

Veritas™ Cluster Server Implementation Guide for Microsoft Exchange Server 2007 with NetApp SnapMirror

Windows Server 2003 (x64)

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Veritas Cluster Server Implementation Guide for Microsoft Exchange Server 2007 with NetApp SnapMirror

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Veritas Cluster Server for NetApp SnapMirror

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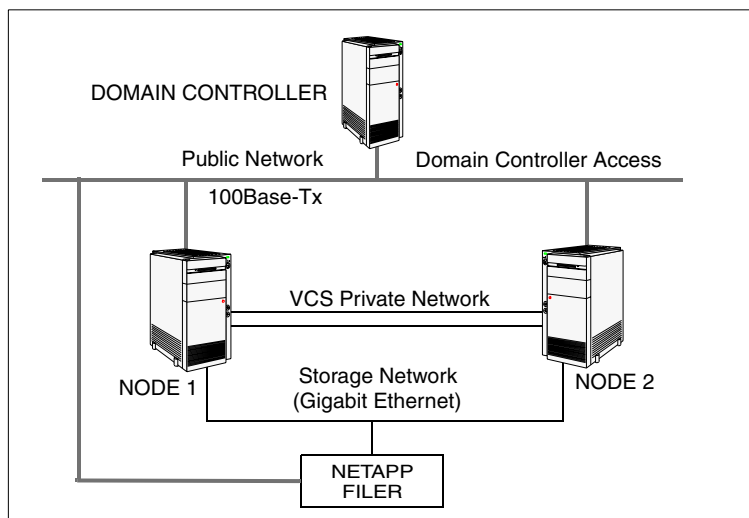
Introduction

The Veritas Cluster Server (VCS) application agent for Exchange provides high availability to Microsoft Exchange Server. The VCS application agent for Network Appliance (NetApp) SnapMirror enables configuring NetApp filers over an iSCSI or Fibre Channel (FC) connection in a VCS cluster environment. Both agents work together to provide high availability and disaster recovery to Exchange Server in environments using Network Appliance filers for shared storage. The agents also support disaster recovery configurations set up using the VCS Global Cluster Option and Network Appliance SnapMirror for data replication.

In a typical configuration, the agents are installed on each node in the cluster. The nodes are connected to the NetApp filers through a dedicated (private) storage network. VCS nodes are physically attached to the Network Appliance filer via an ethernet cable supporting iSCSI or FC as the transport protocol.

[Figure 1-1](#) on page 10 illustrates a typical VCS cluster configuration in a NetApp storage environment.

Figure 1-1 Typical VCS configuration in a NetApp storage environment



This chapter provides an overview of the agents. For more information about the agents, including their VCS resource type definitions and attribute definitions, see “[Resource type definitions](#)” on page 121.

About VCS support for Exchange Server 2007

VCS support for Exchange Server 2007 includes the following features:

- High availability for Mailbox Server role only

High availability support for Exchange Server 2007 is available for the Mailbox Server role only. While installing Exchange, ensure that you do not install any other server role on the system on which you install the Mailbox Server role. If you have already installed the Mailbox Server role along with the other server roles on the same server, you will have to remove the other server roles before configuring Exchange in a VCS environment.

- Exchange Management Shell in the virtual server context

The Exchange Management Shell provides a command-line interface that enables automation of administrative tasks for Exchange Server 2007. VCS provides a shortcut to launch the Exchange Management Shell under the context of the virtual server name.

To launch the Exchange Management Shell in the virtual server context, click **Start > Programs > Symantec > Veritas Cluster Server > Configuration Wizards**

> Application Agent for Exchange Server 2007 > Exchange Server 2007 Shell Launcher.

You must run the Exchange Management Shell under the virtual server context if you wish to administer a clustered Exchange Server 2007 using cmdlets. Ensure that the Exchange service group is online before using the Exchange Management Shell in the virtual server context.

Note: The Exchange Management Shell in the virtual server context is provided to run cmdlets for administering Exchange in a VCS cluster environment only. Do not run VCS executable files or commands in this shell.

Refer to the Exchange Server 2007 documentation for more information on server roles, the Exchange Management Shell and cmdlets.

VCS application agent for Microsoft Exchange

The VCS application agent for Microsoft Exchange monitors Exchange services in a VCS cluster, brings them online, and takes them offline.

The VCS application agent for Microsoft Exchange contains the following agent:

- Exchange Service agent—Monitors core Exchange services. The agent provides high availability for Exchange Server 2007 in a VCS cluster.

Note: High availability support for Microsoft Exchange Server 2007 is available for the Mailbox Server role only.

Exchange Service agent

The Exchange Service (ExchService2007) agent brings the following Exchange services online, monitors their status, and takes them offline:

- Microsoft Exchange AD Topology service (MSEExchangeADTopology): This service provides Active Directory topology information to the Exchange services. If this service is stopped, most Exchange services are unable to start.
- Microsoft Exchange Mail Submission (MSEExchangeMailSubmission): This service submits messages from the Mailbox Server to the Hub Transport Server.
- Microsoft Exchange System Attendant (MSEExchangeSA):

The Exchange component responsible for monitoring, maintenance and Active Directory lookup services, and ensuring that operations run smoothly.

- **Microsoft Exchange Information Store (MSEExchangeIS):**
The Exchange storage used to hold messages in users' mailboxes and in public folders.

In addition, you can also configure the agent to monitor the following optional services:

- **Microsoft Exchange Mailbox Assistants (MSEExchangeMailboxAssistants):**
This service performs background processing of mailboxes in the Exchange store.
- **Microsoft Exchange Monitoring (MSEExchangeMonitoring):**
This service allows applications to call the Exchange diagnostic cmdlets (pronounced "command-lets").
- **Microsoft Exchange Replication Service (MSEExchangeRepl):**
This service provides replication functionality for Mailbox Server role databases and is used by Local Continuous Replication (LCR) and Cluster Continuous Replication (CCR).
- **Microsoft Exchange Search Indexer (MSEExchangeSearch):**
This service performs indexing of mailbox content, which improves the performance of content search.
- **Microsoft Exchange Service Host (MSEExchangeServiceHost):**
This service provides a host for several Microsoft Exchange services.
- **Microsoft Exchange Transport Log Search (MSEExchangeTransportLogSearch):**
This service provides remote search capability for Microsoft Exchange Transport log files.
- **Microsoft Search (msftesql-Exchange):**
This service creates full-text indexes on content and properties of structured and semi-structured data to allow fast linguistic searches on the data.

Each Exchange Server service is configured as a VCS resource of type `ExchService2007`.

Agent operations

- **Online**—Starts the configured Exchange service.
- **Offline**—Stops the configured Exchange service.

- **Monitor**—Determines the state of the configured Exchange service by querying the Service Control Manager (SCM).
The agent monitors and verifies the state of all the databases that are selected for detail monitoring. The agent behavior varies depending on how the attributes are configured.
See “[Detail monitoring and agent behavior](#)” on page 126 for more information.

State definition

- **Online**—Indicates that the configured Exchange service has started.
- **Offline**—Indicates that the configured Exchange service has stopped.
- **Unknown**—Indicates that the agent is unable to determine the state of the configured Exchange service.

VCS hardware replication agent for Network Appliance

The VCS hardware replication agent for Network Appliance provides failover support and recovery, in environments employing Network Appliance filers for storage and SnapMirror for replication.

The agent monitors and manages the state of replicated filer devices and ensures that at a time only one system has safe and exclusive access to the configured devices.

The agent can be used in local clusters, single VCS replicated data clusters, and multi-cluster environments set up using the VCS Global Cluster Option.

The package contains three agents; each agent is described in subsequent sections:

- **NetAppFiler agent**—Monitors the state of the filer.
- **NetAppSnapDrive agent**—Connects and disconnects virtual disks (LUNs) using the iSCSI or FC protocol.
- **NetAppSnapMirror agent**—Determines the role of the filer volumes with respect to replication and promotes a read-only snapmirrored volume to a read-write source volume during a wide-area failover.

NetApp Filer agent

The NetApp Filer agent monitors the state of the filer device. The agent is represented by the NetAppFiler resource type in VCS. NetAppFiler resources are persistent, meaning that they are not brought online or taken offline.

Agent operation

- **Monitor**—Verifies the state of the filer attached to the host by sending an ICMP ping command to the filer. If the filer does not respond, the agent reports the state of the filer as faulted.

NetApp SnapDrive agent

The NetApp SnapDrive agent monitors, connects, and disconnects filer volumes. The agent can be configured to use the iSCSI or the FC protocol.

Agent operations

- **Online**—Connects a virtual disk (LUN) using an iSCSI or an FC initiator. The agent presents the LUN as a locally-attached drive to the host. The agent also removes LUN-host mappings made before the online operation.
- **Offline**—Disconnects the virtual disk (LUN) from the host.
- **Monitor**—Verifies that the specified virtual disk (LUN) is connected to the host.
- **Open**—Verifies that there is connectivity to the filer. It also checks that the VCS Helper service is running with the same privileges as the SnapDrive service.
- **Clean**—Attempts to forcibly disconnect a virtual disk (LUN).

NetApp SnapMirror agent

The NetApp SnapMirror agent monitors the replication state of filer devices. When a failover occurs, the agent reverses the direction of replication.

Agent operations

- **Online**—If the state of the local filer device is `SOURCE`, the agent creates a lock file to indicate that the resource can come online. This effectively makes the devices writable for the application.
If the state of the local filer is `SNAPMIRRORED`, the agent attempts to reverse the direction of replication by changing the state of the local filer to `SOURCE` and that of the original source to `SNAPMIRRORED`.
If the original source filer is down, the agent performs a mirror breakoff to enable local write access, if the filer is not already broken off.
If the original source returns to life, you must resynchronize the data manually.
- **Offline**—Removes the lock file. The agent does not perform any filer operations because an offline entry point does not necessarily indicate an intention to give up the devices.
- **Monitor**—Verifies the lock file exists. If the lock file exists, the monitor entry point reports the status of the resource as online. If the lock file does not exist, the monitor entry point reports the status of the resource as offline.
- **Open**—Removes the lock file, thereby preventing potential concurrency violation if the group fails over to another node.

Note: The agent does not remove the lock file if the agent was started after an `hastop -force` command.

- **Clean**—Removes the lock file. No filer operations are performed since offlining this resource is no indication of a pending role swap.

How the agents make Microsoft Exchange highly available

The VCS application agent for Microsoft Exchange detects an application failure if a configured Exchange service is not running or if a configured virtual server is not available. The Network Appliance agents ensure consistent data access to the node on which Exchange Server is running.

This section describes how the agents migrate Exchange Server to another node in local clusters and in global disaster recovery environments.

Local cluster configuration

When the Exchange agent detects an application or host failure, VCS attempts to fail over the Exchange service group to the next available system in the service group's SystemList.

The Network Appliance agents connects the virtual disks (LUNs) containing Exchange data to the new node. The configured Exchange services and virtual servers are started on the new node, thus ensuring continuous availability for Exchange data, including configured mailboxes.

Disaster recovery configuration

In a disaster recovery configuration, VCS first attempts to fail over the application to a node in the local cluster. If all nodes in the local cluster are unavailable, or if a disaster strikes the site, VCS attempts to fail over the application to the remote site. This involves the following steps:

- Connecting the virtual disks (LUNs) to the target hosts (using the NetAppSnapDrive agent)
- Performing a mirror break, which enables write access to the target (using the NetAppSnapMirror agent)
- Reversing the direction of replication by demoting the original source to a target, and begin replicating from the new source (using the NetAppSnapMirror agent)
- Starting the Exchange services on the remote node (using the VCS agents for Exchange Server)

See [“Managing failover in a disaster recovery environment”](#) on page 102 for more information.

Typical Exchange configurations in a VCS cluster

The VCS application agent for Microsoft Exchange supports the Active/Passive and the Any-to-Any configurations. It also supports the Disaster Recovery configuration.

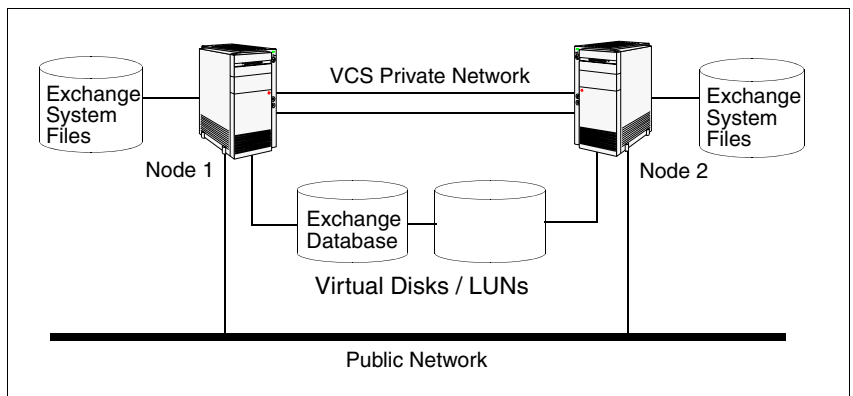
Active/Passive failover configuration

An Active/Passive setup involves one to one failover capabilities. For example, if you have two nodes (SYSTEM1 and SYSTEM2), SYSTEM1 can fail over to SYSTEM2.

In an Active/Passive configuration, one or more Exchange virtual servers can exist in a cluster, but each server must be managed by a service group configured with a distinct set of nodes in the cluster.

In a typical two-node configuration, Microsoft Exchange and VCS application agent for Microsoft Exchange are installed on both nodes. The Exchange database is on shared storage. The shared storage can be managed using the Network Appliance suite of products.

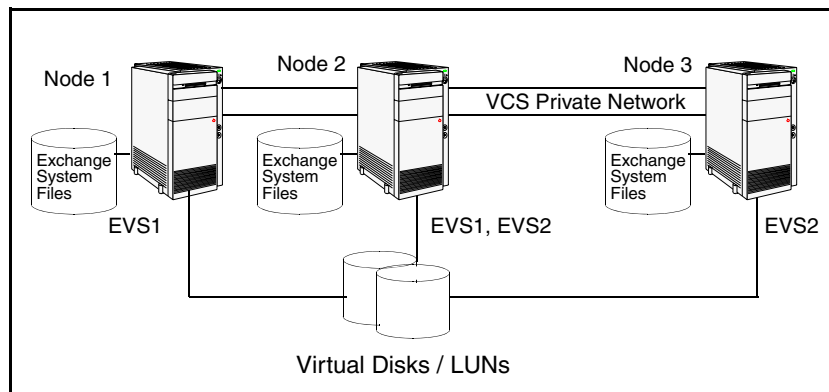
Figure 1-2 Active Passive fail over configuration



Any-to-Any failover configuration

In an Any-to-Any configuration, each Exchange virtual server in the cluster can be configured in a separate service group. Each service group can fail over to any configured node in the cluster, provided that no other Exchange virtual server is online on that node. In other words, you must ensure that an Exchange service group does not fail over to a node on which another Exchange service group is online.

Figure 1-3 Any-to-Any fail over configuration

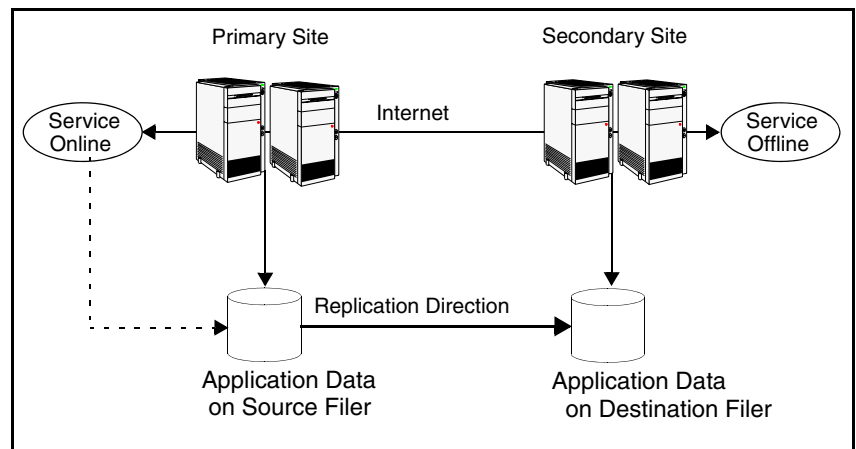


For example, consider a three-node cluster hosting two Exchange virtual servers, EVS1 and EVS2. The virtual servers are configured in VCS in two service groups such that nodes 1 and 2 host the EVS1 service group and nodes 2 and 3 host the EVS2 service group. If node 1 (or node 3) fails, the service group containing the EVS resources is failed over to node 2.

Disaster recovery configuration

A Disaster Recovery (DR) configuration enables you to restore application data and services in the event of a catastrophic failure. A typical DR solution requires primary and secondary sites, and clusters within those sites. The cluster at the primary site provides data and services during normal operation, and the cluster at the secondary site provides data and services if the primary site fails.

Figure 1-4 Disaster Recovery configuration



The illustration displays an environment that is prepared for a disaster with a DR solution. In this case, the primary site is replicating its application data to the secondary site.

When a failure occurs, such as an earthquake that destroys the data center in which the primary site resides, the DR solution is activated. The data that was replicated to the secondary site is used to restore the application services to clients.

Installing the software

This chapter describes how to install the software and presents key considerations.

Licensing

Licensing is based on the Microsoft Windows Server 2003 operating systems in use on a specific server. For each system that runs any of the Symantec products, you need a license.

Evaluation license key

An evaluation license key is embedded in the product. To use this key click Next at the license key entry screen of the product installer. This license key is valid for a limited evaluation period only.

You must purchase the product to obtain a permanent license key.

Virtual Server license policy

Each copy of the VCS for NetApp SnapMirror including all options and agents, whether used on a physical server or within a virtual machine must be separately licensed. Each Licensed Software license specifies the number of instances of the Licensed Software you may run on a particular server at one time.

License management

The product installer allows you to add and remove specific licenses. Adding a license for an option does not install the option. Use the Add/Remove function to install an option. License keys support installation on multiple systems.

Symantec License Inventory Manager

The Symantec License Inventory Manager is an enterprise asset management tracking tool. It determines all the Symantec software products and licenses being used in your network. The Symantec License Inventory Manager is available separately. To order a Symantec License Inventory Manager license and media kit, contact your Symantec sales representative.

Prerequisites

Before you install VCS for NetApp SnapMirror, verify that your configuration meets the following criteria. Refer to the Hardware Compatibility List on the Symantec Support Web site at <http://entsupport.symantec.com> to determine the approved hardware.

Supported software

- Microsoft Exchange servers and their operating systems. Note that all systems must be running the same operating system:
 - Microsoft Exchange Server 2007 Standard Edition or Enterprise Edition
with
Windows Server 2003 x64 (Standard Edition, Enterprise Edition, Datacenter Edition) (SP1 required for all editions, SP2 supported)
or
Windows Server 2003 R2 x64 (Standard Edition, Enterprise Edition, Datacenter Edition)
- Veritas Cluster Server 5.0 Release Update for NetApp SnapMirror with Veritas Cluster Server Application Agent for Microsoft Exchange
- Network Appliance Data ONTAP 7.2
- Network Appliance SnapDrive 4.1, 4.2, and 5.0
- Network Appliance SnapManager for Exchange 4.0
- Microsoft iSCSI software initiator 2.02 and 2.05
- NetApp FCP Attach Kit 3.0, Windows Host Utilities 3.0

System requirements

- Verify that all systems have adequate resources to run Exchange Server and VCS.

- Processor: x64 architecture-based computer with Intel processor that supports Intel Extended Memory 64 Technology (Intel EM64T) or AMD processor that supports the AMD64 platform; Intel Itanium family IA64 processors are not supported.
- Memory: minimum 2 GB of RAM per server.
- File format: Disk partitions must be formatted for the NTFS file system.
- Shared disks to support applications that migrate between nodes in the cluster. Campus clusters require more than one array for mirroring. Disaster recovery configurations require one array for each site.
- SCSI or Fibre Channel Host Bus Adapters (HBAs), or iSCSI Initiator supported NICs to access shared storage.
- Two NICs: one shared public and private, and one exclusively for the private network; Symantec recommends three NICs: one public and two for private network.
- All servers running the same operating system, service pack level, and system architecture.

Network requirements

- Verify the systems on which you install the software are part of a Windows 2003 domain.
- Disable the Windows Firewall on systems running Windows Server 2003 SP2.
- Static IP addresses for the following purposes:
 - One IP address per site for each Exchange Virtual Server (EVS)
 - One IP address for each physical node in the cluster
 - One IP address per cluster when configuring Notification, VCS Web Console. The same IP address can be used for all options.
- Configure name resolution for each node.
- Verify the availability of DNS Services. AD-integrated DNS or BIND 8.2 or higher are supported. Make sure a reverse lookup zone exists in the DNS. Refer to the application documentation for instructions on creating a reverse lookup zone.
- DNS scavenging affects virtual servers configured in VCS because the Lanman agent uses Dynamic DNS (DDNS) to map virtual names with IP addresses. If you use scavenging, then you must set the DNSRefreshInterval attribute for the Lanman agent. This will enable the Lanman agent to refresh the resource records on the DNS servers. See the Lanman agent

description in the *Veritas Cluster Server Bundled Agents Reference Guide* for more information.

- For a disaster recovery configuration, all sites must reside in the same Active Directory domain.

Software requirements

The following software must be installed on each node:

- Microsoft iSCSI Initiator.
- Network Appliance SnapDrive.
When installing SnapDrive, you must specify a user account in the SnapDrive Service Credentials dialog box. The user account must be a domain user and part of the Administrators group of the local system and the filer.
- Network Appliance SnapManager for Exchange.
- If you plan to use Fibre Channel (FC) for connecting the LUNs, ensure that you install the NetApp FCP Attach Kit or Windows Host Utilities on all the cluster nodes. Refer to NetApp documentation for more details.
- You must have licenses for NetApp SnapMirror and SnapRestore (for Disaster Recovery configurations).

Permission requirements

- You must be a domain user.
- You must be an Exchange Full Administrator.
- You must be a member of the Exchange Servers group.
- You must be a member of the Local Administrators group for all nodes where you are installing.
- You must have write permissions for the Active Directory objects corresponding to all the nodes.
- You must have delete permissions on the object if a computer object corresponding to the Exchange virtual server exists in the Active Directory.
- The user for the pre-installation, installation, and post-installation phases for Exchange must be the same user.
- If you plan to create a new user account for the VCS Helper service, you must have Domain Administrator privileges or belong to the Account Operators group. If you plan to use an existing user account context for the VCS Helper service, you must know the password for the user account.

- The user account for the VCS Helper service must have domain admin privileges and must be a member of the administrators group on the filers.

Additional requirements

- Installation media for all products and third-party applications
- Licenses for all products and third-party applications
- You must install the operating system in the same path on all systems. For example, if you install Windows 2003 on C:\WINDOWS of one node, installations on all other nodes must be on C:\WINDOWS. Make sure that the same drive letter is available on all nodes and that the system drive has adequate space for the installation.

Configuration requirements

- Make sure the filers reside in the same domain as the systems.
- Make sure the filers can replicate in both directions.
- Make sure that the filers are reachable; ensure that you can ping the filers using the DNS name.
- If you plan to set up a disaster recovery configuration, make sure the volumes at both sites are of the same size.
- Set up a private network for the shared storage. Assign an IP address to each adapter in the private network.
- Configure the Common Internet File System (CIFS) for each volume. See the Network Appliance documentation for instructions.
- If you plan to use Fibre Channel (FC) for connecting the LUNs, type `hba_info` on the command prompt, and verify that the FC initiators are displayed.
If FC initiators are not displayed, install the mini port driver provided by your vendor and run the command again to verify that the FC initiators are displayed.
- Ensure that the LUNs are mounted. In case of MPIO, ensure that the LUNs are mounted using the required initiators.

Note: MPIO support is available only with FC.

Installing the software using the product installer

Before installing the software on remote systems running Windows 2003, you must modify the driver signing options to ignore warning messages about software authentication.

To modify driver signing options for Windows 2003

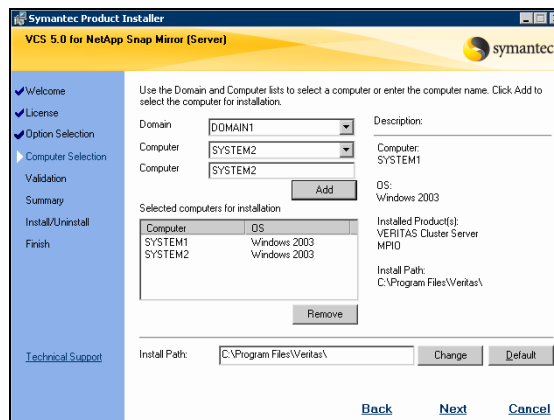
- 1 Open the Driver Signing Options dialog box by using either of the following methods:
 - From Windows Explorer, right-click **My Computer**, and click **Properties**. On the **Hardware** tab, click **Driver Signing** in the Device Manager box.
 - or
 - Open the Control Panel and double-click **System**. On the **Hardware** tab, click **Driver Signing** in the Device Manager box.
- 2 In the Driver Signing Options dialog box, check **Ignore**, and click **OK**.

The examples in the following procedure are based on a Custom/Complete installation.

To install the product using the installer

- 1 From Windows Explorer, navigate to the root directory of the VCS for Network Appliance CD and double-click **Setup.exe**.
- 2 On the product installation panel, click **VCS 5.0 for Network Appliance SnapMirror Release Update**.
- 3 Click **Complete/Custom** to install server components and optional client components. Click **Administrative Console** if you wish to install only the client components.
- 4 Review the information on the Welcome panel and click **Next**.
- 5 Read the License Agreement by using the scroll arrows in the view window. If you agree to the license terms, click **I accept the terms of the license agreement** and then click **Next**.
- 6 In the Enter a license key and click Add field, type the license key, click **Add**, and then click **Next**. The License Key Details section displays more information about the selected key. To delete a license key, select the key from the key list and click **Remove**.
- 7 On the Option Selection panel, check the following product options and click **Next**:

- **VCS 5.0 for Network Appliance SnapMirror Release Update (Server Components)**
 - **Global Clustering Option** - if you plan to configure a disaster recovery environment.
 - **High Availability Hardware Replication Agents:** Select **Veritas Cluster Server Hardware Replication Agent for NetApp**
 - **High Availability Application Agents:** Select **Veritas Cluster Server Application Agent for Exchange**
 - **VCS 5.0 for Network Appliance SnapMirror Release Update (Client Components)** - This will install the VCS Java Console on the same nodes where the server components are installed.
- 8 On the Computer Selection panel, specify the domain and nodes for the installation and click **Next**.



- | | |
|-------------------------------------|--|
| Domain | Select the domain from the drop-down list. |
| Computer | Select the computer name from the dropdown list. This may take some time to populate depending on the domain and network size, speed, and activity. Alternatively, if you know the computer name, type the name in the Computer field. |
| Add | Click Add to add the computer for installation. |
| Selected computers for installation | The Selected computers for installation section displays the list of computers that you have added for installation. To remove a computer, click a computer name and click Remove . |

Install Path The Install Path field displays the default path for installation. To specify a different installation path for a computer:

- 1 Select the computer name from the Selected computers for installation list.
- 2 Type the path in the Install Path field.
- 3 Click **Change** and then click **Yes** to confirm the changes.

To restore the default installation path for a computer:
Select the computer name from the Selected computers for installation list and then click **Default**.

- 9 After the installer validates the systems for the installation, click **Next**. If an error occurs, address the problem described in the Details box, click **Validate Again**, and click **Next**.
- 10 Review the summary information and click **Install**. If necessary, click **Back** to make changes.
- 11 If an installation is not successful on any of the systems, the status screen shows a failed installation. If the installation is successful on all systems, click **Next** after the progress indicator shows the installation is completed. If a security alert asks you to accept the Veritas driver software, click **Yes**.
- 12 Review the installation report and click **Next**.
- 13 Reboot the remote nodes:
 - Select the remote nodes on which the installation took place.
 - Click **Reboot**.
 - Click **Next**.
- 14 Click **Finish**.
- 15 Click **Yes** to reboot the local node.

To ensure a secure system environment, change the driver signing options for the remote Windows 2003 systems to the original state of **Warn** or **Block**.

Installing the software from the command line

You can perform a silent installation from the command prompt using the `Setup.exe` command. See the examples at the end of this section for reference.

To start the installation from the command window

- 1 Insert the product software disc into a drive connected to the system.
- 2 Click **Start > Run**.
- 3 Enter **cmd** in the Open field and click **OK**.
- 4 From the command window, navigate to the root directory of the product software disc.
- 5 Use the following command to install the software:

```
Setup.exe /s [INSTALL_MODE=InstallMode] [SOLUTION=Solution]  
LICENSEKEY="LicenseKey" [OPTIONS="a,b,c,..."]  
[INSTALLDIR="InstallDirPath"] [REBOOT=RebootMode]
```

Where the total length of the argument string is 512 characters.

Parameters for Setup.exe

Information about the possible parameter values follows:

<i>InstallMode</i>	Set to indicate an installation or uninstallation. 1 = To install 5 = To uninstall The default setting is 1 to install. Example: INSTALL_MODE=1
<i>Solution</i>	Set to the type of installation. 6 = VCS for Network Appliance (Server Components) 7 = VCS for Network Appliance (Client Components) The default setting is 6 for server components. Example: SOLUTION=6

Note: To install the server and matching client components, run two `Setup.exe /s` commands, one with the `SOLUTION` parameter set for the server component and the other set for the client component. If you use a script to install the server and client, consider first installing the client and then the server, so that the script can reboot the system after server installation.

<i>LicenseKey</i>	<p>Set the license key for the installation. Enter multiple keys by separating them with a comma (e.g. 123-345-567-789-123,321-543-765-789-321, etc.) The license key must start and end with a quotation mark (").</p> <p><i>LicenseKey</i> has no default setting.</p> <p>Example: LICENSEKEY=" 123-234-123-234-345"</p>
Options	<p>Set the desired options, if any. The option must start and end with a quotation mark (").</p> <p>There are no default settings.</p> <p>The options for VCS for Network Appliance are:</p> <ul style="list-style-type: none">■ ntap■ GCO■ exchange■ sql <p>Example: OPTIONS=" GCO"</p>
<i>InstallDirPath</i>	<p>Set the path of the installation directory. The path must start and end with a quotation mark (").</p> <p>The default setting is <i>SystemDrive:\Program files\Veritas</i></p> <p>Example: INSTALLDIR="C:\InstallationDirectory"</p>
<i>RebootMode</i>	<p>Setting for the automatic reboot of the system at the completion of the installation.</p> <p>0 = No reboot 1 = Reboot</p> <p>The default setting is 0 for no system reboot.</p> <p>Example: REBOOT=1</p>

Note: Reboot the system at the end of installation to ensure that the software drivers for the server component are installed correctly. You do not have to reboot after installing the client.

Example for Setup.exe: Client Installation

This command installs the client components at the specified installation path and tells the system not to reboot at the end of the installation.

```
Setup.exe /s INSTALL_MODE=1 SOLUTION=7  
INSTALLDIR="C:\InstallationDirectory"
```

Example for Setup.exe: Server Installation

This command installs the server components with a license key of 123-234-123-234-345, and with the GCO option. Determines where the installation path is C:\InstallationDirectory and tells the system to reboot at the end of the installation.

```
Setup.exe /s INSTALL_MODE=1 SOLUTION=6  
LICENSEKEY="123-234-123-234-345" OPTIONS="GCO"  
INSTALLDIR="C:\InstallationDirectory" REBOOT=1
```

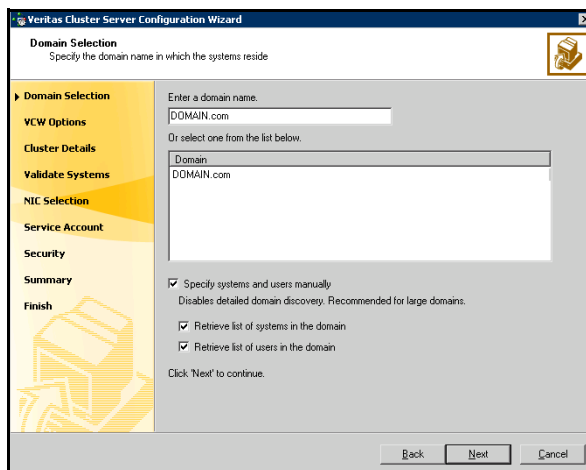
Configuring the cluster

After installing the software, set up the components required to run Veritas Cluster Server. The VCS Configuration Wizard sets up the cluster infrastructure, including LLT and GAB, and provides an option of configuring the Symantec Product Authentication Service in the cluster. The wizard also configures the ClusterService group, which contains resources for Cluster Management Console (Single Cluster Mode) also referred to as Web Console, notification, and global clusters.

- If you plan to set up a disaster recovery environment, configure the wide-area connector process for global clusters.
- When configuring a user account for the VCS Helper service, choose the administrative account set up on the filer.

To configure a VCS cluster

- 1 Start the VCS Configuration wizard. (**Start > All Programs > Symantec > Veritas Cluster Server > Configuration Wizards > Cluster Configuration Wizard**)
- 2 Read the information on the Welcome panel and click **Next**.
- 3 On the Configuration Options panel, click **Cluster Operations** and click **Next**.
- 4 On the Domain Selection panel, select or type the name of the domain in which the cluster resides and select the discovery options.



To discover information about all systems and users in the domain:

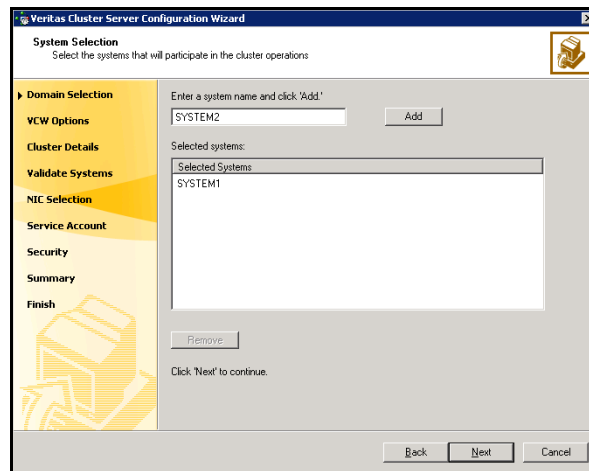
- Clear the **Specify systems and users manually** check box.
- Click **Next**.

Proceed to [step 7](#) on page 34.

To specify systems and user names manually (recommended for large domains):

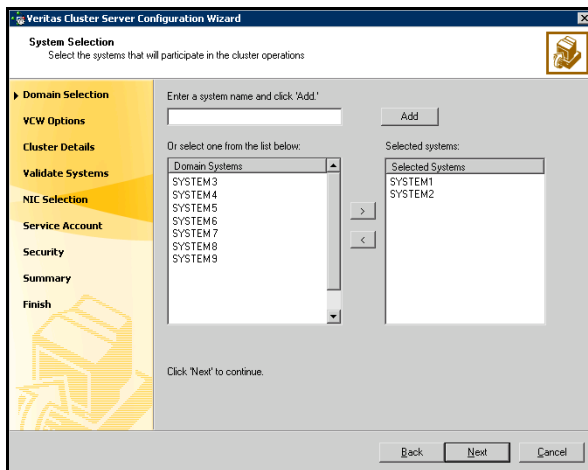
- Check the **Specify systems and users manually** check box.
Additionally, you may instruct the wizard to retrieve a list of systems and users in the domain by selecting appropriate check boxes.
- Click **Next**.
If you chose to retrieve the list of systems, proceed to [step 6](#) on page 34. Otherwise, proceed to the next step.

- 5 On the System Selection panel, type the name of each system to be added, click **Add**, and then click **Next**. Do not specify systems that are part of another cluster.



Proceed to [step 7](#) on page 34.

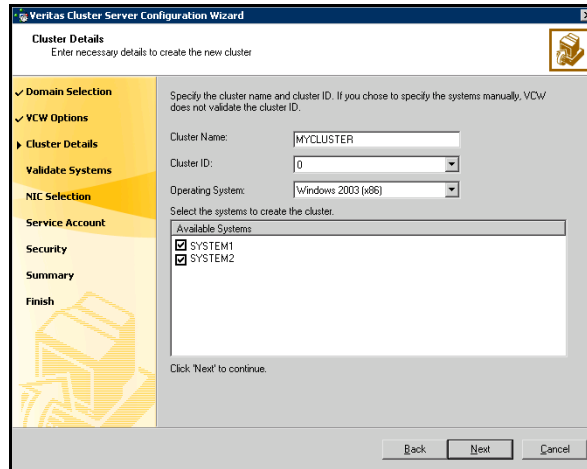
- 6 On the System Selection panel, specify the systems to form a cluster and then click **Next**. Do not select systems that are part of another cluster.



Enter the name of the system and click **Add** to add the system to the **Selected Systems** list, or click to select the system in the Domain Systems list and then click the > (right-arrow) button.

- 7 On the Cluster Configuration Options panel, click **Create New Cluster** and click **Next**.

- 8 On the Cluster Details panel, specify the details for the cluster and then click **Next**.



Cluster Name Type a name for the new cluster. Symantec recommends a maximum length of 32 characters for the cluster name.

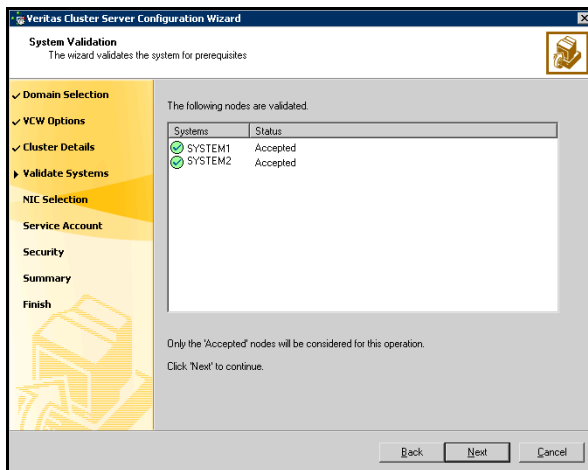
Cluster ID Select a cluster ID from the suggested cluster IDs in the drop-down list, or type a unique ID for the cluster.

Warning: If you chose to specify systems and users manually in [step 4](#) or if you share a private network between more than one domain, make sure that the cluster ID is unique.

Operating System From the drop-down list, select the operating system that the systems are running.

Available Systems Select the systems that will be part of the cluster. The wizard discovers the NICs on the selected systems. For single-node clusters with the required number of NICs, the wizard prompts you to configure a private link heartbeat. In the dialog box, click **Yes** to configure a private link heartbeat.

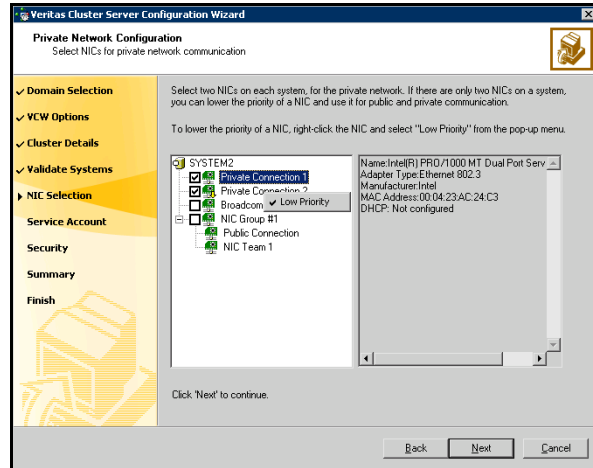
- 9 The wizard validates the selected systems for cluster membership. After the systems are validated, click **Next**.



If a system is not validated, review the message associated with the failure and restart the wizard after rectifying the problem.

If you chose to configure a private link heartbeat in [step 8](#) on page 35, proceed to the next step. Otherwise, proceed to [step 11](#) on page 37.

- 10 On the Private Network Configuration panel, configure the VCS private network and click **Next**.

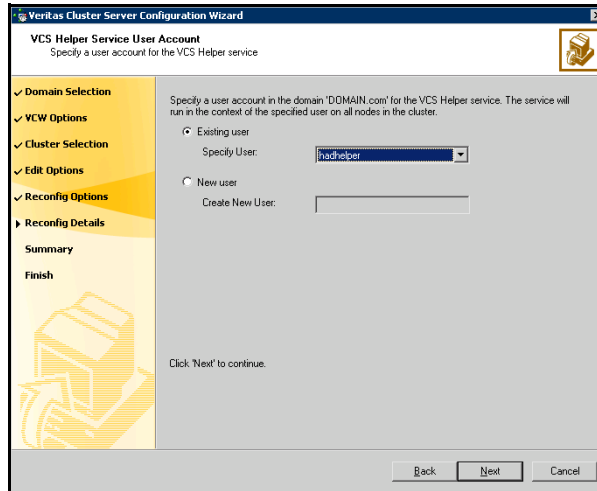


- Select the check boxes next to the two NICs to be assigned to the private network. Symantec recommends reserving two NICs exclusively for the private network. However, you could lower the priority of one NIC and use the low-priority NIC for public and private communication.
- If you have only two NICs on a selected system, make sure you lower the priority of at least one NIC for that system. To lower the priority of a NIC, right-click the NIC and select **Low Priority** from the pop-up menu.

If your configuration contains teamed NICs, the wizard groups them as "NIC Group #N" where "N" is a number assigned to the teamed NIC. A teamed NIC is a logical NIC, formed by grouping several physical NICs together. All NICs in a team have an identical MAC address. Symantec recommends that you do not select teamed NICs for the private network.

- 11 On the VCS Helper Service User Account panel, specify the name of a domain user context for the VCS Helper service. The VCS HAD, which runs in the context of the local system built-in account, uses the VCS Helper

Service user context to access the network. Do not use the Administrator account for the VCS Helper service.



- To specify an existing user, do one of the following:
 - Click **Existing user** and select a user name from the drop-down list,
 - If you chose not to retrieve the list of users in [step 4](#) on page 32, type the user name in the **Specify User** field, and then click **Next**.
- To specify a new user, click **New user** and type a valid user name in the **Create New User** field, and then click **Next**.

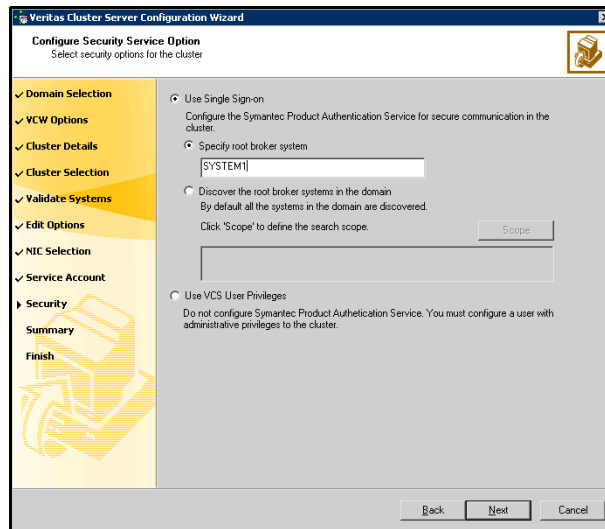
Do not append the domain name to the user name; do not type the user name as DOMAIN\user or user@DOMAIN.

- In the Password dialog box, type the password for the specified user and click **OK**, and then click **Next**.

12 On the Configure Security Service Option panel, specify security options for the cluster and then click **Next**.

Do one of the following:

- To use the single sign-on feature



- Click **Use Single Sign-on**. In this mode, VCS uses SSL encryption and platform-based authentication. The VCS engine (HAD) and Veritas Command Server run in secure mode.

For more information about secure communications in a cluster, see the *Veritas Storage Foundation and High Availability Solutions Quick Start Guide for Symantec Product Authentication Service*.

- If you know the name of the system that will serve as the root broker, click **Specify root broker system**, type the system name, and then click **Next**.

If you specify a cluster node, the wizard configures the node as the root broker and other nodes as authentication brokers. Authentication brokers reside one level below the root broker and serve as intermediate registration and certification authorities. These brokers can authenticate clients, such as users or services, but cannot authenticate other brokers. Authentication brokers have certificates signed by the root.

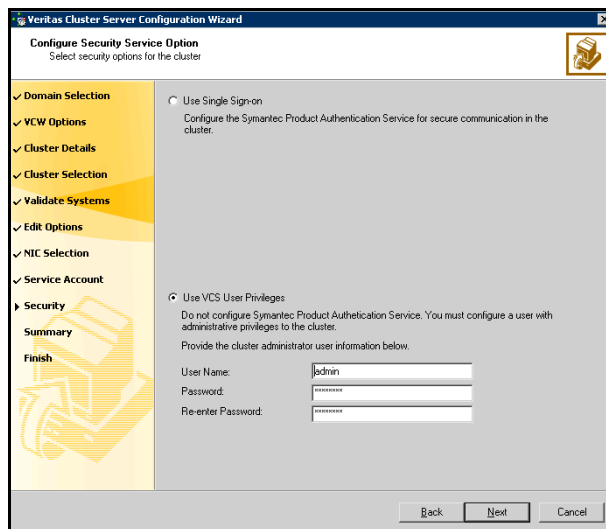
If you specify a system outside of the cluster, make sure that the system is configured as a root broker; the wizard configures all nodes in the cluster as authentication brokers.

- If you want to discover the system that will serve as root broker, click **Discover the root broker systems in the domain** and click **Next**. The wizard will discover root brokers in the entire domain, by default.

- If you want to define a search criteria, click **Scope**. In the Scope of Discovery dialog box, click **Entire Domain** to search across the domain, or click **Specify Scope** and select the Organization Unit from the Available Organizational Units list, to limit the search to the specified organization unit. Use the Filter Criteria options to search systems matching a certain condition. For example, to search for systems managed by Administrator, select **Managed by** from the first drop-down list, **is (exactly)** from the second drop-down list, type the user name **Administrator** in the adjacent field, click **Add**, and then click **OK**.
- Click **Next**. The wizard discovers and displays a list of all the root brokers. Click to select a system that will serve as the root broker and then click **Next**.

If the root broker is a cluster node, the wizard configures the other cluster nodes as authentication brokers. If the root broker is outside the cluster, the wizard configures all the cluster nodes as authentication brokers.

- To use VCS user privilege:



- Click **Use VCS User Privileges**. Accept the default user name and password for the VCS administrator account or type a new name and password.

The default user name for the VCS administrator is admin and the default password is password. Both are case-sensitive. Use this account

to log on to VCS using Cluster Management Console (Single Cluster Mode) or Web Console, when VCS is not running in secure mode.

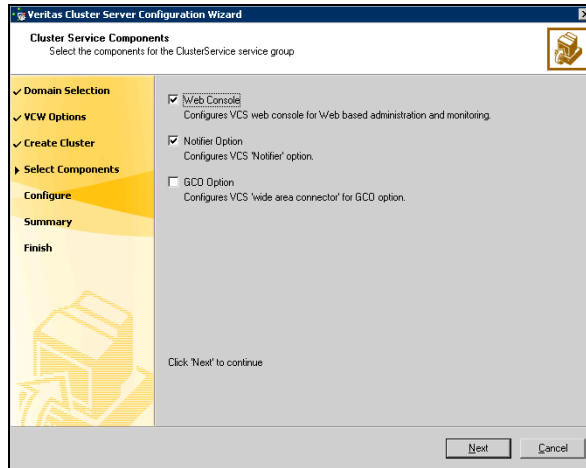
- Click **Next**.

- 13 Review the summary information on the Summary panel, and click **Configure**. The wizard configures the VCS private network. If the selected systems have LLT or GAB configuration files, the wizard displays an informational dialog box before overwriting the files. In the dialog box, click **OK** to overwrite the files. Otherwise, click **Cancel**, exit the wizard, move the existing files to a different location, and rerun the wizard. The wizard starts running commands to configure VCS services. If an operation fails, click **View configuration log file** to see the log.
- 14 On the Completing Cluster Configuration panel, click **Next** to configure the ClusterService service group; this group is required to set up components for the Cluster Management Console (Single Cluster Mode) or Web Console, notification, and for global clusters. To configure the ClusterService group later, click **Finish**. At this stage, the wizard has collected the information required to set up the cluster configuration. After the wizard completes its operations, with or without the ClusterService group components, the cluster is ready to host application service groups. The wizard also starts the VCS engine (HAD) and the Veritas Command Server at this stage.

You are not required to configure the Cluster Management Console (Single Cluster Mode) or Web Console, for this HA environment. Refer to the *Veritas Cluster Server Administrator's Guide* for complete details on VCS Cluster Management Console (Single Cluster Mode), and the Notification resource.

The GCO Option applies only if you are configuring a Disaster Recovery environment and are not using the Disaster Recovery wizard. The Disaster Recovery chapters discuss how to use the Disaster Recovery wizard to configure the GCO option.

- 15 On the Cluster Service Components panel, select the components to be configured in the ClusterService service group and click **Next**.



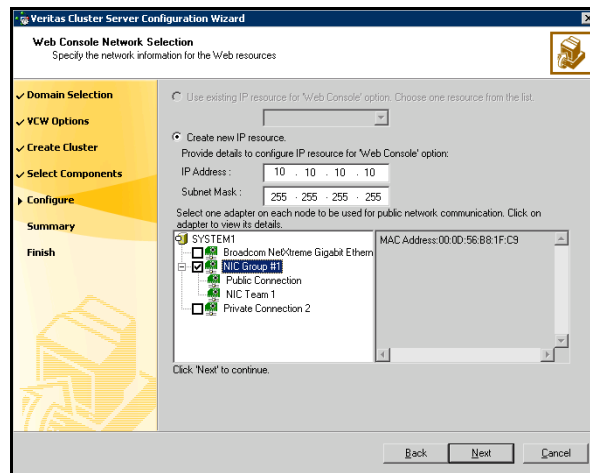
- Check the **Web Console** checkbox to configure the Cluster Management Console (Single Cluster Mode), also referred to as the Web Console.
- Check the **Notifier Option** checkbox to configure notification of important events to designated recipients.

Configuring Web console

This section describes steps to configure the VCS Cluster Management Console (Single Cluster Mode), also referred to as the Web Console.

To configure the Web console

- 1 On the Web Console Network Selection panel, specify the network information for the Web Console resources and click **Next**.



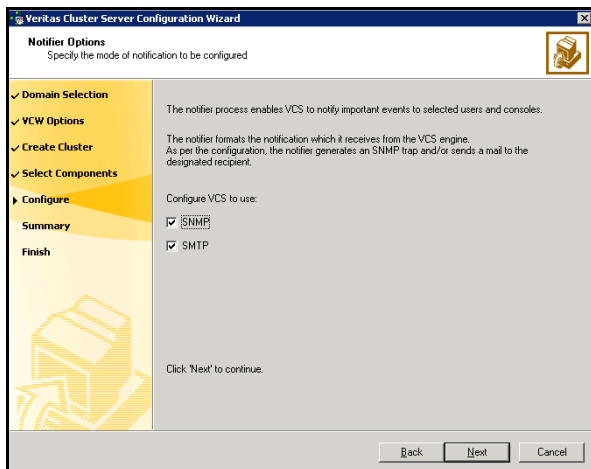
- If the cluster has a ClusterService service group configured, you can use the IP address configured in the service group or configure a new IP address for the Web console.
 - If you choose to configure a new IP address, type the IP address and associated subnet mask.
 - Select a network adapter for each node in the cluster. Note that the wizard lists the public network adapters along with the adapters that were assigned a low priority.
- 2 Review the summary information and choose whether you want to bring the Web Console resources online when VCS is started, and click **Configure**.
 - 3 If you chose to configure a Notifier resource, click Next to proceed with the configuration. Otherwise, click **Finish** to exit the wizard.

Configuring notification

This section describes steps to configure notification.

To configure notification

- 1 On the Notifier Options panel, specify the mode of notification to be configured and click **Next**.



You can configure VCS to generate SNMP (V2) traps on a designated server and/or send emails to designated recipients in response to certain events.

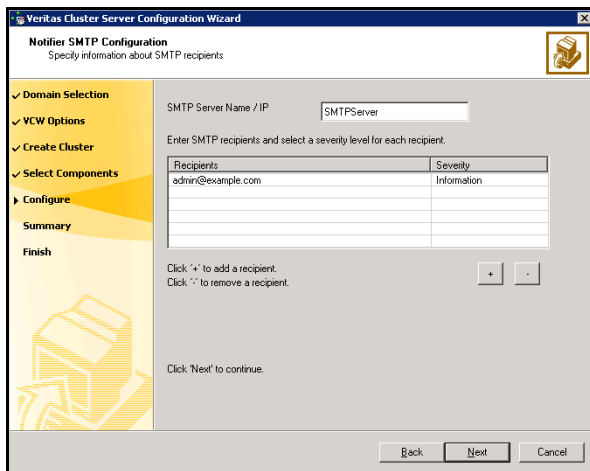
- 2 If you chose to configure SNMP, specify information about the SNMP console and click **Next**.

The screenshot shows the 'Notifier SNMP Configuration' window in the Veritas Cluster Server Configuration Wizard. The window title is 'Veritas Cluster Server Configuration Wizard' and the subtitle is 'Notifier SNMP Configuration'. Below the subtitle is the instruction 'Specify information about SNMP console'. On the left side, there is a navigation pane with the following options: 'Domain Selection', 'VCW Options', 'Create Cluster', 'Select Components', 'Configure', 'Summary', and 'Finish'. The 'Configure' option is currently selected. The main area of the window contains a table for entering SNMP console information. The table has two columns: 'SNMP Console' and 'Severity'. There are three rows in the table. The first row has 'snmpserv' in the 'SNMP Console' column and 'Information' in the 'Severity' column. The second row has 'snmpserv1' in the 'SNMP Console' column and 'SevereError' in the 'Severity' column. The third row is empty. Below the table, there are two buttons: a '+' button to add more consoles and a '-' button to remove a console. Below these buttons is a text box labeled 'Enter SNMP Trap Port' with the value '162' entered. Below the text box is a note: 'Note: SNMP console must be MIB 2.0 compliant'. Below the note is the instruction 'Click 'Next' to continue.'. At the bottom of the window, there are three buttons: 'Back', 'Next', and 'Cancel'.

SNMP Console	Severity
snmpserv	Information
snmpserv1	SevereError

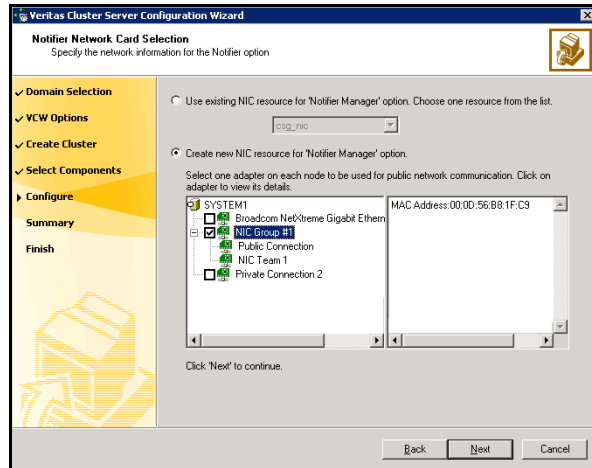
- Click a field in the SNMP Console column and type the name or IP address of the console. The specified SNMP console must be MIB 2.0 compliant.
- Click the corresponding field in the Severity column and select a severity level for the console.
- Click '+' to add a field; click '-' to remove a field.
- Enter an SNMP trap port. The default value is "162".

- 3 If you chose to configure SMTP, specify information about SMTP recipients and click **Next**.



- Type the name of the SMTP server.
- Click a field in the Recipients column and enter a recipient for notification. Enter recipients as admin@example.com.
- Click the corresponding field in the Severity column and select a severity level for the recipient. VCS sends messages of an equal or higher severity to the recipient.
- Click + to add fields; click - to remove a field.

- 4 On the Notifier Network Card Selection panel, specify the network information and click **Next**.



- If the cluster has a ClusterService service group configured, you can use the NIC resource configured in the service group or configure a new NIC resource for notification.
 - If you choose to configure a new NIC resource, select a network adapter for each node in the cluster. The wizard lists the public network adapters along with the adapters that were assigned a low priority.
- 5 Review the summary information and choose whether you want to bring the notification resources online when VCS is started.
 - 6 Click **Configure**.
 - 7 Click **Finish** to exit the wizard.

Installing Microsoft Exchange

This chapter describes how to install and configure Microsoft Exchange and its components in a VCS cluster.

Note: If you have a standalone Exchange Server setup, and you want to configure it for high availability, see [“Making a standalone Exchange server highly available”](#) on page 81 for instructions.

Overview of tasks

Installing Microsoft Exchange in a VCS cluster environment involves three major tasks, that is, pre-installation, Microsoft Exchange installation, and post-installation. The Exchange Setup Wizard for VCS performs the pre-installation and post-installation tasks.

- Meet the prerequisites for installing Microsoft Exchange.
See [“Prerequisites for installing Exchange”](#) on page 50 for more information.
- Install Microsoft Exchange on the first node.
See [“Installing Exchange on the first node”](#) on page 56 for more information.
- Move Microsoft Exchange database to a shared disk.
See [“Moving Exchange databases to shared storage”](#) on page 59 for more information.
- Install Microsoft Exchange on additional nodes.
See [“Installing Exchange on additional nodes”](#) on page 63 for more information.

Prerequisites for installing Exchange

- Verify VCS for NetApp SnapMirror is installed on the node.
- Verify you have configured a VCS cluster using VCS Configuration Wizard (VCW).
See “[Configuring the cluster](#)” on page 32 for instructions.
- Verify the DNS and Active Directory Services are available. Make sure that a reverse lookup zone is created in the DNS. Refer to Microsoft Exchange documentation for instructions on creating a reverse lookup zone.
- Symantec recommends that the Dynamic Update option for the DNS server be set to “Secure Only.”
- Verify the DNS settings for all systems on which Microsoft Exchange will be installed.
See “[Verifying DNS settings for Exchange hosts](#)” on page 51 for instructions.
- VCS Application Agent for Microsoft Exchange requires the operating system to be installed on the same local drive on all nodes. For example if you install Windows 2003 on drive C of one node, installations on all other nodes must be on their respective C drives. Make sure that the same drive letter is available on all nodes and has adequate space for the installation.
- VCS requires Microsoft Exchange to be installed on the same local drive on all nodes. For example if you install Exchange on drive C of one node, installations on all other nodes must be on their respective C drives. Make sure that the same drive letter is available on all nodes and has adequate space for the installation.
- If using iSCSI, verify that the Microsoft iSCSI Initiator is configured to establish a persistent connection between the NetApp filer and the cluster nodes. See the Microsoft documentation for instructions.
- If using FC, verify that you install the NetApp FCP Attach Kit or Windows Host Utilities on all the cluster nodes. Refer to the NetApp documentation for more information.
- Symantec recommends that you have a minimum of two LUNs (or virtual disks), one each for the following:
 - Exchange database
 - Transaction logs for the first storage group, and registry replication information.

Privileges requirements

- You must be a domain user.
- You must be an Exchange Full Administrator.
- You must be a member of the Exchange Servers group.
- You must be a member of the Local Administrators group on all nodes on which Microsoft Exchange will be installed. You must have write permissions for objects corresponding to these nodes in the Active Directory.
- You must have write permissions on the DNS server to perform DNS updates.
- Make sure the VCS Helper Service domain user account has “Add workstations to domain” privilege enabled in the Active Directory.
- If a computer object corresponding to the Exchange virtual server exists in the Active Directory, you must have Delete permissions on the object.
- The same user, or a user with the same privileges must perform the pre-installation, installation, and post-installation phases for Microsoft Exchange.

Verifying DNS settings for Exchange hosts

- 1 Open the Network Connections applet in Control Panel.
- 2 Double-click the adapter.
When enabling DNS name resolution, make sure that you use the public network adapters, and not those configured for the VCS private network.
- 3 From the Local Area Connection Status window, click **Properties**.
- 4 On the **General** tab, check the **Internet Protocol (TCP/IP)** check box and click **Properties**.
- 5 Select the **Use the following DNS server addresses** option.
- 6 Verify that the correct values for the DNS server’s IP address and domain name are entered.
- 7 Click **Advanced**.
- 8 On the **DNS** tab, make sure the **Register this connection’s address in DNS** check box is selected.
- 9 Make sure the correct domain suffix is entered in the **DNS suffix for this connection** field.

Configuring Microsoft iSCSI initiator

The Microsoft iSCSI initiator enables communication between Windows systems and Network Appliance Filers. The initiator uses the iSCSI protocol to present the filer volume as a local block device to the system.

To configure Microsoft iSCSI initiator

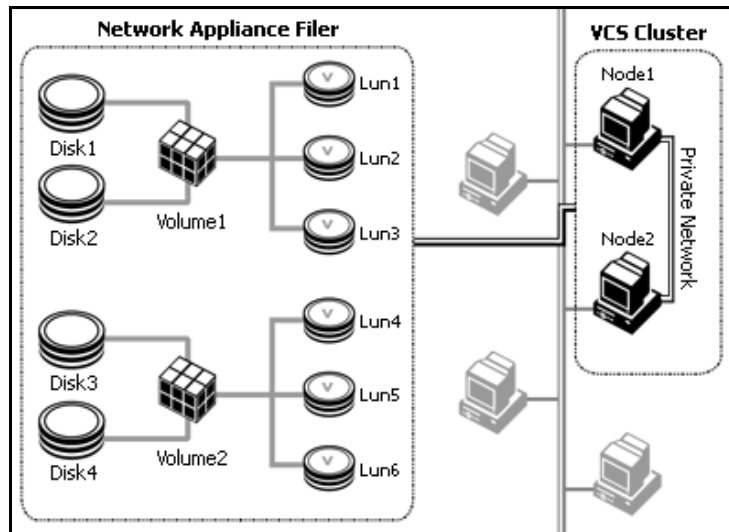
- 1 Make sure the Microsoft iSCSI Initiator software is installed on all cluster nodes. Refer to Microsoft documentation for further information.
- 2 Start the Microsoft iSCSI initiator. Double-click the Microsoft iSCSI Initiator icon from the desktop.
- 3 Click the **Target Portals** tab, if not already selected.
- 4 Click **Add...**
- 5 In the Add Target Portals dialog box, specify the DNS name for the Network Appliance Filer and click **OK**.
- 6 Click the **Available Targets** tab and click **Log On...**
- 7 In the Log On to Target dialog box, verify the target portal name and select the **Automatically restore this connection when the system reboots** check box.
- 8 Click **OK**.
- 9 Click the **Persistent Target** tab to verify that the newly added target portal is listed under the **Select a target** box.
- 10 Click **OK**.

Managing storage using Network Appliance filer

Network Appliance manages data by creating volumes on physical disks. These volumes can further be divided into LUNs (Logical Unit Numbers.) The LUNs are accessible from the cluster nodes, provided the nodes have Microsoft iSCSI Initiator and Network Appliance SnapDrive installed. If you plan to use Fibre Channel (FC) for connecting the LUNs, ensure that you install the FCP Attach Kit or Windows Host Utilities on all the cluster nodes. Refer to the NetApp documentation for more information.

Note: Symantec does not support volumes created using qtree.

Figure 3-1 VCS cluster in a NetApp storage environment



The VCS application agent for Microsoft Exchange requires two LUNs to be created on the NetApp filer, one for Exchange data and the other for transaction logs, and registry replication information. These LUNs must be accessible from all cluster nodes.

Perform the following tasks to create LUNs on the NetApp filer and to make them accessible from cluster nodes:

- Create volumes on the NetApp filer.
- Share the volumes.

- Create LUNs on the shared volumes.

Refer to Network Appliance documentation for instructions on performing these tasks.

Connecting virtual disks to the cluster node

Once the virtual disks are created on the NetApp filer, they must be connected (if not connected already) to the cluster nodes using NetApp SnapDrive.

To connect virtual disks to the cluster node

- 1 Start the Computer Management MMC on the cluster node where you want to connect the LUN. (**Start > All Programs > Administrative Tools > Computer Management**)
- 2 From the left pane, expand **Storage** and double-click **SnapDrive**.
- 3 Right-click **Disks** and then click **Connect Disk...** to launch the Connect Disk wizard.
- 4 Click **Next** on the Welcome page.
- 5 Specify the path of the virtual disk that you wish to connect to the cluster node and then click **Next**.
- 6 Select **Dedicated** as the Virtual Disk Type and then click **Next**.
- 7 Click **Assign a Drive Letter** and then choose a drive letter from the drop-down list.
- 8 On the Select Initiator panel, specify the initiator(s) for the virtual disk and then click **Next**.
- 9 On the igroup Management Type panel, choose the option that allows SnapDrive to perform igroup management automatically and then click **Next**.
- 10 Click **Finish** to begin connecting the specified virtual disk to the cluster node.

Disconnecting virtual disks from the cluster nodes

Steps to disconnect the virtual disks from a cluster node.

To disconnect virtual disks

- 1 Start the Computer Management MMC on the cluster node where you want to disconnect the LUN. (**Start > All Programs > Administrative Tools > Computer Management**)
- 2 From the left pane, expand **Storage** and double-click **SnapDrive**.
- 3 Double-click **Disks** to see the LUNs that are connected to the node.
- 4 Right-click the LUN you want to disconnect and then click **Disconnect Disk....**
- 5 In the Disconnect Disk alert box, click **OK**.

Installing Exchange on the first node

The tasks to be performed on the first node are described in three stages.

Exchange pre-installation: first node

Use the Exchange Server Setup Wizard for Veritas Cluster Server to complete the pre-installation phase. This process changes the physical name of the node to a virtual name.

Note: After you have run the wizard, you will be prompted to restart the node. So, close all open applications and save your data before running the wizard.

To perform Exchange pre-installation

- 1 Verify the LUN created to store the registry replication information is connected to this node and disconnected from other nodes in the cluster.
- 2 Start the Exchange Server Setup Wizard for VCS. Click **Start > All Programs > Symantec > Veritas Cluster Server > Configuration Wizards > Application Agent for Exchange Server 2007 > Exchange Server 2007 Setup Wizard**.
- 3 Review the information in the Welcome panel and click **Next**.
- 4 On the Available Option panel, click **Install Exchange 2007 Mailbox Server role for High Availability** and click **Next**.
- 5 On the Select Option panel, click **Create New Exchange Virtual Server** and click **Next**.
- 6 Specify network information for the Exchange virtual server.
 - Enter a unique virtual name for the Exchange server.
Once you have assigned a virtual name to the Exchange server, you cannot change the virtual name later. To change the virtual name, you must uninstall Exchange Server from the VCS environment and reinstall it using the Exchange Server Setup Wizard for VCS.
 - Enter the name of a domain suffix for the Exchange server.
 - Select the appropriate public NIC from the drop-down list.
The wizard lists the public adapters and low-priority TCP/IP enabled private adapters on the system.
 - Enter a unique virtual IP address for the Exchange server.
 - Enter the subnet mask for the virtual IP address.
 - Click **Next**.

- 7 Select a drive where the registry replication data will be stored and click **Next**.
- 8 Review the summary of your selections and click **Next**.
- 9 A message appears informing that the system will be renamed and restarted after you quit the wizard. Click **Yes** to continue.
- 10 The wizard starts running commands to set up the VCS environment. Various messages indicate the status of each task. After all the commands are executed, click **Next**.
- 11 Click **Reboot**.

When prompted to reboot the node, click **Yes**.

After you reboot the node, the value specified for the Exchange virtual server is temporarily assigned to the node. So, all network connections to the node must be made using the temporary name. After installing Microsoft Exchange, you must rerun this wizard to assign the original name to the node.

On rebooting the node, the Exchange Setup Wizard for VCS is launched automatically. Review the information in the wizard dialog box and proceed to installing Microsoft Exchange Server.

See “[Exchange Server installation: first node](#)” on page 58 for instructions. Click **Revert** to undo all actions performed by the wizard during the pre-installation procedure.

Exchange Server installation: first node

Install Exchange on the node where the Exchange Server Setup Wizard was run for the pre-installation tasks.

HA support for Exchange Server 2007 is available for the Mailbox Server role. While installing Exchange, ensure that you install the Mailbox Server role only.

To install Exchange

- 1 Install Exchange Server using the Microsoft Exchange installation program. See the Microsoft Exchange documentation for instructions.
- 2 Reboot the node if prompted to do so.

Exchange post-installation: first node

After completing the installation, use the Exchange Server Setup Wizard to complete the post-installation tasks. This process reverts the node name to original name and sets the startup type of the Exchange services to manual, so that they can be controlled by VCS.

To perform Exchange post-installation

- 1 Make sure that the LUN containing the registry replication information is connected to the node on which you will perform the post-installation.
- 2 If the Exchange installation did not prompt you to reboot the node, click **Continue** from the Exchange Server Setup Wizard and proceed to [step 4](#). If you rebooted the node after Microsoft Exchange installation, the Exchange Server Setup Wizard is launched automatically.
- 3 Review the information in the Welcome panel and click **Next**.
- 4 A message appears informing that the system will be renamed and restarted after you quit the wizard. Click **Yes** to continue. This sets the node name back to its physical host name.
- 5 The wizard starts performing the post-installation tasks. Various messages indicate the status. After all the commands are executed, click **Next**.
- 6 Click **Finish**.
- 7 When prompted to reboot the node, click **Yes**.
Changes made during the post-installation phase do not take effect till you reboot the node.
Once the node is rebooted, move the databases created during the Exchange installation from the local drive to the shared storage.

Moving Exchange databases to shared storage

After completing Microsoft Exchange installation on the first node, move the Exchange databases on the local drive of the first node to a location on shared storage.

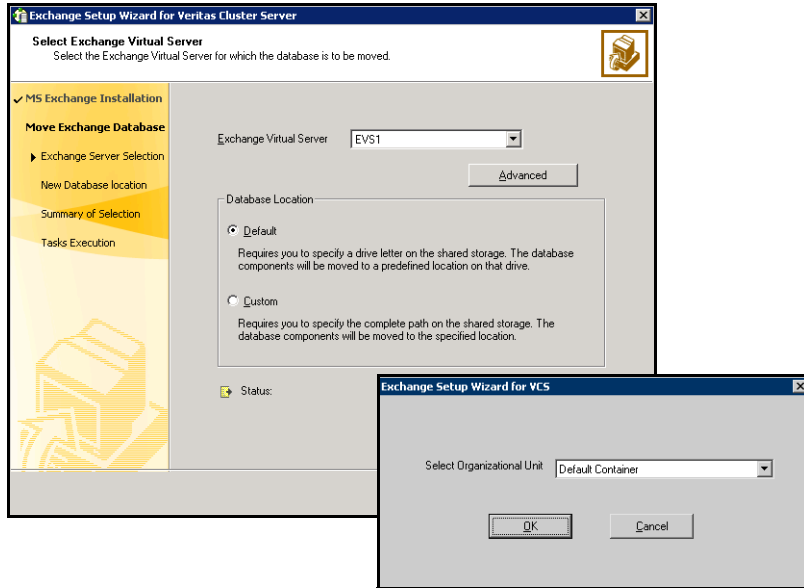
Complete the following tasks before moving the databases:

- Make sure that the LUNs created to store the Exchange database, transaction logs, and registry replication information are connected. Disconnect the LUNs from other systems in the cluster.
- The Exchange Setup Wizard for VCS cannot move the Exchange storage groups until local continuous replication (LCR) is suspended for those storage groups. Please suspend LCR using the Exchange Management Console or the Exchange Management Shell, before moving the Exchange databases. Refer to the Microsoft Exchange documentation for information on how to suspend LCR.

To move Exchange database to a shared storage

- 1 Start the Exchange Server Setup Wizard for VCS. Click **Start > All Programs > Symantec > Veritas Cluster Server > Configuration Wizards > Application Agent for Exchange Server 2007 > Exchange Server 2007 Setup Wizard**.
- 2 Review the information in the Welcome panel and click **Next**.
- 3 In the Available Option panel, click **Configure/Remove highly available Exchange Server** and click **Next**.
- 4 In the Select Option panel, click **Move Exchange Databases** and click **Next**.

- 5 In the Select Exchange Virtual Server panel, select the Exchange virtual server and specify whether you want to move the Exchange databases to a default or a custom location and click **Next**.



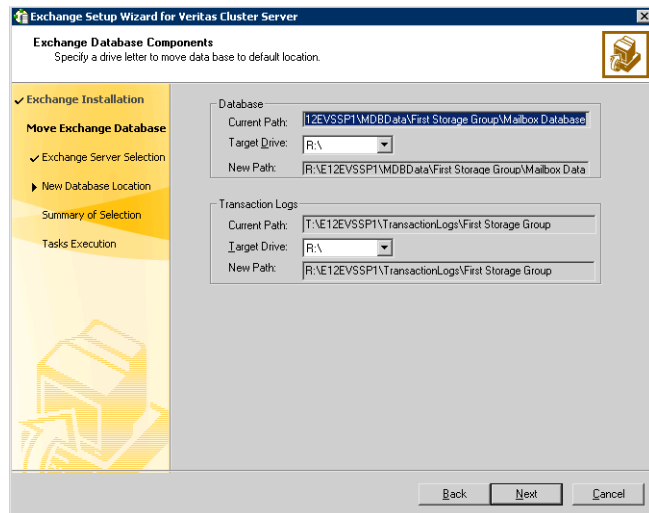
Exchange Virtual Server From the drop-down list, select the Exchange virtual server for which you want to move the database components.

Advanced To specify the Lanman resource details:

- 1 Click **Advanced**.
- 2 From the Organizational Unit drop-down list, select the distinguished name for the Exchange virtual server.
By default, the Lanman resource adds the virtual server to the default container Computers. The user account for VCS Helper service must have adequate privileges on the specified container to create and update computer accounts
- 3 Click **OK**.

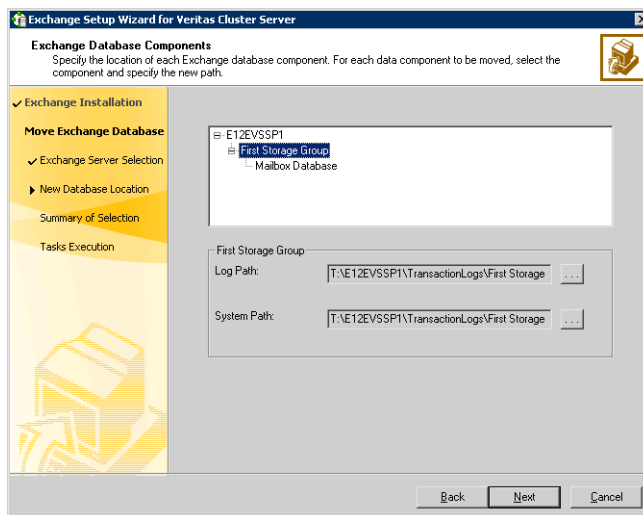
- | | |
|---------|---|
| Default | Select this option if you want to move the database to a default location on the shared storage.
After you click Next , the wizard prompts you for the drive letter on the shared storage. The database components will be moved to a pre-defined location on the drive letter that you select. |
| Custom | Select this option if you want to move the database to a custom location on the shared disk.
After you click Next , the wizard prompts you for the drive letter and the complete path on the shared storage. The database components will be moved to the location that you specify. |

- 6 On the Exchange Database Components panel, complete the following and then click **Next**.
 - If you chose to move the Exchange database to a default location:



- For the Exchange database, select a drive letter from the respective drop-down list.
- For the Transaction logs, select a drive letter from the respective drop-down list.

- If you chose to move the Exchange database to a custom location:



- For each data component to be moved, select the component and specify the path to designate the new location of the component. Click ... (ellipsis button) to browse for folders.

Make sure that the paths for the Exchange database components are not the root of a drive. You must select a directory on the specified drive.

Make sure the path for the Exchange database components contains only ANSI characters.

- 7 Review the summary of your selections and click **Next**.
- 8 The wizard starts performing tasks to move the Exchange databases. Various messages indicate the status of each task. After all the tasks are complete, click **Next**.
- 9 Click **Finish** to exit the wizard.

Installing Exchange on additional nodes

After moving the Exchange databases to shared storage, install Exchange on additional nodes in the cluster for the same Exchange virtual server. You must run the pre-installation, installation, and post-installation procedures on each additional node.

Exchange pre-installation: additional nodes

Use the Exchange Server Setup Wizard for Veritas Cluster Server to complete the pre-installation phase. This process changes the physical name of the node to a virtual name.

Before adding a node to the Exchange cluster, make sure you meet the prerequisites listed under “[Prerequisites for installing Exchange](#)” on page 50.

To perform Exchange pre-installation

- 1 Verify the LUNs created to store the registry replication information and the Exchange database are connected to this node and disconnected from other nodes in the cluster.
- 2 Start the Exchange Server Setup Wizard for VCS from the node to be added to an Exchange cluster. Click **Start > All Programs > Symantec > Veritas Cluster Server > Configuration Wizards > Application Agent for Exchange Server 2007 > Exchange Server 2007 Setup Wizard**.
- 3 Review the information in the Welcome panel and click **Next**.
- 4 In the Available Option panel, click **Install Exchange 2007 Mailbox Server role for High Availability** and click **Next**.
- 5 In the Select Option panel, click **Create a failover node for existing Exchange Virtual Server** and click **Next**.
- 6 Select the Exchange virtual server for which you are adding the failover node and click **Next**.
- 7 Specify network information for the Exchange virtual server.
The wizard discovers the Exchange virtual server name and the domain suffix from the Exchange configuration. Verify this information and provide values for the remaining text boxes.
 - Select the appropriate public NIC from the drop-down list.
The wizard lists the public adapters and low-priority TCP/IP enabled private adapters on the system.
 - Enter the virtual IP address for the Exchange virtual server. By default, the text box displays the IP address that you specified during Exchange pre-installation phase, while creating a new Exchange cluster.

- Enter the subnet mask for the virtual IP address.
 - Click **Next**.
- 8 Review the summary of your selections and click **Next**.
 - 9 A message appears informing that the system will be renamed and restarted after you quit the wizard. Click **Yes** to continue.
 - 10 The wizard starts running commands to set up the VCS environment. Various messages indicate the status of each task. After all the commands are executed, click **Next**.
 - 11 Click **Reboot**.
The wizard prompts you to reboot the node. Click **Yes**.

Warning: After you reboot the node, the value specified for the Exchange virtual server is temporarily assigned to the node. So, all network connections to the node must be made using the temporary name. After installing Microsoft Exchange, you must rerun this wizard to assign the original name to the node.

On rebooting the node, the Exchange Server Setup Wizard is launched automatically. Review the information in the wizard dialog box and proceed to installing Microsoft Exchange Server.

See [“Exchange Server installation: additional nodes”](#) on page 65 for instructions.

Click **Revert Changes** to undo all actions performed by the wizard during the pre-installation procedure.

Do not click **Continue** at this time. Wait until after the Exchange installation is complete.

Exchange Server installation: additional nodes

Install Exchange on the node where the Exchange Server Setup Wizard was run for the pre-installation tasks.

HA support for Exchange Server 2007 is available for the Mailbox Server role. While installing Exchange, ensure that you install the Mailbox Server role only. This is a standard Microsoft Exchange Server installation. Refer to the Microsoft documentation for details on this installation.

- Install the same Exchange version and components on all nodes.

This is a standard Microsoft Exchange Server installation. Refer to the Microsoft documentation for details on this installation.

To install Exchange

- 1 Begin the Exchange installation for disaster recovery at the command prompt using RecoverServer as the install mode:
`<drive letter>:\setup.com /mode:recoverserver`
where `<drive letter>` is the location where the Exchange software is located.
- 2 Setup copies the setup files locally to the computer on which you are installing Exchange 2007 and then checks the prerequisites, including all prerequisites specific to the server roles that you are installing. If you have not met all of the prerequisites, Setup fails and returns an error message that explains the reason for the failure. If you have met all of the prerequisites, Setup installs Exchange 2007.
- 3 Verify that the installation completed successfully. Refer to the Microsoft documentation for more information.

Exchange post-installation: additional nodes

After completing the Microsoft Exchange installation, use the Exchange Server Setup Wizard to complete the post-installation tasks. This process reverts the node name to original name.

To run the Exchange post-installation

- 1 Make sure that the LUNs containing the registry replication information and the Exchange database are connected to the node on which you will perform the post-installation.
- 2 If the Exchange installation did not prompt you to reboot the node, click **Continue** from the Exchange Server Setup Wizard and proceed to [step 4](#). If you rebooted the node after Microsoft Exchange installation, the Exchange Server Setup Wizard is launched automatically.

- 3 Review the information in the Welcome panel and click **Next**.
- 4 A message appears informing that the system will be renamed and restarted after you quit the wizard. Click **Yes** to continue.
- 5 The wizard starts performing the post-installation tasks. After all commands are executed, click **Next**.
- 6 Specify whether you want to add the node to the SystemList of the service group for the EVS selected in the Exchange pre-installation step. Select this option only if service groups are already configured for the EVS. If you wish to add the nodes later, you can do so by using the Exchange service group Configuration Wizard.
- 7 Click **Finish**.
- 8 The wizard prompts you to reboot the node. Click **Yes**. Changes made during the post-installation steps do not take effect till you reboot the node.

Configuring stores to mount on start-up

Run the Exchange System Manager so that all the stores that were previously mounted are automatically mounted on start-up.

To reconfigure mounting of stores at start-up

- 1 Start Exchange System Manager.
- 2 In the left pane, navigate to your storage group.
If you have only one administrative group, expand **Servers > Exchange Server > Storage Group**.
If you have more than one administrative groups, expand **Administrative Groups > Your Administrative Group > Servers > Exchange Server > Storage Group**.
- 3 Right-click the Exchange database and choose **Properties** from the pop-up menu.
- 4 Click the **Database** tab.
- 5 Clear the **Do not mount this store at start-up** check box.
- 6 Click **OK**.

Repeat these steps for all the Exchange databases that were previously mounted.

Configuring the service group

Configuring the Exchange service group involves creating resources for the Network Appliance and Exchange resources. VCS provides several ways of configuring a service group, including the service group configuration wizard, Cluster Manager (Java Console), Cluster Management Console, and the command line. This chapter provides instructions on configuring an Exchange service group using the Exchange Server Configuration Wizard.

Configuring the service group using the wizard

The Exchange Server Configuration Wizard guides you through the process of configuring an Exchange service group. The wizard creates and modifies Exchange service groups. After the Exchange service group is created, you must configure the databases to mount automatically at start-up. Refer to the Exchange documentation for instructions.

This section describes how to create a new Exchange service group using the wizard. To modify an existing service group, see [“Modifying the service group configuration”](#) on page 78.

Review the resource types and the attribute definitions of the agents before configuring the agents. You can find this information in the appendix [“Resource type definitions”](#) on page 121.

For sample configuration files and resource dependency graphs of the Exchange service group, see [“Sample configuration”](#) on page 129.

Prerequisites

- Verify VCS for NetApp SnapMirror is installed on all cluster nodes.
- Verify Exchange is installed and configured identically on all the cluster nodes.
- Verify the cluster is configured using the VCS configuration wizard (VCW).
- Verify your DNS server settings. Make sure a static DNS entry maps the virtual IP address with the virtual computer name.
- You must be a Cluster Administrator to create and configure service groups.
- You must be a Local Administrator on the node where you run the wizard.
- You must be an Administrator for the NetApp Filer containing the LUNs created to store Exchange data components.
- Verify the Command Server is running on all systems in the cluster.
- Verify the Veritas High Availability Daemon (HAD) is running on the system from where you run the wizard.
- Verify the virtual disks (LUNs) created to store the following data components are connected to the node where you run the wizard and disconnected from other nodes in the cluster.
 - Exchange database
 - Transaction logs for the first storage group, and registry replication information.See “[Managing storage using Network Appliance filer](#)” on page 53 for instructions.
- Verify your DNS server settings. Make sure a static DNS entry maps the virtual IP address with the virtual computer name. Refer to the appropriate DNS documentation for further information.

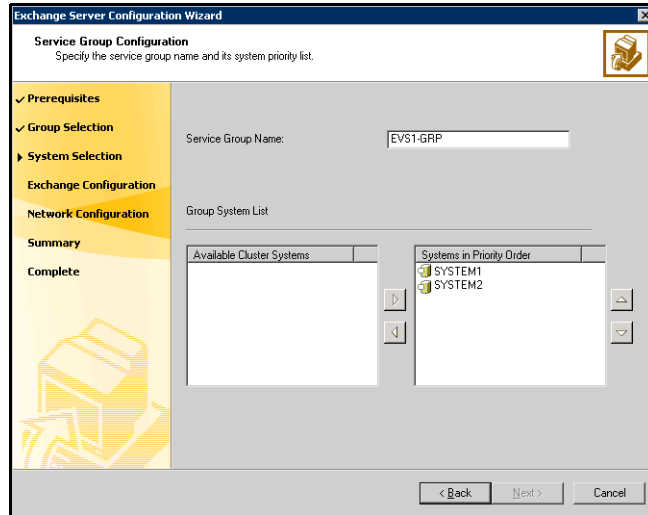
Configuration instructions

The following steps describe how to configure an Exchange service group using the configuration wizard.

To configure an Exchange service group

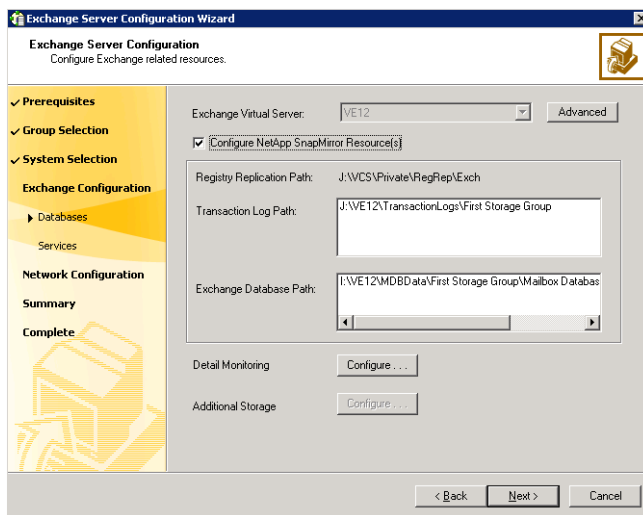
- 1 Start the Exchange Server Configuration Wizard. Click **Start > All Programs > Symantec > Veritas Cluster Server > Configuration Wizards > Application Agent for Exchange Server 2007 > Exchange Server 2007 Configuration Wizard**.
- 2 Review the information in the Welcome panel and click **Next**.

- 3 In the Wizard Options panel, click **Create service group** and click **Next**.
- 4 On the Service Group Configuration panel, specify the service group name and the systems that will part of the service group and click **Next**. The wizard starts validating your configuration. Various messages indicate the validation status.



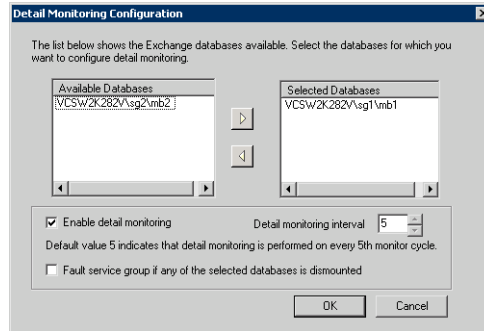
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| Service Group Name | Type a name for the Exchange service group. If you are configuring the service group on the secondary site, ensure that the name matches the service group name on the primary site. |
| Available Cluster Systems | Select the systems on which to configure the service group and click the right-arrow to move the systems to the Systems in Priority Order box. |
| Systems in Priority Order | This list represents the service group's system list. To remove a system from the service group's system list, select the a system and click the left arrow. To change a system's priority in the service group's system list, select the system and click the up and down arrows. The system at the top of the list has the highest priority while the system at the bottom of the list has the lowest priority. |

- 5 On the Exchange Server Configuration panel, verify the Exchange virtual server name and paths to the LUNs created to store Exchange data. An informational message appears if you chose to configure a SnapMirror resource without configuring replication between Network Appliance filers at primary and secondary sites. Review the message and click **Yes** to continue. You must always click **Yes** if you encounter this message while configuring a service group at the secondary site.



- Specify the Exchange Virtual Server.
- If desired, click **Advanced** to specify details for the Lanman resource.
 - Select the distinguished name of the Organizational Unit for the virtual server. By default, the Lanman resource adds the virtual server to the default container "Computers." The user account for VCS Helper service must have adequate privileges on the specified container to create and update computer accounts.
 - Click **OK**.
- Check the **Configure NetApp SnapMirror Resource(s)** check box if you want to configure a NetApp SnapMirror resource. SnapMirror resource is required only in case of a disaster recovery configuration. If you are running the wizard to modify a service group, unchecking this check box will remove the NetApp SnapMirror resource from the service group configuration
- Verify the Exchange Database Path.
- Verify the Transaction Log Path.

- To configure Detail Monitoring for Exchange databases, click **Configure....**



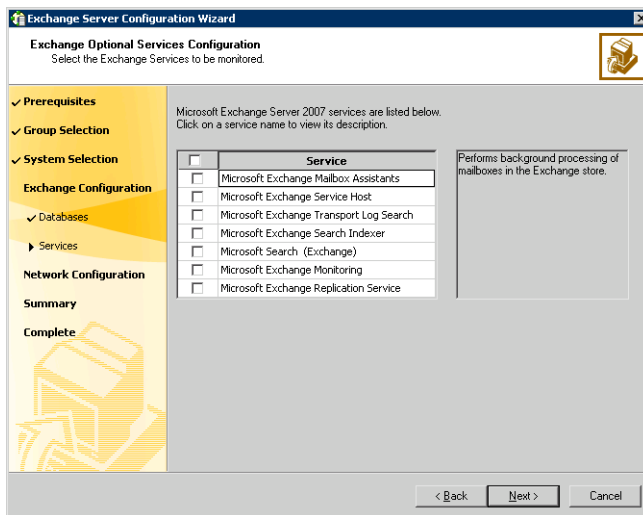
On the Detail Monitoring Configuration dialog box, complete the following:

- In the Available Databases box, select the databases for detail monitoring and double-click, or click the right-arrow button to move them to the Selected Databases box. To remove a database, select the database in the Selected Databases box, and double-click or click the left-arrow button.
- Check **Enable detail monitoring** check box, and specify the monitoring interval in the **Detail monitoring interval** field.
- If you want the VCS agent to fault the service group if a database selected for detail monitoring is dismantled, check the **Fault service group if any of the selected database is dismantled** check box.

See the VCS agent attribute descriptions in the Appendix, for more information on detail monitoring and VCS agent behavior.

- Click **OK**.
- Click **Next**.

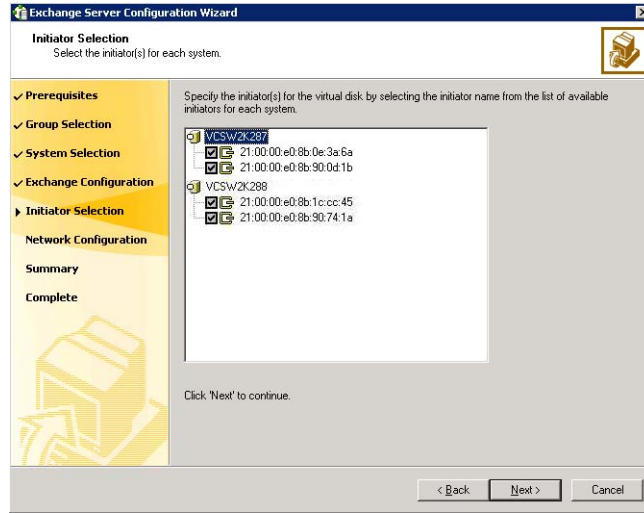
- 6 Select the optional Exchange services to be monitored and click **Next**. Each optional service that is selected will be configured as a VCS resource of type ExchService2007.



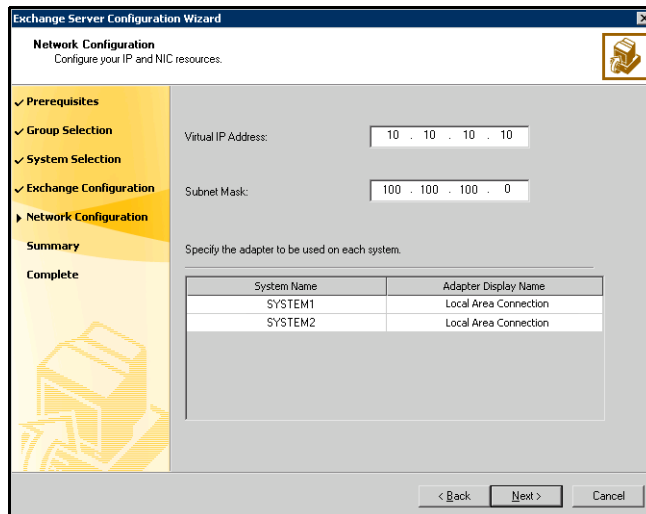
- 7 On the Initiator Selection panel, select the initiator(s) for the virtual disk from the list of available initiators displayed for each cluster node, and then click **Next**.

If you are configuring MPIIO over FC, you must select at least two FC initiators for each cluster node. Note that the node from which you run this

wizard already has an initiator selected by default. This is the initiator that was specified when you connected the LUNs to this cluster node.



- 8 On the Network Configuration panel, specify the following network related information and then click **Next**.



- The Virtual IP Address and the Subnet Mask fields display the values entered while installing Exchange. You can keep the displayed values or type new values.
If you change the virtual IP address, create a static entry in the DNS server mapping the new virtual IP address to the virtual server name.
- For each system in the cluster, select the public network adapter name. Select the **Adapter Display Name** field to view the adapters associated with a node.

The wizard displays all TCP/IP enabled adapters on a system, including the private network adapters, if they are TCP/IP enabled. Make sure that you select the adapters to be assigned to the public network.

- 9 Review the service group configuration, change the resource names, if desired, and then click **Next**.
The Resources box lists the configured resources. Click a resource to view its attributes and their configured values in the Attributes box.
The wizard assigns unique names to resources. To edit a resource name, select the resource, click the resource or press the F2 key. Edit the resource, and press the Enter key to confirm the changes. To cancel editing a resource name, press the Esc key.
- 10 Click **Yes** on the message that prompts you that the wizard will run commands to modify the service group configuration. Various messages indicate the status of these commands.
- 11 In the Completing the Exchange Configuration panel, check the **Bring the service group online** check box to bring the service group online on the local node and click **Finish**.
After bringing the service group online, run the Exchange Management Console to modify the database settings such that all the stores are automatically mounted on start-up.

If you need to configure additional storage groups or mailbox stores on the shared storage you should do that now. Connect the LUNs that have been created for the additional storage groups or mailbox stores, and create the new storage groups and mailbox stores in Exchange Management Console, move them on the shared storage using the Move Exchange Databases option in the Exchange Setup Wizard for VCS and then rerun the Exchange Configuration Wizard to bring them under VCS control.

If you already designated the additional LUNs when you ran the configuration wizard the first time then you can just create the storage groups and mailbox stores in Exchange Management Console.

Running SnapManager for Exchange

Run the SnapManager configuration wizard on the node on which the service group is online to complete the configuration process and to schedule backups of the Exchange database. You must adhere to the following requirements while running SnapManager for Exchange:

- Make sure the Exchange service group is online.
- Do not move the Exchange database components already moved using the Exchange Server Setup Wizard.

If you are scheduling backups in a VCS cluster, schedule them on the node on which the service group is online. If the Exchange virtual server fails over to another node, you must set up the backup schedule again on the new node.

See the Network Appliance documentation for more information about running SnapManager for Exchange.

Verifying the service group configuration

This section provides steps to verify a service group configuration by bringing the service group online, taking it offline, and switching the service group to another cluster node.

Bringing the service group online

Perform the following steps to bring the service group online from the VCS Java or Web Console.

To bring a service group online from the Java Console

- 1 In the Cluster Explorer configuration tree, select the Exchange service group to be taken online.
- 2 Right-click the service group name, and select **Enable Resources**. This enables all resources in the service group.
- 3 Right-click the service group name, and select the system on which to enable the service group. (Right-click > Enable > *system_name* or Right-click > Enable > All)
- 4 Save your configuration (**File > Close Configuration**).
- 5 Right-click the service group and select to online the service group on the system. (Right-click > Online > *system_name*)

To bring a service group online from the Web Console

- 1 On the **Service Group** page (**Cluster Summary > All Groups > Service Group**), click **Online**.
- 2 In the Online Group dialog box, select the system on which to bring the service group online.
- 3 To run PreOnline script, select the **Run PreOnline Script** check box.
- 4 Click **OK**.

Taking the service group offline

Perform the following steps to take the service group offline from the VCS Java or Web Console.

To take a service group offline from the Java Console

- 1 On the **Service Groups** tab of the Cluster Explorer configuration tree, right-click the service group.
or
Select the cluster in the Cluster Explorer configuration tree, select the **Service Groups** tab, and right-click the service group icon in the view panel.
- 2 Choose **Offline**, and choose the appropriate system from the pop-up menu. (Right-click > Offline > *system_name*)

To take a service group offline from the Web Console

- 1 On the **Service Group** page (**Cluster Summary > All Groups > Service Group**), click **Offline**. This opens the Offline Group dialog box.
- 2 Select the system on which to take the service group offline.
- 3 Click **OK**.

Switching the service group

The process of switching a service group involves taking it offline on its current system and bringing it online on another system. Perform the following steps to switch the service group from the VCS Java or Web Console.

To switch a service group from the Java Console

- 1 On the **Service Groups** tab of the Cluster Explorer configuration tree, right-click the service group.
or
Select the cluster in the Cluster Explorer configuration tree, select the Service Groups tab, and right-click the service group icon in the view panel.
- 2 Choose **Switch To**, and choose the appropriate system from the pop-up menu. (Right-click > Switch To > *system_name*)

To switch a service group from the Web Console

- 1 From the Service Group page (**Cluster Summary > All Groups > Service Group**), click **Switch**.
- 2 On the Switch Group dialog box, select the system to switch the service group to.
- 3 Click **OK**.

Modifying the service group configuration

You can dynamically modify the Exchange service group configuration in several ways, including the Exchange Server Configuration Wizard, Cluster Manager (Java Console), Cluster Management Console (Single Cluster Mode) also referred to as Web Console, and the command line. The following steps describe how to modify the service group using the configuration wizard.

Prerequisites

- If the Exchange service group is online, you must run the wizard from the node on which the service group is online. You can then use the wizard to add and remove resources. You cannot change resource attributes.
- To change the resource attributes, you must take the service group offline. However, the NetAppFiler and NetAppSnapDrive resources for the service group must be online on the node where you run the wizard and offline on all other nodes. So, the LUNs created to store the Exchange database, the registry replication information, and the transaction logs should be connected to node where you run the wizard.
- If you are running the wizard to remove a node from the service group's system list, do not run the wizard from the node being removed.

Instructions

The following steps describe how to modify an Exchange service group using the configuration wizard. If you run the wizard to add a system to an online service group, resources having local attributes may go in an UNKNOWN state for a short duration. These resources will come out of the UNKNOWN state in the next monitor cycle.

To modify an Exchange service group

- 1 Start the Exchange Server Configuration Wizard. Click **Start > All Programs > Symantec > Veritas Cluster Server > Configuration Wizards > Application Agent for Exchange Server 2007 > Exchange Server 2007 Configuration Wizard**.
- 2 Read the information in the Welcome panel and click **Next**.
- 3 On the Wizard Options panel, click **Modify service group**, click the service group to be modified, and click **Next**.
- 4 Follow the wizard instructions and make desired modifications to the service group configuration. See "[Configuring the service group using the wizard](#)" on page 67 for more information about the configuration wizard.

Deleting the Exchange service group

The following steps describe how to delete an Exchange service group using the configuration wizard.

To delete an Exchange service group

- 1 Start the Exchange Server Configuration Wizard from a cluster node. Click **Start > All Programs > Symantec > Veritas Cluster Server > Configuration Wizards > Application Agent for Exchange Server 2007 > Exchange Server 2007 Configuration Wizard**.
- 2 Review the information in the Welcome panel and click **Next**.
- 3 In the Wizard Options panel, click **Delete service group**, click the service group to be deleted and click **Next**.
- 4 In the Service Group Summary panel, click **Next**.
- 5 A message appears informing you that the wizard will run commands to delete the service group. Click **Yes** to delete the service group.
- 6 Click **Finish**.

Making a standalone Exchange server highly available

This chapter describes how to bring a standalone Exchange server into a VCS environment. This involves installing VCS on the Exchange server, making it cluster-ready by running the Exchange Server Setup Wizard for VCS, adding nodes to the cluster, installing the VCS Application Agent for Microsoft Exchange in the cluster, and configuring the agent.

You can use the same Exchange server name, so users need not reconfigure their mailboxes.

HA support for Exchange Server 2007 is available for the Mailbox Server role only. If you have installed other server roles on the server where you have installed the Mailbox Server role, remove those server roles before you proceed.

This scenario considers an active/passive configuration with one to one failover capabilities.

Installing VCS for NetApp SnapMirror on the Exchange server

Verify the prerequisites and then install VCS for NetApp SnapMirror on the system that hosts the Exchange server.

See “[Installing the software using the product installer](#)” on page 26 for more information.

Converting the standalone Exchange server into a “clustered” Exchange server

Use the Exchange Setup Wizard to convert a standalone Exchange server into a “clustered” Exchange server. In this wizard, the node name of the standalone Exchange Server becomes the name of the Exchange virtual server and the existing node is given a new physical node name.

Renaming the existing standalone Exchange server allows Active Directory entries to remain valid. For example, if your existing standalone Exchange server is called EXCH, the name of the Exchange virtual server will become EXCH and the existing node is given a new physical node name, for example, SYSTEM1.

Before proceeding, make sure you meet the following requirements:

- You have installed VCS for NetApp SnapMirror on the system that hosts Exchange.
See “[Installing the software](#)” on page 21 for more information.
- HA support for Exchange Server 2007 is available for the Mailbox Server role only. If you have already installed the Mailbox Server role along with the other server roles on the same server, you will have to remove the other server roles before you proceed.
- The system hosting the Exchange server to be made highly available is not configured as a root broker.
- The system hosting the Exchange server does not have VCS configured.

To convert a standalone Exchange Server into a “clustered” Exchange server

- 1 Start the Exchange Server Setup Wizard for VCS from the node having the standalone Exchange server installed. Click **Start > All Programs > Symantec > Veritas Cluster Server > Configuration Wizards > Application Agent for Exchange Server 2007 > Exchange Server 2007 Setup Wizard**.
- 2 Review the information in the Welcome panel and click **Next**.

- 3 In the Available Option panel, click **Make a standalone Exchange Server highly available** and click **Next**.
- 4 Specify information related to your network.
 - Enter a name for the node. This name will be permanently assigned to the node on which the wizard is being run. This name for the node becomes the new name of the physical system after the process is completed. The original name of the system, for example, EXCH, is returned as the name of the Exchange virtual server so that the Active Directory entries remain valid.
 - Enter the name of the domain suffix.
 - Select the appropriate public NIC from the drop-down list. The wizard lists the public adapters and low-priority TCP/IP enabled private adapters on the system.
 - Enter a unique virtual IP address for the Exchange virtual server. If you plan to use the IP address of the node as the virtual IP address, you must assign a new static IP address to the node.
 - Enter the subnet mask for the virtual IP address.
 - Click **Next**.
- 5 Select a drive where the registry replication data will be stored and click **Next**.

The wizard lists disks managed using Windows Disk Management and virtual disks (LUNs). Make sure to select virtual disks (LUNs) to store registry replication information.
- 6 Review the summary of your selections and click **Next**.
- 7 A message appears informing that the system will be renamed and restarted after you quit the wizard. Click **Yes** to continue.
- 8 The wizard starts running commands to set up the VCS environment. Various messages indicate the status of each task. After all the commands are executed, click **Next**.
- 9 Click **Finish**.

The wizard prompts you to restart the system. Click **Yes** to restart the system. Click **No** to restart the system later. You must restart the system before continuing with the next step.

Adding the standalone Exchange server to a cluster

After converting the standalone Exchange server into a virtual server, use the VCS Configuration Wizard (VCW) to create a cluster, if one does not already exist, and then add all the nodes to the cluster.

See “[Configuring the cluster](#)” on page 32 for instructions.

Moving Exchange databases

Use the Exchange Server Setup Wizard for VCS with the **Move Exchange Database** option to move the Exchange database from the clustered Exchange server to a shared disk.

See “[Moving Exchange databases to shared storage](#)” on page 59 for instructions.

Installing Exchange on additional nodes

After moving the Exchange databases to shared storage, install Exchange on additional nodes in the cluster for the same Exchange virtual server, if required. You must run pre-installation, installation, and post-installation procedures for each additional node.

See “[Installing Exchange on additional nodes](#)” on page 63 for more information.

Configuring the Exchange service group for VCS

Configure an Exchange service group in the cluster using the Exchange Server Configuration Wizard. Configuring the Exchange service group involves creating an Exchange service group and defining the attribute values for its resources. After the Exchange service group is created, you must configure the databases to mount automatically at startup.

See “[Configuring the service group](#)” on page 67 for instructions.

Configuring any-to-any failover

This chapter describes how to set up an any-to-any failover configuration in an Exchange cluster. An any-to-any configuration could have many Exchange virtual servers in a cluster, each configured in a separate service group. Each service group can fail over to any configured node in the cluster, provided no other Exchange virtual server is online on that node.

How you configure failover nodes for Exchange instances depends on if Exchange has already been installed on the target node. In any-to-any configuration, the node you plan to use for failover may already have Exchange installed. For example, you configure an EVS1 cluster on SYSTEM1 and SYSTEM3. SYSTEM3 is the failover node for EVS1. Now you install EVS2 on SYSTEM2. You want to use SYSTEM3 as the failover node for EVS2. In this case, you do not install Exchange once again on SYSTEM3. Instead, you specify SYSTEM3 as a common node for failover.

Installing VCS for NetApp SnapMirror

Verify the prerequisites and then install VCS for NetApp SnapMirror on the system.

See “[Installing the software](#)” on page 21 for more information.

Configuring the cluster

After installing VCS, run the VCS Configuration Wizard (VCW) to configure the components required to run the VCS cluster.

See “[Configuring the cluster](#)” on page 32 for more information.

Configuring the first Exchange virtual server

Installing Microsoft Exchange in a VCS cluster environment involves three major tasks, that is, pre-installation, Microsoft Exchange installation, and post-installation. The Exchange Setup Wizard for VCS performs the pre-installation and post-installation tasks.

The “First Node” installation tasks need to be repeated on all of the active Exchange nodes in the any-to-any configuration.

See “[Installing Microsoft Exchange](#)” on page 49 for more information. Ensure that you complete all the procedures mentioned.

Configuring the Exchange service group for VCS

Configure an Exchange service group in the cluster using the Exchange Server Configuration Wizard. Configuring the Exchange service group involves creating an Exchange service group and defining the attribute values for its resources. After the Exchange service group is created, you must configure the databases to mount automatically at startup.

See “[Configuring the service group](#)” on page 67 for instructions.

Configuring another Exchange virtual server for an any-to-any failover

Configure the second Exchange virtual server in the cluster environment. Complete the following tasks:

- Install Exchange on the first node. You must complete pre-installation, Microsoft Exchange installation, and post-installation on the first node only. See “[Installing Exchange on the first node](#)” on page 56 for more information.
- Move the Exchange databases to shared storage. See “[Moving Exchange databases to shared storage](#)” on page 59 for more information.

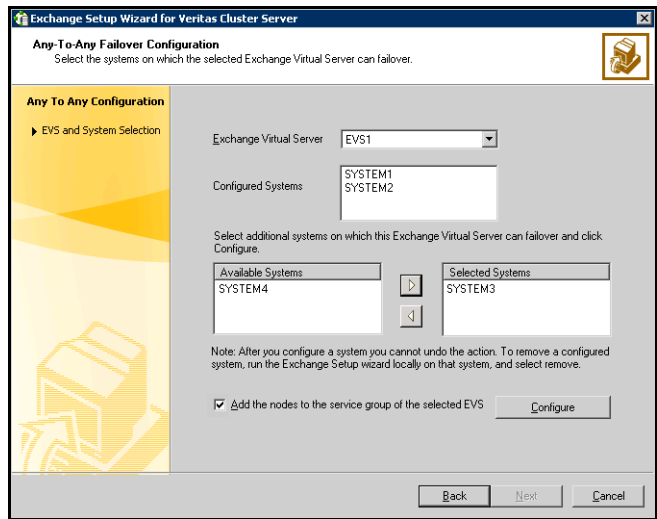
Specifying a common node for failover

Exchange was installed on the node that will be the common failover node during the installation process of the first Exchange virtual server. You do not need to install Exchange a second time on the common failover node. You must run the Exchange Setup Wizard for VCS to set up the any-to-any failover configuration in the Exchange cluster.

The first Exchange virtual server is already configured with the common failover node. You must run this wizard for the second Exchange virtual server only.

To specify a common node for failover

- 1 Start the Exchange Server Setup Wizard for VCS from any node configured to host an Exchange service group. Click **Start > All Programs > Symantec > Veritas Cluster Server > Configuration Wizards > Application Agent for Exchange Server 2007 > Exchange Server 2007 Setup Wizard**.
- 2 Review the information in the Welcome panel and click **Next**.
- 3 In the Available Option panel, click **Configure/Remove highly available Exchange Server** and click **Next**.
- 4 In the Select Options panel, click **Configure any-to-any failover** and click **Next**.
- 5 Select systems to be configured for any-to-any failover. The Existing Systems box lists the nodes on which the Exchange Server service group can fail over.



- Select the Exchange virtual server to which you want to add the additional failover nodes.
- From the Available Systems box, select the systems to be configured for any-to-any failover.

The Available Systems box lists only those systems that have the same version and service pack level of Microsoft Exchange as the selected Exchange virtual server.

- Click the right arrow to move the selected systems to the Selected Systems box. To remove a system from the box, select the system and click the left arrow.
- Specify whether you want to add the systems to the SystemList of the service group for the selected EVS.
- Click **Configure**. Repeat these steps for all the Exchange virtual servers for which you want to configure any-to-any failover.
- Click **Next**.

6 Click **Finish**.

Configuring the Exchange service group for an additional Exchange virtual server

A new Exchange service group must be configured for the second Exchange virtual server. Configure an Exchange service group in the cluster using the Exchange Server Configuration Wizard. Configuring the Exchange service group involves creating an Exchange service group and defining the attribute values for its resources. After the Exchange service group is created, you must configure the databases to mount automatically at startup.

See “[Configuring the service group](#)” on page 67 for instructions.

Deploying agents for disaster recovery

A disaster recovery (DR) solution is a series of procedures you can use to safely and efficiently restore application data and services in the event of a catastrophic failure. A typical DR solution requires clusters on primary and secondary sites with replication between those sites. The cluster on the primary site provides data and services during normal operation; the cluster on the secondary site provides data and services if the primary cluster fails.

This chapter describes how to set up a disaster recovery solution for Exchange server using the VCS agents for Network Appliance SnapMirror and Microsoft Exchange.

Symantec recommends that you configure the secondary site only after you have established a local cluster with the GCO option at the primary site.

Verifying the primary site configuration

If you have not set up the primary site, follow the instructions in the earlier chapters in this guide. The instructions include specifying the disaster recovery configuration options that are required on a primary site. Make sure you complete the following tasks on the primary site:

- Install VCS for NetApp SnapMirror with the GCO option and then configure the VCS cluster at the primary site. While configuring the cluster, ensure that you select the GCO option to configure the wide area connector (WAC) resource in the cluster.
See [Chapter 2, “Installing the software”](#) on page 21 for more information.
- Install Microsoft Exchange server on the primary site cluster nodes.
See [Chapter 3, “Installing Microsoft Exchange”](#) on page 49 for more information.

- Configure the Exchange service group for VCS.
See [Chapter 4, “Configuring the service group”](#) on page 67 for more information.

Setting up the secondary site

Ensure the following before you proceed:

- Configure the Exchange databases for backup and restore using SnapManager for Exchange configuration wizard.
See [“Running SnapManager for Exchange”](#) on page 75 for instructions.
- Make sure the volumes at both sites are of the same size.

Perform the following tasks at the secondary site to set up and configure a disaster recovery environment:

- Install VCS for NetApp SnapMirror with the GCO option and then configure the VCS cluster. While configuring the cluster, ensure that you select the GCO option to configure the wide area connector (WAC) resource in the cluster at the secondary site.
See [Chapter 2, “Installing the software”](#) on page 21 for more information.
- Install Microsoft Exchange at the secondary site using the Exchange Setup Server Wizard for VCS.
See [“Installing Microsoft Exchange at the secondary site”](#) on page 92 for instructions.
- Configure an Exchange service group with SnapMirror resources at the secondary site.
See [“Configuring the Exchange service group at the secondary site”](#) on page 99 for instructions for instructions.
- Replicate the volumes containing data for all Exchange components using Network Appliance SnapMirror.
See [“Configuring replication using Network Appliance SnapMirror”](#) on page 100 for instructions.
- Configure SnapMirror resources in the Exchange service group at the primary site.
See [“Configuring NetAppSnapMirror resources at the primary site”](#) on page 100 for instructions.
- Link the clusters at primary and secondary sites.
See [“Linking clusters at primary and secondary sites”](#) on page 101 for instructions.
- Configure the Exchange service group to be a global group.

See [“Making the Exchange service group global”](#) on page 101 for instructions.

Installing Microsoft Exchange at the secondary site

Before installing Microsoft Exchange on the cluster nodes in the secondary site, ensure the following:

- Make sure you meet the prerequisites for installing Exchange. See “[Prerequisites for installing Exchange](#)” on page 50 for more information.
- Make sure the Exchange service group is offline in the primary site cluster.
- Connect to the LUNs created to store the registry replication information using the same drive letters and LUN names used at the primary site.

Installing Exchange on the first node

The tasks to be performed on the first node are described in the following stages: pre-installation, Exchange installation, and post-installation.

If you are familiar with the procedures for installing Exchange on the primary site, you will find that the procedures for installing Exchange are the same for the secondary site except for the pre-installation procedure for the first node. In the pre-installation procedure for the first node, you must select the wizard option to create a failover node for Exchange disaster recovery setup, instead of the option to create a new Exchange virtual server.

Exchange pre-installation: first node

Use the Exchange Server Setup Wizard for VCS to complete the pre-installation phase. This process changes the physical name of the node to a virtual name.

Note: After you have run the wizard, you will be requested to restart the node. So, close all open applications and save your data before running the wizard.

To perform Exchange pre-installation

- 1 Verify the LUNs created to store the registry replication information and the Exchange database on the secondary site are connected to this node and disconnected from other nodes in the cluster. Assign the same drive letters and names to these LUNs as on the primary site.
- 2 Start the Exchange Server Setup Wizard for VCS. Click **Start > All Programs > Symantec > Veritas Cluster Server > Configuration Wizards > Application Agent for Exchange Server 2007 > Exchange Server 2007 Setup Wizard**.
- 3 Review the information in the Welcome panel and click **Next**.

- 4 In the Available Option panel, click **Install Exchange Server for High Availability** and click **Next**.
- 5 In the Select Option panel, click **Create a failover node for Exchange disaster recovery setup** and click **Next**.
- 6 In the Select System From Primary Site panel, enter the name of a system on the primary site on which Exchange virtual server is configured and click **Next**.
- 7 In the Select Exchange Virtual Server panel, select the Exchange virtual server for disaster recovery and click **Next**.
- 8 The installer verifies that the selected node meets the Exchange requirements. If the service group on the primary node has not been taken offline, the installer prompts you to do so without exiting the installer, or you can cancel the installation wizard and take the service group offline manually. When all requirements are validated, click **Next**.
- 9 Enter a name of a failover node and click **Next**.
- 10 Specify the information related to your network. The wizard discovers the Exchange virtual server name and the domain suffix from the Exchange configuration. Verify this information and provide values for the remaining fields.
 - Enter a unique virtual IP address for the virtual server. By default, the wizard displays the IP address assigned while installing Exchange in the primary cluster; you can assign a different IP address in the secondary cluster.
 - Enter the subnet to which the virtual IP address belongs.
 - Select the appropriate public NIC from the drop-down list. The wizard lists the public adapters and low-priority TCP/IP enabled private adapters on the system.
 - Click **Next**.
- 11 In the Registry Replication Drive panel, select a drive where the registry replication data will be stored and click **Next**. Make sure you select the same drive letter (or directory in case of folder mounts) as the one used at the primary site for registry replication.
- 12 Review the summary of selections and click **Next**.
- 13 A message appears informing that the system will be renamed and restarted after you quit the wizard. Click **Yes** to continue.
 If a DNS entry for the specified Exchange server and IP address does not exist, the wizard will display a message. Click **OK** to let the wizard create the DNS entry. If the wizard is unable to create the entry, click **OK** to continue.

- 14 The wizard starts running commands to set up the VCS environment. Various messages indicate the status of each task. After all the commands are executed, click **Next**.
- 15 Click **Reboot**. The wizard prompts you to reboot the node. Click **Yes**. After you reboot the node, the value specified for the Exchange virtual server is temporarily assigned to the node. So, all network connections to the node must be made using the temporary name. After installing Microsoft Exchange, you must rerun this wizard to assign the original name to the node.

On rebooting the node, the Exchange Server Setup Wizard is launched automatically. Review the information in the wizard dialog box and proceed to installing Microsoft Exchange Server. Do not click Continue at this time. Wait until after you install Exchange installation.

See “[Exchange Server installation: first node](#)” on page 94 for instructions. If you need to undo all actions performed by the wizard during the pre-installation, click **Revert Changes**.

Exchange Server installation: first node

Install Exchange on the node where the Exchange Server Setup Wizard was run for the pre-installation tasks.

HA support for Exchange Server 2007 is available for the Mailbox Server role. While installing Exchange, ensure that you install the Mailbox Server role only.

- Install the same Exchange version and components on all nodes.

This is a standard Microsoft Exchange Server installation. Refer to the Microsoft documentation for details on this installation.

To install Exchange

- 1 Begin the Exchange installation for disaster recovery at the command prompt using RecoverServer as the install mode:

```
<drive letter>:\setup.com /mode:recoverserver
```

where **<drive letter>** is the location where the Exchange software is located.
- 2 Setup copies the setup files locally to the computer on which you are installing Exchange 2007 and then checks the prerequisites, including all prerequisites specific to the server roles that you are installing. If you have not met all of the prerequisites, Setup fails and returns an error message that explains the reason for the failure. If you have met all of the prerequisites, Setup installs Exchange 2007.
- 3 Verify that the installation completed successfully. Refer to the Microsoft documentation for more information.

Exchange post-installation: first node

After completing the Microsoft Exchange installation, use the Exchange Setup Wizard for VCS to complete the post-installation phase. This process reverts the node name to the physical name, and sets the Exchange services to manual so that the Exchange services can be controlled by VCS.

To run the Exchange post-installation

- 1 Verify the LUNs created to store the registry replication information and the Exchange database are connected to this node and disconnected from other nodes in the cluster.
- 2 If the Exchange installation did not prompt you to reboot the node, click **Continue** from the Exchange Server Setup Wizard and proceed to [step 4](#). If you rebooted the node after Microsoft Exchange installation, the Exchange Server Setup Wizard is launched automatically.
- 3 Review the information in the Welcome panel and click **Next**.
- 4 A message appears informing that the system will be renamed and restarted after you quit the wizard. Click **Yes** to continue.
- 5 The wizard starts performing the post-installation tasks. Various messages indicate the status. After all commands are executed, click **Next**.
- 6 Click **Finish**.
- 7 The wizard prompts you to reboot the node. Click **Yes**. Changes made during the post-installation steps do not take effect till you reboot the node.
- 8 Once the node is rebooted, move the databases created during the Exchange installation from the local drive to the shared drive. If you want to add failover nodes to the Exchange cluster, proceed to [“Installing Exchange on additional nodes”](#) on page 96 for instructions.

Installing Exchange on additional nodes

Install Exchange on additional nodes in the secondary site cluster to configure the nodes as failover nodes for the same Exchange virtual server. You must run the pre-installation, Exchange installation, and post-installation procedures on each additional node.

Exchange pre-installation: additional nodes

Use the Exchange Server Setup Wizard for VCS to complete the pre-installation phase. This process changes the physical name of the node to a virtual name.

Before adding a node to the Exchange cluster, make sure you meet the prerequisites listed under [“Prerequisites for installing Exchange”](#) on page 50.

To perform Exchange pre-installation

- 1 Verify the LUNs created to store the registry replication information and the Exchange database are connected to this node and disconnected from other nodes in the cluster.
- 2 Start the Exchange Server Setup Wizard for VCS from the node to be added to an Exchange cluster. Click **Start > All Programs > Symantec > Veritas Cluster Server > Configuration Wizards > Application Agent for Exchange Server 2007 > Exchange Server 2007 Setup Wizard**.
- 3 Review the information in the Welcome panel and click **Next**.
- 4 In the Available Option panel, click **Install Exchange 2007 Mailbox Server role for High Availability** and click **Next**.
- 5 In the Select Option panel, click **Create a failover node for existing Exchange Virtual Server** and click **Next**.
- 6 Select the Exchange virtual server for which you are adding the failover node and click **Next**.
- 7 Specify network information for the Exchange virtual server. The wizard discovers the Exchange virtual server name and the domain suffix from the Exchange configuration. Verify this information and provide values for the remaining text boxes.
 - Select the appropriate public NIC from the drop-down list. The wizard lists the public adapters and low-priority TCP/IP enabled private adapters on the system.
 - Optionally, enter a unique virtual IP address for the Exchange virtual server. By default, the text box displays the IP address assigned when the Exchange Virtual Server was created on the first node. You should not have to change the virtual IP address that is automatically

generated when setting up an additional failover node for the virtual server in the same cluster.

- Enter the subnet mask for the virtual IP address.
- Click **Next**.

- 8 Review the summary of your selections and click **Next**.
- 9 A message appears informing that the system will be renamed and restarted after you quit the wizard. Click **Yes** to continue.
- 10 The wizard starts running commands to set up the VCS environment. Various messages indicate the status of each task. After all the commands are executed, click **Next**.
- 11 Click **Reboot**.

The wizard prompts you to reboot the node. Click **Yes**.

After you reboot the node, the value specified for the Exchange virtual server is temporarily assigned to the node. So, all network connections to the node must be made using the temporary name. After installing Microsoft Exchange, you must rerun this wizard to assign the original name to the node.

On rebooting the node, the Exchange Server Setup wizard is launched automatically. Review the information in the wizard dialog box and proceed to installing Microsoft Exchange Server.

See “[Exchange Server installation: additional nodes](#)” on page 98 for instructions.

If you want to undo all actions performed by the wizard during the preinstallation procedure, click **Revert**.

Do not click **Continue** at this time. Wait until after the Exchange installation is complete.

Exchange Server installation: additional nodes

Install Exchange on the node where the Exchange Server Setup Wizard was run for the pre-installation task.

HA support for Exchange Server 2007 is available for the Mailbox Server role. While installing Exchange, ensure that you install the Mailbox Server role only.

- Install the same Exchange version and components on all nodes.

This is a standard Microsoft Exchange Server installation. Refer to the Microsoft documentation for details on this installation.

To install Exchange

- 1 Begin the Exchange installation for disaster recovery at the command prompt using RecoverServer as the install mode:

```
<drive letter>:\setup.com /mode:recoverserver
```

where **<drive letter>** is the location where the Exchange software is located.
- 2 Setup copies the setup files locally to the computer on which you are installing Exchange 2007 and then checks the prerequisites, including all prerequisites specific to the server roles that you are installing. If you have not met all of the prerequisites, Setup fails and returns an error message that explains the reason for the failure. If you have met all of the prerequisites, Setup installs Exchange 2007.
- 3 Verify that the installation completed successfully. Refer to the Microsoft documentation for more information.

Exchange post-installation: additional nodes

After completing the Microsoft Exchange installation, use the Exchange Server Setup Wizard to complete the post-installation tasks. This process reverts the node name to original name.

To perform the Exchange post-installation

- 1 Verify the LUNs created to store the registry replication information and the Exchange database are connected to this node and disconnected from other nodes in the cluster.
- 2 If the Exchange installation did not prompt you to reboot the node, click Continue from the Exchange Server Setup Wizard and proceed to [step 4](#). If you rebooted the node after Microsoft Exchange installation, the Exchange Server Setup Wizard is launched automatically.
- 3 Review the information in the Welcome panel and click **Next**.

- 4 A message appears informing that the system will be renamed and restarted after you quit the wizard. Click **Yes** to continue.
- 5 The wizard starts performing the post-installation tasks. Various messages indicate the status. After all commands are executed, click **Next**.
- 6 Specify whether you want to add the node to the SystemList of the service group for the EVS selected in the pre-installation step. You must do so only if service groups are already configured for the EVS.
If you wish to add the nodes later, you can do so by using the Exchange service group configuration wizard.
- 7 Click **Finish**.
- 8 The wizard prompts you to reboot the node. Click **Yes**.
Changes made during the post-installation steps do not take effect till you reboot the node.

Backing up and restoring the Exchange disk group

A DR installation of Microsoft Exchange does not create Exchange data files. Therefore, after installing Exchange on the secondary site, you must back up the Exchange disk group on the primary site and then restore it on the secondary site. Make sure you restore the data at the same path at the secondary site as on the primary site.

Complete the following tasks:

- On the primary site, back up all volumes in the Exchange disk group.
- Restore the group in the corresponding location on the secondary site.

See the Network Appliance documentation for instructions on restoring data.

Note: Perform this step *only once* at the secondary site.

Configuring the Exchange service group at the secondary site

Configuring the Exchange service group involves creating an Exchange service group and defining the attribute values for its resources.

See [Chapter 4, “Configuring the service group”](#) on page 67 for more information.

- Make sure the service group has the same name as in the primary site cluster.
- Make sure you configure NetApp SnapMirror resources in the service group.
- Do not bring the service group online.

Note that the service group may be partially online because the LUNs are connected to the node.

Configuring replication using Network Appliance SnapMirror

You can replicate Exchange data by establishing a SnapMirror relationship between the filers at the primary and secondary sites. Before configuring replication, make sure the service group is offline at the secondary site. SnapMirror replicates snapshots taken on a filer and applies them to a remote filer over a wide area network; these snapshots can be used by the target host to provide rapid failover in case of a disaster.

You can transfer the initial base snapshot image from the primary to secondary via tape, and then set up incremental SnapMirror updates to the destination filer.

Refer to Network Appliance documentation for more information.

Configuring NetAppSnapMirror resources at the primary site

Configure NetAppSnapMirror resources at the primary site to monitor data replication from the primary site to the secondary site. The following steps describe how to add the resources using the Exchange Server Configuration Wizard.

You may want to repeat this procedure and create a NetAppSnapMirror resource at the secondary site. This is required in cases where:

- the service group is online at the secondary site (either it is failed over or switched to the secondary site) and the filer should replicate from secondary to primary site
- if you want to fail over or switch the service group from the secondary to the primary site

To configure SnapMirror resource using Exchange Server Configuration Wizard

- 1 Verify the LUNs created to store the registry replication information and the Exchange database are connected to this node and disconnected from other nodes in the cluster.
- 2 Start the Exchange Server Configuration Wizard. Click **Start > All Programs > Symantec > Veritas Cluster Server > Configuration Wizards > Application Agent for Exchange Server 2007 > Exchange Server 2007 Configuration Wizard**.
- 3 Review the information in the Welcome panel and click **Next**.
- 4 In the Wizard Options panel, click **Modify service group**, click the service group to be modified, and click **Next**.
- 5 In the Service Group Configuration panel, verify the list of systems in the service group and click **Next**.
- 6 In the Exchange Server Configuration panel, check **Configure the NetApp SnapMirror resource(s)** and click **Next**.
- 7 Accept default values in the subsequent dialog boxes and click **Next** till you reach the wizard completion panel.
- 8 In the Completing the Exchange Configuration panel, uncheck the **Bring the service group online** check box and click **Finish**.

Linking clusters at primary and secondary sites

Once all the setup tasks are completed at the primary and secondary sites, you must link the clusters at both the sites. The VCS Java Console provides a wizard to create global cluster by linking standalone clusters.

For instructions, see the chapter on Administering Global Clusters from Cluster Manager (Java Console) in the *Veritas Cluster Server Administrator's Guide* for instructions.

Making the Exchange service group global

After linking the clusters at the primary and secondary sites, use the Global Group Configuration wizard of the Java Console to convert the Exchange service group from a local service group to a global service group. This will enable the Exchange service group to fail over across clusters.

For instructions, see the chapter on Administering Global Clusters from Cluster Manager (Java Console) in the *Veritas Cluster Server Administrator's Guide* for instructions.

Managing failover in a disaster recovery environment

In a disaster recovery configuration, VCS first attempts to fail over the application to a node in the local cluster. If all nodes in the local cluster are unavailable, or if a disaster strikes the site, VCS attempts to fail over the application to the remote site.

Remote failover involves starting the Exchange services on a node in the remote cluster. In case of an administrative failover, this also involves reversing the direction of replication by demoting the original source to a target, and replicating from the new source.

Managing a successful remote failover

For a successful failover, you must perform the following tasks after the service group comes online at the remote site.

To manage a successful failover

- 1 Freeze the Exchange service group at the remote site.
- 2 Restore Exchange data from the latest valid database snapshot using the Network Appliance SnapManager Restore utility.
- 3 Unfreeze the Exchange service group.

Managing failover in response to a network outage

In the event that the public network or the private storage network at the local cluster fails, the application fails over to the remote site. Perform the following tasks to ensure a proper failover.

To ensure a proper failover

- 1 Freeze the service group at the local site.
- 2 Restore the network connections. You may see concurrency violation errors in the engine log. Ignore these errors.
- 3 Unfreeze the service group.
- 4 Take the service group offline at the local site.

- 5 Freeze the service group at the remote site.
- 6 Restore Exchange data from the latest valid database snapshot using the Network Appliance SnapManager Restore utility.
- 7 Unfreeze the Exchange service group.

Switching the service group back to the local cluster

When the application fails over to a remote site, switching the application back to the local site involves the following additional tasks, depending on whether the failover was administrative or in response to a disaster.

Administrative failover

In case of an administrative failover, VCS brings the service group online at the remote site and reverses the direction of replication.

To switch the application back to the local cluster

- 1 Back up the Exchange data using Network Appliance SnapManager. See the Network Appliance documentation for instructions.
- 2 Switch the service group.
 - In the Service Groups tab of the Cluster Explorer configuration tree, right-click the service group.
 - Click **Switch To**, and click **Remote switch**.
 - Select a system at the local site and click **OK**.

Failover in response to a disaster

In the event that a disaster strikes the local cluster and the application fails over to the remote site, data is written to the LUNs at the remote site. When the local site comes up again, the Exchange data at both sites is out-of-sync.

To switch the application back to the local cluster

- 1 Synchronize the Exchange data at both sites by running the `fbsync` action at the site at which the service group is online.

```
# hares -action SnapMirror_rename fbsync -sys node_name
```

The variable `SnapMirror_rename` represents the name of the SnapMirror resource; `node_name` represents the node on which the service group is online.
Run the action for each SnapMirror resource.
- 2 Back up the Exchange data using Network Appliance SnapManager. See the Network Appliance documentation for instructions.
- 3 Switch the service group.
 - In the Service Groups tab of the Cluster Explorer configuration tree, right-click the service group.
 - Click **Switch To**, and click **Remote switch**.
 - Select a system at the local site and click **OK**.

Removing the software

This chapter describes steps to remove VCS for Network Appliance SnapMirror.

Prerequisites

- From the Exchange service group SystemList, remove the node where you are removing Microsoft Exchange.
- Verify that the user mailboxes and routing group connectors are deleted from the system where you are removing Microsoft Exchange.

See “[Troubleshooting Microsoft Exchange uninstallation](#)” on page 118 to resolve errors encountered while removing Microsoft Exchange.

Overview of tasks

Removing VCS for Network Appliance SnapMirror from a cluster node involves the following tasks:

- Remove Microsoft Exchange Server from the node using the Exchange Server Setup Wizard for VCS.
See “[Removing Microsoft Exchange](#)” on page 106 for instructions.
- Remove the VCS configuration from the node using VCS Configuration wizard (VCW).
See “[Removing the VCS configuration](#)” on page 108 for instructions.
- Remove VCS for Network Appliance SnapMirror.
See “[Removing the agents](#)” on page 108 for instructions.

Removing Microsoft Exchange

The Exchange Server Setup Wizard for VCS performs the following tasks for removing Microsoft Exchange from a node:

- If the node being removed is configured to host other Exchange virtual servers, the wizard removes the node from the SystemList of the service group for the specified Exchange virtual server. The wizard does not remove Microsoft Exchange from the node.
See “[Removing a node without removing Microsoft Exchange](#)” on page 106 for instructions.
- If the node being removed is not configured to host other Exchange virtual servers, the wizard removes the node from the SystemList of the service group for the specified Exchange virtual server. The wizard also removes Microsoft Exchange from the node by launching the Microsoft Exchange Installation wizard.
See “[Removing a node and removing Microsoft Exchange](#)” on page 107 for instructions.

Note: If you are uninstalling Microsoft Exchange from all nodes in the cluster, delete the service group after taking it offline.

Removing a node without removing Microsoft Exchange

These steps describe how to remove a node without removing Microsoft Exchange.

To remove a node without removing Microsoft Exchange

- 1 Start the Exchange Server Setup Wizard for VCS. Click **Start > All Programs > Symantec > Veritas Cluster Server > Configuration Wizards > Application Agent for Exchange Server 2007 > Exchange Server 2007 Setup Wizard**.
- 2 Review the information in the Welcome panel and click **Next**.
- 3 In the Available Option panel, click **Configure/Remove highly available Exchange Server** and click **Next**.
- 4 In the Select Option panel, click **Remove Exchange Server** and click **Next**.
If an Exchange service group is configured on the node, the wizard prompts you to remove the system from the service group’s SystemList attribute. Resolve the error and rerun the Exchange Server Setup Wizard.
- 5 Select the Exchange virtual server for which you are removing the failover node and click **Next**.

- 6 The wizard starts running commands to set up the VCS environment for removing the node from the Exchange service group. Various messages indicate the status of each command. Once all the commands are executed, click **Next**.
- 7 Click **Finish**.
 Proceed to “[Removing the agents](#)” on page 108 for instructions on uninstalling the VCS agent for Exchange.

Removing a node and removing Microsoft Exchange

These steps describe how to remove a node and remove Microsoft Exchange.

To remove a node and remove Microsoft Exchange

- 1 Start the Exchange Server Setup Wizard for VCS. Click **Start > All Programs > Symantec > Veritas Cluster Server > Configuration Wizards > Application Agent for Exchange Server 2007 > Exchange Server 2007 Setup Wizard**.
- 2 Review the information in the Welcome panel and click **Next**.
- 3 In the Available Option panel, click **Configure/Remove highly available Exchange Server** and click **Next**.
- 4 In the Select Option panel, click **Remove Exchange Server** and click **Next**. If an Exchange service group is configured on the node, the wizard prompts you to remove the system from the service group’s SystemList attribute. Resolve the error and rerun the Exchange Server Setup Wizard.
- 5 Select the Exchange virtual server for which you are removing the failover node and click **Next**.
- 6 A message appears informing that the system will be renamed and restarted after you quit the wizard. Click **Yes** to continue.
- 7 The wizard starts running commands to set up the VCS environment for removing the node from the Exchange service group. Once all the commands are executed, click **Next**.
 If the node is the last node in the Exchange service group, the wizard prompts you to choose whether you want to retain the entry for the EVS in the Active Directory. Click **Yes** to remove the entry or **No** to retain the entry.
- 8 Click **Reboot**. The wizard prompts you to restart the node. Click **Yes** to restart the node.
 If you have other applications running, click **No**, close all applications, and restart the node manually.

- 9 Restarting the node automatically launches the Exchange Server Setup Wizard for VCS. Review the information in the Welcome dialog box and click **Next**.
- 10 A message appears informing that the system will be renamed and restarted after you quit the wizard. Click **Yes** to continue.
- 11 In the Microsoft Exchange Installer Welcome panel, read the welcome information and click **Next**.
- 12 In the Server Role Selection panel, clear the **Mailbox Role** check box and the **Management Tools** check box if applicable, and then click **Next**. The Exchange installer will proceed with the uninstallation.
- 13 In the completion panel, click **Finish**.
Do not reboot the node at this stage. The Exchange Server Setup Wizard for VCS must complete its operations before the node is rebooted.
- 14 The Exchange Server Setup Wizard for VCS will be launched automatically. The wizard performs the post-uninstallation tasks. Once all the tasks are complete, click **Next**.
- 15 Click **Finish**. The wizard prompts you to restart the node. Click **Yes** to restart the node.
If you have other applications running, click **No**, close all applications, and restart the node manually.

Removing the VCS configuration

Before you remove the VCS for Network Appliance SnapMirror, use the VCS Configuration Wizard (VCW) to delete the VCS configuration from all nodes where Microsoft Exchange Server was uninstalled using the Exchange Server Setup Wizard for VCS.

For instructions, see the chapter on Modifying the Cluster Configuration in the *Veritas Cluster Server Administrator's Guide*.

Removing the agents

This section describes steps for uninstalling VCS for Network Appliance SnapMirror using the Veritas Product Installer.

You can also perform a silent uninstallation of the software from the command prompt. For more information, including the command syntax, see [“Installing the software from the command line”](#) on page 29.

Prerequisites

- Verify that you have local administrative privileges on the node where you are removing the agent.
- Verify that all Exchange service groups are offline on all nodes in the cluster.

Instructions

Follow these steps to removing VCS for Network Appliance SnapMirror.

To remove VCS for Network Appliance SnapMirror

- 1 In the **Add/Remove Programs** applet, click VCS for Network Appliance (Server Components) and click **Remove**.
- 2 Review the Welcome page and click **Next**.
- 3 Select the check box if you want to remove the client components and click **Next**.
- 4 Specify the nodes from which you want to remove the agents.
 - Select the node. This may take some time depending on the size of the domain and network conditions.
 - Click **Add**. To remove a node, highlight the node in the computer list and click **Remove**.
 - Click **Next**.
- 5 The installer validates the system for removal. After the node is accepted, click **Next**.

If a node is rejected, the **Comments** column displays the cause for rejecting the node. Highlight the node to view a detailed information about the failure in the **Details** box. Resolve the error, highlight the node in the selected systems list, and click **Validate Again**. Once all the nodes are accepted, click **Next**.
- 6 Review the summary of your selections and click **Uninstall**. The installer displays the status.
- 7 After the uninstallation is complete, review the report and click **Next**.
- 8 Click **Finish**.

License management

The product installer also allows you to add or remove license keys for options in your installation of VCS for NetApp SnapMirror components.

To add or remove license keys

- 1 Open the Windows Control Panel and click **Add or Remove Programs**.
- 2 Select **VCS for Network Appliance (Server Components)** and click **Change**.
- 3 The Symantec Product Installer screen appears. Select **License Management**. Click **Next**.
- 4 The license key screen appears. Enter the license key you want to add and click **Update**. If you want to remove a license key, select the license key in the Licenses field and click **Remove**.

Troubleshooting the agents

This chapter describes how to troubleshoot common problems in the VCS agents for Network Appliance and Microsoft Exchange. The chapter lists the error messages, and describes the problem associated with the agent. Recommended solution is included, where applicable.

VCS logging

VCS generates two error message logs: the engine logs and the agent logs. Log file names are appended by letters. Letter A indicates the first log file, B the second, C the third, and so on.

The agent log is located at %VCS_HOME%\log\agent_A.txt. The format of agent log messages is:

Timestamp (Year/MM/DD) | Mnemonic | Severity | UMI | Agent Type |
Resource Name | Entry Point | Message Text

A typical agent log resembles:

```
2006/12/19 15:09:22 VCS INFO V-16-20024-13
ExchService2007:d1-ExchService2007-MSEExchangeIS:online:Service
(MSEXCHANGEIS) is taking longer to start. Timeout = 10 seconds
```

Here,

- Timestamp denotes the date and time when the message was logged.
- Mnemonic denotes which Symantec product logs the message. For VCS application agent for Microsoft Exchange, mnemonic is 'VCS'.
- Severity denotes the seriousness of the message. Severity of the VCS error messages is classified into the following types:

- CRITICAL indicates a critical error within a VCS process. Contact Technical Support immediately.
- ERROR indicates failure of a cluster component, unanticipated state change, or termination or unsuccessful completion of a VCS action.
- WARNING indicates a warning or error, but not an actual fault.
- NOTE informs that VCS has initiated an action.
- INFO informs about various state messages or comments.
Of these, CRITICAL, ERROR, and WARNING indicate actual errors. NOTE and INFO provide additional information.
- UMI or Unique Message ID is a combination of Originator ID, Category ID, and Message ID. For example, the UMI for a message generated by the ExchService agent would resemble: V-16-20024-13
Originator ID for all VCS products is 'V-16.' Category ID for ExchProtocol agent is 20023 while that for ExchService agent is 20024. Message ID is a unique number assigned to the message text.
- Message text denotes the actual message string.

You can view these message logs using Notepad or any text editor. All messages are logged to the engine and the agent logs. Messages of type CRITICAL and ERROR are also written to the Windows event log.

Network Appliance agents error messages

This section describes the error messages for the NetApp agents.

Table 9-1 Network Appliance agents error messages

Message	Description
Failed to open connection to filer %s.	<p>Make sure that the VCS Helper Service account has domain admin privileges and is part of the administrator's group on the local host and the filer.</p> <p>Make sure the private network is functioning properly. Verify you can ping the IP used for the private storage network. This is the IP defined the StorageIP attribute of the NetAppFiler resource.</p>
Failed to initialize ONTAPI on system	<p>The agent could not find the file NTAPADMIN.DLL on the system. Verify the file exists in the %VCS_HOME%\bin directory</p>
Invalid attributes exist in the configuration	<p>Some agent attributes have not been defined or have been defined incorrectly. Verify the configuration definition for the agent.</p>
<i>ONTAP API called failed for object_name on filer_name.</i>	<p>The specified API failed on the specified object. See the NetApp ONTAP API documentation for information about the associated error message</p>
Volume %s on filer %s is not a SnapMirror replicated volume	<p>Verify replication is set up on the specified volume.</p>
Multiple snapmirror destinations for a volume is not supported by this agent. 'snapmirror status' for volume %s on filer %s returned multiple status entries. Administrative intervention required	<p>There should be only one destination per source volume.</p>

Table 9-1 Network Appliance agents error messages (continued)

Message	Description
Initialize VLibNetAppHost::Initialize() failed. (error_type: %s, error_code: 0x%s)	The agent could not detect the iSCSI or the FC Initiator on the host. Make sure that you have installed and configured Microsoft iSCSI Initiator or an FC Initiator on each node.
Failed to connect/disconnect virtual disk. (error_type: %s, error_code: 0x%s. error_message: %s)	This could occur because one or more of the following parameters are defined incorrectly in the VCS configuration: <ul style="list-style-type: none"> ■ Filer name ■ Volume name/LUN name ■ Share name ■ Storage IP Verify the configuration definition of the resource. Make sure each attribute is defined correctly.
Unable to create/delete online lock file %s. Error code %s,	Make sure you have write permissions on the specified directory.

Exchange Service agent error messages

This section describes the error messages for the Exchange Service agent.

Table 9-2 Exchange Service agent error messages

Message	Description
Failed to find the service object. Please check the 'Service' attribute.	The value specified for the “Service” attribute is incorrect. Solution: Provide a valid value for the Lanman resource. If the value is correct, see error type and error code for further information.
Failed to open the service object.(Service = <i>service name</i>). <i>Error Type, Error Code</i> .	The agent failed to open the service object. Solution: See the associated Windows error type and error code for more information.
Failed to get the state of the service (<i>service name</i>). <i>Error Type, Error Code</i> .	The agent failed to retrieve the state of the service. Solution: See the associated Windows error type and error code for more information.
Failed to start the service (<i>service name</i>) <i>Error Type, Error Code</i> .	The agent failed to start the specified service. Solution: See the associated Windows error type and error code for more information.
Failed to stop the service (<i>service name</i>). <i>Error Type, Error Code</i> .	The agent failed to stop the service. Solution: See the associated Windows error type and error code for more information.
Failed to kill the service (<i>service name</i>) <i>Error Type, Error Code</i> .	The agent failed to terminate the service. Solution: See the associated Windows error type and error code for more information.

Table 9-2 Exchange Service agent error messages (continued)

Message	Description
Configuration error. 'Service' attribute is not configured.	<p>No value specified for the “Service” attribute.</p> <p>Solution: Specify a valid value for the attribute.</p>
Configuration error. 'LanmanResName' attribute is not configured.	<p>No value specified for the “LanManResName” attribute.</p> <p>Solution: Specify a valid value for the attribute.</p>
The (<i>service name</i>) service is in STARTED state but is not running under the context of Virtual Server (<i>virtual server name</i>).	<p>The Exchange service is already running, but not in the context of the virtual server name.</p> <p>Solution: Stop the service and bring the corresponding ExchService2007 resource online.</p>
Failed to set the virtual environment for service: (<i>service name</i>). <i>Error Type, Error Code</i> .	<p>The agent failed to set the environment block for the service.</p> <p>The agent needs to set the environment block for starting the service in the context of the virtual server name.</p> <p>Solution: See the associated Windows error type and error code for more information.</p>
Failed to remove virtual environment for Service = (<i>service name</i>). <i>Error Type, Error Code</i> .	<p>The agent failed to remove the environment block for the service.</p> <p>While taking the resource offline, the agent stops the service and removes the environment block.</p> <p>Solution: See the associated Windows error type and error code for more information.</p>
Configuration error. \"LanmanResName\" attribute is not configured.	<p>No value specified for the “LanmanResName” attribute.</p> <p>Solution: Specify a valid value for the attribute.</p>

Table 9-2 Exchange Service agent error messages (continued)

Message	Description
<p>Configuration error. DetailMonitoringInterval attribute is greater than zero but DBList is empty. No database is specified for detail monitoring.</p>	<p>Detail monitoring for databases is enabled and the monitoring interval (DetailMonitor attribute) is also specified. But there are no databases selected. The DBList attribute is empty.</p> <p>Solution: Select the databases for the detail monitoring.</p>
<p>FaultOnMountFailure flag is true. \"Auto Mount\" on database: (<i>database names</i>) is enabled but database is dismounted. Agent will return status as offline."</p>	<p>The attribute FaultOnMountFailure is set to True for databases that are set to mount automatically on startup. But these databases are dismounted. So the agent will fault the service group.</p>
<p>\"Auto Mount\" on database: (<i>database names</i>) is enabled but database is dismounted. Agent will return status as Unknown.</p>	<p>Databases that are set to mount automatically on startup are dismounted. If these databases are selected for detail monitoring, the agent will return an Unknown status and appropriate administrative action is required.</p>
<p>Failed to add computer account to 'Exchange Servers' group <i>Error Type, Error Code.</i></p>	<p>Unable to add the computer account to the Exchange Servers group.</p> <p>Solution: Make sure that the user has permissions to add computer accounts to the Exchange Servers group. If the user has those permissions, see the error type and error code for further information.</p>

Troubleshooting Microsoft Exchange uninstallation

You might encounter errors while removing Microsoft Exchange if any of the following requirements are not adhered to:

- User mailboxes exist.
- The Exchange Server to be uninstalled has routing group connectors configured.
- Public folder databases exist.

In any of the above scenarios, complete the following steps to resolve the error:

- 1 Start the following Exchange services manually using the Service Control Manager:
 - MExchangeSA
 - MExchangeIS
- 2 Move or delete user mailboxes. See the Exchange documentation for instructions.
- 3 Move or delete public folder. See the Exchange documentation for instructions.
- 4 Stop all Exchange services started in Step 1.
- 5 Start the Exchange Server Setup Wizard for VCS and select the **Remove Exchange** option. Note that you must uninstall Exchange only by using the Exchange Server Setup Wizard for VCS.

Troubleshooting Exchange Setup Wizard issues

This section describes some of the issues related to the Exchange Setup Wizard for VCS.

Exchange Setup Wizard may fail to rename the node

When adding a failover node to an existing Exchange cluster, the Exchange Setup Wizard may fail to rename the node during the pre-installation phase, and report the following error message:

```
Failed to rename the node. Refer to the log file for further details.
```

This can happen if the Exchange Setup Wizard is unable to delete the Exchange Virtual Server computer object in the Active Directory.

To resolve this issue, you must manually delete the Exchange Virtual Server computer object from the AD, and run the wizard again.

Exchange Setup Wizard may fail while moving the Exchange databases

When moving the Exchange databases to shared storage, the Exchange Setup Wizard may fail. This may happen if the DNS entry for the Exchange virtual server does not exist. Check if the DNS entry exists.

To resolve this issue, you must add the DNS entry manually.

Exchange database status appears as unknown

The status of the Exchange databases appears as unknown. This may happen even if the Microsoft Exchange Information Store (MSEExchangeIS) service is running.

To resolve this issue, check if the DNS entry for the Exchange virtual server exists. If it does not, add the DNS entry manually.

Resource type definitions

This appendix lists the resource type definitions and attribute definitions of the agents. The resource type represents the VCS configuration definition of the agent and specifies how the agent is defined in the configuration file `main.cf`. The Attribute Definitions lists the attributes associated with the agent. The Required attributes table lists the attributes that must be configured for the agent to function properly.

NetApp Filer agent

The NetApp Filer agent is configured as a resource of type `NetAppFiler`.

Resource type definition

```
type NetAppFiler (
    static int MonitorInterval = 30
    static i18nstr ArgList[] = { FilerName, StorageIP }
    static str Operations = None
    str FilerName
    str StorageIP
)
```

Attribute definitions

Table A-1 NetApp Filer agent attributes

Attribute	Type - Dimension	Description
FilerName	string-scalar	DNS-resolvable name or IP address of the locally attached filer.
StorageIP	string -scalar	The private storage IP address of the filer.

NetApp SnapDrive agent

NetApp SnapDrive agent is configured as a resource of type NetAppSnapDrive.

Resource type definition

```

type NetAppSnapDrive (
    static int MonitorInterval = 30
    static int NumThreads = 1
    static i18nstr ArgList[] = { FilerResName,
    "FilerResName:FilerName", "FilerResName:StorageIP", VolumeName,
    ShareName, LUN, MountPath, Initiator, InitiatorMonitorInterval }
    str FilerResName
    str VolumeName
    str ShareName
    str LUN
    str MountPath
    str Initiator[]
    int InitiatorMonitorInterval = 30
)

```

Attribute definitions

Table A-2 NetApp SnapDrive agent attributes

Attribute	Type - Dimension	Description
FilerResName	string-scalar	Name of the VCS NetAppFiler-type resource in the service group.
VolumeName	string-scalar	Name of the volume containing the virtual disk. Define the volume name in the same case as on the filer.
ShareName	string-scalar	Name of the CIFS share containing the virtual disk.
LUN	string-scalar	Name of the LUN (virtual disk) on the filer that is presented to the host for mounting. Define the LUN name in the same case as on the filer.
MountPath	string-scalar	Drive letter to be assigned to the virtual disk.
Initiator	string-vector	<i>Name of iSCSI or FC initiator the host uses to connect virtual disks. You can retrieve this value from the Disk Management console.</i>

NetApp SnapMirror agent

NetApp SnapMirror agent is configured as a resource of type NetAppSnapMirror.

Resource type definition

```
type NetAppSnapMirror (
  static keylist SupportedActions = { fbsync }
  static int MonitorInterval = 300
  static int NumThreads = 1
  static il8nstr ArgList[] = { FilerResName,
    "FilerResName:FilerName",
    "FilerResName:StorageIP", VolumeName,
  SnapMirrorArguments,
    SnapMirrorSchedule, AppResName }
  str FilerResName
  str VolumeName
  str SnapMirrorArguments
  str SnapMirrorSchedule
  str AppResName
)
```

Attribute definitions

Table A-3 NetApp SnapMirror agent attributes

Attribute	Type - Dimension	Description
FilerResName	string-scalar	Name of the VCS NetAppFiler-type resource in the group.
VolumeName	string-scalar	Name of the filer volume that is to be mounted via iSCSI. Define the volume name in the same case as on the filer.
SnapMirrorArguments	string-scalar	Specifies the SnapMirror arguments such as maximum transfer speed and restart mode.
SnapMirrorSchedule	string-scalar	Specifies the schedule the destination uses for updating data. Do not assign a value for this attribute if you use SnapManager. By default, this attribute does not have any value.

Table A-3 NetApp SnapMirror agent attributes (continued)

Attribute	Type - Dimension	Description
AppResName	string-scalar	Name of the resource configured to monitor the application being made highly available.

Exchange Service agent

The Exchange Service agent is configured as a resource of type ExchService2007.

Resource type definition

```
type ExchService2007 (
    static i18nstr ArgList[] = {Service,
        "LanmanResName:VirtualName", DetailMonitor,
        FaultOnMountFailure, DBList}
    str Service
    str LanmanResName
    int DetailMonitor = 0
    boolean FaultOnMountFailure = 0
    i18nstr DBList[]
)
```

Attribute definitions

Table A-4 Exchange Service agent required attributes

Required Attributes	Type - Dimension	Definition
Service	string-scalar	<p>The name of the Exchange service to be monitored. This attribute could take any of the following values:</p> <ul style="list-style-type: none"> ■ MExchangeADTopology ■ MExchangeIS ■ MExchangeMailSubmission ■ MExchangeSA ■ MExchangeMailboxAssistants ■ MExchangeServiceHost ■ MExchangeTransportLogSearch ■ MExchangeSearch ■ msftesql-Exchange ■ MExchangeMonitoring ■ MExchangeRepl
LanmanResName	string-scalar	<p>The name of the LANMAN resource on which the ExchService2007 resource depends.</p>

Table A-5 Exchange Service agent optional attributes

Optional Attribute	Type - Dimension	Definition
DetailMonitor	integer-scalar	<p>The interval at which the agent performs detail monitoring on the databases specified in the DBList attribute.</p> <p>The default value 5 indicates that the agent performs detail monitoring on every 5th monitor cycle.</p> <p>Setting this value to 0 disables detail monitoring.</p>
FaultOnMountFailure	boolean-scalar	<p>This flag is used to control the agent behavior in case of detail monitoring. It is applicable to Exchange databases that are selected for detail monitoring.</p> <p>If this flag is set to true and a database that is set to mount automatically on startup is dismantled, the agent will fault the service group.</p> <p>The default value is 0 (false).</p>
DBList	string-vector	<p>List of databases for which the agent will perform detail monitoring.</p>

Detail monitoring and agent behavior

You can configure the VCS agent for Exchange Server 2007 to perform detail monitoring on Exchange databases by specifying the desired databases in the DBList attribute. The frequency at which the agent monitors the database is determined by the Detail Monitor attribute.

If you have selected certain databases but do not want the agent to perform detail monitoring on those databases, you do not have to delete the selected databases from the DBList attribute. You can disable detail monitoring by just setting the value of the Detail Monitor attribute to 0. That way, you do not have to select the databases again.

[Table A-6](#) describes the agent behavior depending on the state of the databases selected for detail monitoring and the FaultonMountFailure attribute settings.

Table A-6 Detail monitoring and agent behavior

Exchange database set to mount on startup	Exchange database state	FaultonMountFailure attribute value	Agent state
Yes	Mounted	Does not matter	Online
Yes	Dismounted	1 (True)	Offline (Service group will fault)
		0 (False)	Unknown (Administrative action required)
No	Mounted	Does not matter	Online
No	Dismounted	Does not matter	Unknown (Administrative action required)

You may want to dismount the Exchange databases for performing certain administrative operations. In such cases, to avoid the agent from faulting the service group, you can set the FaultonMountFailure attribute value to 0 (false), and then dismount the database and perform the operations.

Once done, you can again mount the databases, set the FaultonMountFailure attribute to 1 (true) and restore the agent behavior to fault the service group if a database is dismounted.

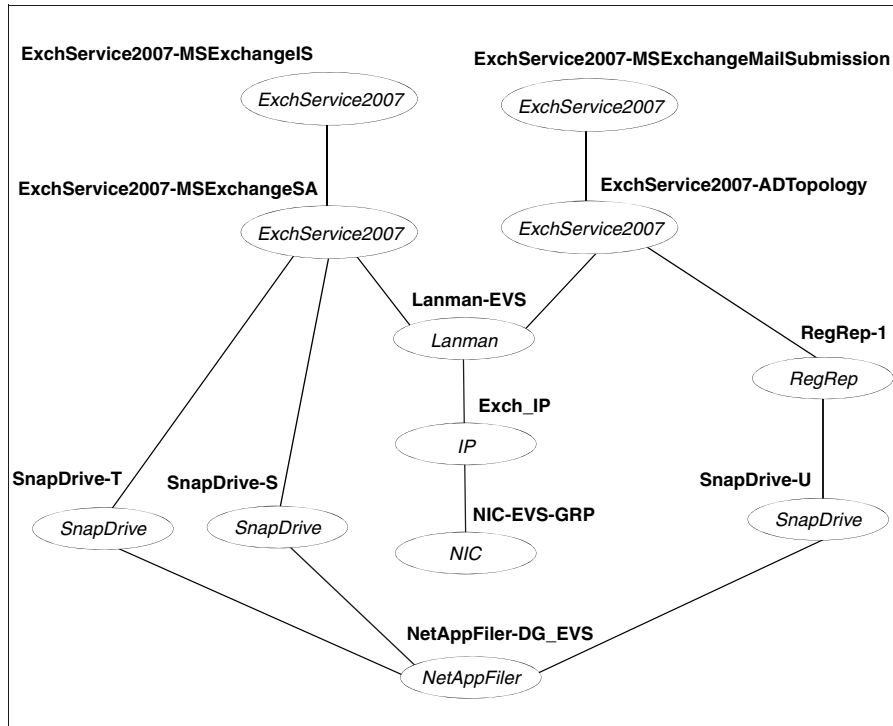
Sample configuration

The sample configurations in this appendix describe typical service groups configured to monitor the state of the Exchange Server in a VCS cluster. The appendix lists the sample configuration for clusters using Network Appliance filers to manage shared storage.

The sample configuration graphically depicts the resource types, resources, and resource dependencies within the service group. The sample configuration files (main.cf) are also included for your reference. For more information about these resource types, see the chapter *Veritas Cluster Server Bundled Agents Reference Guide*.

Dependency graph (local cluster configuration)

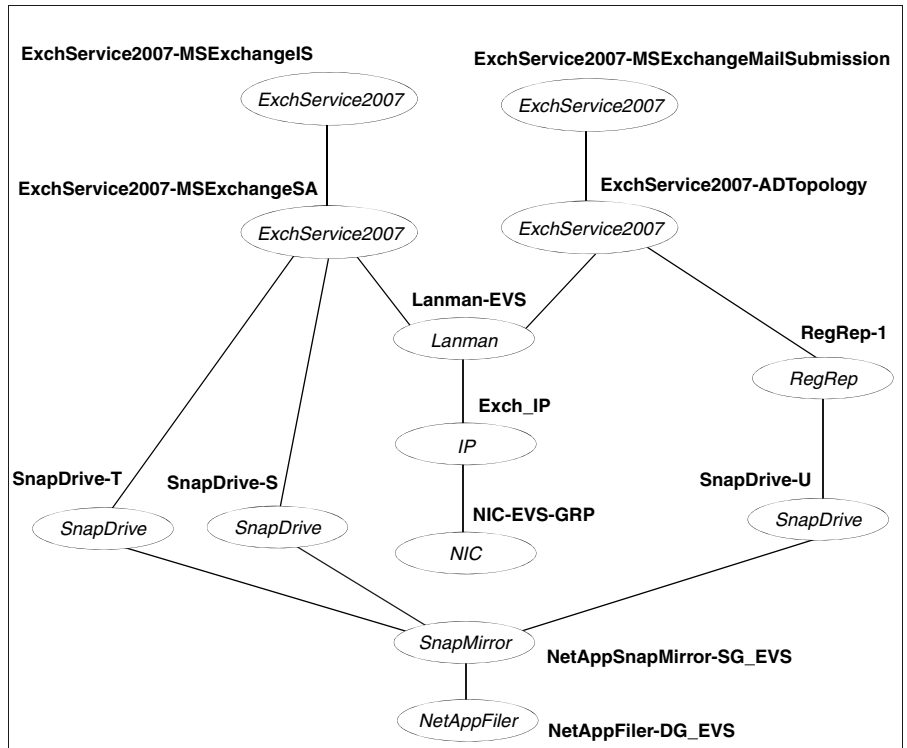
The following dependency graph shows a VCS service group that has Network Appliance related resources.



- Three LUNs are mounted as drives T, S, and U respectively, using the SnapDrive agent.
The Registry Replication resource, configured to replicate the Exchange registry keys, is set up on LUN U of the cluster disk group. The Exchange database is installed on LUN S.
- The Exchange services (MSEExchangeSA, MSEExchangeIS, MSEExchangeADTopology, and MSEExchangeMailSubmission) are configured as resources of type ExchService2007.
- The virtual name for the server is created using the Lanman resource.
The service group virtual IP address for the server is configured using the IP and NIC resource types.

Dependency graph (disaster recovery configuration)

The following dependency graph shows a VCS service group in a cluster that is a part of a global cluster.



Sample configuration (local cluster configuration)

```
include "types.cf"

cluster cle12 (
    SecureClus = 1
)

system VCSW2K287 (
    Limits = { ExchLoad = 10 }
)

system VCSW2K288 (
    Limits = { ExchLoad = 10 }
)

group A2 (
    SystemList = { VCSW2K288 = 0, VCSW2K287 = 1 }
    Prerequisites = { ExchLoad = 10 }
)

ExchService2007 A2-ExchService2007-MSEExchangeSA (
    Service = MSEExchangeSA
    LanmanResName = A2-Lanman
)

ExchService2007 A2-ExchService2007-MSEExchangeIS (
    Service = MSEExchangeIS
    LanmanResName = A2-Lanman
)

ExchService2007 A2-ExchService2007-MSEExchangeMailSubmission (
    Service = MSEExchangeMailSubmission
    LanmanResName = A2-Lanman
)

ExchService2007 A2-ExchService2007-MSEExchangeADTopology (
    Service = MSEExchangeADTopology
    LanmanResName = A2-Lanman
)

ExchService2007 A2-ExchService2007-MSEExchangeMailboxAssistants
(
    Service = MSEExchangeMailboxAssistants
    LanmanResName = A2-Lanman
)

ExchService2007 A2-ExchService2007-MSEExchangeServiceHost (
    Service = MSEExchangeServiceHost
    LanmanResName = A2-Lanman
)
```

```
)  
  
ExchService2007 A2-ExchService2007-MSEExchangeTransportLogSearch  
(  
    Service = MSEExchangeTransportLogSearch  
    LanmanResName = A2-Lanman  
)  
  
ExchService2007 A2-ExchService2007-MSEExchangeSearch (  
    Service = MSEExchangeSearch  
    LanmanResName = A2-Lanman  
)  
  
ExchService2007 A2-ExchService2007-msftesql-Exchange (  
    Service = msftesql-Exchange  
    LanmanResName = A2-Lanman  
)  
  
ExchService2007 A2-ExchService2007-MSEExchangeMonitoring (  
    Service = MSEExchangeMonitoring  
    LanmanResName = A2-Lanman  
)  
  
ExchService2007 A2-ExchService2007-MSEExchangeRepl (  
    Service = MSEExchangeRepl  
    LanmanResName = A2-Lanman  
)  
  
IP A2-IP (  
    Address = "10.121.59.48"  
    SubNetMask = "255.255.253.0"  
    MACAddress @VCSW2K288 = "00-11-43-DD-F4-36"  
    MACAddress @VCSW2K287 = "00-11-43-DD-F4-80"  
)  
  
Lanman A2-Lanman (  
    VirtualName = ANY2  
    IPResName = A2-IP  
    DNSUpdateRequired = 1  
    ADUpdateRequired = 1  
    ADCriticalForOnline = 1  
)  
  
NIC A2-NIC (  
    MACAddress @VCSW2K288 = "00-11-43-DD-F4-36"  
    MACAddress @VCSW2K287 = "00-11-43-DD-F4-80"  
)  
  
NetAppFiler A2-NetAppFiler (  
    FilerName = winvm-netapp02  
    StorageIP = "10.121.57.8"  
)
```

Sample configuration (local cluster configuration)

```

NetAppSnapDrive A2-NetAppSnapDrive (
  FilerResName = A2-NetAppFiler
  VolumeName = vol18
  ShareName = data08
  LUN = "d85.lun"
  MountPath = T
  Initiator @VCSW2K288 = { "21:00:00:e0:8b:1c:cc:45",
    "21:00:00:e0:8b:90:74:1a" }
  Initiator @VCSW2K287 = { "21:00:00:e0:8b:0e:3a:6a" }
)

NetAppSnapDrive A2-NetAppSnapDrive-1 (
  FilerResName = A2-NetAppFiler
  VolumeName = vol18
  ShareName = data08
  LUN = "d84.lun"
  MountPath = S
  Initiator @VCSW2K288 = { "21:00:00:e0:8b:1c:cc:45",
    "21:00:00:e0:8b:90:74:1a" }
  Initiator @VCSW2K287 = { "21:00:00:e0:8b:0e:3a:6a" }
)

RegRep A2-RegRep (
  MountResName = A2-NetAppSnapDrive
  ReplicationDirectory = "\\VCS\Private\RegRep\Exch"
  Keys = {

"HKLM\SYSTEM\CurrentControlSet\Services\MSEExchangeADTopology" =
"",

"HKLM\SYSTEM\CurrentControlSet\Services\MSEExchangeIS" = "",

"HKLM\SYSTEM\CurrentControlSet\Services\MSEExchangeMailSubmissio
n" = "",

"HKLM\SYSTEM\CurrentControlSet\Services\MSEExchangeMailboxAssist
ants" = "",

"HKLM\SYSTEM\CurrentControlSet\Services\MSEExchangeMonitoring" =
"",

"HKLM\SYSTEM\CurrentControlSet\Services\MSEExchangeRepl" = "",

"HKLM\SYSTEM\CurrentControlSet\Services\MSEExchangeSA" = "",

"HKLM\SYSTEM\CurrentControlSet\Services\MSEExchangeSearch" = "",

"HKLM\SYSTEM\CurrentControlSet\Services\MSEExchangeServiceHost"
= "",

```

```

"HKLM\\SYSTEM\\CurrentControlSet\\Services\\MSExchangeTransportLogSearch" = "",

"HKLM\\SYSTEM\\CurrentControlSet\\Services\\msftesql-Exchange" = ""
}
    RestoreLocally = 1
)

A2-RegRep requires A2-NetAppSnapDrive
A2-NetAppSnapDrive requires A2-NetAppFiler
A2-Lanman requires A2-IP
A2-NetAppSnapDrive-1 requires A2-NetAppFiler
A2-ExchService2007-MSExchangeSA requires A2-RegRep
A2-ExchService2007-MSExchangeSA requires A2-Lanman
A2-ExchService2007-MSExchangeSA requires A2-NetAppSnapDrive-1
A2-ExchService2007-MSExchangeIS requires
A2-ExchService2007-MSExchangeSA
    A2-ExchService2007-MSExchangeMailSubmission requires
A2-ExchService2007-MSExchangeADTopology
    A2-ExchService2007-MSExchangeADTopology requires A2-RegRep
    A2-ExchService2007-MSExchangeADTopology requires A2-Lanman
    A2-ExchService2007-MSExchangeMailboxAssistants requires
A2-ExchService2007-MSExchangeADTopology
    A2-ExchService2007-MSExchangeServiceHost requires
A2-ExchService2007-MSExchangeADTopology
    A2-ExchService2007-MSExchangeTransportLogSearch requires
A2-ExchService2007-MSExchangeADTopology
    A2-ExchService2007-MSExchangeSearch requires
A2-ExchService2007-msftesql-Exchange
    A2-ExchService2007-msftesql-Exchange requires
A2-ExchService2007-MSExchangeADTopology
    A2-ExchService2007-MSExchangeMonitoring requires
A2-ExchService2007-MSExchangeADTopology
    A2-ExchService2007-MSExchangeRepl requires
A2-ExchService2007-MSExchangeADTopology
    A2-IP requires A2-NIC

```

Sample configuration (local cluster configuration)

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