

Dell™ PowerEdge™ Systems
Dell | Microsoft® SQL Server 2005
Standard Edition with SP2 Database
on Microsoft® Windows Server®
2003 R2 Standard Edition or
Enterprise Edition with SP2
Deployment Guide Version 1.1

Notes and Notices



NOTE: A NOTE indicates important information that helps you make better use of your computer.



NOTICE: A NOTICE indicates either potential damage to hardware or loss of data and tells you how to avoid the problem.

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This document provides information for installing and configuring the Microsoft® SQL Server™ 2005 Standard Edition with SP2 software following Dell's recommended configurations for SQL Server 2005.

The following topics are covered:

- Software and hardware requirements
- Installing and configuring Microsoft® Windows Server® 2003 R2 Edition with SP2
- Configuring networking and storage for SQL Server 2005 database
- Configuring MSCS Clustering for SQL Server 2005
- Installing SQL Server 2005 and software updates
- Additional information
- Troubleshooting


For more information on Dell's supported configurations for SQL Server 2005, see the Dell|SQL Server solutions website at dell.com/sql.

If you purchased the SQL Server 2005 Deployment Service, your Dell Professional Services representative will assist you with the following:

- Verifying hardware and software configurations
- Configuring networking and storage
- Installing SQL Server 2005 Standard Edition
- Installing SQL Server 2005 Service Pack 2

Software and Hardware Requirements

For a list of the minimum supported hardware and software components for this solution, please refer to the Solution Deliverable List (SDL) document on dell.com/sql.

 **NOTE:** Depending on the number of users, the application you use, your batch processes, and other factors, you may need a system that exceeds the minimum hardware requirements in order to achieve your desired performance. For initial sizing information, please refer to the following link: dell.com/sql.

License Agreements

 **NOTE:** If you do not have a SQL Server 2005 software license, contact your Dell sales representative.

Important Documentation


For more information on specific hardware components, see the documentation that came with your system.

Installing and Configuring the Operating System

This section provides information about installing and configuring the Windows Server 2003 R2 Standard or Enterprise Edition with SP2 operating system for SQL Server 2005 deployment. This Deployment Guide requires a companion Dell Database Resource CD to complete the installation on EMC Fibre Channel Storage. Please download the Dell Database Resource CD from dell.com/sql.


Using the Dell™ PowerEdge™ Installation and Server Management Media to Perform a Clean Installation of the Operating System

Use the *Dell PowerEdge Installation and Server Management* CD that shipped along with your server to ensure that all the supported drivers for the Windows operating system are installed.

 **NOTE:** If you purchased a Dell system without an operating system, Dell strongly recommends that you use the supported version of the Dell PowerEdge Installation and Server Management media to guide you through the operating system installation. The Dell PowerEdge Service and Diagnostic Utilities media contains the latest drivers available at the time you purchased your Dell system. See the Dell Support website at support.dell.com/support/downloads for any updated drivers that were not included on your Dell PowerEdge Service and Diagnostic Utilities media. The *Dell Database Resource* CD contains software drivers such as EMC Fibre Channel and NIC Teaming that are not included in the Operating System base drivers. Download the *Dell Resource* CD from dell.com/sql.

 **NOTE:** To update base drivers, use the Dell PowerEdge Service and Diagnostic Utilities media.


The Dell PowerEdge Installation and Server Management media guides you through the operating system installation procedure and installs the Dell-specific device drivers that are not on the operating system media.

 **NOTICE:** During the installation procedure, all data is erased from your hard drive. Dell recommends that you back up your data before you perform this procedure.


Installing Microsoft Windows Server 2003 R2, Standard or Enterprise Edition with SP2 Using the Dell PowerEdge Installation and Server Management CD

- 1 Connect a keyboard, mouse, and monitor to your system.
- 2 Turn on your system.
- 3 Insert the *Dell PowerEdge Installation and Server Management* CD into the CD drive.
- 4 Press <Ctrl><Alt><Delete> to restart your system.
- 5 If you are not using the *Dell PowerEdge Installation and Server Management* CD for the first time, the **Welcome to Dell OpenManage™ Server Assistant** window appears. Go to step 7.
- 6 If you are using the *Dell PowerEdge Installation and Server Management* CD on your system for the first time, perform the following steps:
 - a When prompted, click the appropriate language for your system.


The Dell Software License Agreement window appears.

 **NOTE:** Read the information carefully.

- b If you agree with all of the information, click **Accept** to continue.
- c If you do not agree with all the information, click **Decline**.

 **NOTE:** When you click **Decline**, your system will restart and you will not be able to complete the operating system installation.

- 7 Click **Server OS Installation** for Server Setup to install the operating system.
The **Set the Date and Time** window appears.
- 8 Select the appropriate date, time, and time zone; then, click **Continue**.
The **Operating System to Install** window appears.
- 9 Select **Microsoft Windows Server 2003 x86 Edition Service Pack 2**.
- 10 Click **OK**, and then click **Continue**.
- 11 To set up a new boot partition, select the appropriate file system and size for your partition and click **Continue**.

 **NOTICE:** If there is an existing partition on the hard drive, the **Confirm to delete partition** window appears. Click **Continue**. Server Assistant deletes all existing partitions on the hard drive.


 **NOTE:** For maximum system security, Dell recommends selecting **NTFS File System**.


The **Network Adapter(s)** configuration window appears.

- 12 Select one of the following options and click **Continue**:
 - a Obtain IP address from DHCP server.
 - b Specify an IP address

The **Enter Configuration Information Edition** window appears.

- 13 Type your system information in the appropriate fields and click **Continue**.

 **NOTE:** By default, the **Open Manage Server Assistant (OMSA)** check box is selected. This property will prompt for the OMSA CD that came with your system and install it automatically during the OS install.

 **NOTE:** If you are not using the media provided by Dell, enter the Windows Product Key at this stage.

The **Operating System Installation Summary** window appears.


- 14 If the configuration settings are correct, click **Continue**.

The **Microsoft Windows Installation Wizard** window appears. The file copy process starts.

- 15 If the configuration settings are not correct, perform the following steps:
 - a Click **Back** until the appropriate screen appears.
 - b Enter the correct information.
 - c Click **Continue** until the **Microsoft Windows Installation Wizard** window appears.


- 16 When prompted, insert the *Microsoft Windows Server 2003 R2 Standard Edition with SP2 Disk 1* or *Microsoft Windows Server 2003 R2 Enterprise Edition with SP2 Disk 1* CD into the CD drive.

The Dell OpenManage Server Assistant automatically detects the CD and begins copying the operating system files.

 **NOTE:** This procedure may take several minutes to complete.

17 When prompted, remove the CD from the CD drive, and click **Finish**.


Your system automatically restarts, Windows Setup appears in text mode, and the installation continues.

 **NOTE:** If **Console Redirection** is enabled in the System Setup program, you are prompted for an administrator password in the text mode of Windows Setup. Enter an administrator password and press **Enter** to continue. The **Emergency Management System** window appears. Click **OK** to continue.

Windows Setup automatically restarts your system, and the **Windows Setup** window appears. Windows Setup completes the installation and restarts your system.

18 In the **Log On** window, type your administrator password, and click **OK**.

The system prompts you to insert the *Microsoft Windows Server 2003 SP2 Disk 2 CD*.


 **NOTE:** If you want to install the optional R2 components, click **OK** and then see the "Installing the R2 Components" on page 8 to complete the installation.

19 Click **Cancel** to proceed with the operating system installation without installing the optional R2 components.

The **Windows Setup** dialog box appears with directions on how to continue with the second CD install at a later time.

20 Click **OK**.

The **Windows Server Post-Setup Security Updates** window appears.

 **NOTE:** At this time, your Windows firewall is disabled. Dell recommends that you update your system with the latest critical security updates and configure **Automatic Updates** before you click **Finish**.

21 Click **Finish**.

22 Click **Yes** to close the window.

The **Manage Your Server** window appears.

The operating system is now installed on your system. If you need additional information to complete the rest of the installation, see the documentation that came with your software or go to the Microsoft Support website at www.support.microsoft.com.

Installing the R2 Components

Perform the steps below to install the optional R2 components:


1 Insert the *Windows Server 2003 R2 Disk 2 CD* into the CD drive, and then click **OK**.

The **Welcome to the Windows Server 2003 R2 Setup Wizard** window appears.

2 Click **Next**.

The **End-User License Agreement** window appears.

3 If you agree with the information, accept the license terms and click **Next**.

 **NOTE:** If you do not agree with the information in the End-User License Agreement, click **Cancel**. Installation of the optional R2 components will terminate.

The **Setup Summary** window appears.


4 Click **Next**.


The **Completing Windows Server 2003 R2 Setup** window is displayed.

5 Click **Finish**.

The following is a list of optional R2 components available on the *Windows Server 2003 R2 Disk 2 CD*:

- Active Directory Application Mode
- Active Directory Federation Services
- Identity Management for UNIX
- Distributed File System
- File Server Management
- File Server Resource Manager
- Hardware Management
- Print Management Component
- Storage Manager for SANs
- Microsoft .NET Framework 2.0
- Common Log File System
- Microsoft Services for NFS
- Subsystem for UNIX-based Application
- Windows SharePoint Services

 **NOTE:** For more information on the R2 components, go to www.microsoft.com/WindowsServer2003/R2/default.aspx.

 **NOTE:** If you are installing the Hardware Management component on a recently released Dell system, a message appears containing information about third-party IPMI drivers. For more information on this message, see the document *Important Information for Windows Server 2003*.

Installing Specific R2 Components on Your System (optional)

Perform the steps below to install a specific R2 component on your system:

- 1** Log on as an administrator and click **Start**→**Settings**→**Control Panel**, and then double-click on **Add or Remove Programs**.
- 2** Click on **Add/Remove Windows Components**.

The **Windows Components Wizard** window appears.


- 3 Select the R2 components you want to install, and follow the prompts on the screen to complete the installation.

Installing Internet Information Services (IIS) using the *Windows Server 2003 SP2CD*

This section is only required if you want to install Internet Information Server (IIS) on the same system with SQL Server 2005. The IIS server is required for advanced SQL Server 2005 features such as Reporting and Analysis Services. For SQL installation requirements, see www.msdn2.microsoft.com/en-us/library/ms143506.aspx.

Configuring Networking for SQL Server 2005

This section provides information about configuring the network interface for connecting to the public network.


 **NOTE:** The node requires a unique public IP address. The public IP address should be registered with DNS. If a DNS server is not available, then the IP address must be registered in the hosts file in the node.

For a single server running SQL Server 2005, it is recommended that at least two network interfaces are used, and that the interfaces be teamed to provide additional redundancy for the database server.

For a SQL Server 2005 cluster, each node must contain at least two network interfaces: one for the cluster interconnect (heartbeat), and one for client connections (public). It is recommended that a third interface be added, which allows network interface teaming to be employed on the public network. NIC Teaming is not supported on the heartbeat network.

Configuring NIC Teaming for Your Public Network Adapters

The network teaming drivers and utilities must be installed before completing these steps. These items can be installed from the Dell Database Resource CD.

 **NOTE:** TCP Offload Engine (TOE) functionality for TOE-capable NICs is not supported in this solution.


- 1 Identify the two network adapters that will be used for NIC teaming.
- 2 Connect an Ethernet cable from each selected network adapter to the public network switch.
- 3 If you have Broadcom NICs, go to step 4. If you have Intel NICs on node 1, configure NIC teaming by performing the following steps:
 - a Right-click **My Computer** and select **Manage**.
 - b In the **Computer Management** window, click **Device Manager**.
 - c Expand **Network adapters**.
 - d Right-click the Intel NIC, which is identified for NIC teaming and click **Properties**.
 - e The **Properties** window appears.
 - f Click on the **Teaming** tab.
 - g Select **Team with other Adapters** and click **New Team**.

- h** Specify a name (for example, `Public`) for the NIC team and click **Next**.
 - i** In the **Select the Adapters to include in this Team** box, select the remaining network adapters you identified for NIC teaming and click **Next**.
 - j** From the **Select a team Mode** list, select **Adaptive Load Balancing** and click **Next**.
 - k** Click **Finish** to complete the teaming.
 - l** The **Team: Properties** window displays.
 - m** Click **OK**.
 - n** Click **OK** to close the **Properties** window.
- 4** If you have Broadcom NICs, configure NIC teaming by performing the following steps.
- a** On the Windows desktop, click **Start** and select **Program→Broadcom→Broadcom Advanced Control Suite 2**.
The **Broadcom Advanced Control Suite 2** window appears.
 - b** Click **Tools** and select **Create a Team**.
The **Broadcom Teaming Wizard** window appears.
 - c** Click **Next**.
 - d** In the **Enter the name for the team** field, specify a name (for example, `Public`) and click **Next**.
 - e** In the **Team type** area, select **Smart Load Balancing (TM) and Failover (SLB)** and click **Next**.
 - f** In the **Available Adapters** box, select the network adapters you identified for NIC teaming and add them to the **Team Members** box.
 - g** Click **Next**.
 - h** Select **Do not Configure a Standby Member** and click **Next**.
 - i** When prompted to **Configure LiveLink** select **No** and click **Next**.
 - j** In the **Creating/Modifying a VLAN** window, select **No** and click **Next**.
 - k** In the last window, select **Preview changes in Broadcom Advanced Control Suite 2** and click **Finish**.
 - l** In the **Broadcom Advanced Control Suite 2** window, select **Apply**.
A message appears cautioning that the network connection will be temporarily interrupted.
 - m** Click **Yes** to proceed.
 - n** In the **IP Address Setting Reminder** window, click **OK**.
 - o** In the **Broadcom Advanced Control Suite 2** window, click **OK**.

Configuring the IP Addresses for Your Public Network Adapters

Use the following procedure to configure the IP addresses for the public network adapters.

The network adapter status displays in the system tray after you perform the procedures in this section.

- 1 Update the adapter's network interface name, if required. Otherwise, go to step 2.
 - a Click **Start** and navigate to **Settings** → **Control Panel** → **Network Connections**.
 - b In the **Network Connections** window, right-click the public network adapter you want to rename, and select **Rename**.
 - c Rename the public adapter name to `Public` and press <Enter>.
 - 2 Configure the IP addresses by doing the following:
 - a Navigate to **Start** → **Settings** → **Control Panel** → **Network Connections** and then right-click the public adapter that you configured in step 3 or step 4 of the "Configuring NIC Teaming for Your Public Network Adapters" on page 10 and select **Properties**.
A **Properties** window displays.
 - b Double-click **Internet Protocol (TCP/IP)** in the list displayed under **This connection uses the following items**.
 - c Click **Use the following IP address**.
 - d Enter the following information and then click **OK**.
 - IP address
 - Subnet mask
 - Default gateway address
 - DNS server IP address
 - e In the **Public Properties** window, select **Show icon in notification area when connected**.
 - f Click **OK**.
 - g Close the **Network Connections** window.
 - 3 Add the public IP address and the host name to the following file:
`%SystemRoot%\system32\drivers\etc\hosts`.
-  **NOTE:** Add the public IP address to the hosts file only if it is not registered with DNS.
- 4 Ensure that the node can communicate with the public network.
 - 5 Open a command prompt window.
 - 6 Verify that the network adapter responds to the following ping commands.
 - a At the command prompt, type:
`ping <public_host_name>`
where <public_host_name> is the host name

b At the command prompt, type:

```
ping <network_gateway>
```

where <network_gateway> is the IP address of the network gateway.

If the node's network adapter does not respond to ping commands, check your network configuration and then repeat this step.

Configuring the IP Addresses for Your Private Network Adapters

If you are installing a SQL Server 2005 cluster, each node will require a static IP address for the private (heartbeat) network. These addresses must be on the same subnet, which must be different than that used for the public network. For more information, refer to the Dell PowerEdge Cluster Information and Troubleshooting Guide on support.dell.com.

Use the following procedure to configure the IP addresses for the private network adapters.

The network adapter status displays in the system tray after you perform the procedures in this section.

- 1** Update the adapter's network interface name, if required. Otherwise, go to step 2.
 - a** Click **Start** and navigate to **Settings** → **Control Panel** → **Network Connections**.
 - b** In the **Network Connections** window, right-click the public network adapter you want to rename, and select **Rename**.
 - c** Rename the public adapter name to **Private** and press <Enter>.
- 2** Configure the IP addresses by doing the following:
 - a** Navigate to **Start** → **Settings** → **Control Panel** → **Network Connections** and then right-click the private adapter that you configured in step 3 or step 4 of the "Configuring NIC Teaming for Your Public Network Adapters" on page 10 and select **Properties**.

A **Properties** window displays.
 - b** Double-click **Internet Protocol (TCP/IP)** in the list displayed under **This connection uses the following items**.
 - c** Click **Use the following IP address**.
 - d** Enter the following information and then click **OK**.
 - IP address
 - Subnet mask
 - Default gateway address
 - DNS server IP address
 - e** In the **Private Properties** window, select **Show icon in notification area when connected**.
 - f** Click **OK**.
 - g** Close the **Network Connections** window.

- 3 Add the public IP address and the host name file:

```
%SystemRoot%\System32\drivers\etc\hosts
```



NOTE: Add the private IP address to the hosts file only if it is not registered with DNS.

- 4 Ensure that the node can communicate with the public network.
- 5 Open a command prompt window.
- 6 Verify that the network adapter responds to the following ping commands.

- a At the command prompt, type:

```
ping <public_host_name>
```

where <public_host_name> is the host name

- b At the command prompt, type:

```
ping <network_gateway>
```

where <network_gateway> is the IP address of the network gateway.

If the node's network adapter does not respond to ping commands, check your network configuration and then repeat this step.

Configure Network Interface for Maximizing Data Throughput

- 1 Click **Start**, point to **Settings**, and then click **Control Panel**.
- 2 In the **Control Panel**, double-click **Network Connections**, and then double-click on the virtual adapter created in step 3 or step 4 of the "Configuring NIC Teaming for Your Public Network Adapters" on page 10.
- 3 On the **General** tab, click **Properties**, select **File and Printer Sharing Microsoft Networks**, and then click **Properties**.
- 4 Click **Maximize data throughput for network applications** option on the **Server Optimization** tab.

Configuring External Storage for SQL Server 2005

Hardware Overview for Standalone SAS

The Dell Solution for Microsoft SQL Server 2005 offers support for the Dell™ PowerVault™ MD3000 SAS storage array and the Dell|EMC CX3-series Fibre Channel storage arrays. Either type of array can be configured in a direct-attached configuration with an SQL Server running on either a single server or a cluster. The Dell|EMC CX3-series arrays may also be configured in a Fibre Channel Storage Area Network (SAN).

Figure 1-1 and Table 1-1 illustrate the required server connections for a Direct-Attached SAS storage.

Figure 1-1. Hardware Connections in a Dell Solution for SQL Server 2005

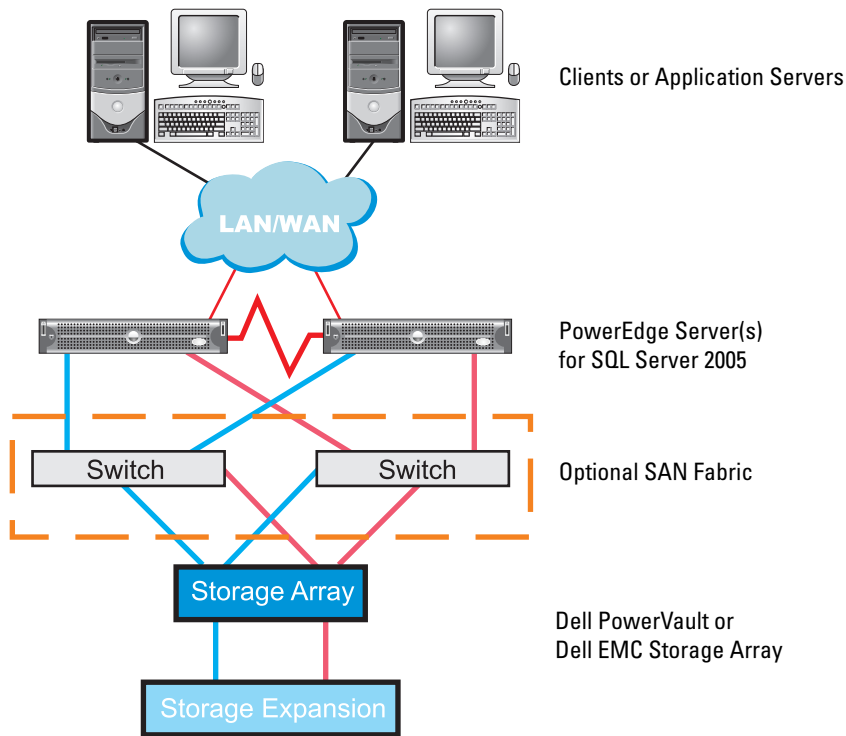


Table 1-1. Hardware Interconnections for a Direct-attached SAS Storage

Component	Connections
Each PowerEdge Server	One CAT5e/6 cable from the NIC to the public local area network (LAN). If clustered, one CAT5e/6 cable from an additional NIC to the private (heartbeat) local area network (LAN). If available, one CAT5e/6 cable from an additional NIC to the public local area network (LAN).
Each Storage Array	One CAT5e/6 from each storage controller or storage processor for array management. Redundant Connections (SAS or FC) between the storage array and the PowerEdge server(s). See "Cabling the Storage Systems" on page 16 for more information.

Cabling the Storage Systems

This section provides information for connecting your cluster to a storage system.

Storage management can be either in-band through the SAS connection, or out-of-band using an Ethernet connection. For out-of-band storage management, cable the Ethernet ports on the storage array to the public network.

NOTE: Dell recommends that you configure your Dell PowerVault MD3000 to use both in-band and out-of-band management paths. Establishing all management connections to a RAID enclosure provides additional paths in the case of a management connection failure.

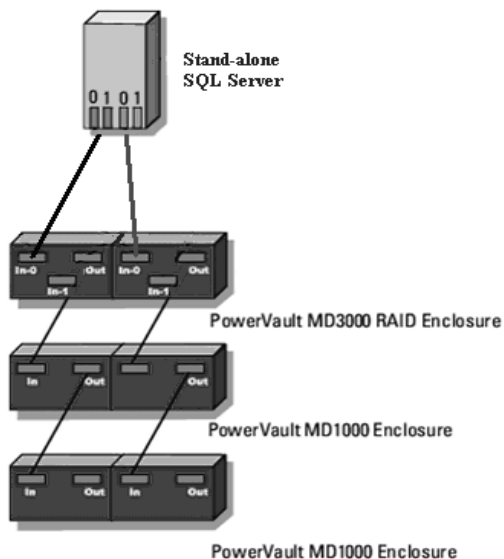
Cabling the Standalone Server in Redundant Configuration With Dual SAS 5/E HBAs

Each server attaches to the storage system using one SAS 5/E HBA and two SAS cables. In this configuration, there are redundant storage paths from the server to the storage system. If a component fails in the storage path such as the port, the cable, or the storage controller, the multi-path software automatically reroutes the I/O requests to the alternate path so that the storage array continues to operate without interruption.

To cable the server:

- 1 Install a SAS cable from the server HBA 1 port 0 to the RAID controller module 0 port In 0.
- 2 Install a SAS cable from the server HBA 2 port 0 to the RAID controller module 1 port In 0.

Figure 1-2. Redundant Configuration With Dual SAS 5/E HBA



Cabling the Cluster in Redundant Configuration With Single SAS 5/E HBAs

Each cluster node attaches to the storage system using one SAS 5/E HBA and two SAS cables. In this configuration, there are redundant storage paths from the cluster node to the storage system. If a component fails in the storage path such as the port, the cable, or the storage controller, the multi-path software automatically reroutes the I/O requests to the alternate path so that the storage array continues to operate without interruption.

To cable the cluster:

- 1 Connect cluster node 1 to the storage system.
 - a Install a SAS cable from the cluster node 1 HBA port 0 to the RAID controller module 0 port In 0.
 - b Install a SAS cable from the cluster node 1 HBA port 1 to the RAID controller module 1 port In 0.
- 2 Connect cluster node 2 to the storage system.
 - a Install a SAS cable from the cluster node 2 HBA port 0 to the RAID controller module 0 port In 0.
 - b Install a SAS cable from the cluster node 2 HBA port 1 to the RAID controller module 1 port In 0.


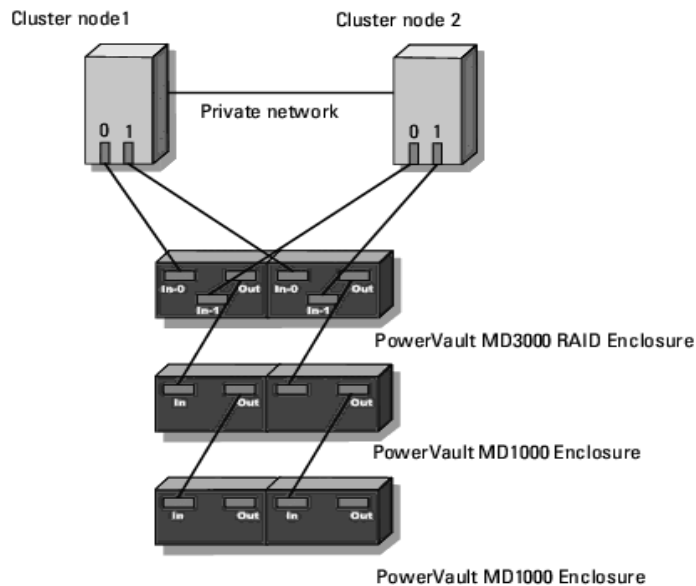
 **NOTE:** If the HBA on the primary server fails, MSCS moves the cluster group to the other server and accesses the data through the other server.

Figure 1-3. Redundant Cluster Configuration With Single SAS 5/E HBA



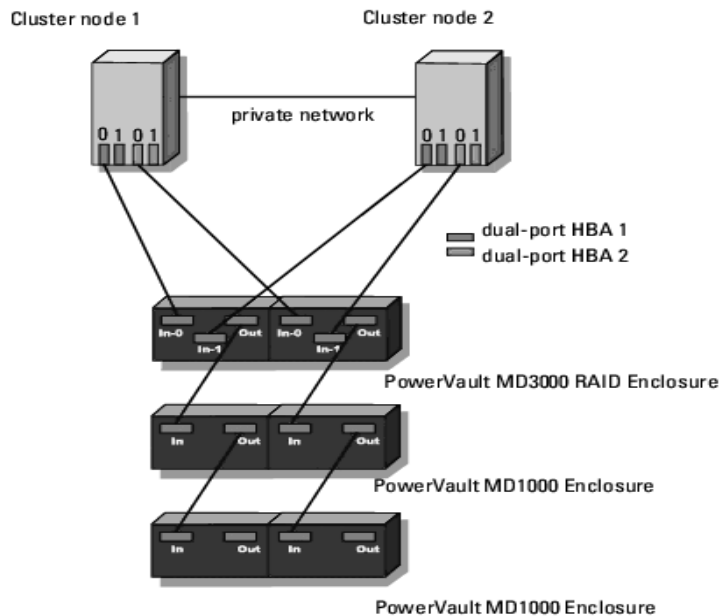
Cabling the Cluster in Redundant Configuration With Dual SAS 5/E HBAs

Each cluster node attaches to the storage system using two SAS 5/E HBAs and two SAS cables. In this configuration, there are redundant storage paths from the cluster node to the storage system. If a component fails in the storage path such as the HBA, the cable, or the storage controller, the multi-path software automatically reroutes the I/O requests to the alternate path so that the storage array continues to operate without interruption.

To cable the cluster:

- 1 Connect cluster node 1 to the storage system.
 - a Install a SAS cable from the cluster node 1 HBA 1 port 0 to the RAID controller module 0 port In-0.
 - b Install a SAS cable from the cluster node 1 HBA 2 port 0 to the RAID controller module 1 port In-0.
- 2 Connect cluster node 2 to the storage system.
 - a Install a SAS cable from the cluster node 2 HBA 1 port 0 to the RAID controller module 0 port In-1.
 - b Install a SAS cable from the cluster node 2 HBA 2 port 0 to the RAID controller module 1 port In-1.

Figure 1-4. Redundant Cluster Configuration With Dual HBAs



Cabling the Dell|EMC Fibre Channel Storage Systems

This section provides information for connecting your standalone server and cluster server to a storage system in a direct-attached or in a SAN-attached configuration.

Cabling configuration in a Direct-Attached environment

A direct-attached configuration consists of redundant Fibre Channel host bus adapter (HBA) ports cabled directly to a Dell|EMC storage system. Direct-attached configurations are self-contained and do not share any physical resources with other server or storage systems.

Cabling a Stand-alone Server

A server attaches to the storage system using two fiber optic cables with duplex local connector (LC) multimode connectors that attach to the HBA ports in the server and the storage processor (SP) ports in the Dell|EMC storage system. These connectors consist of two individual fiber optic connectors with indexed tabs that must be aligned properly into the HBA ports and SP ports.



NOTICE: Do not remove the connector covers until you are ready to insert the connectors into the HBA port, SP port, or tape library port.



NOTE: The connections listed in this section are representative of one proven method of ensuring redundancy in the connections between the server and the storage system. Other methods that achieve the same type of redundant connectivity may be acceptable.

To cable, do the following steps:

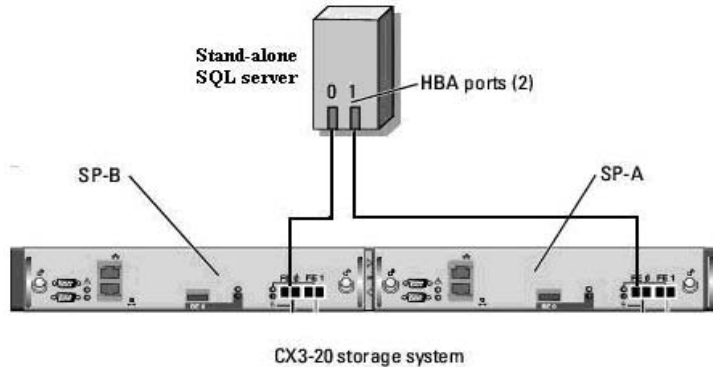
- 1 Install a cable from a server HBA port 0 to SP-A port FE 0.
- 2 Install a cable from a server HBA port 1 to SP-B port FE 0.

Figure 1-5 and Figure 1-6 illustrate methods of cabling a server direct-attached to a CX3-20 and CX3-40 storage system, respectively.



NOTE: The cables are connected to the storage processor ports in sequential order for illustrative purposes. While the available ports in your storage system may vary, HBA port 0 and HBA port 1 must be connected to SP-A and SP-B, respectively.

Figure 1-5. Cabling the Server Direct-attached to a CX3-20 Storage System Using two Single Port FC HBAs.



Cabling the Cluster Servers

Each cluster node attaches to the storage system using two fiber optic cables with duplex local connector (LC) multimode connectors that attach to the HBA ports in the cluster nodes and the storage processor (SP) ports in the Dell|EMC storage system. These connectors consist of two individual fiber optic connectors with indexed tabs that must be aligned properly into the HBA ports and SP ports.

NOTICE: Do not remove the connector covers until you are ready to insert the connectors into the HBA port, SP port, or tape library port.

NOTE: The connections listed in this section are representative of one proven method of ensuring redundancy in the connections between the cluster nodes and the storage system. Other methods that achieve the same type of redundant connectivity may be acceptable.

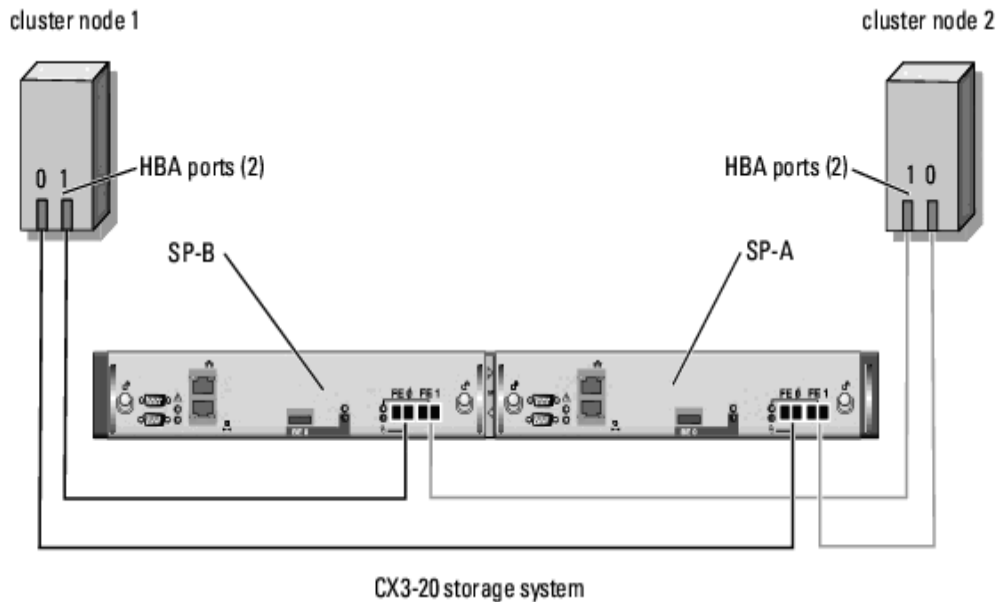
To cable the cluster:

- 1 Connect cluster node 1 to the storage system.
 - a Install a cable from cluster node 1 HBA port 0 to SP-A port FE 0.
 - b Install a cable from cluster node 1 HBA port 1 to SP-B port FE 0.
- 2 Connect cluster node 2 to the storage system.
 - a Install a cable from cluster node 2 HBA port 0 to SP-A port FE 1.
 - b Install a cable from cluster node 2 HBA port 1 to SP-B port FE 1.

Figure 1-5 and Figure 1-6 illustrate methods of cabling a two-node direct-attached cluster to a CX3-20 and CX3-40 storage system, respectively.

NOTE: The cables are connected to the storage processor ports in sequential order for illustrative purposes. While the available ports in your storage system may vary, HBA port 0 and HBA port 1 must be connected to SP-A and SP-B, respectively.

Figure 1-6. Cabling the Cluster Nodes Direct-attached to a CX3-20 Storage System



Cabling Configurations in a SAN-Attached Environment

A SAN-attached cluster is a cluster configuration where all standalone servers or cluster nodes are attached to a single storage system or to multiple storage systems through a SAN using a redundant switch fabric.

SAN-attached cluster configurations provide more flexibility and more performance and are more expandable than direct-attached configurations.

NOTE: The connections listed in this section are representative of one proven method of ensuring redundancy in the connections between the cluster nodes and the storage system. Other methods that achieve the same type of redundant connectivity may be acceptable.

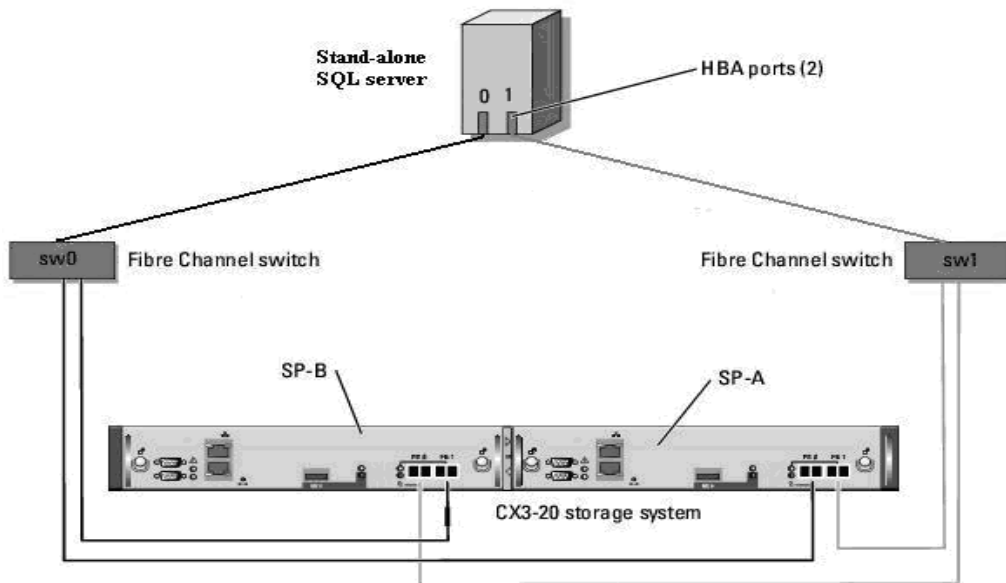
The Stand-alone servers and cluster nodes attach to the storage system using a redundant switch fabric and fiber optic cables with duplex LC multimode connectors.

The switches, the HBA ports in the cluster nodes, and the SP ports in the storage system use duplex LC multimode connectors. The connectors consist of two individual fiber optic connectors with indexed tabs that must be inserted and aligned properly in the small form-factor pluggable (SFP) module connectors on the Fibre Channel switches and the connectors on the cluster nodes and storage systems. Each HBA port is cabled to a port on a Fibre Channel switch. One to four cables connect from the outgoing ports on a switch to a storage processor on a Dell|EMC storage system.

Cabling a Stand-alone Server

- 1 Connect a standalone server to the SAN
 - a Connect a cable from HBA port 0 to Fibre Channel switch 0 (sw0).
 - b Connect a cable from HBA port 1 to Fibre Channel switch 1 (sw1).
- 2 Connect the storage system to the SAN.
 - a Connect a cable from Fibre Channel switch 0 (sw0) to SP-A port FE 0.
 - b Connect a cable from Fibre Channel switch 0 (sw0) to SP-B port FE 1.
 - c Connect a cable from Fibre Channel switch 1 (sw1) to SP-A port FE 1.
 - d Connect a cable from Fibre Channel switch 1 (sw1) to SP-B port FE 0.

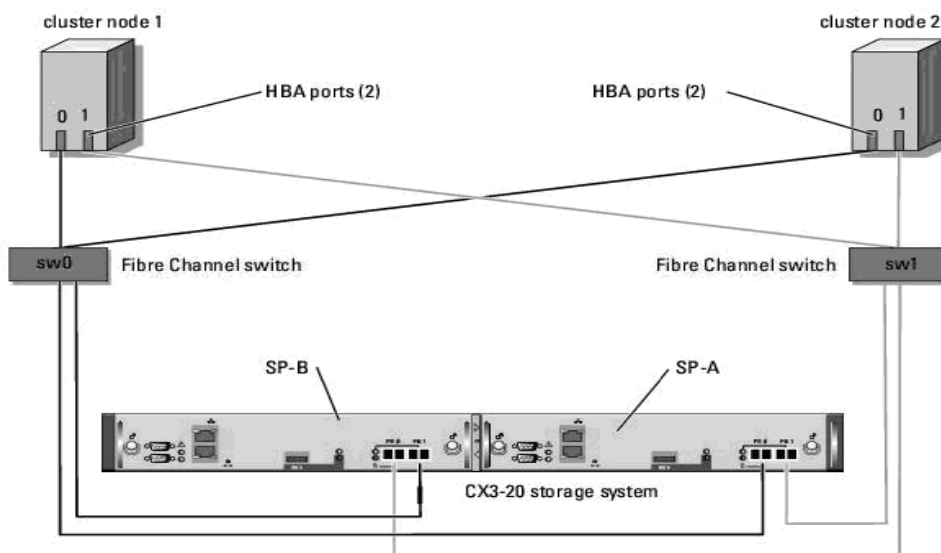
Figure 1-7. Cabling a Stand-alone Server to the Dell|EMC CX3-20 SPE



Cabling the Cluster Servers

- 1 Connect cluster node 1 to the SAN.
 - a Connect a cable from HBA port 0 to Fibre Channel switch 0 (sw0).
 - b Connect a cable from HBA port 1 to Fibre Channel switch 1 (sw1).
- 2 Repeat step 1 for each node.
- 3 Connect the storage system to the SAN.
 - a Connect a cable from Fibre Channel switch 0 (sw0) to SP-A port FE 0.
 - b Connect a cable from Fibre Channel switch 0 (sw0) to SP-B port FE 1.
 - c Connect a cable from Fibre Channel switch 1 (sw1) to SP-A port FE 1.
 - d Connect a cable from Fibre Channel switch 1 (sw1) to SP-B port FE 0.

Figure 1-8. Cabling a SAN-Attached Cluster to the CX3-20 SPE



Setting Up Your Storage Array

Once your nodes have access to the storage array, careful consideration is required to achieve the best performance. Several factors can affect performance; for example, workload, user connections, physical server configurations, and size of database. For more information, please visit dell.com/sql.

Below are some basic recommendations to deploy your system for testing purposes. Depending on your application requirements, these settings may not apply. Please consult with your Dell account representative for additional services.

Table 1-2 and Table 1-3 show a simple layout for a two physical processor system.

Table 1-2. Storage LUN Layout

Storage Processor	Virtual Disks
SPA	TEMPDB, DATA2, QUORUM
SPB	DATA1, LOGS

Table 1-3. Storage Layout Example

Disk Number	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14
Storage Layout Assignments	LUN1 — Quorum	LUN2 — TEMPDB 1+1 RAID 1/0 SPA	LUN3 — LOGS 2+2 RAID 1/0 SPB			LUN4 — DATA1 2+2 RAID 1/0 SPB			LUN5 — DATA2 2+2 RAID 1/0 SPB			HotSpare			



 **NOTE:** For more Storage Best practices, please refer to the Reference Architecture document on dell.com/sql. Storage must be configured with a minimum of three virtual disks created and assigned to the node.

Table 1-4. LUN/Virtual Disk Configuration and Sizes

LUN/Virtual Disk	Minimum Size	Number of Partitions	Used For
Assign as many virtual disks to the database as the number of processors in the node. NOTE: For best performance it is recommended to assign as many virtual disks to the database as the number of processors in the node. For example, if the node has two processors, assign two virtual disks to the database.	Database size / n For example, if there are two LUNs/virtual disks, each LUN/virtual disk will be the size of the database divided by two.	1	Database
1 LUN/virtual disk	Depending on required temp database size	1	Temp database
1 LUN/virtual disk	10% of database size	1	Log file
NOTE: This is required for clustering only.			
1 LUN/virtual disk	1 GB	1	Quorum disk

 **NOTE:** Applications utilizing SQL Server as a back end may have specific requirements dictated by the design characteristics of the application and are beyond the scope of this Deployment Guide. For application-specific guidelines and recommendations as they relate to physical and logical database layout, please contact your application provider.

Installing the Host-Based Software Needed for Storage

Follow the documentation accompanying the storage device to install the appropriate host-based storage software, drivers for storage controller, and multi-path driver software for your storage array. Please refer to the Solution Deliverables List (SDL) for the latest versions.

Preparing the Disks for Installing the SQL Server 2005 Database

- 1 Open a Windows command prompt.
- 2 Type the following at the Windows command prompt:

```
diskpart
```


- 3 Type the following at the DISKPART prompt:

```
list disk
```

- 4 Type the following at the DISKPART prompt:

```
select disk <n>
```

where <n> is the disk number corresponding to the virtual disks assigned to the host which needs to be partitioned.

 **NOTE:** EMC recommends aligning the partition at 64. The EMC CX3 default stripe size is 64KB, and the Dell PowerVault default stripe size is 128KB.

- 5 Type the following at the DISKPART prompt:

```
create partition primary align=128
```
- 6 Repeat step 3 through step 5 for all other external disks identified in Table 1-4.
- 7 Close the window for the command prompt.
- 8 Use the following procedure to assign a drive letter to all external disks.
 - a Right-click **My Computer** and select **Manage**.
 - b In the **Computer Management** window expand **Storage** and click on **Disk Management**.
 - c In the **Disk Management** window, right-click the partition area and select **Change Drive Letter and Paths**.
 - d Click **Add**.
 - e Click **Assign the following drive letter** and select an appropriate drive letter from the drop-down menu.
 - f Click **OK**.

- 9 Use the following procedure to format all external disks to NTFS.
 - a In the **Disk Management** window, right-click the partition area and choose **Format**.
 - b Enter volume label (optional) in the **Volume label** field.
 - c Choose **NTFS** in the **File system** pull down menu.
 - d Choose **64K** in the **Allocation unit size** pull-down menu.
 - e Click **OK**.
 - f Click **OK** when the format warning message displays.
 - g Close the **Computer Management** window.

Verifying Hardware and Software Configurations

Before you begin database server setup, ensure that the hardware installation, network interfaces, and the node software are configured correctly.

Configuring MSCS Clustering for SQL Server 2005

When MSCS is installed properly, the service starts on each node and responds automatically in the event that one of the nodes fails or goes offline. To provide application failover for the cluster, the MSCS software must be installed on each cluster node.

Verifying Cluster Readiness

To ensure that your server and storage systems are ready for MSCS installation, ensure that these systems are functioning correctly and verify the following:

- All cluster servers are able to log on to the same domain.
- The shared disks are partitioned and formatted, and the same drive letters that reference logical drives on the shared storage system are used on each node.
- All IP addresses and network names for each cluster node are communicating with each other and the public network.

Configuring Microsoft Cluster Service (MSCS) With Windows Server 2003

The following procedure is performed on Node 1.



NOTE: It is recommended to shut down Node 2 prior to configuring the cluster. Shutting down Node 2 assures that the cluster disks are protected and assigned to the cluster correctly.

To create a new cluster on Node 1:

- 1 Click the **Start** button, select **Programs**→**Administrative Tools**→**Cluster Administrator**.
- 2 From the **File** menu select **Open Connection**.

- 3 In the **Action** box of **Open Connection to Cluster** window, select **Create new cluster**.
The **New Server Cluster Wizard** window appears.
- 4 Click **Next** to continue.
- 5 Follow the procedures in the wizard, and then click **Finish**.
- 6 Add the additional node(s) to the cluster.
 - a Turn on the remaining node(s).
 - b Click the **Start** button, select **Programs**→ **Administrative Tools**, and then double-click **Cluster**.
 - c Click **Administrator**.
 - d From the **File** menu, select **Open Connection**.
 - e In the **Action** box of the **Open Connection to Cluster** window, select **Add nodes to cluster**.
 - f In the **Cluster** or **Server name** box, type the name of the cluster or click **Browse** to select an available cluster from the list, and then click **OK**.

The **Add Nodes Wizard** window appears.

If the **Add Nodes Wizard** does not generate a cluster feasibility error, go to step g.

If the **Add Nodes Wizard** generates a cluster feasibility error, go to the next section, "Adding Cluster Nodes Using the Advanced Configuration Option."

- g Click **Next** to continue.
- h Follow the procedures in the wizard and click **Finish**.

Adding Cluster Nodes Using the Advanced Configuration Option




NOTE: If you are adding additional nodes to the cluster using the **Add Nodes** wizard and the nodes are not configured with identical internal storage devices, the wizard may generate one or more errors while checking cluster feasibility in the **Analyzing Configuration** menu. If this situation occurs, select the **Advanced Configuration** option in the **Add Nodes** wizard to add the nodes to the cluster.


To add the nodes using the **Advanced Configuration Option**:

- 1 From the **File** menu in **Cluster Administrator** window, select **Open Connection**.
- 2 In the **Action** box of the **Open Connection to Cluster** window, select **Add nodes to cluster** and then click **OK**.
The **Add Nodes Wizard** window appears.
- 3 Click **Next**.
- 4 In the **Select Computers** menu, click **Browse**.
- 5 In the **Enter the object names to select** (examples), type the names of one to seven systems to add to the cluster, with each system name separated by a semicolon.
- 6 Click **Check Names**.

The **Add Nodes Wizard** verifies and underlines each valid system name.

- 7 Click **OK**.
 - 8 In the **Select Computers** menu, click **Add**.
 - 9 In the **Advanced Configuration Options** window, click **Advanced (minimum) configuration**, and click **OK**.
 - 10 In the **Add Nodes** window, click **Next**.
-  **NOTE:** In the **Analyzing Configuration** menu, **Cluster Administrator** analyzes the cluster configuration. If **Cluster Administrator** discovers a problem with the cluster configuration, a warning icon appears in the **Checking Cluster Feasibility** window. Click the plus ("+") sign to review any warnings, if needed.
- 11 Click **Next** to continue.
 - 12 In the **Password** field of the **Cluster Service Account** menu, type the password for the account used to run the Cluster Service, and click **Next**.
 - 13 The **Proposed Cluster Configuration** menu appears with a summary and the configuration settings for your cluster.
 - 14 Click **Next** to continue.

The new systems (hosts) are added to the cluster. When completed, **Tasks completed** appears in the **Adding Nodes to the Cluster** menu.

 **NOTE:** This process may take several minutes to complete.

- 15 Click **Next** to continue.
- 16 In the **Completing the Add Nodes Wizard** window, click **Finish**.

Verifying MSCS Operation

After you install MSCS, verify that the service is operating properly.

To verify that the MSCS service is operating properly:

- 1 Click the **Start** button and select **Programs**→**Administrative Tools**, and then select **Services**.
- 2 In the **Services** window, verify the following:
 - In the **Name** column, **Cluster Service** appears.
 - In the **Status** column, **Cluster Service** is set to **Started**.
 - In the **Startup Type** column, **Cluster Service** is set to **Automatic**.

Creating a Cluster Resource Group for SQL Server 2005

When you create the cluster, MSCS will create a Cluster Group for management, and will create an additional group for each shared disk that is detected during cluster initialization. Because SQL Server uses multiple disks, it is recommended to modify the default configuration.

Follow these steps to create a resource group for SQL Server 2005 that contains all of the data, log, and tempdb disks that will be used by the clustered SQL Server instance:

- 1 Right-click one of the groups and rename to SQL Server.
- 2 Identify the disks that should be in the SQL Server Group from the other additional groups, and move each additional disk by clicking and dragging to the SQL Server Group.

The goal is to have all available SQL disks on one Resource Group.

Installing SQL Server 2005 Database

Pre-Install Preparation



NOTE: Using multiple files is a best practice. The names provided below are just examples.

- 1 Create <n> folders on each of the external disks assigned to the database where <n> is equal to the number of cores in the processor. For example, if the processor is dual core, then create two folders on each of the external disks.
- 2 Name each of the folders that you created in step 10 using the following naming convention:

MSS_DATA_<number>

where <number> is a number that increments for each folder. For example, MSS_DATA_1 and MSS_DATA_2 and so on.

The following is an example file system layout for the database for a node with two dual core processors:

E:\(MSS_DATA_1), (MSS_DATA_2)

F:\(MSS_DATA_3), (MSS_DATA_4)

- 3 Create two folders on the external disk assigned to the log. Name the folders as follows:

MSS_LOG1

TEMPDB_LOG1


- 4 Create a folder on the external disk assigned for the tempdb database and name it as follows:

TEMPDB_DATA_1

Configuring a Windows Account to Enable Instant File Initialization

To enable instant file initialization for data or tempdb files in SQL Server 2005, you must run the SQL Server 2005 service account under a Windows account and assign the Windows SE_MANAGE_VOLUME_NAME permission to that Windows account.


- 1 Log into the SQL Server 2005 using an account that has administrative privileges.
- 2 Click **Start**, point to **Settings**, and then click **Control Panel**.

- 3 In the **Control Panel** window, double-click **Administrative Tools**.
 - 4 In the **Administrative Tools** window, double-click **Local Security Settings**.
 - 5 In **Local Security Settings** window, expand **Security Settings**, and then expand **Local Policies**.
 - 6 Select the **User Rights Assignment** folder.
The policies will be displayed in the details pane.
 - 7 In the pane, double-click **Perform Volume Maintenance Tasks**.
 - 8 On the **Local Security Setting** tab, click **Add**.
 - 9 In the **Select Users or Groups** dialog box, add the Windows account that will be used to run the SQL Server process (sqlservr.exe).
-  **NOTE:** By default, SQL Server 2005 runs under the Local System account.
- 10 Click **OK**.
 - 11 Click **OK** to close the **Perform Volume Maintenance Tasks** window.
 - 12 Reboot the node.

Installing the SQL Server 2005 Database Software


This section provides information about installing the SQL Server 2005 software. The following topics are covered:

- Installing SQL Server 2005 Database
- Installing Service Pack 2 for SQL Server 2005

 **NOTE:** For local installations, you must run setup as an administrator. If you install from a network share, you must use a domain account that has read and execute permissions on the network share.

- 1 Insert the *SQL Server 2005* install media into your CD or DVD drive. The install program should launch automatically. If it does not launch, then do the following to launch the install:
 - a Click **Start** and select **Run**.
 - b In the **Run** window, type the following and click **OK**.
`%DVD Drive%\splash.hta`
 - c If installing from a network share, navigate to the network folder and launch `splash.hta` by clicking on it.
- 2 Select **Server components, Tools, Books Online, Samples**.
- 3 On the **End User License Agreement** page, read the license agreement, and then select the check box to accept the licensing terms and conditions. Click **Next** to continue.
- 4 The **Installing Prerequisites** page displays the components required for SQL Server 2005. To install these components, click **Install**.
- 5 Click **Next** after the components are installed.
- 6 On the **Welcome to the Microsoft SQL Server Installation Wizard** page, click **Next**.

- 7 On the **System Configuration Check** page, the system is scanned for conditions that may block setup. Make sure all the requirements are met successfully. To proceed with setup after the scan completes, click **Next**.
- 8 On the **Registration Information** page, enter information in the **Name** and **Company** text boxes, enter your 25-character product key and click **Next**.
- 9 On the **Components to Install** page, select the components for your installation. The following selections provide the minimum installation of SQL Server 2005 on a single node. Other selections may be optionally installed once the minimum requirement is complete.
 - **SQL Server Database Services**
 - In case of cluster, select **Create a SQL Server failover cluster**.

 **NOTE:** For more information about Reporting Services, Analysis Services, Notification Services and Integrations Services, refer to the SQL Server 2005 Books Online or to www.microsoft.com/sql.

Click **Next** when you have completed your selections.

- 10 On the **Instance Name** page, select an instance for your installation.
 - If this is a new installation select **Default instance**.
 - If a default or named instance is already installed, click **Named Instance** and then type a unique instance name in the space provided.


 **NOTE:** Always use **Named Instance** for cluster installations.

- Click **Next**.

If this is a non-cluster configuration go to step 16.

- 11 On cluster configuration type a Virtual server name on the **Virtual Server Name** page, Click **NEXT**.
- 12 On the **Virtual Server Configuration** page, specify Public network and an available IP address, Click **Add** to add the public IP address, then click **Next**.
- 13 Select the SQL Server resource group that was previously created in the "Creating a Cluster Resource Group for SQL Server 2005" on page 28.


Enter the **Data Files** location. This location determines where the master database files will be installed. A location on a shared disk that is part of the SQL Server Cluster Resource Group should be selected to ensure that the database can failover between nodes.

 **NOTE:** Unavailable cluster groups will show any group that already has a SQL Server instance. Only one instance can be installed per Cluster Group.

- 14 In the **Cluster Node Configuration** page, verify that the failover node appears under **Selected Nodes**. Click **Next**.
- 15 On the **Remote Account Information** page, type in the password of the domain account that has permission rights to run the SQL instance on all cluster nodes.

16 On the **Service Account** page, select **Use the built-in System account**.

To use a domain user account, select **Use a domain user account** and enter the username, password and domain name.

 **NOTE:** The domain name cannot be a fully qualified Domain Name System (DNS) name. For example, if your DNS name is domain-name.com, use **domain-name** in the **Domain** field. SQL Server 2005 does not accept **domain-name.com** in the **Domain** field.


To specify an individual account for each service, select **Customize for each service account**. Select a service name from the drop-down box, and then provide login credentials for the service.

17 Click **Next**.

18 On the **Domain Groups for Clustered Services** page, enter the DomainName\GroupName that you have set up in domain under the **SQL Server** box.

- a** Enter the DomainName\GroupName that you have set up in domain under the **SQL Server Agent** box
- b** Enter the DomainName\GroupName that you have set up in domain under the **Full-Text Search** box.
- c** Click **Next**.

19 On the **Authentication Mode** page, choose the authentication mode to use for your SQL Server 2005 installation and click **Next**.

 **NOTE:** Enter and confirm the password for the system administrator (sa) login account when you choose **Mixed Mode Authentication**. Do not set a blank password for the sa login account.

20 On the **Collation Settings** page, click **Next**.

www.msdn2.microsoft.com/en-us/library/ms144260.aspx.

21 If you selected **Reporting Services** as a feature to install, the **Report Server Installation Options** page is displayed. Do one of the following:

- Select the radio button to configure the report server with default values.
- For a custom configuration, choose the **Install but do not configure the server** installation option.

22 Click **Next**.

23 On the **Error and Usage Report Settings** page, click **Next**.

24 On the **Ready to Install** page, review the summary of features and components for your SQL Server 2005 installation and click **Install**.


25 If prompted, insert *SQL Server 2005 CD 2*.

26 Click **OK**.

27 On the **Setup** progress page, click **Next**.


28 On the **Completing the Microsoft SQL Server Installation Wizard** page, click **Finish**.

- 29 If you are instructed to restart the computer, do so now. Be sure to *read* the message from the Setup program when you complete the installation.


 **NOTE:** Failure to restart the computer may cause failures when you run the Setup program in the future.

Installing Service Pack 2 for the SQL Server 2005 Database

- 1 Close all applications before proceeding.
- 2 Right-click **My Computer** and select **Manage**.
- 3 Expand **Services and Applications**.
- 4 Select **Services**.
- 5 In the **Services** window, stop all SQL Server services:
 - a Right-click the services that begin with **SQL Server** and that have a status of **Started**
 - b Select **Stop**.


 **NOTE:** If you are installing SQL SP2 on a cluster setup, stop the **Cluster Service**.

- 6 Insert the *SQL Server 2005 SP2* CD into the CD drive.
- 7 Double-click the **SQL Server 2005 SP2** executable to start the install.
- 8 In the **Welcome** page, click **Next**.
- 9 In the **End User License Agreement** page, read the license agreement; select the check box to accept the License Terms agreement and click **Next**.
- 10 In the **Feature Selection** page, accept the defaults and click **Next**.
- 11 In the **Authentication** page, select the authentication mode you selected for SQL Server 2005 during the installation and click **Next**.

 **NOTE:** If you select the SQL Server Authentication mode, enter the sa password you entered in step 19 of "Installing the SQL Server 2005 Database Software" on page 30. In case of cluster, enter the domain user credentials on the **Remote User Account** page.

The **Remote User Account** page will appear if it is a cluster configuration. Type the user information that has been configured to run the cluster service.

- 12 Accept the defaults in the **Error and Usage Reporting Settings** window and click **Next**.
- 13 The **Running Processes** page lists the processes that are locking files required for the SP2 update.

 **NOTE:** If any files are listed here, then a **Reboot** is required after installing SP2.

- 14 In the **Ready to Install** page, click **Install**.
- 15 If a **Computer Reboot Required** message displays, click **OK** in the message box.
- 16 In the **Installation Process** page, click **Next**.
- 17 In the **Installation Complete** page, click **Next**.

 **NOTE:** In cluster configurations, SQL SP2 needs to be installed on each node.

18 In the **Additional Information** window, click **Finish**.

19 Reboot the computer.

Additional Information

For SQL Server 2005 database best practices, please refer to the Reference Architecture White paper on dell.com/sql.

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