches</td>
<td>2</td>
<td>48 1GigE ports per switch</td>
</tr>
</tbody>
</table>
Software resources

The software used in the solution is listed in Table 2.

<table>
<thead>
<tr>
<th>Software</th>
<th>Version</th>
<th>Configuration</th>
</tr>
</thead>
<tbody>
<tr>
<td>EMC Avamar backup software</td>
<td>4.1</td>
<td>Single-node configuration</td>
</tr>
<tr>
<td>VMware ESX Server</td>
<td>3.5 Update 3</td>
<td>Each ESX server is configured with a predetermined IP address, which is used to bootstrap the customer configuration process</td>
</tr>
<tr>
<td>VMware VirtualCenter (DRS, VHA, VMotion)</td>
<td>2.5 Update 3</td>
<td>In a standalone implementation, the Virtual Center server is deployed as a VM on the cluster; the Virtual Center server license is provided by the customer</td>
</tr>
<tr>
<td>EMC Celerra Management</td>
<td>5.6</td>
<td>To configure iSCSI devices for ESX servers</td>
</tr>
</tbody>
</table>
Deploying a server virtualization solution that encompasses everything from IP networks to server and storage configuration to backup and recovery is a complicated process. Individual components must be procured, deployed and configured not only to work independently, but to work together in an effective and efficient manner. The EMC Integrated Infrastructure for VMware solution greatly simplifies this.

All of the solution’s physical components can be purchased by the customer and integrated on site according to the blueprint. Automation is used to configure the cluster according to EMC best practices, which enables the solution to be rapidly deployed according to the customer’s specific requirements.

The solution utilizes EMC offerings around multi-protocol Network Attached Storage, server virtualization, and data de-duplication to consolidate both data center and branch office operations.

To learn more about this and other solutions, contact an EMC representative or visit www.emc.com.