

Dell 3-2-1 Reference Configurations: High-availability virtualization with Dell PowerEdge R515 servers



A Principled Technologies configuration guide commissioned by Dell Inc.

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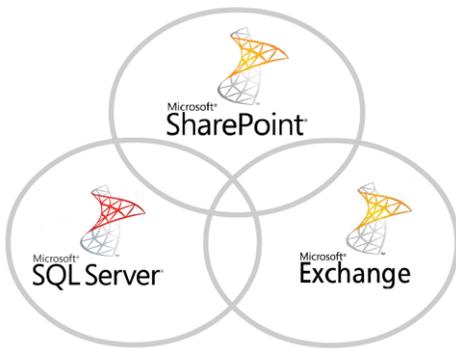
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INTRODUCTION

Dell™ 3-2-1 Reference Configurations help companies by simplifying the design, ordering, and deployment of a virtualized infrastructure. Choosing a proven architecture designed by Dell to meet your needs allows you to confidently deploy an optimal solution without the time requirement and hassle of compiling your hardware solution piecemeal. You also get to reap the benefits of Dell's best practice recommendations and guidelines.

In this guide, we take a look at the pieces Dell provides you to create a highly available virtualized infrastructure and take you step by step through the process of setting it up. Dell 3-2-1 Reference Configurations follow the 3-2-1 model, which means the configuration is comprised of three servers, two switches, and one storage array. Our virtualized architecture consists of two Dell PowerEdge™ R515 servers with AMD Opteron™ 4184 processors as host servers, one Dell PowerEdge R415 server as a management server, two Dell PowerConnect™ 6248 switches, and one Dell EqualLogic® PS4000XV storage array. We add the software you need to help manage your business, including Dell OpenManage, and from Microsoft®, Windows Server® 2008 R2 SP1, Exchange Server 2010, SQL Server® 2008 R2, SharePoint Server® 2010, and System Center Essentials 2010.

We show you how to combine these components into a robust infrastructure with the power to support over 500 users. For our performance testing of this solution, see our companion [performance report](#).



Features of the new Dell PowerEdge R515



Figure 1: The new Dell PowerEdge R515 server.

The Dell PowerEdge R515 with AMD Opteron 4184 processors offers many new features for maximizing performance and for minimizing operational expenses, including the following:

- **Power.** The Dell PowerEdge R515 includes enhancements that let it use less energy than many older servers do, so your potential power savings are dramatic.
- **Processors.** AMD Opteron 4100 Series processors power the Dell PowerEdge R515, making it an excellent yet affordable platform.
- **Management.** The Dell PowerEdge R515, like all late-model Dell servers, comes with the Dell Lifecycle Controller. This tool simplifies server management by providing a single interface for management functions and by storing critical system information in the system itself. There are no CDs or USB keys to keep track of for drivers or firmware.
- **Storage.** The Dell PowerEdge R515, available in both an 8-bay and 12-bay chassis, holds up to 25 terabytes of internal storage, many times the capacity of prior common small business servers.
- **Memory.** The Dell PowerEdge R515 holds up to 128 GB of RAM, many times the RAM capacity of older small business servers, allowing for powerful flexibility with virtualized database solutions.

About Dell OpenManage

Dell server configurations come equipped with Dell OpenManage software, which brings together network and systems management applications built using industry-standard specifications. Dell OpenManage operates seamlessly with systems management

consoles like Microsoft Systems Center Essentials to bring you all the tools you need to manage your infrastructure in one place.

About Microsoft Windows Server 2008 R2 SP1

Windows Server 2008 R2 SP1, the latest release of this server OS from Microsoft, includes many features that benefit your business, including the following:

- **Virtualization.** Microsoft Windows Server 2008 R2 comes with Microsoft Hyper-V, which you can use to create virtual machines. These virtual servers, which are often more powerful than your previous physical machines, can host your critical business applications and databases. Virtual machines, while allowing you to isolate business functions for security or regulatory reasons, are the backbone of high-availability in that they can be easily migrated from one server node to another node in a failover cluster when needed.
- **Simplified installation.** The wizard-based setups of Windows Server 2008 R2 and SQL Server 2008 R2 make the installation and configuration process considerably simpler than in past versions.
- **Windows Management and updated components.** Microsoft Windows Server 2008 R2 includes a revamped Server Manager console that contains almost all server management functions, including the ability to quickly add Roles and Features to your server.

About Microsoft SQL Server 2008 R2

SQL Server 2008 R2 is the latest release of Microsoft's database management platform. As with each release, Microsoft has added new features to expand on the capabilities of their Database Management System (DBMS) platform. Where earlier versions of SQL Server required database administrators to rely primarily on either in-house applications or third-party tools to monitor multiple instances, SQL Server 2008 R2 simplifies multi-server management.

About Microsoft Exchange Server 2010 SP1

Microsoft Exchange Server 2010 SP1 equips you with a robust communications platform that can also give your users anywhere access, increasing their mobility. Some other key features of Exchange Server 2010 include Unified Mailbox Resiliency, archiving, and access to the Outlook Web Application.

About Microsoft SharePoint Server 2010

Microsoft SharePoint Server 2010 is the latest version of this very popular and flexible software. It allows users to create collaborative Web sites and to create and manage their own workspaces. Some of its key features include SharePoint 2010 Communities, which lets users share ideas and information from a single platform; the SharePoint Search feature, which lets users find other people and information quickly; and SharePoint 2010 Insights, which gives users an improved ability to access databases, reports, and business applications.

About Microsoft System Center Essentials 2010

Microsoft System Center Essentials (SCE) 2010 software, which now includes System Center Virtual Machine Manager (SCVMM) 2008 R2 technology, provides you with a centralized management solution from which you can configure, maintain, modify, and monitor the physical and virtualized servers in your infrastructure. Dell PRO-Pack (Performance and Resource Optimization Pack), when used in conjunction with SCE 2010, helps provide simplified, proactive management for physical and virtual servers, through such actions as alerting SCVMM of the need for live migration of VMs to another server in the cluster. With SCE 2010 and Dell PRO-Pack, it is easier

than ever to monitor your configuration and quickly address any issues that should arise.

WE SHOW YOU HOW – SETTING UP YOUR DELL 3-2-1 REFERENCE CONFIGURATION

For this Guide, we assume that you have an existing infrastructure server running Active Directory Domain Services (AD DS), Domain Name Services (DNS), and Active Directory Certificate Services.

Figure 2 shows the hardware that comprises the Dell 3-2-1 Reference Configuration we tested, along with the function of each piece.

Quantity	Name	Function
2	Dell PowerEdge R515	Host servers
1	Dell PowerEdge R415	Management server
2	Dell PowerConnect 6248	Switches
1	Dell EqualLogic PS4000XV	Storage array

Figure 2: The hardware that comes with the Dell 3-2-1 Reference Configuration we tested.

Our Dell 3-2-1 Reference Configuration had the following software requirements:

- Microsoft Windows Server 2008 R2 SP1 Enterprise Edition (x 6)
- Dell Host Integration Tools (HIT)
- Dell OpenManage Server Administrator 6.4 (OMSA)
- Microsoft Systems Center Essentials 2010
- Microsoft Exchange Server 2010 SP1
- Microsoft SQL Server 2008 R2
- Microsoft SharePoint Server 2010
- Broadcom® Advanced Control Suite (BACS)

Cabling

For our high-availability setup, we configured the network cabling of the hardware as shown in Figure 3.

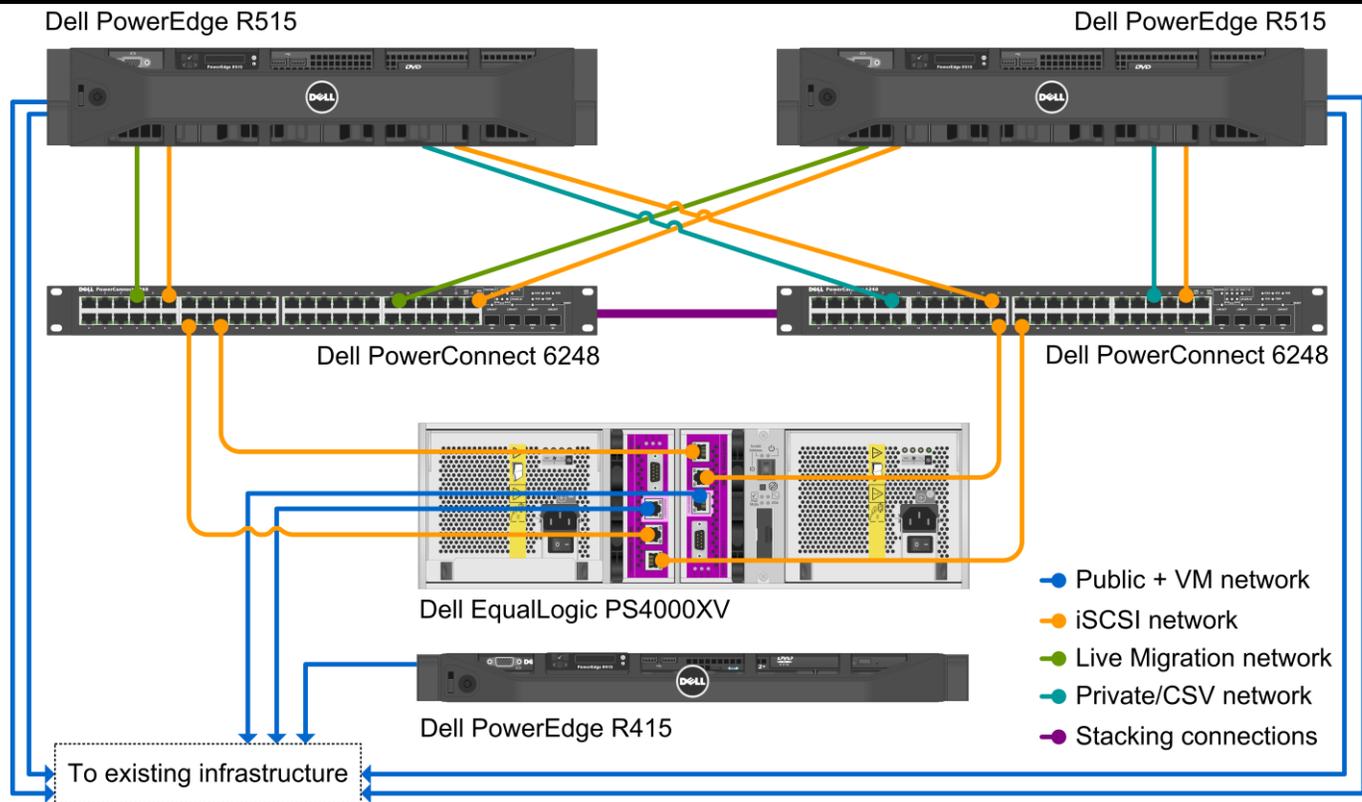


Figure 3: Networking cabling for our Dell 3-2-1 Reference Configuration.

To take advantage of the features of the Dell PowerConnect 6248 switches, we implemented the stacking feature to allow connectivity between the switches. This feature lets you easily manage the two switches from a single management console and allows for greater bandwidth than you would have using link aggregation.

Figure 4 shows how we configured the network cables across the NICs for each Dell PowerEdge R515.

NIC	Port number	Traffic type
Integrated on-board NIC	1	Public/VM #1
	2	Private/CSV
Broadcom NetXtreme II 5709 #1	1	iSCSI #1
	2	Live Migration
Broadcom NetXtreme II 5709 #2	1	iSCSI #2
	2	Public/VM #2

Figure 4: NIC port configurations for each Dell PowerEdge R515.

Once we connected all of the network cables, we attached all power cables. At this point, it was safe to power on all of the hardware.

Setting up the switches

By default, the Dell PowerConnect 6248 switches are configured with a blank password, have the IP address 192.168.2.1, and have the subnet mask 255.255.255.0. We used a serial connection to access the basic setup wizard on the switches, allowing us to easily configure an administrator password and change the IP address to match our IP scheme. Figure 5 provides details on our IP scheme. For more information on configuring the many features of the Dell PowerConnect 6248, visit <http://support.dell.com/support/edocs/network/pc62xx/en/index.htm>.

Subnet	Traffic type	Adapters assigned to this subnet
192.10.1.0	iSCSI	iSCSI adapters(for this setup, there are four)
192.20.1.0	Public/VM	Management server, storage management, public/VM host server, infrastructure server, and iDRAC management
192.30.1.0	Private/ CSV	Private/CSV adapters (for this setup, there are two)
192.40.1.0	Live Migration	Live Migration adapters (for this setup, there are two)

Figure 5: The IP scheme we used.

Setting up the shared storage and networking

In this section, we discuss setting up the Dell PowerEdge R515s with the Dell EqualLogic PS4000XV storage array and isolating the various types of switch traffic using VLANs. For more details, see [Appendix A](#).

Perform these steps on the first Dell PowerEdge R515, which will become the first Hyper-V host:

NOTE

1. Using Server Manager, install the Hyper-V role and add the Failover Clustering feature. You will need to restart the server after installing the Hyper-V role.

During our installation of this role on both Hyper-V host servers, we did not create a virtual network. We did this later in Systems Center Essentials when we created the virtual machines to avoid accidentally creating multiple virtual networks.

2. Install the Dell EqualLogic Host Integration Tools (HIT) software provided with the PS4000XV.
3. Open the Dell EqualLogic Remote Setup Wizard provided with the HIT software to initialize the PS4000XV, set the basic storage group IP address, and create an administrator username and password.
4. Go into the Network and Sharing Center, and apply the appropriate IP address and label to each NIC.
5. Open the Dell EqualLogic Remote Setup Wizard to modify the MPIO settings, and limit iSCSI traffic to the iSCSI IP subnet you selected.
6. Change the name of your server to an appropriate name and join the domain. In our case, we selected Hypervhost1 for the server name and test.local for our domain. Joining the domain modifies the IQN name of your Hyper-V host server. We performed this step to avoid having to change the iSCSI access settings of the Dell EqualLogic PS4000XV storage later. After completing this step, reboot the server and log into the domain.

NOTE

If you are unable to establish contact with the domain controller, you may need to modify the Windows Firewall settings on the Hyper-V host servers.

7. Open a Web browser window, and enter the IP address of the storage group. Once you have provided the credentials you set up in Step 2, complete the following steps in the console:
 - a. Apply the IP address of the second iSCSI connection and enable it.
 - b. Apply the IP address of the management port and enable it.

- c. Create nine volumes, one for each type of data that will be hosted on the servers, virtual machine operating systems, as well as a disk witness volume for the failover cluster, allocating an adequate size to meet your needs. Figure 6 shows the volume sizes that we selected during this setup process. For the virtual machine operating system and disk witness volumes, restrict access based on the iSCSI initiator name and enter the IQN of the first Hyper-V host server. Leave the default selection for no access to the remaining volumes created. Be sure to allow multiple simultaneous connections for all volumes. Later in setup, when the virtual machines are running, we will add access to the SharePoint, Exchange, and SQL Server volumes to match their respective virtual machine IQN.

Volume Name	Volume size (GB)
VirtualMachine1	70
VirtualMachine2	70
VirtualMachine3	70
SharePoint	500
Exchange	500
ExchangeLog	125
SQLData	500
SQLLog	125
DiskWitness	10

Figure 6: The volumes we created on the Dell EqualLogic PS4000XV.

NOTE

Once you have completed basic setup on the second Hyper-V host, you will need to return to this console to grant access to the virtual machine operating system and disk witness volumes by adding the iSCSI initiator name of the second host. We will remind you to do this later.

8. Open iSCSI Initiator in Administrative Tools, add the IP address of the storage under Discovery, and establish connections to each of the virtual machine operating system and disk witness volumes. Ensure that the target is added to the favorite targets and that multi-path is enabled so that the Hyper-V host automatically establishes connections with the storage.
9. Open Disk Management and bring each of the volumes online. Perform a quick format and assign drive letters.

10. Install Broadcom Advanced Control Suite (BACS) and create a NIC team with failover and load balancing on the two Public/VM network NICs.
11. Assign an IP address to the teamed NIC. The two Public/VM network NICs no longer have individual IP addresses and instead are accessed using the single teamed NIC IP address.

Now that the first Hyper-V host is configured, complete these steps on the other Dell PowerEdge R515, which will become the second Hyper-V host server:

1. Using Server Manager, install the Hyper-V role and add the Failover Clustering feature. Restart the server after installing the Hyper-V role.
2. Install the Dell EqualLogic Host Integration Tools software provided with the PS4000XV.
3. Navigate to the Network and Sharing Center, and apply the appropriate IP address and label to each NIC.
4. Open the Dell EqualLogic Remote Setup Wizard to modify the MPIO settings, and limit iSCSI traffic to the iSCSI IP subnet you selected.
5. Change the name of your server to an appropriate name and join the domain. In our case, we selected Hypervhost2 for the server name. After completing this step, reboot the server, and log into the domain.
6. Open a Web browser window and enter the IP address of the Dell EqualLogic PS4000XV storage group. Provide the adequate credentials, and modify the access settings for each of the virtual machine and disk witness volumes by adding the iSCSI initiator name of this secondary Hyper-V host. This allows the host to connect to the Dell EqualLogic PS4000XV storage in iSCSI Initiator.
7. In Administrative Tools, open iSCSI Initiator, add the IP address of the storage under Discovery, and establish connections to each of the target volumes. Ensure that the target is added to the favorite targets and that multi-path is enabled so that the Hyper-V host automatically establishes connections with the storage.

8. Open Disk Management, and verify that the volumes are visible in Windows and that they are online.
9. Install Broadcom Advanced Control Suite (BACS) and create a NIC team with failover and load balancing on the two Public/VM network NICs using the same name as the first Hyper-V host.
10. Assign an IP address to the teamed NIC. The two Public/VM network NICs no longer have individual IP addresses and instead are accessed using the single teamed NIC IP address.

Now, we will use the management server (in our case, the Dell PowerEdge R415) to access the Dell PowerConnect 6248 switches and create the VLANs to isolate the different types of traffic. Perform the following steps on the management server:

1. In the Network and Sharing Center, apply an IP address to the management server.
2. Change the name of your server to an appropriate name and join the domain. For the name, we selected Mgmt-Server. Reboot the server, and log into the domain.
3. Open a Web browser window, enter the IP address of the switches, and enter the appropriate administrator credentials when prompted.
4. Using the Web console, create three VLANs. Figure 7 shows the VLAN ID and type of traffic assigned to each VLAN.
5. Assign the appropriate ports on each switch unit to each VLAN.

VLAN ID	Traffic type	Ports assigned to this VLAN
10	iSCSI	iSCSI traffic ports from storage and servers (for this setup, there are four)
30	Private/ CSV	Private/CSV ports (for this setup, there are two)
40	Live Migration	Live Migration ports (for this setup, there are two)

Figure 7: Sample VLAN configuration.

We recommend that you follow Dell best practices for switch ports that handle iSCSI traffic. For more information, see the latest edition of the Dell EqualLogic Configuration Guide at <http://www.delltechcenter.com/page/EqualLogic+Configuration+Guide>.

Preparing the failover cluster and configuring the management server

Next, we will prepare the Hyper-V hosts for failover clustering and configure the management server. For more details, see [Appendix B](#).

First, perform the following steps on both of the Hyper-V host servers:

1. Reboot the server and verify that virtualization is enabled on the AMD Opteron 4184 processors in the BIOS.
2. During the boot process, access the iDRAC utility and configure the IP settings. In our setup, we selected an IP address that can be accessed from the management server.
3. Install Dell OpenManage Server Administrator.

NOTE

You may need to create a self-signed certificate to be able to configure the HTTPS listener and install the Remote Enablement feature. See the user's guide for more information at

<http://support.dell.com/support/edocs/software/svradmin/6.4/en/index.htm>

4. Install the Failover Clustering feature using Server Manager.

Next, complete the following steps on only one of the Hyper-V host servers:

1. In the Failover Clustering feature in Server Manager, run the Validate a Configuration Wizard. You need to add both Hyper-V host servers into the wizard when it prompts you, and run all tests to ensure that your hardware is set up correctly. Once you have verified that all tests have passed, continue with the next step. For more information on failover cluster validation

and requirements, go to <http://technet.microsoft.com/en-us/library/cc772055.aspx>.

2. Create a failover cluster with both Hyper-V hosts and assign an appropriate NIC and IP address for the public cluster network.
3. Enable Cluster Shared Volumes, verify that the cluster is using the correct disk witness you created for quorum, and add the other three volumes as cluster shared volumes.
4. Configure the networks for cluster access and ensure that iSCSI NICs are not configured for cluster network communication. Be sure to note which cluster network has the subnet corresponding with your Private/CSV network, as you will need this to complete the next step.
5. Designate the Private/CSV network as the preferred network for CSV communication using the Metric property. For more information on this property, see [http://technet.microsoft.com/en-us/library/ff182335\(WS.10\).aspx](http://technet.microsoft.com/en-us/library/ff182335(WS.10).aspx)

Next, complete these steps on the management server:

1. Reboot the server, access the iDRAC utility, and configure the IP settings.
2. Install Dell OpenManage Server Administrator.

NOTE

You might need to create a self-signed certificate to be able to configure the HTTPS listener and install the Remote Enablement feature.

3. Using Server Manager in Remote Server Administration Tools, add the following features:
 - a. Under Role Administration Tools, add Hyper-V Tools.
 - b. Under Feature Administration Tools, add Failover Clustering Tools.
4. In Administrative Tools, go to Hyper-V Manager, and connect to both of the Hyper-V host servers to verify that the management server can access the host servers.
5. Install Systems Center Essentials (SCE) 2010 with all available features, and unless you have an existing server in your infrastructure with SQL, choose to install SQL Express during the Systems Center installation process.

6. When the installation has completed, run the SCE 2010 console and complete the configuration wizard. During the wizard, you may elect to automatically discover unmanaged servers or run the discovery wizard afterwards and add the Hyper-V host servers.
7. Wait for SCE 2010 to install the management agents onto both Hyper-V host servers, and then add one of the Hyper-V host servers using the Designate a Host for Virtual Machines wizard. The wizard will automatically detect the failover cluster and will also designate the second node (the other Hyper-V host server) as a host. When configuring the network, create a virtual network on the BASP adapter, which is your Teamed NIC, and select Do Not Configure for all other network adapters.
8. Finally, download and import the Dell PRO enabled Management Pack 2.0 into SCE 2010 from <http://support.us.dell.com/support/downloads/download.aspx?c=us&cs=555&l=en&s=biz&releaseid=R252410&formatcnt=1&libid=0&typeid=-1&dateid=-1&formatid=-1&fileid=369241>.

Creating the virtual machines

Creating virtual machines (VMs) is easy using Systems Center Essentials 2010. Use the steps below to create the three VMs you will need for your virtualized environment. For more details, see [Appendix C](#).

1. In the Computers section of the SCE console, use the New Virtual Machine wizard to create the VM as follows:
 - a. Select an appropriate virtual hardware template, and make any necessary customizations.
 - b. Select Install from the DVD, and insert your copy of Windows Server 2008 R2 SP1 Enterprise Edition into the drive of the host you will select in the next step.
 - c. Select one of the two Hyper-V host servers, assign a name to the VM, select the appropriate volume, and create the VM.
2. Use the Configure Virtual Machine wizard to install the operating system and perform discovery to add it to management. Note that before discovery can succeed, you

need to go into the VM, assign an adequate name and IP address, and join it to the domain.

3. Repeat this procedure twice to create the other two VMs, distributing the VMs so that two are on one Hyper-V host server, and one is on the other Hyper-V host server.

NOTE

Verify that you do not have the host DVD/CD drive attached to more than one virtual machine, or you may experience errors when attempting to start your VMs.

4. Using the Failover Cluster Manager, configure the priority of the networks for Live Migration so that the dedicated Live Migration NIC is the preferred network and ensuring that the iSCSI NICS are not used for Live Migration.
5. Using the Hyper-V Manager, create an external virtual network on each of the two iSCSI adapters on each Hyper-V host server, allowing for the management operating system to share the adapter. Be sure to use identical names for the two virtual networks across the two Hyper-V host nodes.
6. You will need to shut down all VMs to complete this step. Using the Hyper-V Manager, go into the settings for each VM, create two virtual network adapters, and attach each to one of the virtual networks you created in the previous step.
7. Finally, boot up the VMs and assign IP addresses to the newly created virtual network adapters using your iSCSI network IP scheme.

Customizing your virtual machines

In this final section, we discuss adding additional storage volumes to the VMs, and installing SQL Server 2008 R2, Exchange Server 2010 SP1, and SharePoint Server 2010 on the VMs.

Adding storage volumes to the virtual machines

Follow the steps below to attach the storage volumes you created on the Dell EqualLogic PS4000XV earlier to each of the virtual machines.

1. Install the Dell EqualLogic Host Integration Tools software on the VM.
2. Open a Web browser window, and enter the IP address of the storage group. Once you have provided the appropriate

credentials, modify the access settings for the appropriate volumes by adding the iSCSI initiator name of the VM. For example, for VM #1, which will serve as the SQL Server VM, you will modify the SQLData and SQLLog volumes' access settings by adding the iSCSI initiator name of VM #1 and so on.

3. Open iSCSI Initiator, add the IP address of the storage under Discovery, and establish connections to the appropriate target volumes. Ensure that the target is added to the favorite targets and that multi-path is enabled so that the VM automatically establishes connections with the storage.
4. Open Disk Management and bring each of the volumes online. Perform a quick format and assign drive letters.

Installing SQL Server 2008 R2 on VM #1

After you create your virtual machines, you must install SQL Server 2008 R2 on VM #1. Although it is not required, you should, when possible, deploy SQL Server 2008 R2 on machines that are part of an Active Directory® domain. If you do choose to deploy SQL Server in a domain, do not make the SQL Server service domain accounts members of the Domain Administrators group. In fact, grant only the necessary rights on the local server to the SQL Server service account as part of your pre-installation planning. The SQL Server installation software creates the local groups it needs for its security purposes.

This section provides an overview of the SQL Server 2008 R2 installation process. [Appendix D](#) provides detailed installation instructions.

1. Insert the SQL Server 2008 R2 DVD into the host machine DVD drive, mount it to the virtual machine, and log into the virtual machine. If prompted to enable the .NET Framework Core role, click OK.
2. On the Installation Center screens, choose Installation, and choose to proceed with a new installation. (See Figure 8.)

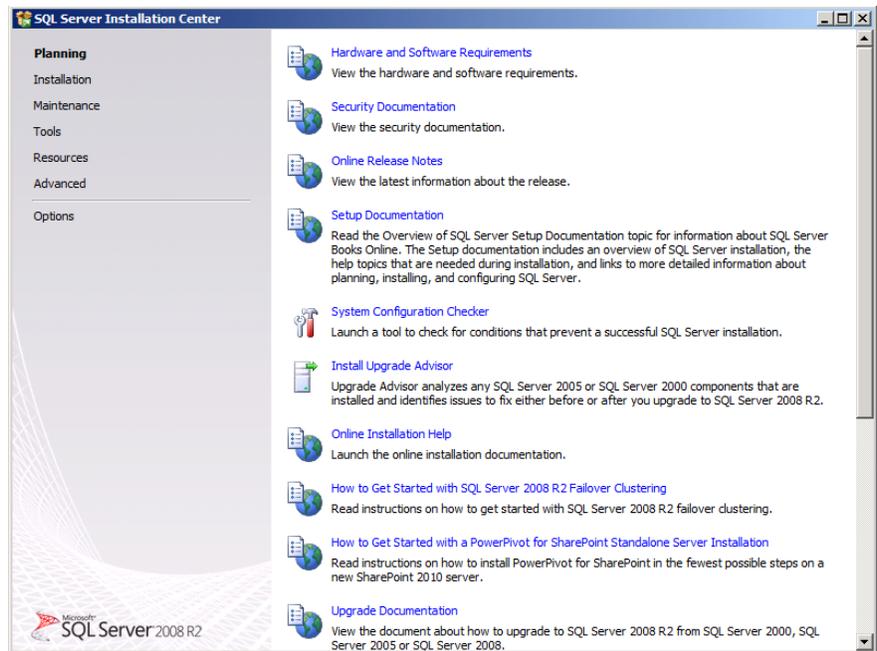


Figure 8: SQL Server 2008 R2 Installation Center options.

3. Proceed through the first several installation steps, entering license information, and installing prerequisites with default options specified. On the Setup Role screen, choose a SQL Server Feature Installation.
4. On the Feature Selection screen, select only what you need for your particular configuration (see Figure 9). In our case, we chose the Database Engine Services and Management Tools.

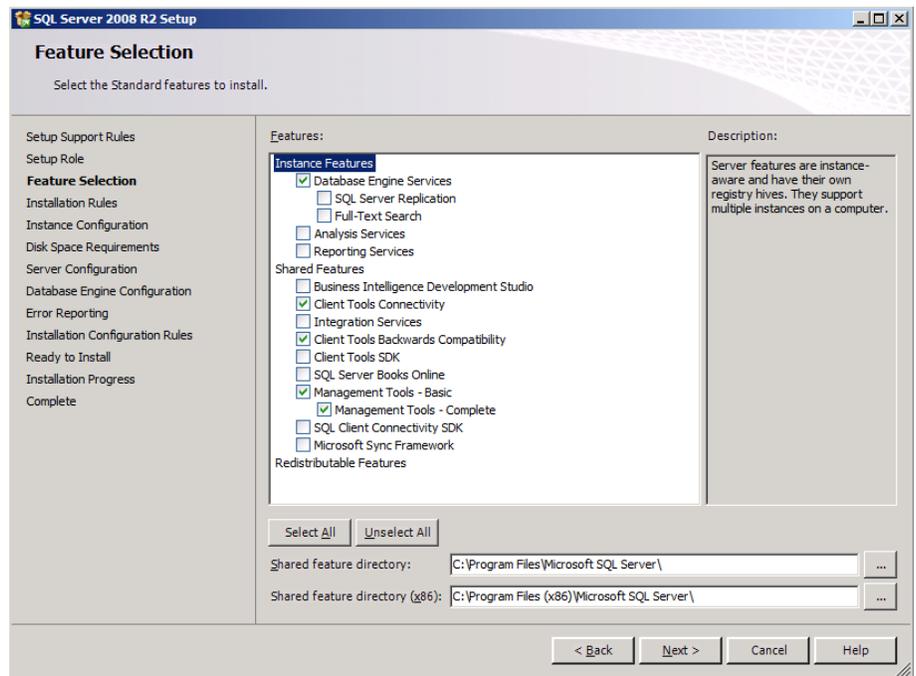


Figure 9: Choosing features for installation.

5. On the first installation, choose to install the default instance. If you perform subsequent installations on the same server, choose named instance and provide a name for the instance.
6. Configure the credentials of the SQL Server service account and SQL Server Agent accounts.
7. Specify SQL Server administrators, and specify the authentication mode desired for your configuration. Microsoft recommends Windows Authentication mode, but legacy applications may require SQL Server authentication.
8. Complete the installation.

Installing Microsoft Exchange Server 2010 on VM #2

We performed a basic installation of Exchange Server 2010. For complete details on the installation of Exchange Server 2010, see [Appendix D](#).

1. Install the Web Server (IIS) role and necessary role services, .NET Framework, and the latest available Microsoft Filter Pack. Also, set the Net.Tcp Port Sharing Service to start

automatically, and install the Remote Server Administration Tools pack. Reboot the server.

2. Insert the Exchange 2010 installation DVD, and capture the DVD drive to the virtual machine. When the Autoplay window appears, click Run Setup.EXE (see Figure 10).



Figure 10: The main installation menu for Exchange Server 2010.

3. The installer should consider steps 1 and 2 to be complete (they will appear grayed out). Click the link to Step 3: Choose Exchange Language Option and install only languages from the DVD.
4. Click the link to Step 4: Install Microsoft Exchange Server 2010.
5. On the introduction screen, click Next, and accept the license agreement.
6. Select Typical Exchange Server Installation, and click Next (see Figure 11).

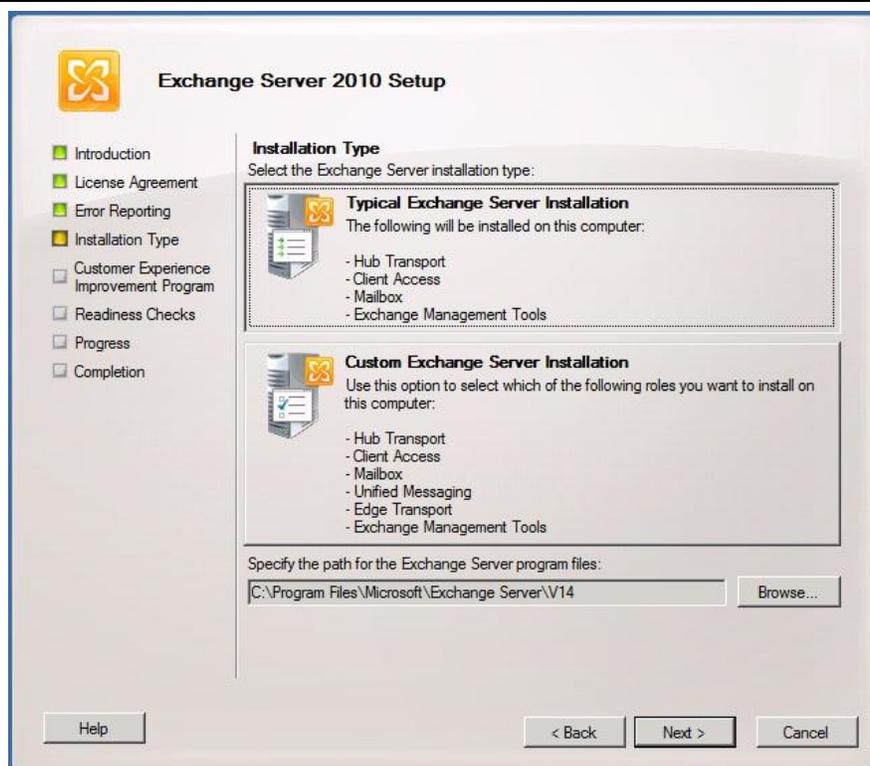


Figure 11: Exchange Server 2010 Installation type selection screen.

7. Leave the organization name at default (First Organization), and click Next.
8. To enable compatibility with previous Outlook 2003 clients, at the question about client computers running Outlook 2003 or Entourage, select Yes, and click Next.
9. Click Next to accept defaults for Configure Client Access server external domain, and select your preference for the Customer Experience Improvement Program.
10. The installation will now perform a readiness check. (If a warning about a lack of SMTP appears after the check finishes, ignore it. We will address this later.) To start the installation process, click Install (see Figure 12).

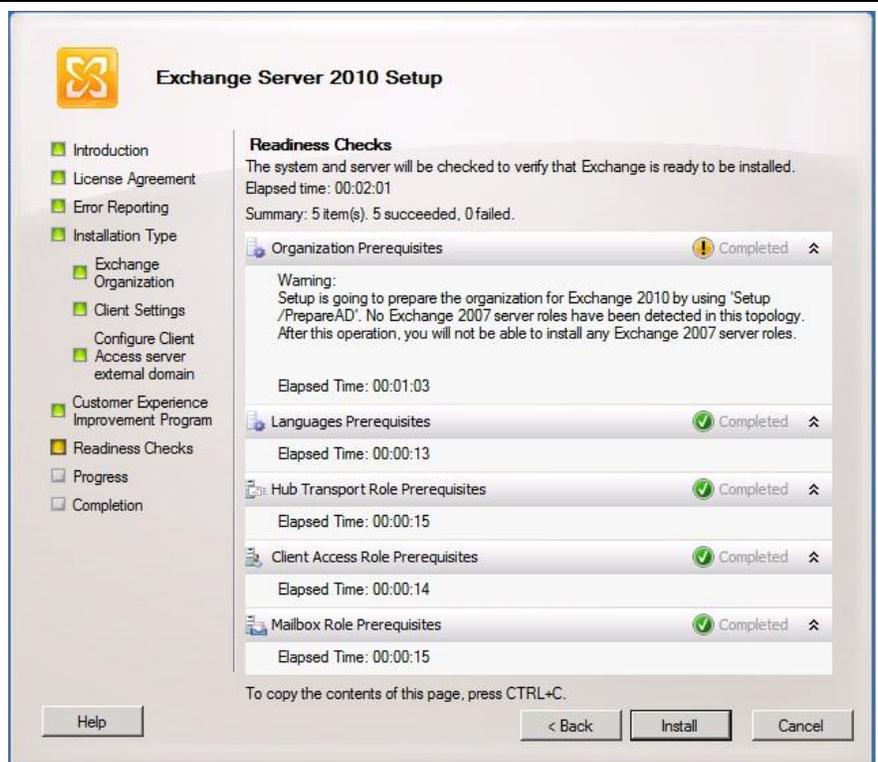


Figure 12: Readiness Checks status and install screen.

11. Once the installation has completed, click Finish. Exchange should automatically open the Exchange Management Console (see Figure 13).

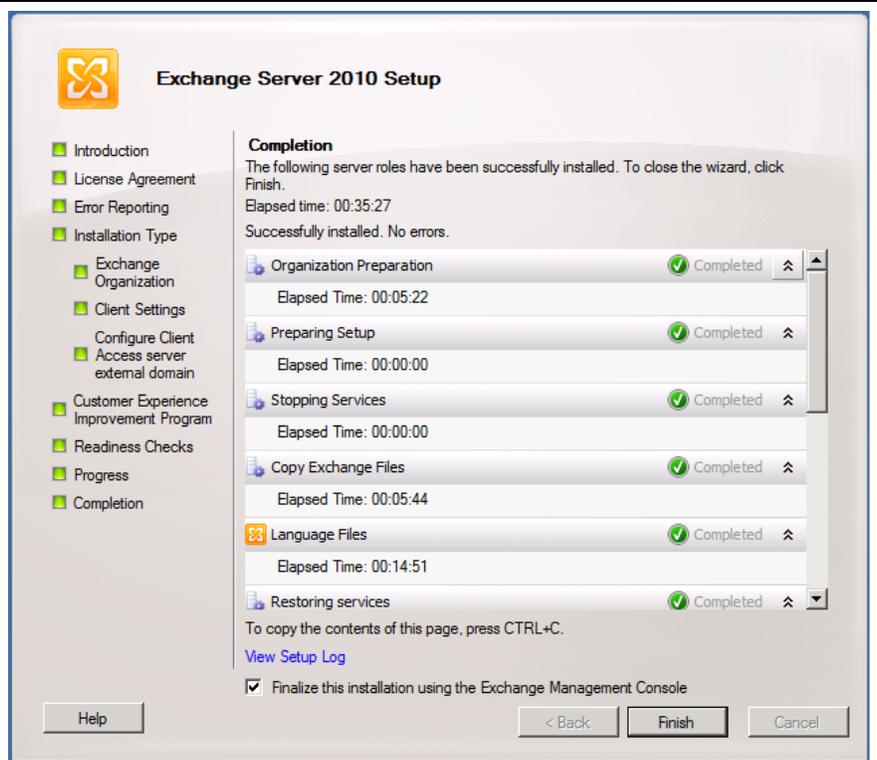


Figure 13: Installation complete screen.

NOTE

In order to receive external email, you will need to contact your Internet Service Provider (ISP) to register your MX record associated with your email server’s external IP address. You will also need to establish routes in your firewall to direct all SMTP traffic to your Exchange Server 2010 IP address.

Installing Microsoft SharePoint Server 2010 on VM #3

When we installed SharePoint Server 2010, we followed the server farm installation procedure. For complete details on the installation of SharePoint Server 2010, see [Appendix D](#).

1. Insert the installation DVD, and capture the DVD drive in the VM session. Launch setup.exe, and click Install software prerequisites (see Figure 14).



Figure 14: The main installation menu for SharePoint Server 2010.

2. When the prerequisites finish installing, click Install SharePoint Server on the main SharePoint installation menu.
3. Choose the Stand-alone server type, and click Install (see Figure 15).



Figure 15: Selecting the server type.

4. When the installation finishes, check the box for Run the SharePoint Products Configuration Wizard now, and click Close.
5. When the configuration completes successfully, click Finish.

SUMMING IT ALL UP

High availability infrastructures are an essential part of any business. To keep your data going and your company moving along, you need a system that not only handles your business in an effective, structured manner, but one that won't fail.

Dell 3-2-1 Reference Configurations, which include the latest Dell PowerEdge servers and EqualLogic storage, provide you and your business with the tools to design and deploy a virtualization infrastructure with no hassles and continued support.

As we have shown in this Guide, a Dell 3-2-1 Reference Configuration takes the guesswork out of the typically complicated task of designing, setting up, and configuring a virtual infrastructure, and instead makes the process simple and straightforward.

APPENDIX A – SETTING UP THE SHARED STORAGE AND NETWORKING

Adding the Hyper-V role

1. Open Server Manager, and click Roles.
2. Click Add Roles.
3. On the Before You Begin page, check the Skip this page by default box, and click Next.
4. Select Hyper-V, and click Next.
5. On the Hyper-V Introduction page, click Next.
6. On the Create Virtual Networks page, click Next.
7. Confirm installation selections, and click Install.
8. Once the installation is complete, click Close.
9. When the system prompts a restart, click Yes.
10. Allow the system to fully reboot, and login using the administrator credentials.
11. Once the desktop loads, the Hyper-V Installation Results window will finish the installation.
12. Click Close. The Hyper-V role will now be available in Server Manager under Roles.

Installing the failover clustering feature on the Hyper-V host servers

1. Open Server Manager, and click Features.
2. Click Add Features.
3. Select Failover Clustering, and click Next.
4. Click Install.
5. Once the new feature installation completes, click Close.

Installing Dell EqualLogic Host Integration Tools

1. Insert the disk and click Setup.exe.
2. At the Welcome screen, click Next.
3. At the License Agreement screen, review and accept the terms of the license agreement, and click Next.
4. At the Installation Type screen, select Typical (Requires reboot on Windows Server platforms), and click Next.

5. In the Microsoft iSCSI Initiator service is not running pop-up, click Yes to start the service and enable iSCSI traffic through the firewall.
6. In the Microsoft iSCSI service pop-up, click Yes.
7. When the iSCSI Initiator Properties window pops up, accept the defaults, and click OK.
8. If a Windows Firewall Detected pop-up appears, click Yes to enable echo requests.
9. At the Ready to install the components screen, click Install.
10. In the Microsoft Multipath I/O feature is not detected pop-up, click Yes to install the feature.

NOTE

When installing HIT on a failover cluster node, there will be an additional screen called the Cluster Access Information screen. Enter the appropriate credentials, specify a shared network path, and click Next. For more information regarding installing HIT on a failover cluster, see the HIT User's Guide documentation provided with your Dell EqualLogic PS4000XV.

11. At the Installation Complete screen, click Finish.
12. In the System Restart Required pop-up, select Yes, I want to restart my computer now, and click OK.

Running the Remote Setup Wizard for the Dell EqualLogic PS4000XV

1. Click Start → All Programs → EqualLogic, and open Remote Setup Wizard.
2. At the Welcome screen, leave the radio button on Initialize a PS Series array, and click Next. The Remote Setup Wizard will search for uninitialized PS Series arrays.
3. At the All PS Series arrays have been initialized screen, select the storage array, and click Next. (See Figure 16.)

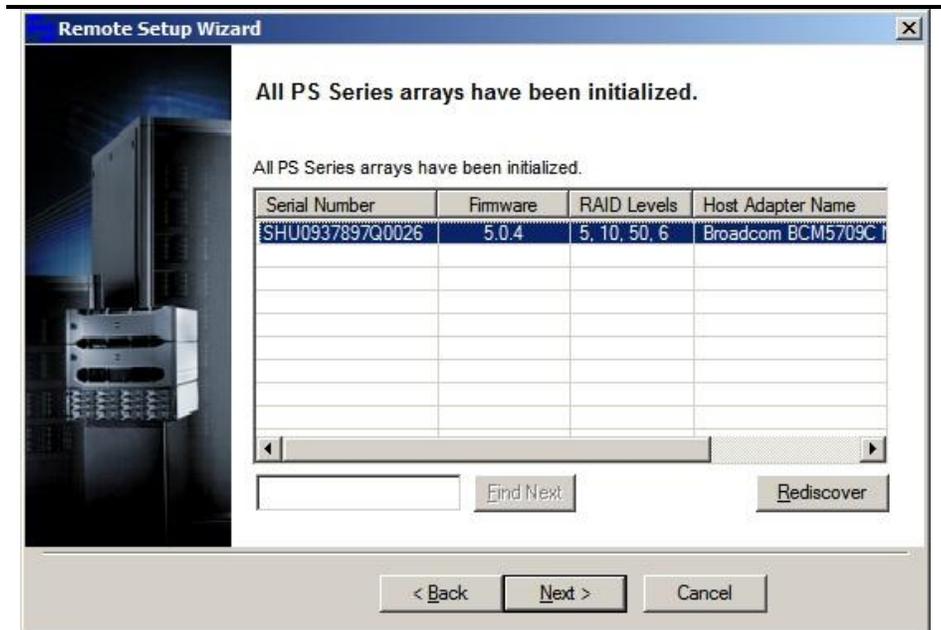


Figure 16: The All PS Series arrays have been initialized screen.

- At the Initialize Array screen, enter the appropriate information. For our testing, we used PS4000storage for Member Name, 192.10.1.11 for IP Address, 255.255.255.0 for Subnet Mask, and 192.10.1.1 for Default Gateway. (See Figure 17.)

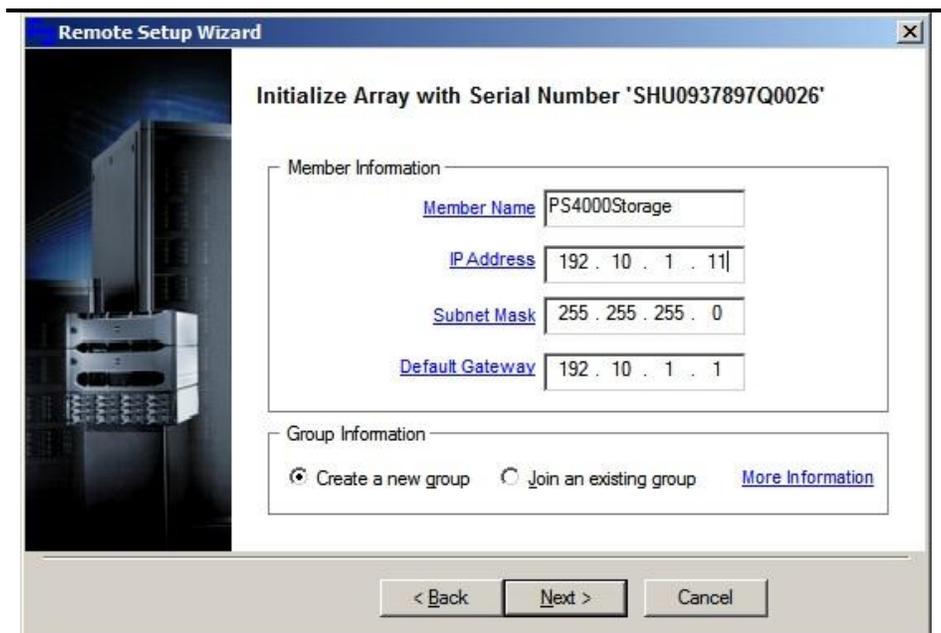


Figure 17: The Member Information screen.

5. Under Group Information, leave the Create a new group radio button selected, and click Next. (See Figure 17.)
6. At the Create a New Group screen, enter the appropriate information. For our testing, we used `grpmanager` for the Group Name, and `192.10.1.10` for the Group IP Address. (See Figure 18).



Figure 18: The Create a New Group screen.

7. On the Create a New Group screen, select the desired RAID level. We selected RAID 10 for the RAID Policy. (See Figure 18.)
8. Under Credentials for New Group, enter the passwords. (See Figure 18.)
9. Under CHAP credentials for VDS/VSS access to group, enter a user name and password and click Next. (See Figure 18.)
10. On the Initialization Successful pop-up, click OK.
11. Click Finish.

Configuring MPIO settings

1. Click Start → All Programs → EqualLogic → Remote Setup Wizard.
2. At the Welcome to the Remote Setup Wizard screen, select Configure MPIO settings for this computer, and click Next.

3. Under Subnets included for MPIO, select the subnets you wish to exclude from MPIO.
4. Click Exclude.
5. Click Finish.

Configuring the Dell EqualLogic PS4000XV storage

1. Click Start → Internet Explorer, and enter the IP address of the Dell EqualLogic PS Series Group Manager. For our testing, we used 192.10.1.10.
2. Log into the group manager using the credentials you created during the Remote Setup Wizard.
3. Expand Members, click the member PS4000Storage (see Figure 19), and, in the right pane, select the Network tab.

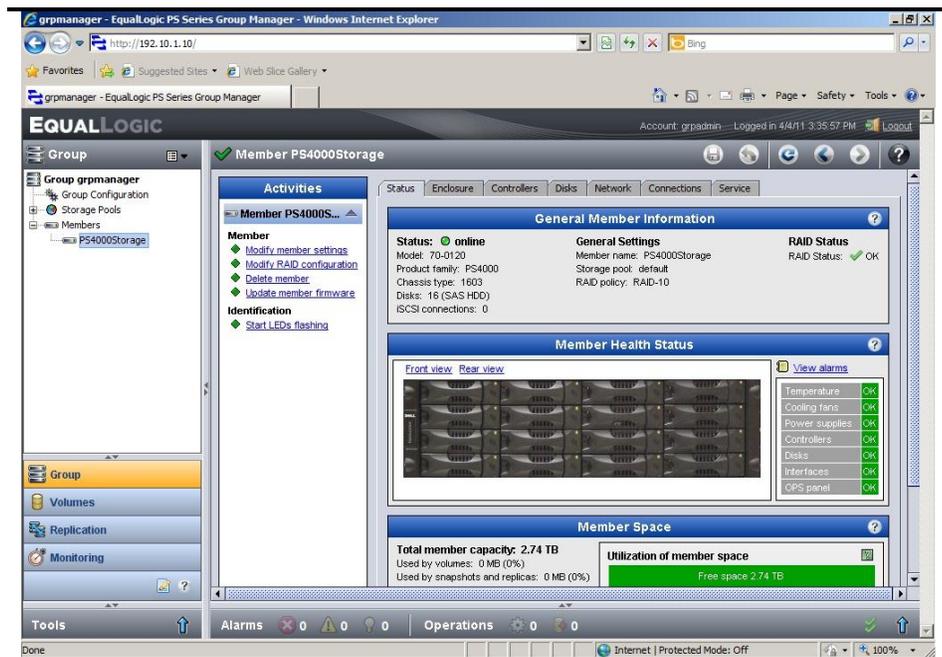


Figure 19: Navigating to the storage.

4. Right-click eth1, and select Modify IP settings.
5. Enter the desired IP address for the second iSCSI connection and click OK. For our testing we used 192.10.1.12 for the IP address and 255.255.255.0 for the Subnet mask
6. Right-click eth1, and select Enable interface.
7. Repeat steps 4 and 5 for eth2 which is the management port, and apply the appropriate IP address and subnet mask. For

our testing, we used 192.20.1.10 for the IP address, and 255.255.255.0 for the subnet mask.

8. Create the volumes:

- a.** In the left pane, click Volumes, and, in the adjacent pane, click Create volume. (See Figure 20.)

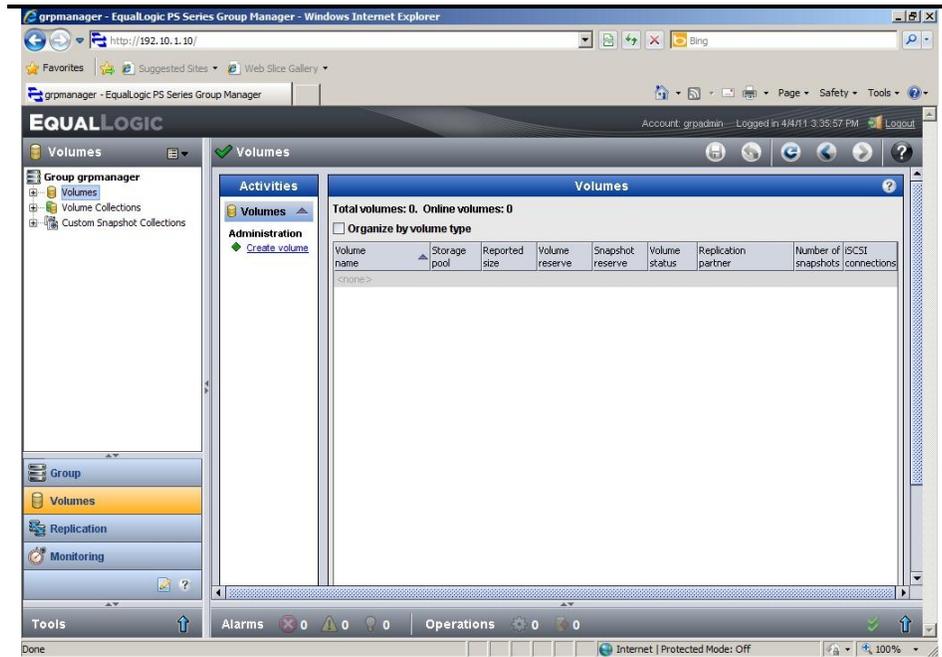


Figure 20: The Volumes pane.

- b.** Name the volume VirtualMachine1, and click Next.
- c.** Type 70 for the Volume size, and click Next. For our testing purposes we did not create a snapshot reserve with the volume. (See Figure 21.)

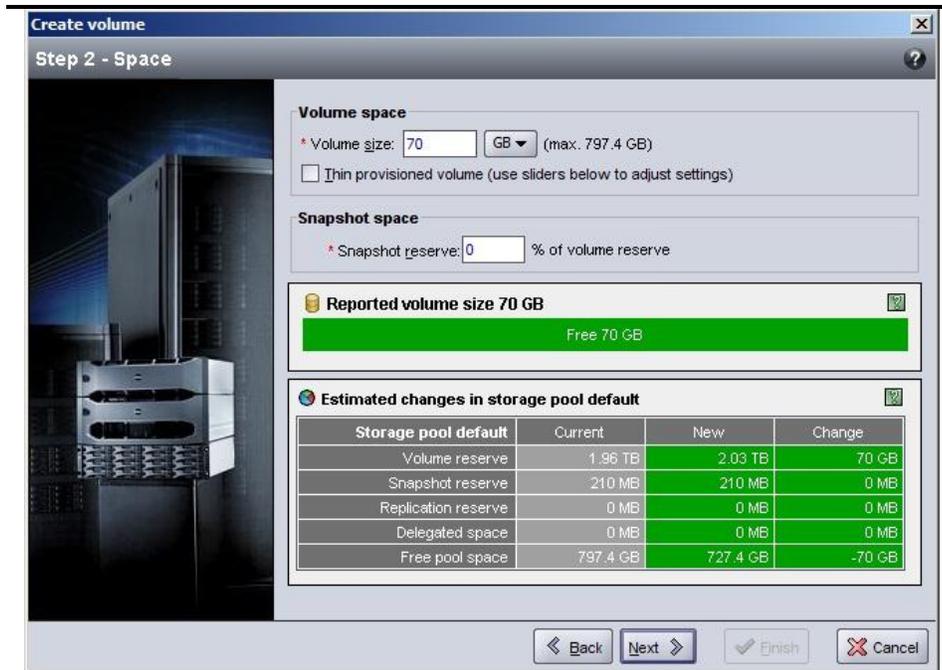


Figure 21: Setting the Volume size.

- d. On the Step 3 – iSCSI Access screen, click the Allow simultaneous connections from initiators with different IQN names checkbox, and perform the following, depending on the volume you are creating:
 - a. For the VirtualMachine1-3 and DiskWitness volumes, click the Limit access to iSCSI initiator name radio button, and enter the appropriate iSCSI initiator name. For our testing, this was `iqn.1991-05.com.microsoft:hypervhost1.test.local`
 - b. For the SharePoint, Exchange, and SQL Server volumes, leave the no access radio button selected since you will enter the IQN name of the appropriate VM later.
 - e. Click Finish.
9. Repeat step 8 eight times for the remaining volumes, using the following names and Volume sizes:
 - VirtualMachine2 – 70GB
 - VirtualMachine3 – 70GB
 - SharePoint – 500GB

- Exchange – 500GB
- ExchangeLog – 125GB
- SQLData – 500GB
- SQLLog – 125 GB
- DiskWitness – 10 GB

Connecting to the volumes with Microsoft iSCSI Initiator

1. Click Start → Administrative Tools → iSCSI Initiator.
2. Select the Discovery Tab, and click Discover Portal.
3. Enter the IP Address for the Dell EqualLogic Storage Group, and click OK.

NOTE

The Discovery tab now shows the Target portal you added (see Figure 22.)

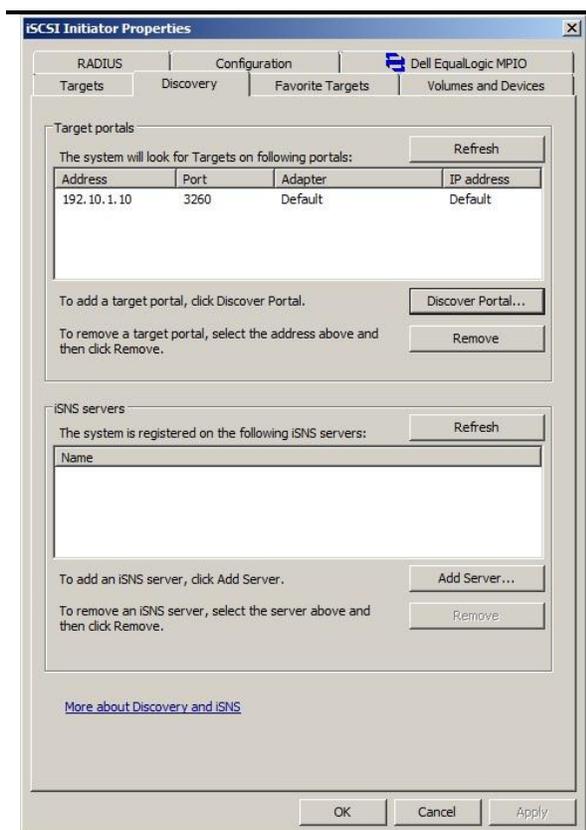


Figure 22: The Discovery tab showing the Target we added.

4. Select the Targets tab, and click Refresh.
5. Select the first Inactive Target listed, and click Connect.

6. Ensure that the Add this connection to the list of Favorite Targets is selected, check the Enable multi-path check box, and click OK. (See Figure 23.)



Figure 23: Connecting to a Target.

7. Repeat steps 5 and 6 three times, until you've connected to all four volumes, and click OK.

Installing Broadcom Advanced Control Suite

1. On the Dell Update Package pop-up for installing Broadcom NetXtreme Family of Adapters, click Install...
2. On the InstallShield Wizard welcome screen, click Next.
3. Click the I accept the terms in the license agreement radio button, and click Next.
4. Under Drivers and Management Applications, click Control Suite, click BASP, select to install this feature on the local hard drive in the drop down menu, and click Next. (See Figure 24.)

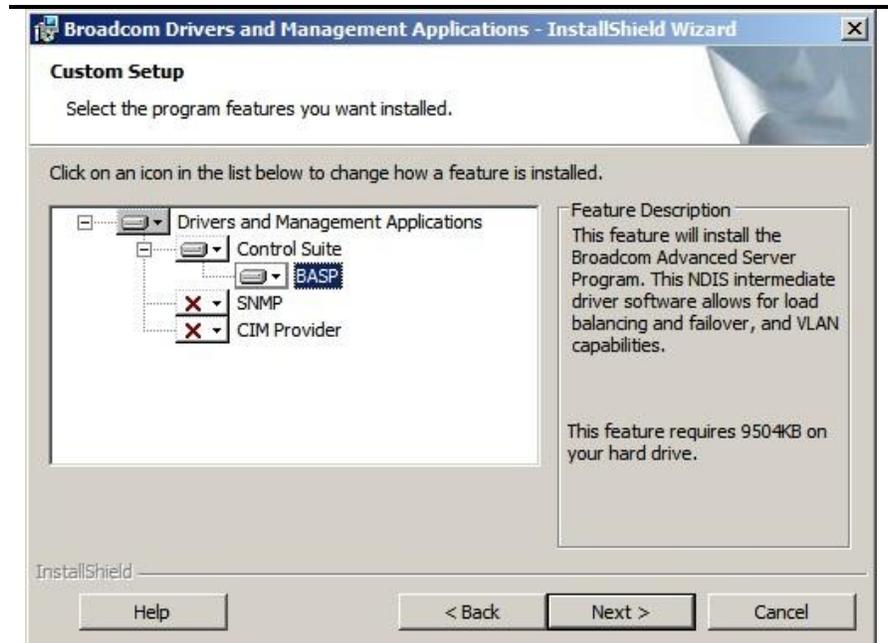


Figure 24: Selecting BASP for installation

5. On the Ready to Install the Program screen, click Next.
6. At the pop-up warning screen, click Yes. (See Figure 25.)

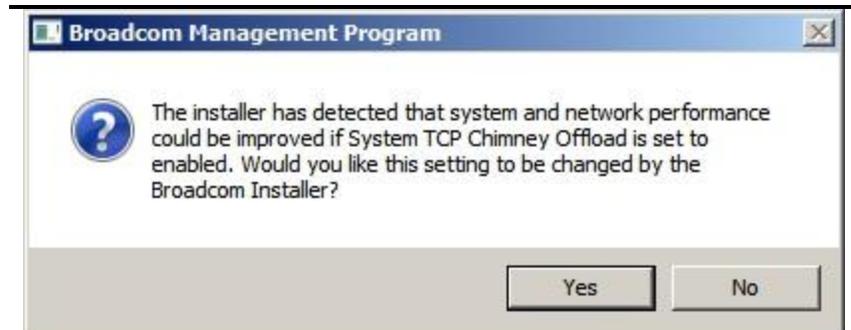


Figure 25: Broadcom Management Program pop-up

7. On the InstallShield Wizard Completed screen, click Finish.
8. At the Update Package Complete screen, click OK.

Configuring a NIC team with the Public/VM NICs in BACS

1. Click Start → All Programs → Broadcom → Broadcom Advanced Control Suite 3.
2. Click Team Management. (See Figure 26.)

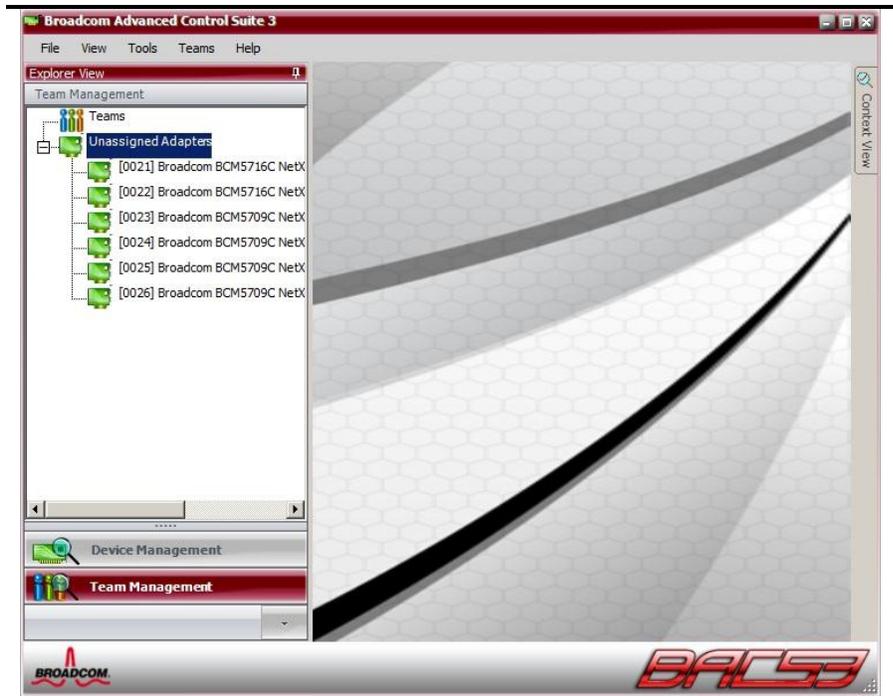


Figure 26: Team Management view

3. Click Teams from the taskbar, and select Create a Team to launch the Broadcom Teaming Wizard.
4. At Welcome to the Broadcom Teaming Wizard screen, click Next.
5. In the textbox, type the name of the team (in our case, Public-VM Teamed NIC), and click Next.
6. For Team type, select the Smart Load Balancing™ and Failover (SLB) radio button, and click Next.
7. At the Assigning Team Members screen, select the two Public-VM dedicated NICs and click Add, then click Next. (See Figure 27.)

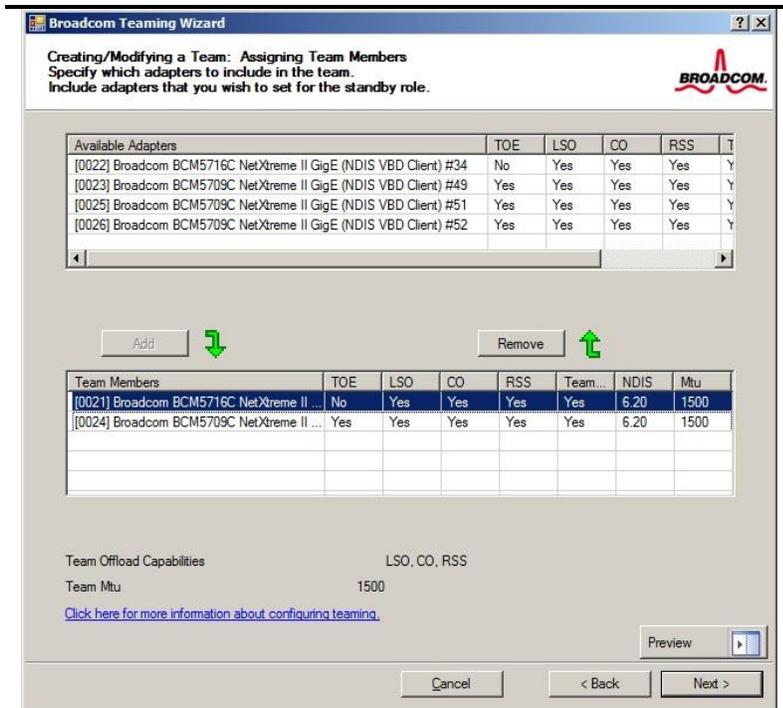


Figure 27: Assigning team members

8. Select Do not configure a standby member, and click Next.
9. On the Configuring LiveLink screen, select the No radio button, and click Next.
10. On the Configure VLAN Support screen, select the Skip manage VLAN radio button, and click Next.
11. Under Commit changes, select the Commit changes to system and Exit the wizard radio button, and click Finish.
12. On the pop-up that states Applying the changes will temporarily interrupt the network connection, click Yes. When the configuration process finishes, you should see the newly created virtual adapter from the teamed NICs, as Figure 28 shows.

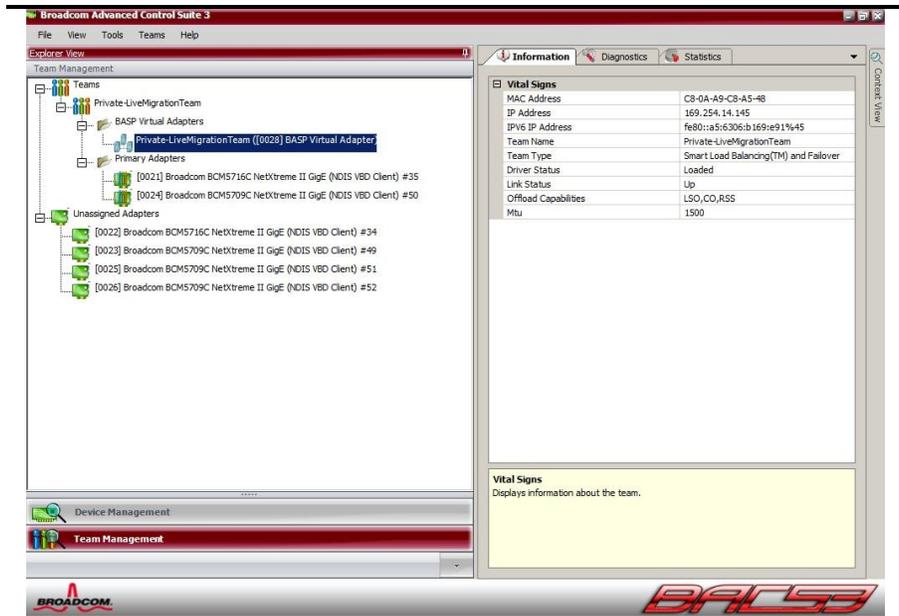


Figure 28: New virtual adapter from teamed NICs

Configuring the Dell EqualLogic PS4000XV for access from the second Hyper-V host server

1. Click Start → Internet Explorer, and enter the IP address of the Dell EqualLogic PS Series Group Manager. For our testing, we used 192.10.1.10.
2. Log into the group manager using the credentials you created during the Remote Setup Wizard.
3. Click on the Volume VirtualMachine1, click the Access tab, and click Add.
4. Check the Limit access to iSCSI initiator name checkbox and enter the iSCSI initiator name of the second Hyper-V host server and click OK. For our testing, this was `iqn.1991-05.com.microsoft:hypervhost2.test.local`

NOTE

When you've successfully given access to the second Hyper-V host, the Access Control List screen looks like Figure 29.

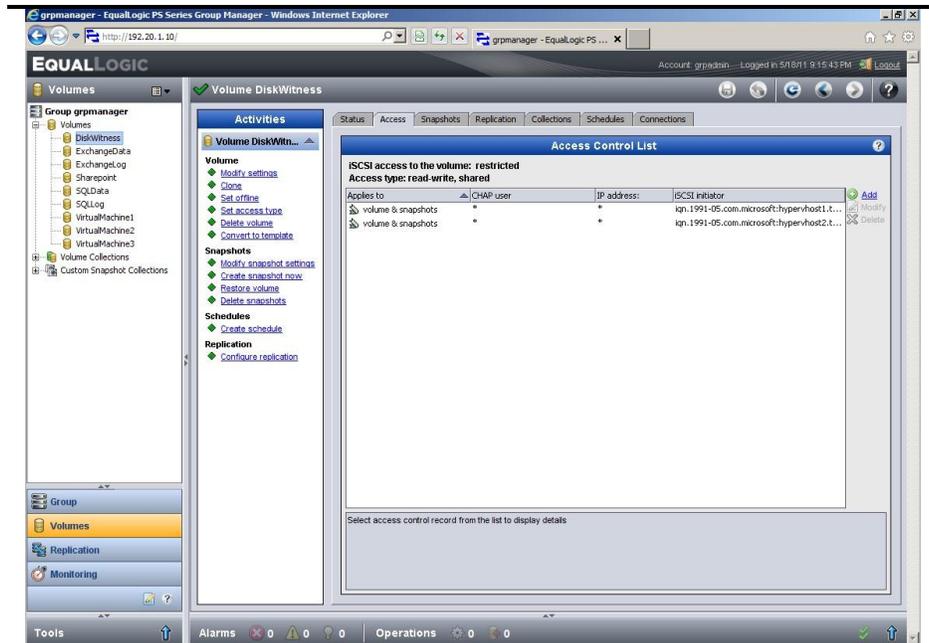


Figure 29: Access control addition successful.

5. Repeat steps 3 and 4 three times for the remaining volumes:
 - VirtualMachine2
 - VirtualMachine3
 - DiskWitness

Creating a VLAN and assigning ports on the Dell PowerConnect 6248 switch

1. Open a Web browser and enter the IP address of the switch. For our testing, this was 192.20.1.250.
2. Enter the appropriate login credentials.
3. In the left pane, expand Switching, VLAN, and click VLAN Membership.
4. In the right pane, click the Add button.
5. Enter the first VLAN ID and Name, and click Apply Changes.
6. Repeat step 5 twice to create the remaining VLANs.
7. When you finish, click Back. The VLAN drop-down menu should show the newly created VLANs.
8. To add a port to a VLAN, select the appropriate VLAN from the drop down menu and click on the desired ports in the Static row (See Figure 30).

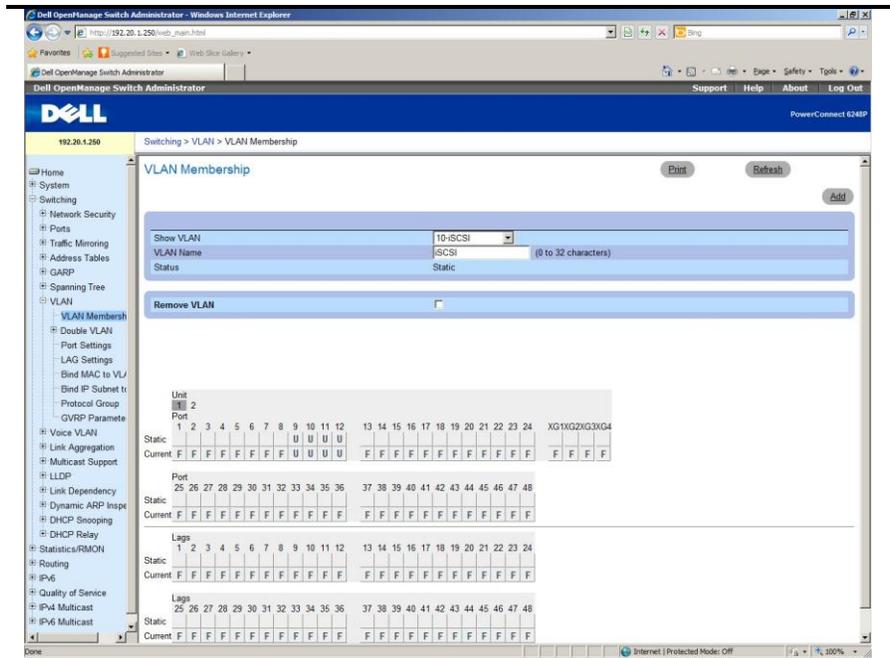


Figure 30: Assigning ports to a VLAN

9. Click Apply Changes to save the VLAN port assignments.
10. Repeat steps 8 and 9 twice to complete the port assignments for the remaining two VLANs on Unit 1, then click to select Unit 2 (the other switch) and repeat steps 8 and 9 for all VLANs.

APPENDIX B – PREPARING THE FAILOVER CLUSTER AND CONFIGURING THE MANAGEMENT SERVER

Creating a self-signed certificate

1. Click Start→Run.
2. Type `mmc`, and click OK.
3. When the console opens, click File→Add/Remove Snap-in...
4. Under Available snap-ins, select Certificates, and click Add.
5. Select Computer account, and click Next.
6. Select Local computer, and click Finish.
7. At the Add or Remove Snap-ins window, click OK.
8. On the left-hand side, expand Certificates (Local Computer).
9. Right-click Personal, and click All Tasks→Request New Certificate.
10. On the Before You Begin page, click Next.
11. On the Select Certificate Enrollment Policy page, click Active Directory Enrollment Policy, and click Next.
12. Check the Computer box, and click Enroll.
13. Once the certificate installation completes, click Finish. The new certificate will now be listed under Certificates (Local Computer)→Personal→Certificates.

Installing Dell OpenManage Server Administrator 6.4

1. Insert the installation disk for Dell OpenManage Server Administrator into the DVD drive.
2. When the AutoPlay window appears, click Run autorun.exe.
3. When the Dell OpenManage Install window appears, click Install.
4. The install wizard will then scan for prerequisites.
5. If a Remote Enablement warning is listed, click the link to configure HTTPs Listener Windows Remote Management.
6. When the Are you sure you want to configure HTTPs Listener Windows Remote Management prompt appears, click Yes.
7. When the configuration tool completes, click Rescan Dependencies.

8. When the scan completes, click Server Administrator.
9. At the Welcome to the Install Wizard for Dell OpenManage Server Administrator screen, click Next.
10. Accept the license agreement, and click Next.
11. At the Setup Type screen, select Custom, and click Next.
12. At the Custom Setup screen, click Server Instrumentation → Remote Enablement → This feature will be installed on the local hard drive, and click Next.
13. At the Ready to Install the Program screen, Click Install.
14. Once the installation completes, click Finish.

Running the Validate a Configuration Wizard

1. Open Server Manager.
2. Expand Features, and select Failover Cluster Manager.
3. Click Validate a Configuration...
4. On the Before You Begin page, check the Do not show this page again box, and click Next.
5. At the Select Servers page, type the name of each Hyper-V host server and click Add. After adding both servers, click Next.
6. On the Testing Options page, select Run all tests (recommended), and click Next.
7. On the Confirmation page, click Next to begin running the validation tests.
8. Once the validation tests complete successfully, click Finish.

Creating and configuring the cluster

1. Open Server Manager.
2. Expand Features, and select Failover Cluster Manager.
3. Click Create a Cluster...
4. On the Before You Begin page, check the Do not show this page again box, and click Next.
5. On the Select Servers page, type the name of each Hyper-V host server and click Add. After adding both servers, click Next.

6. On the Access Point for Administering the Cluster page, enter a cluster name.
7. Select a valid network, enter the desired IP address, and click Next.
8. On the Confirmation page, click Next.
9. Once the new cluster is created and configured, click Finish.
10. The new cluster now appears under Server Manager→Features→Failover Cluster Manager.
11. Select the newly created cluster.
12. Click Enable Cluster Shared Volumes...
13. Read the notice window that appears, check the I have read the above notice box, and click OK.
14. On the left-hand side of the Server Manager window, expand the new cluster, and click Cluster Shared Volumes.
15. Click Add storage.
16. Select the desired disks, and click OK to add the disks to the cluster.
17. Once the Add storage task completes, the added disks will now be listed on the main page for Cluster Shared Volumes.
18. Next, expand Networks in the left pane, right-click on the first cluster network in the center pane, and click Properties.
19. Determine, based on the listed subnet identifying the network type, whether each network will allow cluster network communication and whether clients will be able to connect through the network. For example, using our sample IP scheme, the subnet 192.10.1.0 is our iSCSI network, so we selected Do not allow cluster network communication on this network.

NOTE

Be sure to take note of which cluster network has the subnet that corresponds to the Private/CSV network, as you will need this information to complete the next step. In our test setup, this subnet is 192.30.1.0 and was assigned as Cluster Network 4.

20. Next, designate the Private/CSV network as the preferred network for CSV communication. Click Start→Administrative Tools→Windows PowerShell Modules.

21. Type `Get-ClusterNetwork | ft Name, Metric, AutoMetric, Role` and press Enter to view the current preferred network assignments.
22. Type `(Get-ClusterNetwork "Cluster Network 4").Metric = 900`, where "Cluster Network 4" is the Private/CSV Network, and press Enter to set it as the preferred network. Setting the Metric to a lower value than the other networks, in this case a value of 900, will make it the preferred network for CSV communication. To confirm the change, repeat step 21 and verify that Cluster Network 4 now has a Metric value of 900. For more information, see [http://technet.microsoft.com/en-us/library/ff182335\(W.S.10\).aspx](http://technet.microsoft.com/en-us/library/ff182335(W.S.10).aspx)
23. Close the PowerShell Module window.

Configuring the networks for cluster access

1. Open Server Manager, and click Features.
2. Click Add Features.
3. On the Select Features page, expand Role Administration Tools, and select Hyper-V Tools.
4. Expand Feature Administration Tools, and select Failover.

Installing Hyper-V Tools and failover clustering tools

1. Open Server Manager, and click Features.
2. Click Add Features.
3. On the Select Features page, expand Role Administration Tools, and select Hyper-V Tools.
4. Expand Feature Administration Tools, and select Failover Clustering Tools.
5. Click Next.
6. On the Confirm Installation Selections page, click Install.
7. Once the installation is complete, click Close.

Installing Systems Center Essentials 2010

1. Insert the System Center Essentials installation DVD into the DVD drive.
2. When the AutoPlay window appears, click Run setupSCE.exe.

3. At the System Center Essentials 2010 Setup window, check the Download the latest updates to System Center Essentials 2010 during setup box, and click Install.
4. On the Product registration information page, enter a name, an organization, and your product key, and click Next.
5. When prompted, install .NET Framework 3.5 SP1.
6. At the license agreement, check the I have read, understood, and agree with the terms of the license agreement box, and click Next.
7. On the Select components to install page, ensure that all components are selected and click Next.
8. The wizard will then check the environment for prerequisite hardware and software. Review and correct any prerequisite warnings, and click Next.
9. On the Setup will install these missing software prerequisites page, select Install Internet Information Services (IIS) and Install SQL Server 2008 SP1 on this computer now, and click Next.
10. When all prerequisite installations complete successfully, click Next.
11. On the Where should System Center Essentials files be located page, click Next.
12. On the Where should Virtualization Management data be located page, accept the default location, and click Next.
13. On the Provide management account credentials page, enter the administrator user name and password, then enter the proper domain name, and click Test.
14. When the test completes, click Next.
15. On the Help improve System Center Essentials page, select No for all three items, and click Next.
16. On the Ready to install System Center Essentials page, review the Essentials Server and Essentials Reporting settings, and click Install.
17. When the installation completes successfully, check the Open the System Center Essentials console when this wizard closes, and click Close.

Configuring Systems Center Essentials 2010

1. On the Get Started page, click Start.
2. On the Policy Type page, select Yes, and click Next.
3. On the Firewall Exceptions page, select Yes, create Windows Firewall exceptions (recommended), and click Next.
4. On the Configure Remote Assistance page, select No, do not enable Remote Assistance, and click Next.
5. On the Computer Discovery page, select Yes.
6. Select Automatically discover and manage all computers, and click Next.
7. On the E-mail Notifications page, select No, I will set up notifications later, and click Next.
8. On the Proxy Server page, select No, and click Synchronize.
9. Once the synchronization is complete, click Next.
10. On the Monitoring Configuration page, leave default selections, and click Next.
11. On the Error Monitoring page, select Yes, collect application errors (recommended), enter a valid directory for the Error reporting upload location, and click Next.
12. On the Configure Error Forwarding page, click Next.
13. On the Microsoft Updates page, select Automatically (recommended), and click Next.
14. On the Update Languages page, select Yes (recommended), and click Next.
15. On the Update Classifications page, select Download only critical, security, and service pack updates from Microsoft (recommended), and click Next.
16. On the Update Deployment page, leave default selections and click Next.
17. On the Summary page, review the configuration and click Configure.
18. Once the configuration completes, check the Start discovering computers to manage when this wizard closes, and click Close. Allow for the SCE console to install management agents on the discovered computers before proceeding.

Adding the failover cluster as a virtual machine host in SCE 2010

1. Open System Center Essentials 2010.
2. On the left-hand side, click Computers.
3. In the Computer Overview pane, click Designate a Host under Virtualization.
4. On the Select a Computer screen, select the first virtualization host.
5. Click Next.
6. Enter the administrator credentials and domain.
7. Click Designate.
8. When the validation prompt appears, click OK.
9. At the Network Configuration screen, click Next.
10. Select the BASP Virtual Adapter and enter an appropriate name for the virtual switch, then set all other network adapters to Do not configure, and click Next.
11. Repeat step 10 for the second node.
12. At the Summary screen, click Create.
13. At the Completion screen, check the When the wizard closes, take me to view the new host box, and click Close.

Importing the Dell PRO enabled management pack into SCE 2010

1. Download the Dell PRO Pack 2.0 from <http://support.us.dell.com/support/downloads/download.aspx?c=us&cs=555&l=en&s=biz&releaseid=R252410&formatcnt=1&libid=0&typeid=-1&dateid=-1&formatid=-1&fileid=369241>.
2. Double-click the downloaded file.
3. When the Open File – Security Warning window appears, click Run.
4. At the Dell PRO Enabled Management Pack window, click OK.
5. Enter a location for the unzipped file, and click Unzip.
6. When the unzip process is complete, click OK.
7. Open Systems Center Essentials
8. When the System Center Essentials console appears, click Administration on the left-hand side.

9. Under Tasks, click Import Management Packs...
10. On the Select Management Pack page, click Add → Add from disk...
11. At the Online Catalog Connection prompt, click No.
12. Browse to the unzipped Dell PRO Pack, and click Open.
13. Once the Dell PRO Pack has been added, click Install.
14. At the System Center Essentials security prompt, click Yes.
15. Once the management pack is successfully imported, click Close.

APPENDIX C – CREATING AND CONFIGURING THE VIRTUAL MACHINES

Creating a virtual machine in SCE 2010

1. Open System Center Essentials 2010.
2. On the left-hand side, select Computers.
3. On the right-hand side, click New Virtual Machine under Computer Group.
4. At the Select Template screen, select an appropriate template, and click OK.
5. At the Installing Operating System screen, select Install from DVD, insert the Windows Server 2008 R2 SP1 install disk into the appropriate Hyper-V host server, and click Next.
6. Select a host for the new virtual machine, and click Next.
7. At the Virtual Machine Name screen, enter a name, description, and host folder for the new virtual machine.
8. Click Next.
9. At the Summary screen, review the virtual machine settings, and click Create.
10. When the virtual machine is successfully created, check the When the wizard closes, open the Configure Virtual Machine window to set up the virtual machine for management box.
11. Click Close.
12. When the Configure Virtual Machine window appears, click Install an operating system. A VM window pops up showing that the Windows Server 2008 R2 SP1 files are being loaded from the DVD
13. At the Language Selection Screen, click Next.
14. Click Install Now.
15. Select Windows Server 2008 R2 Enterprise (Full Installation), and click Next.
16. Click the I accept the license terms check box, and click Next.
17. Click Custom.
18. Click Next.

19. At the User's password must be changed before logging on warning screen, click OK.
20. Enter the desired password for the administrator in both fields, and click the arrow to continue.
21. At the Your password has been changed screen, click OK.
22. Click OK, and click Close to exit.

Configuring a virtual machine in SCE 2010

Before proceeding with this section, ensure that you have configured your virtual machine with an appropriate name and IP address, and that it has been joined to the existing domain.

1. At the Configure Virtual Machine VM1 screen, click 3. Add the new virtual machine to management. (See Figure 31.)



Figure 31: Adding the new virtual machine to management.

2. On the What would you like to manage? screen, select Windows computers, and click Next.
3. On the Auto or Advanced? Screen, select the Automatic computer discovery radio button, and click Next.
4. On the Administrator Account screen, select the Use selected Management Server Action Account, and click Discover.
5. On the Select Objects to Manage screen, select the appropriate virtual machine and click Next.

6. On the Summary screen, click Finish. The Agent Management Task Status window will pop up and show the status of the agent installation into the virtual machine.
7. When the task has completed and the Status says Success, click Close. You should be able to see the newly added virtual machine as Figure 32 shows.

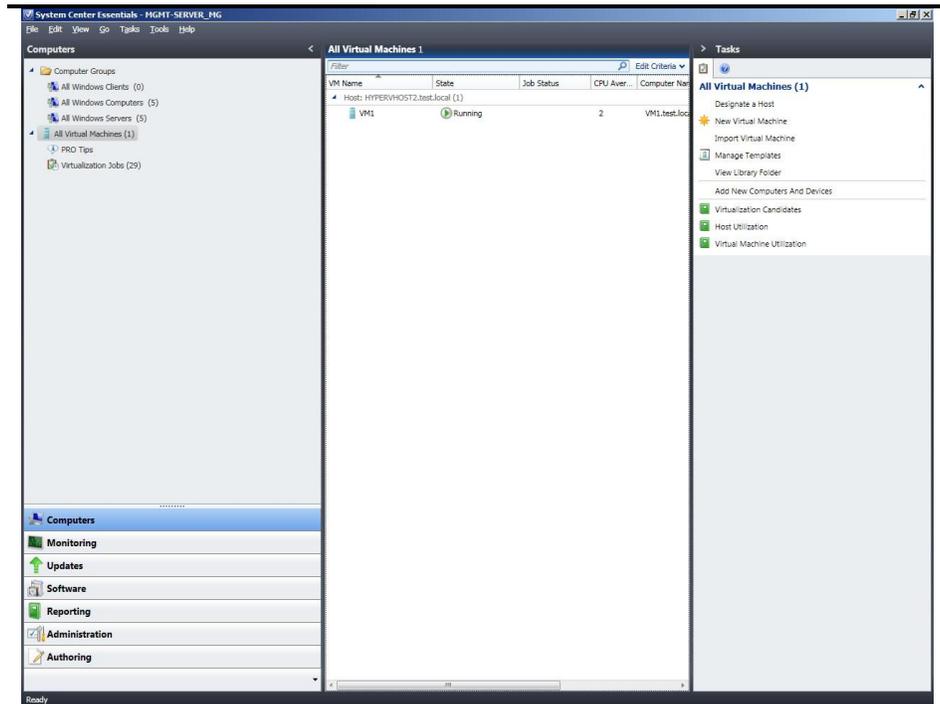


Figure 32: The newly added virtual machine.

Configuring the Live Migration networks for the virtual machines

1. Click Start → Administrative Tools → Failover Cluster Manager.
2. Click Manage a Cluster.
3. Enter the cluster name, and click OK.
4. Expand the cluster name, services and applications, and click on SCVMM VM resources for the first virtual machine.
5. In the center pane, right-click SCVMM <virtualmachinename>, and click Properties, where <virtualmachinename> is the name of your VM.
6. Click the Network for live migration tab.
7. Use the Up and Down buttons to order the networks by priority, with the dedicated Live Migration network first, followed by the Private/CSV network, then the Public

network, and verify that the iSCSI network is disabled for live migration. Click OK.

This should automatically set the live migration priorities for all virtual machines. For more information on the Live Migration network, go to [http://technet.microsoft.com/en-us/library/dd446679\(WS.10\).aspx](http://technet.microsoft.com/en-us/library/dd446679(WS.10).aspx).

Creating the iSCSI virtual network switches

1. Click Start → Administrative Tools → Hyper-V Manager.
2. Ensure that New virtual network is highlighted in the left pane, and External is highlighted in the right pane, and click Add.
3. For the name, enter an appropriate name.

NOTE

Be sure to use the same name for each of the virtual network switches on the other Hyper-V host.

4. For connection type, select the External radio button, use the drop down menu to select the first iSCSI physical adapter, and ensure that the Allow management operating system to share this network adapter checkbox is selected, and click Apply.
5. When the warning dialogue box appears, click OK.
6. Repeat steps 2 through 5 for the second iSCSI adapter, and click Ok.
7. Repeat steps 2 through 6 for the second Hyper-V host, ensuring that you use the same virtual network names.

Creating virtual network adapters

1. Click Start → Administrative Tools → Hyper-V Manager.
2. Right-click on each of the VMs and shut down each one.
3. Right-click on the first VM, and select Settings...
4. Ensure that Add Hardware is selected in the left pane, that Network Adapter is selected in the right pane, and click Add.
5. Under Network, use the drop-down menu to select the first iSCSI virtual network, and click Apply.
6. Repeat steps 4 and 5 to add the second iSCSI network adapter, connect it to the second iSCSI virtual network, and click OK.

7. Repeat steps 3 through 5 for the other two VMs.

Enabling access to volumes on the storage level

Before completing the following steps, boot the VMs, assign IP addresses to the iSCSI NICs, and install the HIT software into each VM.

1. Connect to the first VM, open a Web browser, and log into the EqualLogic PS Series Group Manager with the appropriate credentials.
2. Expand the volumes, and select the appropriate volume.
3. In the right pane, click the Access tab, and click Add.
4. At the Create access control record screen, click limit access to iSCSI initiator name, enter the name of the appropriate VM, and click OK.
5. Repeat steps 2 through 4 for any additional volumes that you need to enable access to for that VM. For example, for VM #1 you will need to enable access to both the SQLData and SQLLog volumes. When you are finished, close the browser window.
6. Click Start → Administrative Tools → iSCSI Initiator.
7. Select the Discovery Tab, and click Discover Portal.
8. Enter the IP Address for the Dell EqualLogic Storage Group, and click OK.
9. Select the Targets tab, and click Refresh.
10. Select the first Inactive Target listed, and click Connect.
11. Ensure that the Add this connection to the list of Favorite Targets is selected, check the Enable multi-path check box, and click OK.
12. Repeat steps 10 and 11 if needed for additional volumes, and click OK.
13. Repeat steps 1 through 12 for the other two VMs.
14. Right-click the first VM, and click Settings...

APPENDIX D – CUSTOMIZING YOUR VIRTUAL MACHINES

Installing SQL Server 2008 R2 on VM #1

Install an instance of Microsoft SQL Server 2008 R2 by following these steps. This installation walkthrough covers only the installation of the Database Engine and Management Components. For other components outside the scope of this guide, such as Reporting Services, Integration Services, or Analysis Services, see Microsoft documentation at [http://msdn.microsoft.com/en-us/library/ms143219\(SQL.105\).aspx](http://msdn.microsoft.com/en-us/library/ms143219(SQL.105).aspx).

1. On the management server, click the Start button, and click Hyper-V Manager.
2. Select the appropriate Hyper-V Host machine, right-click the virtual machine you wish to install SQL Server on, and choose to connect.
3. Log into the virtual machine.
4. Insert the installation DVD for SQL Server 2008 R2 into the appropriate Hyper-V host server's DVD drive.
5. Using the Hyper-V menu, choose Media, and Capture D: Drive, where D: is the letter of the physical server's DVD drive.
6. Click Run SETUP.EXE. If Autoplay does not begin the installation, navigate to the SQL Server 2008 R2 DVD, and double-click.
7. If the installer prompts you with a .NET installation prompt, click Yes to enable the .NET Framework Core role.
8. At the SQL Server Installation Center screen, click Installation. Click New installation or add features to an existing installation.
9. At the Setup Support Rules screen, click OK.
10. At the Product Key screen, enter your licensing information, if applicable, and click Next.
11. At the License Terms screen, accept the license terms, and click Next.
12. At the Setup Support Files screen, click Install.

13. At the Setup Support Rules screen, click Next.
14. At the Setup Role screen, choose SQL Server Feature Installation, and click Next.
15. At the SQL Server 2008 R2 Feature Selection screen, select the features that your organization requires. We chose the following features for this guide: Database Engine Services, Client Tools Connectivity, Client Tools Backwards Compatibility, Management Tools – Basic, and Management Tools – Complete. Click Next.
16. At the Installation Rules screen, click Next.
17. At the Instance Configuration, enter the appropriate details for your configuration. For a default instance, leave the defaults selected. For a named instance, enter a new instance name and adjust the file paths as necessary.
18. At the Disk Space Requirements screen, click Next.
19. At the Server Configuration screen, choose the service account, preferably an Active Directory domain account, fill in a password if necessary, and click Next.
20. At the Database Engine Configuration screen, choose an authentication mode. If your legacy servers use SQL Server logins at all, select Mixed Mode. If you exclusively use Active Directory domain accounts in your SQL Server environment, choose Windows Authentication.
21. If you choose to use Mixed Mode authentication, enter a password for the system administrator (SA) account, click Add Current User, and click Next.
22. At the Error Reporting screen, click Next.
23. At the Installation Configuration Rules screen, click Next.
24. At the Installation screen, click Install.
25. At the Complete screen, click Close.
26. After the SQL Server 2008 R2 installation process completes, check Microsoft's Web site for the latest SQL Server service pack and install that service pack. At the time we wrote this Guide, there were none.

Installing Exchange Server 2010 SP1 on VM #2

1. Select Start→Administrative Tools→Server Manager.

2. Click Add Roles.
3. At the Before You Begin screen, click Next.
4. At the Select Server Roles screen, click Web Server (IIS).
5. If prompted by an Add features required for Web Server (IIS) pop-up window, click Add Required Features.
6. Click Next.
7. At the Web Server (IIS) screen, click Next.
8. At the Select Role Services screen, select the IIS 6 Metabase Compatibility, IIS 6 Management Console, Basic Authentication, Windows Authentication, Digest Authentication, and Dynamic content Compression checkboxes, and click Next.
9. At the Confirm Installation Selections screen, click Install.
10. At the Installation Results screen, click Close.
11. Select Start → Administrative Tools → Server Manager.
12. Click Features.
13. Click Add Features.
14. Select .NET Framework 3.5.1 Features.
15. When the Add Features Wizard pop-up window prompts you, click Add Required Role Services.
16. Click Next.
17. At the Introduction to Web Server (IIS) screen, click Next.
18. At the Select Role Services screen, click Next.
19. Click Install.
20. At the Installation Results screen, click Close.
21. Download the Microsoft Filter Pack 2.0.
(<http://www.microsoft.com/downloads/en/details.aspx?FamilyID=5cd4dcd7-d3e6-4970-875e-aba93459fbee>)
22. Run FilterPackx64.EXE.
23. Click Next.
24. Click I accept the terms in the License Agreement, and click Next.
25. Click OK once installation is complete.

26. Click Start→Administrative Tools→Services.
27. Right-click the Net.Tcp Port Sharing service, and click Properties.
28. Change the Net.Tcp Port Sharing startup type to Automatic, and click OK.
29. Open command prompt and type `ServerManagerCmd -i RSAT-ADDS`, and hit Enter.
30. Reboot the server.
31. Insert the Exchange Server 2010 installation DVD, and capture the DVD drive in the VM session. When the Autoplay window appears, click Run Setup.EXE.
32. The installer should consider steps 1 and 2 to be complete (they appear grayed out). Click the link to Step 3: Choose Exchange Language Option.
33. Click Install only languages from the DVD.
34. Click the link to Step 4: Install Microsoft Exchange Server.
35. To go past the introduction screen, click Next.
36. Accept the license agreement, and click Next.
37. Select No for error reporting, and click Next.
38. Select Typical Exchange Server Installation, and click Next.
39. Leave the organization name at default (First Organization), and click Next.
40. At the question about client computers running Outlook 2003 or Entourage, select Yes, and click Next.
41. To accept defaults for Configure Client Access server external domain, click Next.
42. At the Customer Experience Improvement Program screen, select I don't wish to join the program at this time, and click Next.
43. If a warning about a lack of SMTP appears after the check finishes, ignore it for now. We address this issue in steps 42-52 below.
44. Click Install to start the installation process.

45. Once the installation has completed, click Finish. Exchange should automatically open the Exchange Management Console.
46. If Exchange does not automatically open the Exchange Management Console, click Start→All Programs→Microsoft Exchange Server 2010→Exchange Management Console.
47. In the left pane, expand Microsoft Exchange On-Premises, expand Organization Configuration, and select Hub Transport.
48. In the Actions pane on the far right, select New Send Connector.
49. Name the send connector SMTP, select the intended use as Internet, and click Next.
50. In the Address space window, click Add.
51. In the SMTP Address Space window, type * as the address, ensure that the installer has checked Include all subdomains, and click OK.
52. Click Next.
53. On the Network settings page select Use domain name system (DNS) “MX” records to route mail automatically and click Next.
54. Accept the defaults in the Source Server window and click Next.
55. At the New Connector page, click New to create the connector.
56. Click Finish to close the New SMTP Send Connector wizard.

In order to receive external email, you will need to contact your Internet Service Provider (ISP) or DNS provider to register the MX record associated with your email server’s external IP address. You will also need to establish routes in your Firewall to direct all SMTP traffic to your Exchange Server 2010 IP address.

Installing SharePoint Server 2010 on VM #3

1. Insert the installation DVD, and capture the DVD drive in the VM session.

2. Launch setup.exe, and click Install software prerequisites.
3. At the Welcome to the Microsoft SharePoint 2010 Products Preparation Tool screen, click Next.
4. Accept the EULA, and click Next.
5. When the prerequisites finish installing, click Finish.
6. On the main SharePoint installation menu, click Install SharePoint Server.
7. Enter your product license key, and click Continue.
8. Accept the EULA, and click Continue.
9. Choose the Stand-Alone server type, and click Install.
10. When the installation finishes, check the box for Run the SharePoint Products Configuration Wizard now, and click Close.
11. On the Welcome to SharePoint Products screen, click Next.
12. On the pop-up warning about services that will need to be restarted during the configuration, click Yes.
13. When the wizard has completed the configuration, click Finish.

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