



**EMC<sup>®</sup> NetWorker<sup>®</sup>**  
**VSS Client for Microsoft Windows Server 2003**  
First Edition

**Administration Guide**  
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**EMC Corporation**  
*Corporate Headquarters:*  
Hopkinton, MA 01748-9103  
1-508-435-1000  
[www.EMC.com](http://www.EMC.com)

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## Audience

This guide is part of the NetWorker VSS Client for Microsoft Windows documentation set, and is intended for use by system administrators during the setup and maintenance of the product.

Readers should be familiar with the following topics:

- ◆ EMC NetWorker
- ◆ EMC NetWorker Snapshot management
- ◆ Microsoft Volume Shadow Copy Service (VSS) technology

## Related documentation

Related documents include:

- ◆ *EMC NetWorker VSS Client for Microsoft Windows Server 2003 First Edition Installation Guide*
- ◆ *EMC NetWorker VSS Client for Microsoft Windows Server 2003 First Edition Release Notes*
- ◆ *EMC NetWorker, Release 7.3.2, Multiplatform Version, Administration Guide*
- ◆ *EMC Software Compatibility Guide*
- ◆ EMC Solutions Enabler documentation

## Conventions

EMC uses the following conventions:

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**Note:** A note presents information that is important, but not hazard-related.

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### **CAUTION**

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**A caution note contains information that is essential to avoid data loss.**

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## Typographical conventions

EMC uses the following type style conventions in this document:

<b>Normal</b>	Used in running (nonprocedural) text for: <ul style="list-style-type: none"> <li>Names of interface elements (such as names of windows, dialog boxes, buttons, fields, and menus)</li> <li>Names of resources, attributes, pools, Boolean expressions, buttons, DQL statements, keywords, clauses, environment variables, filenames, functions, utilities</li> <li>URLs, pathnames, filenames, directory names, computer names, links, groups, service keys, file systems, notifications</li> </ul>
<b>Bold:</b>	Used in running (nonprocedural) text for: <ul style="list-style-type: none"> <li>Names of commands, daemons, options, programs, processes, services, applications, utilities, kernels, notifications, system call, man pages</li> </ul> Used in procedures for: <ul style="list-style-type: none"> <li>Names of interface elements (such as names of windows, dialog boxes, buttons, fields, and menus)</li> <li>What user specifically selects, clicks, presses, or types</li> </ul>
<i>Italic:</i>	Used in all text (including procedures) for: <ul style="list-style-type: none"> <li>Full titles of publications referenced in text</li> <li>Emphasis (for example a new term)</li> <li>Variables</li> </ul>
<b>Courier:</b>	Used for: <ul style="list-style-type: none"> <li>System output, such as an error message or script</li> <li>URLs, complete paths, filenames, prompts, and syntax when shown outside of running text.</li> </ul>
<b>Courier bold:</b>	Used for: <ul style="list-style-type: none"> <li>Specific user input (such as commands)</li> </ul>
<i>Courier italic:</i>	Used in procedures for: <ul style="list-style-type: none"> <li>Variables on command line</li> <li>User input variables</li> </ul>
< >	Angle brackets enclose parameter or variable values supplied by the user
[ ]	Square brackets enclose optional values
	Vertical bar indicates alternate selections - the bar means "or"
{ }	Braces indicate content that you must specify (that is, x or y or z)
...	Ellipses indicate nonessential information omitted from the example

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**Your comments** Comments and suggestions about our product documentation are always welcome.

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<http://Powerlink.EMC.com>
2. Click the **Feedback** link.



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This chapter includes the following topics:

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## About the NetWorker VSS client

The EMC® NetWorker® VSS (Volume Shadow Copy Service) Client for Microsoft Windows works with Microsoft VSS technology to provide snapshot backup and recovery services for file systems, and application, and operating system data.

The NetWorker VSS client allows for the creation of point-in-time [snapshot](#) data. A snapshot can be retained on storage volumes for quick access. One can also perform a [rollover](#) of a snapshot to a traditional backup medium such as a tape, file type device, or advanced file type device. Data can be recovered either from a snapshot or from the rolled over backup.

---

## Supported configurations

This section describes the basic configurations in which the NetWorker VSS client is supported. A NetWorker VSS client can be set up in a LAN-based or LAN-free environment.

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### Simple LAN-based configuration

[Figure 1 on page 13](#) shows a simple LAN-based configuration with a storage area network. In a LAN-based configuration, the production data is stored on a storage area network (SAN) or direct attached storage. The data path to the NetWorker storage node devices is over a LAN. The application server that is being protected has the NetWorker VSS client installed.

The data moves as follows:

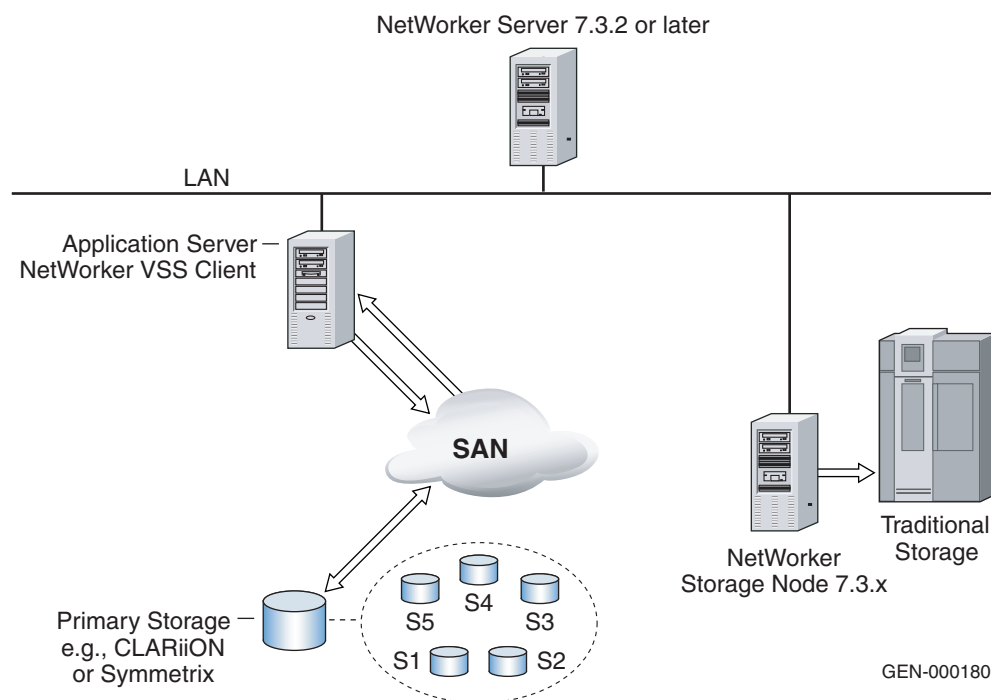
1. The NetWorker server, which must be version 7.3.2 or later, initiates the process by contacting the application server where the NetWorker VSS client software is installed.
2. The application server with the NetWorker VSS client software creates a snapshot of the data on the storage volume.

---

**Note:** In the figure, snapshots are represented by S1 through S5.

---

3. The application server with the NetWorker VSS client software uses a snapshot in primary storage to transfer the data over the LAN and into a conventional backup medium such as a file type disk, advanced file type disk, or tape.



GEN-000180

Figure 1 Simple LAN-based configuration

## LAN-based configuration with a proxy client

Figure 2 on page 14 shows a LAN-based configuration with a storage area network and a proxy client. Both the application server and the proxy client have the NetWorker VSS client installed.

A proxy client is a host that acts as a remote [data mover](#) when snapshots are rolled over to a conventional backup medium. A proxy client frees resources on the application server by offloading, from the application server, the work of processing and backing up snapshots. When a backup operation uses a proxy client, it is known as a [serverless backup](#).

The data moves as follows:

1. The NetWorker server initiates the process by contacting the application server where the NetWorker VSS client software is installed.
2. The application server with the NetWorker VSS client software creates a snapshot of the data on the storage volume.

**Note:** In the figure, snapshots are represented by S1 through S5.

3. The snapshot is made visible to the proxy client.
4. The proxy client uses a snapshot in primary storage to transfer the data over the LAN and into a conventional backup medium such as a file type disk, advanced file type disk, or tape.

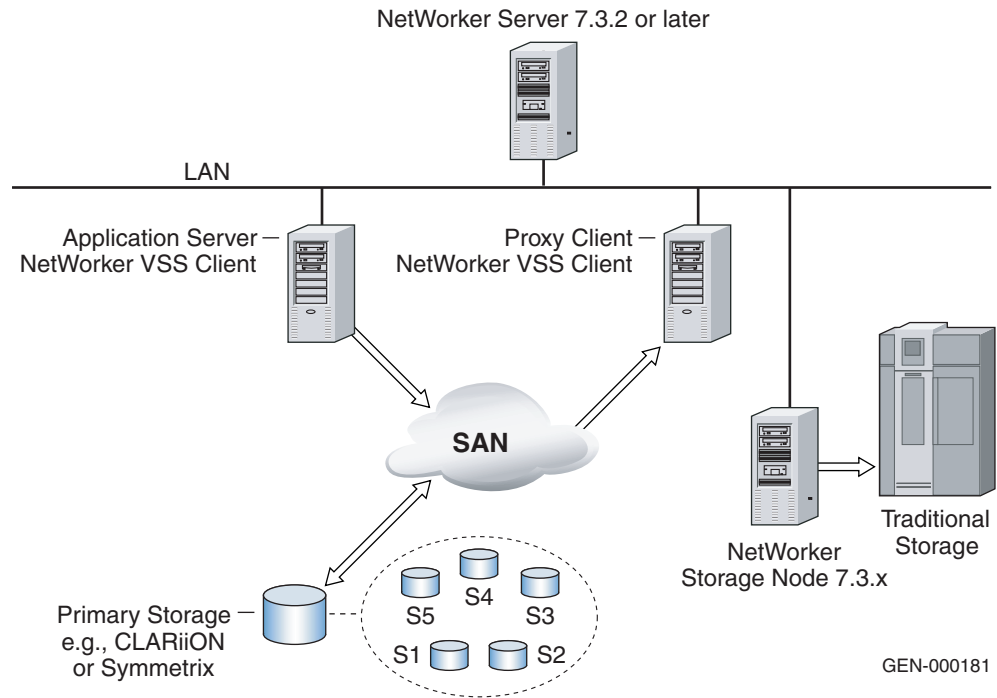


Figure 2 LAN-based configuration with a proxy client

## LAN-free configuration

Figure 3 on page 15 shows a LAN-free configuration with a storage area network. The NetWorker VSS client is installed on the application server. The proxy client is installed on the NetWorker storage node.

You can set up a NetWorker storage node version 7.3.2 or later as a proxy client to avoid the network traffic that is generated when a snapshot is rolled over to a conventional backup medium. Network traffic is avoided because both the conventional backup device and the snapshot are directly attached to the storage node.

**Note:** Install the proxy client software using the NetWorker VSS client software package.

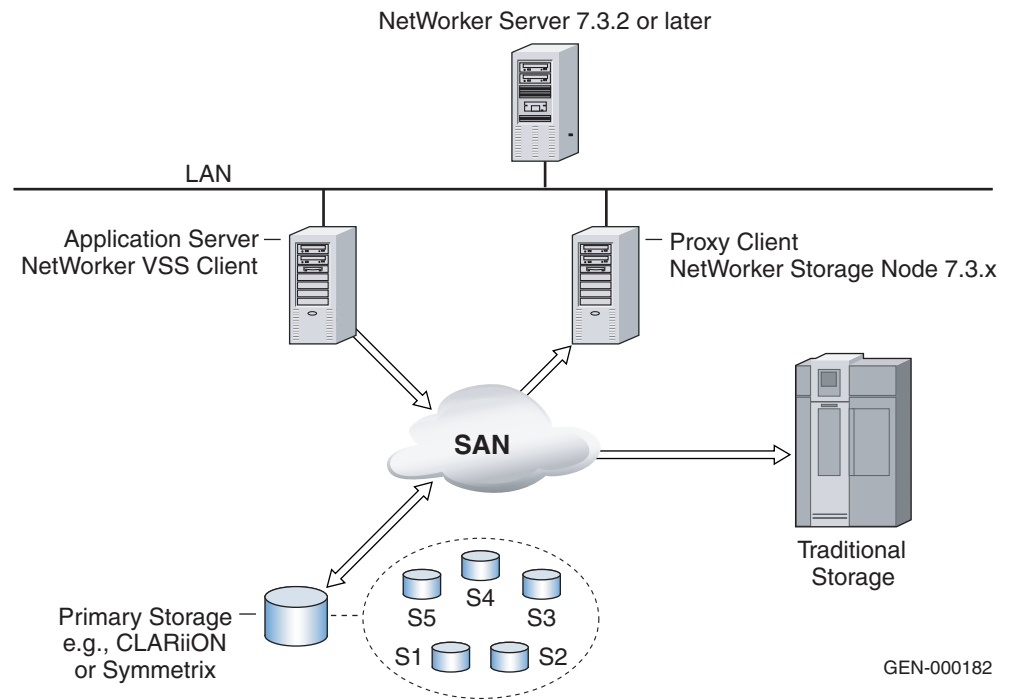
The data moves as follows:

1. The NetWorker server initiates the process by contacting the application server where the NetWorker VSS client software is installed.
2. The application server with the NetWorker VSS client software creates a snapshot of the data on the storage volume.

**Note:** In the figure, snapshots are represented by S1 through S5.

3. The snapshot is made visible to the proxy client.
4. The proxy client, in this case the storage node, uses a snapshot in primary storage to transfer the data into a conventional backup medium such as a file type disk, advanced file type disk, or tape.

The NetWorker server and the application server communicate through the LAN. However, the data itself is not transferred across the LAN because the conventional backup medium is attached directly to the NetWorker storage node.



GEN-000182

Figure 3 LAN-free configuration

## Understanding the VSS snapshot creation process

Microsoft Volume Shadow Copy Service (VSS) acts as a coordinator among the following three components that create, modify, back up, and recover data:

- ◆ Requestors  
Requestors include the NetWorker backup application.
- ◆ Writers  
Including writers for operating system data, application data such as Microsoft Exchange or SQL Server data, and file system volumes such as a D: \ data drive.
- ◆ Providers  
Providers include the Microsoft VSS software provider or hardware-based providers such as the EMC VSS Provider.

In VSS, NetWorker software is a **requestor**—an application that performs the backup and recovery of applications or services. When a requestor performs a backup or recovery, the following occurs:

1. The requestor asks for information from VSS.
2. VSS reviews the request for validity.
3. VSS sends **writer** data from multiple application and system writers to the requestor.
4. The requester tells VSS which writers and volumes to include in the snapshot.

Each application and service that supports VSS has its own writer, which understands how the application or service works. After the writer signals that it has prepared the data the following occurs:

- ◆ The VSS software:
  - Directs the writer to freeze input/output (I/O) to the selected volumes.
  - Queues transactions for later processing.
  - Calls a *provider* to capture the requested data.
- ◆ The provider:
  - Captures the prepared data.
  - Creates a snapshot that exists side-by-side with the live volume.

After the snapshot is created:

- The provider signals VSS, this signal tells the writer to resume activity.
- I/O is released to the selected volumes and any queued writes that arrived during the provider's work are processed.

[Figure 4 on page 17](#) illustrates the VSS backup process.

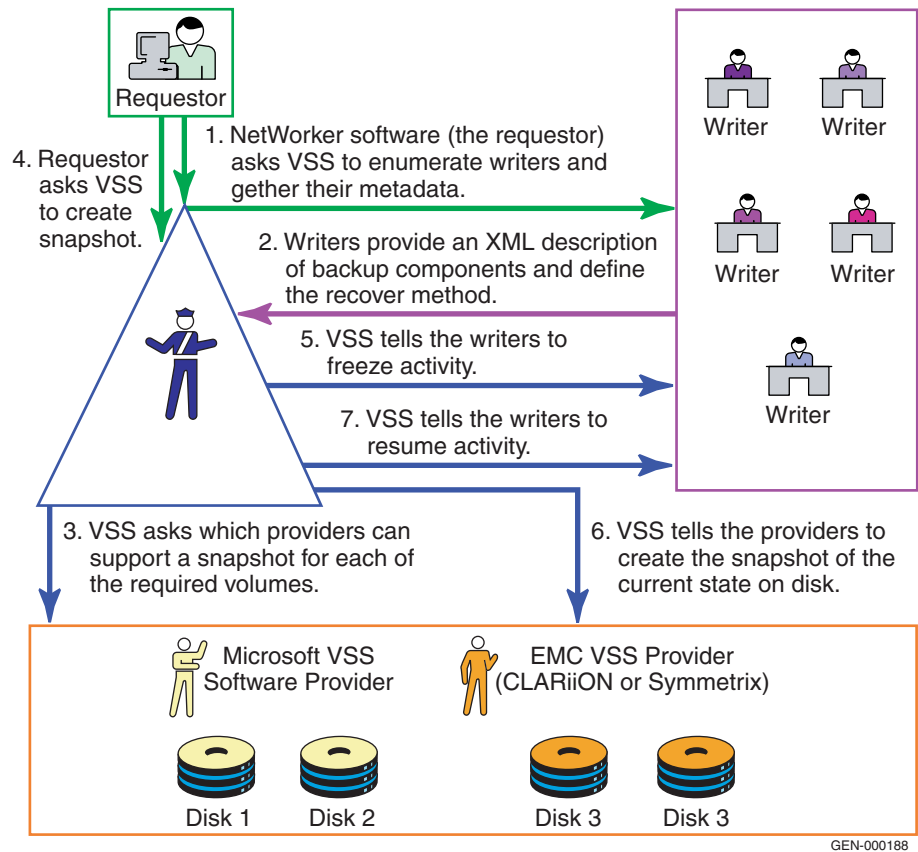


Figure 4 VSS backup process

### About writers

Writers provide information about what data to back up, and specific methods for handling components and applications during backup and recovery. They also identify the type of application or service that is being backed up.

If a service or application is present on a system but is not active, information from its writer will not be available. Consequently, a writer can appear or disappear from backup to backup.

## Supported writers

Table 1 lists the writers that are supported for the NetWorker VSS client:

**Table 1** Currently supported writers

Writer Type	Includes writers for:
Volumes	A file system path such as D:\data
Applications	Microsoft ADAM (Active Directory Application Mode) Microsoft Exchange 2003 Microsoft SQL Server 2000 service pack 4 Microsoft SQL Server 2005 Microsoft FRS 2 (Distributed File Replication Server)
Windows System Components	BITS (Background Intelligent Transfer Service) COM+ REGDB (Registration Database) Certificate Authority Cluster service DHCP (Dynamic Host Configuration Protocol) Jet Event log FRS (File Replication Server) IIS (Internet Information Services) Metabase MSDE (Microsoft SQL Server Desktop Engine for SQL 2000 embedded databases) NTDS (Active Directory Schema) Registry RSM (Removable Storage Manager) Remote Storage Manager System Components TermServLicensing WINS (Windows Internet Name Service) WMI (Windows Management Instrumentation) FSRM (File Storage Resource Manager)

## About providers

A provider is used to capture snapshots. Two types of providers are available: either the Microsoft VSS software provider or a hardware-based provider such as the EMC VSS Provider. The Microsoft VSS software provider is a host-based provider that works with any type of storage hardware. The EMC VSS Provider works with a CLARiiON<sup>®</sup> or Symmetrix<sup>®</sup> disk array. Some features of the NetWorker VSS client, such as serverless backup and rollback recovery, are only available with hardware providers such as the EMC VSS Provider.

## Providers and backup performance

The Microsoft VSS software provider uses a copy-on-write snapshot technology. Some hardware providers such as the EMC VSS Provider, support split-mirror snapshot technology as well as copy-on-write technology. Although copy-on-write technology requires less hardware resources, split-mirror technology provides better performance.

Large or fast-changing databases should not be saved with copy-on-write snapshot technology. The input/output requirements of these databases can cause the copy-on-write cache to overflow and invalidate the snapshot. Additionally, copy-on-write technology cannot match the performance of split-mirror technology. For large or fast-changing database, use the EMC VSS Provider in conjunction with

EMC hardware to provide a split-mirror storage solution such as a CLARiiON clone or a Symmetrix BCV.

---

## NetWorker VSS client snapshot backups

Backups are configured as scheduled snapshot backups on a NetWorker server release 7.3.2 or later.

**Note:** Ad hoc (manual) backups, from either the command line or from the NetWorker VSS client, are not supported. However, one can manually start a scheduled backup at any time.

The NetWorker VSS client supports three types of snapshot backups:

- ◆ “Nonpersistent rollover backup” on page 19
- ◆ “Instant backup with or without rollover” on page 19
- ◆ “Serverless backup” on page 19

Snapshot backups are specified through a snapshot policy and various settings for the Client resource. Snapshot policies and Client resources are set up on the NetWorker server. For more information, see [Chapter 2, “Configuring a Scheduled Backup.”](#)

---

### Nonpersistent rollover backup

A nonpersistent snapshot backup (also referred to as a live backup) creates a point-in-time snapshot of the data and then performs a [rollover](#) to a conventional backup medium such as tape, file, or advanced file type device. The original snapshot is automatically deleted from the NetWorker VSS client.

---

### Instant backup with or without rollover

An instant backup creates and retains a snapshot on a mounted storage disk volume. Depending on how backups are configured, a snapshot that is created during an instant backup may be configured to roll over to a conventional backup. While the snapshot resides on a mounted storage disk volume, it is referred to as a [persistent snapshot](#).

Retaining persistent snapshots on a mounted storage disk volume enables one to perform an instant recovery. The number of persistent snapshots that can be retained on a volume depends on the amount of resources available. Other factors that constrain the number of persistent snapshots include:

- ◆ The snapshot technology that is used, either copy-on-write or split-mirror.
- ◆ The input/output patterns of the drive.
- ◆ The processing involved in running a snapshot backup group.

---

### Serverless backup

A [proxy client](#) is used in conjunction with instant snapshot backups to provide [serverless backups](#). Serverless backups free the application server from much of the processing involved in a nonpersistent or instant snapshot backup. In a serverless backup, a snapshot is created on the application server and then immediately moved to the proxy client for further processing.

Serverless backups are particularly useful when there is additional processing involved in a snapshot backup. For example, to help determine whether a snapshot of a Microsoft Exchange database is consistent, the Exchange utility, **eseutil**, should be run against the snapshot. Running **eseutil** can be disk intensive. Offloading the work from the Exchange server to a proxy client frees resources on the Exchange server.

A serverless backup can be rolled over to a conventional backup and the backup can remain on the mounted storage disk volume as a persistent snapshot.

---

**Note:** Serverless backup is available only with VSS hardware providers and is subject to the capabilities of the vendor's hardware. The EMC VSS Provider for CLARiiON and Symmetrix provides the capability to perform serverless backup operations for these storage platforms.

---

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## NetWorker VSS client recoveries

There are three types of recoveries:

- ◆ [“Conventional recovery” on page 20](#)
- ◆ [“Instant recovery” on page 20](#)
- ◆ [“Rollback recovery” on page 21](#)

By default, recoveries are performed from a conventional backup. If a conventional backup is not available for the selected browse time, an instant recovery is performed. The default recovery method can be specified in the NetWorker recovery options dialog box. For more information, see [“NetWorker recovery options” on page 51](#).

---

### Conventional recovery

A conventional recovery consists of recovering data from a snapshot that has been rolled over to tape. Conventional recoveries support the same level of item selection as do instant recoveries.

---

### Instant recovery

Instant recoveries are performed on persistent snapshots. An instant recovery can take less time to complete than a conventional recovery because the snapshot is available on a mounted disk storage volume rather than on a conventional backup medium.

Instant recoveries support the selection of individual files in a file system snapshot. Additionally, instant recoveries support the selection of individual components at whatever level of granularity is supported by the system or application writer.

If the persistent snapshot is created using a proxy client, the snapshot file system on the proxy client is read to restore the files. In this way, performance is improved even further because the job of processing the snapshot for recovery is offloaded from the NetWorker VSS client production host to the proxy client.

---

**Notes:**

The procedure to perform an instant recovery of file system data differs if only a persistent snapshot is available. For more information, see [Chapter 3, "Recovering Data."](#)

When performing an instant recovery, the snapshot may become invalidated. This can occur if the snapshot is based on copy-on-write technology. If a large amount of data is recovered to the original volume, the cache may overflow. This is true for the Microsoft VSS software provider and for hardware providers that use copy-on-write technology, such as CLARiiON snapshots and Symmetrix virtual devices (VDEVs).

---

**Rollback recovery**

A rollback recovery is the process of returning data volumes to an earlier point-in-time. The entire contents of a persistent snapshot is recovered during a rollback recovery. One cannot select individual components in a rollback recovery operation. A rollback recovery is the fastest way to recover the contents of a persistent snapshot.

A rollback recovery is known as a "destructive" recovery because all changes that were made to the file systems after the selected snapshot was taken are overwritten. For example, suppose that a snapshot of a database is taken every hour. At 5:30 P.M., it is determined that the database is corrupt and that the last known consistent database snapshot was taken at 5:00 P.M. When the database host is rolled back to the 5:00 P.M. snapshot, all database transactions between the time of the 5:00 P.M. and 5:30 are overwritten.

---

**Notes:**

The snapshot to be rolled back must reside on a CLARiiON or Symmetrix storage system that is supported with the EMC VSS Provider.

The NetWorker VSS client to which the snapshot is to be rolled back must be supported with a proxy client.

For more information about rollback recoveries, see ["Roll back a snapshot" on page 80](#).

## About the NetWorker VSS client interface

The NetWorker VSS client interface has three views:

- ◆ “Recover view” on page 22
- ◆ “Snapshot Management view” on page 24
- ◆ “Monitor view” on page 25

### Recover view

With the exception of rollback recovery, all recoveries are performed from the Recover view. Rollback recoveries use the Snapshot Management view. [Figure 5 on page 22](#) shows the Recover view.

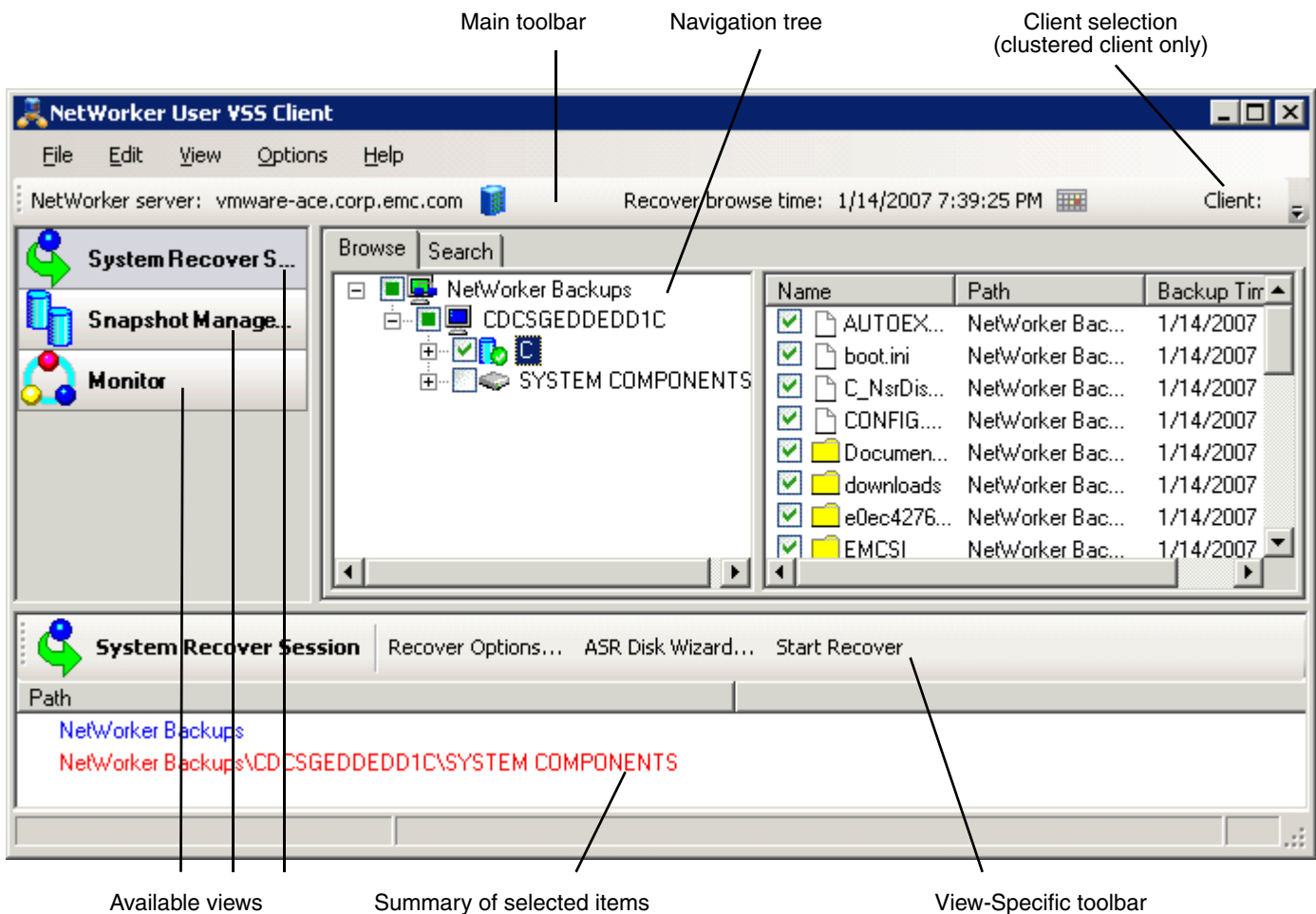
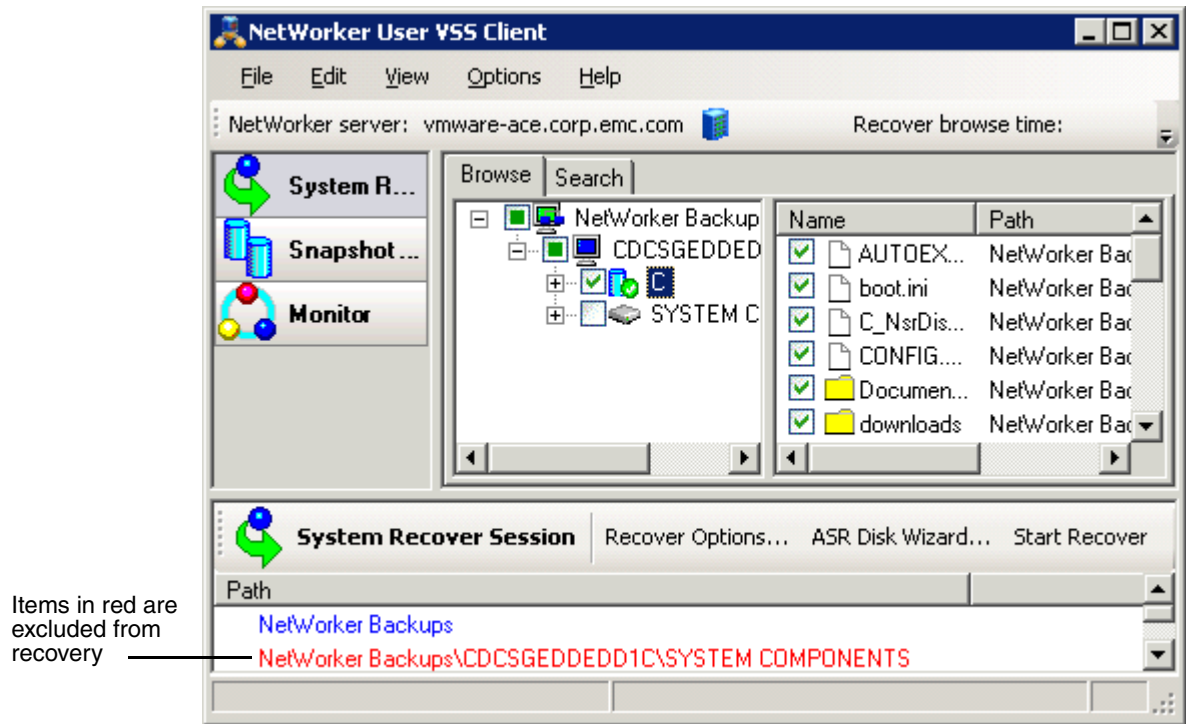


Figure 5 NetWorker VSS client main window

The summary of selected items can also display an exclusion representation, which shows only those items that are not selected for recovery. This view can be helpful when many items are selected for recovery. Figure 6 shows an exclusion representation.

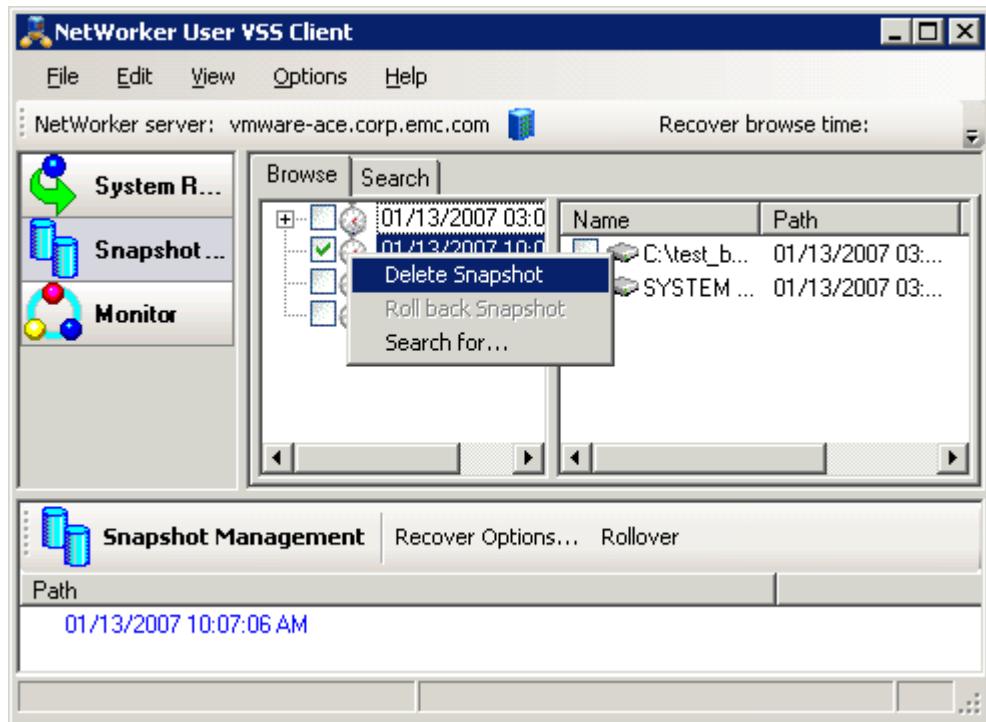


**Figure 6** Exclusion representation of recover items

To view an exclusion representation, right-click in the Summary pane at the bottom of the window and select **Exclusion Representation**.

## Snapshot Management view

Various operations on snapshots are performed from the Snapshot Management view shown in [Figure 7 on page 24](#).



**Figure 7** Snapshot Management view

The following operations can be performed on snapshots:

- ◆ Rollover snapshot
- ◆ Rollback snapshot
- ◆ Delete snapshot

In most cases, snapshot rollover and delete operations are performed automatically based on snapshot policies, which are set up on the NetWorker server. However, if you need to manually delete or rollover a snapshot, you can do so in the Snapshot Management view. For more information about snapshot policies, see [Chapter 2, "Configuring a Scheduled Backup."](#) For more information about performing manual snapshot operations from the Snapshot Management view, see [Chapter 6, "Snapshot Management."](#)

## Monitor view

Recovery and snapshot management operations can be monitored in the Monitor view shown in [Figure 8 on page 25](#).

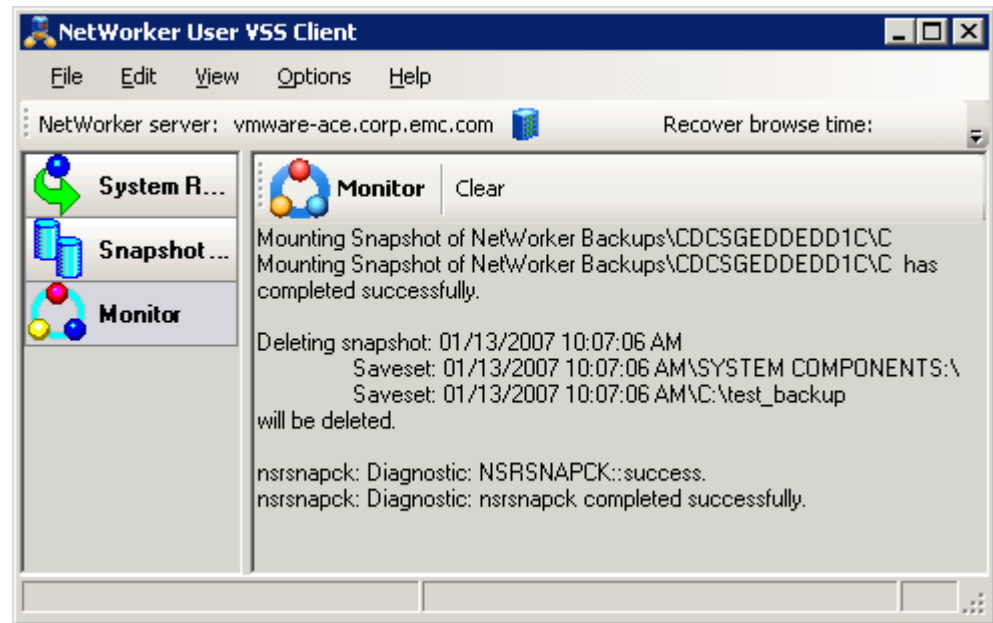


Figure 8 Monitor view

Most messages displayed in the Monitor view are also written to log files. For more information about log files, see [Chapter 8, "Troubleshooting."](#) You can also copy and paste text from the Monitor view to another application.

## Using the NetWorker VSS client graphical user interface

This section describes how to perform the following basic tasks in the NetWorker VSS client interface.

### Opening the software and connecting to a NetWorker server

To recover data, you must connect to the NetWorker server on which the backup was configured.

**Note:** Upon opening the NetWorker VSS client for the first time, the **Change NetWorker Server** dialog box displays automatically. In this case, begin this procedure at step 3.

To connect to a NetWorker server:

1. From the **Start** menu, open the NetWorker VSS client software.
2. From the **Main** toolbar, click the **NetWorker Server** icon.

The **Change NetWorker Server** dialog box appears.

3. Click **Update Server List** to browse for NetWorker 7.3.2 or later servers. The discovery process may take a few minutes.

4. When the list is updated, select a server. The selection appears in the **Server** field.  
You can also type a name in the **Server** field.
5. Click **OK**.

**Note:** You can also select **Configure Options** from the **Options** menu to connect to a NetWorker server.

## Selecting an item for recovery

To select items for recovery:

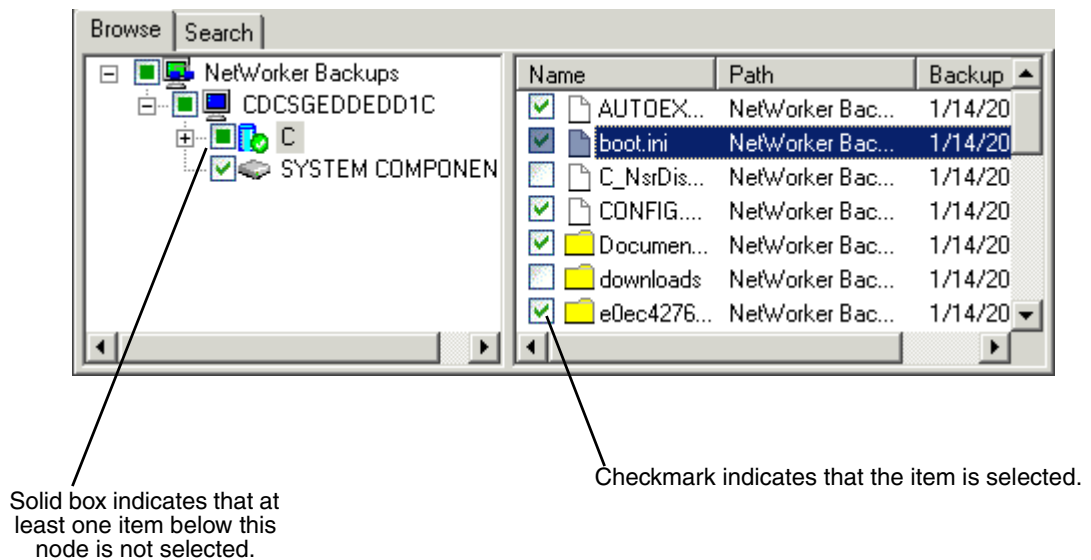
- ◆ Click the checkbox beside a node in the **Navigation Tree**. To clear an item, click the checkbox again.

A checkmark indicates that the node is selected. By default, all items contained in the node, such as folders and files, will also be selected for recovery.

To clear an item contained in a selected node:

- ◆ Expand the node and click the checkbox beside the item to clear it. The checkmark disappears.

Figure 9 on page 26 depicts one selected item and several partially selected nodes in the **Navigation Tree**.



**Figure 9** Selected and partially selected items

## Searching for an item

To search for a recovery item:

1. Select the **Search** tab above the **Navigation Tree**.
2. In the **Path** field, type a directory path.
3. Optionally, in the **Name** field, type the name of the search item.

You can refine your search as follows:

- Literal match (case-insensitive)  
Type **abc** to return *abc* or *ABc* but not *abcd* or *ABCD*.
  - Literal match (case-sensitive)  
Type **"abc"** to return *abc* but not *ABc* or *abcd*.
  - Name contains (case-insensitive)  
Type **%abc%** to return *abc*, *abcd*, *ABCD*, or *xyzABCde*
  - Name starts with (case insensitive)  
Type **abc%** to return *abcd* or *ABCde* but not *xyzABCde*
  - Name ends with (case insensitive)  
Type **%abc** to return *xyzAbc* but not *ABCde*
4. Click **Search**.

The **Details** pane displays the results of the search.

---

## Specifying a recovery browse time

To browse for items that were backed up on or before a particular time:

1. From the application toolbar, click the **Browse** calendar icon.
2. Click the arrows to select the date and time; click **OK**.

The **Navigation Tree** displays backup items from the specified date and prior.

---

## Selecting a backup version for recovery

**Note:** This topic applies to system recovery or Active Directory recovery operations only. For information about rollback snapshot recoveries, see [“Snapshot Management” on page 79](#).

To view the versions of an item that were backed up prior to the current browse time:

1. In the **Navigation Tree**, select a recover item. For more information, see [“Selecting an item for recovery” on page 26](#).
2. Right-click the selected item and select **Versions** from the pop-up menu.
3. Select the backup version to recover.
4. Select **Use selected item backup time as new browse time** to change the browse time to the same date as the selected backup version.
5. Click **OK**.

The recover items displayed in the **Navigation Tree** are from the selected browse time.

## Viewing the volumes required for a recovery

There are no NetWorker volumes associated with a snapshot backup until the snapshot has been rolled over to a NetWorker server. If you select to view the required volumes for a System Component or application data snapshot that has not been rolled over, no volumes will be displayed.

To view the volumes that are required for a recovery operation:

1. In the **Navigation Tree**, select a recover item. For more information, see [“Selecting an item for recovery” on page 26](#).
2. Right-click the selected item and select **Required Volumes** from the pop-up menu.

The **Required NetWorker Volumes** dialog box appears with a list of the volumes that must be mounted.

- If a volume is already mounted, the device name is shown after the volume name.
  - If a required volume is *not* mounted, the administrator is prompted to mount it after the recovery operation is started.
3. Click **OK**.

---

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## Backup configuration roadmap

Use the following roadmap to plan your backups.

To back up volume data such as a drive letter or to back up Windows system components such as the registration database:

- ◆ Complete tasks 1 through 7.

To back up application data such as SQL or Exchange:

- ◆ Evaluate the information in [“Best practices and considerations for backing up application data”](#) on page 30.
- ◆ Complete tasks 1 through 7.

To back up a NetWorker VSS client that is part of a cluster:

- ◆ Evaluate the information in [“Backing up a clustered NetWorker VSS client”](#) on page 46
- ◆ Complete tasks 1 through 7.

To back up an Active Directory server:

- ◆ Complete [Chapter 4, “Active Directory and ADAM Backups.”](#)

## Best practices and considerations for backing up application data

[Table 2](#) lists the considerations to be aware of when specifying values in the **Save Set** attribute for a particular Client resource.

**Table 2 Application backup best practices and considerations (1 of 2)**

Consideration	Description
Different policies for application server data	For application servers such as SQL or Exchange servers, consider backing up the server application data under a different schedule than the host operating system data and volumes. Typically, application data is backed up several times a day while operating system data and volumes are backed up less frequently. To accomplish this, create a separate backup group, snapshot policy, and Client resource for: <ul style="list-style-type: none"> <li>• server application data</li> <li>• volumes and operating system data</li> </ul> Assign the appropriate snapshot policy and Client resource to each backup group.
Installation path for application server program	Do not install application server program files on the same volume as the application's database files and log files.
Copy-On-Write versus Mirroring	Large or fast-changing databases should not be saved with Copy-on-Write snapshot technology. Instead, use a split-mirror snapshot technology such as a CLARiiON clone or a Symmetrix BCV. Although Copy-on-Write technology requires less hardware resources, split-mirror technology can better handle the requirements of large or fast-changing databases. Split-mirror technology is only supported with the EMC VSS Provider.
NetWorker modules and the NetWorker VSS client	If you attempt to use both the NetWorker VSS client and a NetWorker module to backup application data, the module backups will be promoted to Full backups. For more information, see <a href="#">“NetWorker VSS client issues”</a> on page 92.

Table 2 Application backup best practices and considerations (2 of 2)

Consideration	Description
Microsoft Exchange data	The Exchange server must have Exchange Server Service Pack 1 (SP1) or later installed.
	After upgrading to the NetWorker VSS client, you cannot recover Exchange backups that were performed with a previous version of the NetWorker client. To ensure that all Exchange data can be recovered to the point-in-time of the upgrade, perform a full backup of Exchange data immediately after upgrading to the NetWorker VSS client.
	Save sets and backup groups that include the Exchange writer cannot include other application writers or the SYSTEM COMPONENTS writer. The Exchange writer can however, be included in the same save set with volume components such as D : \.
	Database files and log files must reside on separate volumes for the Exchange server. If they are on the same volume, backup will fail.
	If Exchange has been installed after the NetWorker VSS client software or if the Exchange username, password, or domain has changed, run the <b>nwexinfo.exe</b> utility to update the NetWorker VSS client. For more information, refer to the <i>EMC NetWorker VSS Client for Windows Server 2003 First Edition Installation Guide</i> .
	When installing the NetWorker VSS client or when running the <b>nwexinfo.exe</b> utility, the correct Exchange username and password must be specified. Otherwise all backups for the client resource will fail. Even backups that do not include Exchange data will fail if the username or password was specified incorrectly.
Microsoft SQL data	If SQL 2005 backups were performed when the SQL Server VSS Writer service was disabled, and you subsequently enable the writer, perform a complete backup of SQL 2005 data. Performing a complete backup enables you to recover all SQL 2005 data from the same application folder, which is named SQLServerWriter.

## Task 1: Configure a backup pool for snapshot operations

Snapshots create metadata that is used in the management of snapshot operations such as an instant recovery operation. Create a snapshot pool to store the save sets that contain snapshot metadata.

Configuration a backup pool is a four-part process:

1. [“Configuring a device” on page 32](#)
2. [“Configuring a label template” on page 32](#)
3. [“Configuring a backup pool” on page 33](#)
4. [“Labeling the device” on page 33](#)

**Note:** All of the tasks in this section must be performed on a NetWorker server release 7.3.2 or later. Access the NetWorker server from the Administration window of the NetWorker Management Console.

For more information about performing the steps in this section, refer to the *NetWorker, Release 7.3.2, Multiplatform Version, Administration Guide* or later.

---

## Configuring a device

Configure a media device for snapshot metadata. Configure a tape, file, or advanced file type device. For best performance, configure a file or advanced file type device so that a snapshot can be recovered without the potential delay associated with retrieving a tape.

To configure a device:

1. In the **Administration** window of the **NetWorker Management Console**, click **Devices**.
2. In the expanded left pane, select **Devices**.
3. From the **File** menu, select **New**.
4. In the **Name** attribute, replace the default name with the path and name of the device.
  - If the device is configured on the NetWorker server's storage node, the name is the simple device path, such as `c:\tmp\d0` for a file type device. A tape device would have a format similar to `\\.Tape0`.
  - If the device is configured on a remote storage node, the name must indicate that the storage node is remote, by including `rd=` and the name of the remote storage node in the device path. For example, if the remote storage node is *neptune*, then the device path might be `rd=neptune:c:\tmp\d0`.
5. In the **Comment** field, specify a comment for the device.
6. From the **Media Type** attribute, select the appropriate media type.
7. Click the **Auto Media Management** attribute so that a checkmark appears beside it.
8. Click the **Configuration** tab.
9. In the **Target Sessions** attribute, type or select a value. Set this attribute to a large value to speed up the backup.
10. Click **OK**.

---

## Configuring a label template

Labels identify the kind of data that is stored on the volumes in a backup pool. Label templates define a naming convention for labels. Create a label template for volumes that are used to contain snapshot metadata.

To configure a label template:

1. In the **Administration** window of the **NetWorker Management Console**, click **Media**.
2. In the expanded left pane, select **Label Templates**.
3. From the File menu, select **New**.
4. In the **Name** attribute, type a name that identifies the series of labels as belonging to volumes for snapshot metadata.
5. In the **Comment** attribute, specify a comment for the label.

6. In the **Fields** attribute, specify a text name such as *Snapshot\_Metadata* and on a separate line, specify a numeric range such as *001-999* or a text range such as *aa-zz*.

These attributes are used to incrementally identify each label.

7. Click **OK**.

---

## Configuring a backup pool

To configure a backup pool to store snapshot metadata:

1. In the **Administration** window of the **NetWorker Management Console**, click **Media**.
2. In the expanded left pane, select **Media Pools**.
3. From the **File** menu, select **New**.
4. For the **Name** attribute, type a name that matches the label template.
5. In the **Comment** attribute, specify a comment for the pool.
6. Select the **Enabled** attribute.
7. For the **Pool Type** attribute, select the Backup Pool type.
8. For the **Label Template** attribute, select the matching label template.
9. Do not select a group in the **Groups** attribute.

Do not associate the pool with a particular group. This pool may be associated with several backup groups, so a single group should not be specified here.

10. Click the **Selection Criteria** tab.
11. For the **Clients** attribute, specify a NetWorker VSS client. A value must be entered for this attribute because no group was specified.
12. In the **Devices** attribute, select each device that can accept snapshot rollovers for this pool.
13. Click **OK**.

---

## Labeling the device

Before a device can be used for backup, it must be labeled.

To label a device:

1. In the **Administration** window of the **NetWorker Management Console**, click **Devices**.
2. In the right pane, right-click on the name of the device and select **Label**.
3. In the **Pool** attribute, select the backup pool that was created.
4. Select the **Mount after Labelling** attribute.
5. Click **OK**.

## Task 2: Configure snapshot policies

A snapshot policy determines the following:

- ◆ When and how often are snapshots created?
- ◆ How many snapshots, if any, are retained as persistent snapshots?
- ◆ Which snapshots, if any, are rolled over to conventional storage?
- ◆ When do snapshots expire and become eligible for deletion?

**Note:** Snapshots can also be manually rolled over or deleted. For more information, see [Chapter 6, "Snapshot Management."](#)

You can specify a preconfigured policy or create a custom snapshot policy. The following preconfigured snapshot policies exist:

- ◆ **Serverless**  
A single snapshot is taken per day. The data is then rolled over to conventional storage and the snapshot is deleted.
- ◆ **Daily**  
Eight snapshots are taken per day. The data in the first snapshot is rolled over to conventional storage. Each snapshot has an expiration policy of 24 hours.



### CAUTION

**Ensure that your snapshot policies include at least one rollover to conventional backup. Disaster recovery can only be performed from a conventional backup.**

## Creating a snapshot policy

To create a custom snapshot policy:

1. In the **Administration** window of the **NetWorker Management Console**, click **Configuration**.
2. In the expanded left pane, select **Snapshot Policies**.
3. From the **File** menu, select **New**.
4. In the **Name** attribute, type a name for the snapshot policy.
5. In the **Comment** attribute, type a comment for the snapshot policy.
6. In the **Number of Snapshots** attribute, enter the number of snapshots to be created per day.

The **Number of Snapshots** attribute works in conjunction with the Group resource **Interval** and **Start Time** attributes. The value for the **Start Time** and **Interval** attributes must allow the specified number of snapshots to be created in a 24-hour period. For example, if you want to take four snapshots per day and the first snapshot must occur at 4:00 A.M. (**Start Time** attribute), then the **Interval** attribute must be set to 5 hours or less.

$$\text{Number of Snapshots} < (24:00 - \text{Start Time}) / \text{Interval}$$

For more information, see ["Task 4: Configure a backup group" on page 37](#).

- In the **Retain Snapshots** attribute, enter the maximum number of snapshots that can be retained for a specified period of time before being expired. The period of time is specified in the **Snapshot Expiration Policy** attribute.

**Note:** Use a minimum **Retain Snapshot** value of two. This will insure that the most recent snapshot is retained while the new snapshot is created. A **Retain Snapshot** value of one will delete the only snapshot copy while creating the new snapshot.

- In the **Snapshots Expiration Policy** attribute, select a preconfigured expiration policy to determine how long snapshots can be retained before being deleted.
- In the **Backup Snapshots** attribute, specify which snapshots will be rolled over to a conventional storage medium.

Valid values are **All, None, First, Last, Every n**.



#### CAUTION

**Implement a regular snapshot rollover policy to protect data against a disaster such as a hardware failure.**

If the Backup Snapshot attribute is set to **None**, you can still roll over the snapshot manually. For more information, see [Chapter 6, "Snapshot Management."](#)

- Click **OK**.

## Snapshot policy examples

[Table 3](#) depicts settings for a conventional backup. Four snapshots per day are taken. All snapshots are rolled over to a conventional storage medium. Each snapshot is deleted after it is rolled over.

**Table 3** Conventional snapshot policy

<b>Name</b>	Conventional backup
<b>Comment</b>	Rollover and then delete.
<b>Number of Snapshots</b>	4
<b>Retain Snapshots</b>	0
<b>Snapshot Expiration Policy</b>	Day
<b>Backup Snapshots</b>	All

[Table 4](#) depicts settings for an instant backup. Four snapshots per day are taken. Up to 28 snapshots are retained for a maximum period of one week. No snapshots are rolled over.

**Table 4** Instant snapshot policy (1 of 2)

<b>Name</b>	Instant backup
<b>Comment</b>	Persistent snapshots with no rollovers.
<b>Number of Snapshots</b>	4

**Table 4** Instant snapshot policy (2 of 2)

<b>Retain Snapshots</b>	28
<b>Snapshot Expiration Policy</b>	Week
<b>Backup Snapshots</b>	None

[Table 5](#) depicts settings for an instant backup with rollover to a conventional medium. Four snapshots per day are taken. Up to 28 snapshots are retained for a maximum period of one week. Every first and third snapshots are rolled over.

**Table 5** Instant snapshot with rollover policy

<b>Name</b>	Instant and conventional backup
<b>Comment</b>	Persistent snapshots with rollover to tape.
<b>Number of Snapshots</b>	4
<b>Retain Snapshots</b>	28
<b>Snapshot Expiration Policy</b>	Week
<b>Backup Snapshots</b>	Every 1 (press Enter) Every 3

### Task 3: Configure a backup schedule

Backup schedules determine the days on which full or incremental backups are run. Full backups include all of the data specified in a NetWorker VSS client resource save set, while incremental backups include only the data that has changed since the last backup.

[Table 6](#) contains the considerations to be aware of when configuring a backup schedule for a NetWorker VSS client. The procedure for creating backup schedules for a NetWorker VSS client is the same as for creating a backup schedule for a regular NetWorker client.

**Table 6** Considerations for NetWorker VSS client backup schedules

<b>Backup levels</b>	<b>Consideration</b>
Full level	These backups are supported for all types of data.
Incremental backups	These are supported only for backup of volume directories and paths such as E:\ or E:\business_files\.
Level 1 to 9 backups	These are supported only for backup of volume directories or paths such as E:\ or E:\business_files\.

**Note:** The information in [Table 6](#) applies only to rollover backup operations. Snapshots are always taken at Full level.

## Task 4: Configure a backup group

Backup groups enable you to balance backup loads to reduce the impact on your storage and network resources. Use a backup group to assign the following attributes to a set of Client resources:

- ◆ Snapshot policy
- ◆ Backup start times
- ◆ Schedules
- ◆ Backup pools

**Note:** A client resource or backup group cannot specify volumes that use both CLARiiON and Symmetrix storage systems. For hosts that have both CLARiiON and Symmetrix volumes, create separate backup groups and client resources. Each backup group and its client resources can specify volumes from only one type of storage system.

To configure a backup group:

1. In the **Administration** window of the **NetWorker Management Console**, click **Configuration**.
2. In the expanded left pane, select **Groups**.
3. From the **File** menu, select **New**.
4. In the **Name** attribute, type a name for the backup group.
5. In the **Comment** attribute, type a description.
6. For the **Start Time** attribute, enter the time when the first snapshot is to be created.
7. For the **Autostart** attribute, select **Enabled**.
8. Click the **Snapshot** attribute so that a checkmark appears beside it.
9. For the **Snapshot Policy** attribute, select a snapshot policy. For more information about snapshot policies, see [“Task 2: Configure snapshot policies” on page 34](#).
10. For the **Snapshot Pool** attribute, select a pool that was created for the snapshot. For more information about pools, see [“Task 1: Configure a backup pool for snapshot operations” on page 31](#).
11. Click the **Advanced** tab.
12. For the **Interval** attribute, specify how often a snapshot will be created.  
  
The **Interval** attribute works in conjunction with the backup group **Start Time** attribute and the snapshot policy **Number of Snapshots** attribute. For example, if you want to take four snapshots per day (**Number of Snapshots** attribute) and the first snapshot must occur at 4:00 A.M. (**Start Time** attribute), then the **Interval** attribute must be set to 5 hours or less.  
  
$$\text{Number of Snapshots} < (24:00 - \text{Start Time}) / \text{Interval}$$
13. Ensure that **Restart Window** attribute value is less than or equal to the **Interval** attribute value.
14. Set the **Client Retries** attribute to 0 (zero).
15. Click **OK** to create the backup group.

## Task 5: Configure a Client resource

A Client resource specifies what to include in a snapshot of a NetWorker VSS client. Client resources are associated with other backup resources such as groups and snapshot policies.

You can create multiple Client resources for the same NetWorker VSS client host. In this way, you can apply different backup attributes to different types of information on the same host. For example, if the NetWorker VSS client host is an Exchange server, you can create one Client resource to backup the Exchange databases and create another Client resource to backup Windows system component data. This way, you can backup Exchange databases many times a day and back up Windows system component data only once a day.

To create a Client resource:

1. In the **Administration** window of the **NetWorker Management Console**, click **Configuration**.
2. In the expanded left pane, select **Clients**.
3. From the **File** menu, select **New**.
4. In the **Name** attribute, type the hostname of the NetWorker client computer.
5. In the **Comment** attribute, type a description. If you are creating multiple Client resources for the same NetWorker client host computer, use this attribute to differentiate the purpose of each resource.
6. From the **Browse Policy** attribute, select a browse policy from the list. The browse policy determines how long rolled-over data is available for quick access.
7. From the **Retention Policy** attribute, select a retention policy from the list. The retention policy determines how long rolled-over data is available though not necessarily quickly.
8. Select the **Scheduled Backups** attribute.
9. In the **Save Set** attribute, specify the components to be backed up. Place multiple entries on separate lines.

To specify all volume data and all available Windows system components:

- Type **All**

Application data such as Exchange data is not included in the save set **All**.

To back up specific volumes:

- Type the volume name. For example, to specify the volume E and all of its subfolders and files, type:  
**E:\**
  - To specify only a particular folder or file such as a folder named `large_net` and all files and folders under `large_net`, type:  
**E:\client\_data\large\_net\**
- Entries are not case-sensitive.
- To specify volume mount point data, place the name of the mount point on a separate line. For example, if you have a mount point named `CAD_Drawings` on volume `E:\` and you want to back up all of the data on `E:\` including the data under the mount point, type:

**E:\** (press Enter)

**E:\CAD\_Drawings**

The save set **All** will include mount point data only if no other path to the remote data is found during backup.

To specify all available Windows system components such as the registration database and Windows event log, type the save set **All** or type following:

- **SYSTEM COMPONENTS:\**  
Ensure that the backslash (\) character is entered with the save set name **SYSTEM COMPONENTS:\**. Otherwise, backup fails and no concise error message is provided.

To specify application data such as Exchange data, type:

- **APPLICATIONS:\Microsoft Exchange Writer\**
- For more information about specifying save set syntax for applications, see [“Specifying save sets for application data” on page 40](#).

If you are backing up data for a Microsoft Exchange application, ensure that all databases in a specified Storage Group are mounted. If at least one database in a selected Storage Group is not mounted, the entire backup of the Storage Group will fail.

If you are backing up data for a Microsoft SQL application, ensure that all SQL databases are mounted. Unmounted databases are not backed up.



#### CAUTION

**To protect against a disaster, ensure that all volumes and Windows system components are backed up. Also ensure that the associated snapshot policy includes at least one rollover to a conventional backup. Disaster recovery can only be performed from a conventional backup.**

10. For the **Group** attribute, select the backup group to which this client resource will be added.

If client resources for the same NetWorker VSS client host are added to different backup groups, ensure that the **Start Time** attribute for each backup group is spaced far enough apart so that the backups for the host's client resources do not overlap.

11. For the **Schedule** attribute, select a backup schedule.

12. Select the **Apps & Modules** tab.

13. In the **Backup command** attribute, type the backup command.

- For all types of backup data except for Active Directory conventional backups, type:  
**nsrsnap\_vss\_save.exe**

For information about Active Directory backups, see [“Performing a conventional AD or ADAM backup” on page 70](#).

14. In the **Application information** attribute, type the following variable and value:

**NSR\_SNAP\_TYPE=vss**

Type any additional variables and their values on a separate line.

Additional variables include specifications for a data mover (proxy client) and for Exchange set up attributes. For information about additional variables and their values, see [“Application information variable settings” on page 43](#).

15. If a proxy client is being set up for the NetWorker VSS client, type the hostname of the proxy client in the **Remote Access** attribute.  
 If the NetWorker VSS client is part of a cluster, type the names of the physical nodes of the cluster in the **Remote Access** attribute.
16. Click **OK**.

## Specifying save sets for application data

Table 7 lists the save set syntax to specify for supported types of application data. Specify application data save sets in the **Save Set** attribute of a Client resource.

To find the exact name of a particular Exchange storage group or SQL Server instance and database combination, see “[Displaying valid application data save sets](#)” on page 41.

**Table 7 Save set syntax (1 of 2)**

Type of data to back up	Save set syntax
<b>Exchange application data</b>	
All Exchange storage groups.	APPLICATIONS:\Microsoft Exchange Writer\
Back up just the Exchange storage group named, <i>group_name</i> .	Applications:\Microsoft Exchange Writer\group_name Some special characters in an Exchange storage group name must be replaced with URL encoded values. For more information, see “ <a href="#">URL encoding for SQL and Exchange save sets</a> ” on page 42.
<b>SQL application data</b>	
All SQL 2000 embedded databases	SYSTEM COMPONENTS:\
All SQL 2000 named instances and standalone databases.	APPLICATIONS:\MSDEWriter-SQL2000\
Only the SQL 2000 host instance and database name combination.	APPLICATIONS:\MSDEWriter-SQL2000\host\instance\master For example, to backup the database named <b>accounts07</b> on the SQL Server named instance <b>MT11\AP</b> , type the following: APPLICATIONS:\MSDEWriter-SQL2000\MT11%5CAP\accounts07 Some special characters in a SQL Server named instance or database name must be replaced with URL encoded values. For more information, see “ <a href="#">URL encoding for SQL and Exchange save sets</a> ” on page 42.
All SQL Server 2005 named instances and databases including express and standalone databases.	If the SQL Server VSS Writer service is enabled (it is disabled by default), type the following: APPLICATIONS:\SqlServerWriter\ If the SQL Server VSS Writer service is disabled, SQL 2005 named instances and databases including express and standalone databases, can be backed up with the following syntax: APPLICATIONS:\MSDEWriter-SQL2000\

Table 7 Save set syntax (2 of 2)

Type of data to back up	Save set syntax
Only the SQL 2005 host instance and database name combination.	<p>APPLICATIONS:\SqlServerWriter\host\ instance\master</p> <p>For example, to backup the database named <b>trans07</b> on the SQL Server named instance <b>MT11\BU</b>, type the following:</p> <p>APPLICATIONS:\SqlServerWriter\MT11%5CBU\ trans07</p> <p>Some special characters in a SQL Server named instance or database name must be replaced with their URL encoded values. For more information, see <a href="#">"URL encoding for SQL and Exchange save sets"</a> on page 42.</p>
DFS data	<p>Applications:\DFS Replication service writer\ Also back up the SYSTEM COMPONENTS:\ save set on the namespace server (usually the domain controller) that is associated with the DFS configuration.</p> <p><b>Note:</b> To backup DFS objects, the <b>searchFlags</b> attribute on the Active Directory server must be set to <b>8</b>. For more information, see <a href="#">"Set searchFlags attribute on shared folder and DFS objects"</a> on page 70.</p>
ADAM data	<p>Applications:\ADAM (instance_name) Writer</p> <p>For example, the ADAM instance named <b>AddressBook</b> would be entered as:</p> <p>Applications:\ADAM (AddressBook) Writer</p>
Active Directory	For information about backing up Active Directory services, see <a href="#">Chapter 4, "Active Directory and ADAM Backups."</a>

### Displaying valid application data save sets

To display a list of the application data save sets that are available for back up:

1. Open a command-prompt on the application server.
2. From the command-prompt, type the following command to list the valid application data save set names.

If the application server is not on a virtual host, type:

```
nsrsnap_vss_save -?
```

If the application server is on a virtual host, type:

```
nsrsnap_vss_save -? -c virtual_server_name
```

**Note:** If the application server is on a virtual host, run this command from the physical node that is currently hosting the application server.

3. Press **Enter**.

The application data save sets that are available for backup are listed in a format similar to the following:

```
"APPLICATIONS:\SqlServerWriter"
"APPLICATIONS:\SqlServerWriter\CORPDBSERV1%5CYUKON"
"APPLICATIONS:\SqlServerWriter\CORPDBSERV1%5CYUKON\master"
"APPLICATIONS:\SqlServerWriter\CORPDBSERV1%5CYUKON\model"
"APPLICATIONS:\SqlServerWriter\CORPDBSERV1%5CYUKON\msdb"
"APPLICATIONS:\SqlServerWriter\CORPDBSERV1%5CYUKON\NADATA"
```

Each line of output corresponds to a save set entry that you can add to the **Save Set** attribute of a Client resource. Each entry that you add to the **Save Set** attribute must be typed on a separate line.

### URL encoding for SQL and Exchange save sets

When specifying save set names in the **Save Set** attribute of the client resource, there are cases where special characters, such as the backslash (\), must be specified by their URL encoded values. URL encoded values are used to represent special characters in the following cases:

- ◆ SQL Server named instances
- ◆ SQL Server database names
- ◆ Exchange storage groups

Consider the following example of a SQL Server named instance. The name of a SQL Server named instance consists of two parts: the name of the host and a unique name. These two parts are always separated with a backslash (\) character. When specifying a SQL Server named instance in the **Save Set** attribute, replace the backslash with its URL encoded value, which is %5C. In the following example, a SQL Server named instance that is identified as:

```
CORPDBSERV1\YUKON
```

would be represented in the **Save Set** attribute as:

```
CORPDBSERV1%5CYUKON
```

To backup only the database named NADATA in the SQL Server named instance CORPDBSERV1\YUKON, the complete entry in the **Save Set** attribute would be:

```
APPLICATIONS:\SqlServerWriter\CORPDBSERV1%5CYUKON\NADATA
```

If the database name in the previous example was NA#DATA, the save set entry would be:

```
APPLICATIONS:\SqlServerWriter\CORPDBSERV1%5CYUKON\NA%23DATA
```

[Table 8](#) lists the most commonly used special characters and their URL values.

**Table 8** Special characters and their URL encoded values

Special character	URL encoded value	Special character	URL encoded value
\	%5C	?	%3F
/	%2F	]	%5D
"	%22	[	%5B
%	%25	}	%7D
#	%23	{	%7B
&	%26	^	%5E
<	%3C	'	%60
>	%3E		%7C

## Application information variable settings

Table 9 lists the variables that can be specified in the **Application information** attribute of the Client resource.

Table 9 Application information variable settings (1 of 2)

Attribute Name	Description	Values
<b>All snapshots</b>		
NSR_SNAP_TYPE= <i>value</i>	Specifies the snapshot service provider name.	<ul style="list-style-type: none"> <li>vss</li> </ul> This value is required.
NSR_DATA_MOVER= <i>value</i>	Specifies the hostname of the NetWorker VSS client that moves snapshots from the NetWorker VSS client to primary and secondary (conventional) storage. The host can be either a local host or a proxy client host.	<ul style="list-style-type: none"> <li>The local host</li> <li>The proxy client hostname</li> </ul> If no value is entered, the local host is used as the data mover. If you are setting up a proxy client for a virtual cluster server, you must also type the proxy client hostname in the <b>Remote Access</b> attribute of the Client resource. For serverless backups, specify a proxy client. If setting up an Exchange client resource, it is recommended that you use a proxy client. If a proxy client is specified, Exchange consistency checks are performed on the proxy client. Related messages are written to the Replication Manager log files ( <code>erm_clientxx.log</code> ) on the proxy client. If no proxy client is specified for an Exchange client resource, consistency checks are performed on the client resource host. Related messages are logged on the client resource host in both the Replication Manager log files and the <code>vssclient.log</code> file.

Table 9 Application information variable settings (2 of 2)

Attribute Name	Description	Values
<b>Exchange snapshots</b>		
NSR_DM_PORT= <i>value</i>	Specifies the control port number to use in communicating with the data mover client. This is the control port that the Replication Manager (RM) client service is running on. For more information about RM ports, refer to the <i>EMC NetWorker VSS Client for Windows First Edition Installation Guide</i> .	<ul style="list-style-type: none"> <li>The RM client control port number. For example: NSR_DM_PORT=6728</li> </ul> An RM client control port number must be specified.
NSR_ALT_PATH= <i>value</i>	Specifies the path on which to mount Exchange snapshots during the backup process. Exchange snapshots are mounted so that the database consistency check utility, <b>eseutil.exe</b> can be run.	<ul style="list-style-type: none"> <li>A mount path. For example: NSR_ALT_PATH=G:\mount_replica\</li> </ul> If a proxy client is specified in the NSR_DATA_MOVER attribute, enter the mount path on the proxy client.
NSR_CHECK_JET_ERRORS= <i>value</i>	Specifies which JET database errors to check for in the event log before taking a snapshot.  <b>Note:</b> If errors are found, the snapshot will fail.	<ul style="list-style-type: none"> <li>1018</li> <li>1019</li> <li>1022</li> <li>all</li> <li>none</li> </ul> Values can be separated with a comma, for example: NSR_CHECK_JET_ERRORS=1018, 1019 The default is <b>all</b> .

## Task 6: Configure privileges

The NetWorker VSS client must be granted NetWorker Administrator privileges in order to perform media database operations during snapshot deletion. If you set up a proxy client for the NetWorker VSS client, grant the proxy client NetWorker Administrator privileges. If you are setting up a NetWorker VSS client in a cluster, grant NetWorker administrator privileges to each cluster node and virtual server.

To add configure privileges:

1. In the **Administration** window of the **NetWorker Management Console**, click **Configuration**.
2. In the expanded left pane, click **User Groups**.
3. Right-click the **Administrators** group, then select **Properties**.

The Properties dialog box appears.

4. In the **Users** attribute, add the following values for the NetWorker VSS client host. Place each value on a separate line:

```
user=administrator,host=VSS_client_host
```

```
user=system,host=VSS_client_host
```

Where *VSS\_client\_host* is the DNS hostname of the NetWorker VSS client.

If a proxy client is set up for the NetWorker VSS client, add the following values:

**user=administrator,host=VSS\_clientproxy\_host**

**user=system,host=VSS\_clientproxy\_host**

If the NetWorker VSS client is installed in a cluster, grant NetWorker administrator privileges to each cluster node and virtual server.

5. Click **OK**.

## Task 7: Configure a proxy client

A proxy client is a separate host that acts as a data mover for a NetWorker VSS client. By default, the NetWorker VSS client acts as its own data mover. However, a proxy client is required for serverless backups. Serverless backups free the NetWorker VSS client from much of the processing involved in a snapshot backup. In a serverless backup, a snapshot is created on the NetWorker VSS client and then immediately moved to the proxy client for further processing.

A proxy client can also be set up on a NetWorker storage node. In this way network traffic that is generated when a snapshot is rolled over to a conventional backup medium is avoided.

[Table 10](#) lists the requirements for setting up a proxy client.

**Table 10 Configuration requirements for a proxy client (1 of 2)**

Requirement	Description
<b>General requirements</b>	
Installation	The proxy client must have the same version of the NetWorker VSS client software as the host for which it is acting as the proxy client. For more information, refer to the <i>EMC NetWorker VSS Client for Microsoft Windows Server 2003 First Edition Installation Guide</i> .
Configuration	Create a NetWorker VSS client resource for the proxy client host. For more information, see <a href="#">“Task 5: Configure a Client resource” on page 38</a> .
	Type the proxy client host name in the <b>Application Information</b> and the <b>Remote Access</b> attributes of the NetWorker VSS client resource that will use the services of the proxy client.
Connectivity	The proxy client must have connectivity between the NetWorker VSS client, the NetWorker server, and the storage subsystem on which snapshots reside.
Serverless backups	A proxy client is required for serverless backups. Additionally, serverless backups are supported only with VSS hardware providers and depend on the capabilities of the storage subsystem. For the EMC VSS Provider, serverless backups are supported for both CLARiiON and Symmetrix storage systems.
Rollback recovery	The NetWorker VSS client to which the snapshot is to be rolled back must be supported with a proxy client. For more information rollback requirements, see <a href="#">“Roll back a snapshot” on page 80</a> .
EMC CLARiiON	For proxy clients using EMC CLARiiON storage and the EMC VSS Provider, at least one CLARiiON LUN must be permanently assigned to the proxy host.
Third-party hardware providers	Hardware providers may have additional configuration requirements for proxy clients. Refer to the vendor’s product documentation for details on these requirements.

Table 10 Configuration requirements for a proxy client (2 of 2)

Requirement	Description
<b>Additional requirements for an Exchange server</b>	
Exchange performance	Set up a proxy client for an Exchange server. A proxy client performs the processing associated with the Exchange consistency checker utility, eseutil.exe, thus reducing the load on the Exchange server.
Consistency checker utility	The Exchange consistency checker utility, eseutil.exe, must be installed on the proxy client. The version of eseutil.exe, must be of the same version (service pack level) as the Exchange server. For example, if Exchange Server 2003 Service Pack 2 is installed on the Exchange server, then the version of eseutil.exe that is installed on the proxy client must be from the Exchange Server 2003 SP2 Management utilities. Failure to do so will cause the consistency checker utility to report errors even when the databases are valid. Install the eseutil.exe utility from the Exchange Management Tools located on the Exchange Server CD.
Installation path to consistency checker utility	If the installation of the Exchange consistency checker utility, eseutil.exe, is not performed from the Exchange installation program, ensure that the path to the eseutil.exe program is in the \$PATH environment variable.
Exchange mount paths	Use the NSR_ALT_PATH variable to specify a path to mount snapshots on the proxy client. For more information, see <a href="#">"Application information variable settings" on page 43</a> .

## Backing up a clustered NetWorker VSS client

To configure a virtual NetWorker VSS client for backup, complete all of the tasks required to backup a regular NetWorker VSS client. However, there are some considerations to be aware of when setting up a virtual NetWorker VSS client. [Table 11 on page 46](#) outlines the considerations that are unique to setting up a clustered NetWorker VSS client.

Table 11 Additional steps and considerations for backing up a clustered client resource

Backup task	Consideration
"Task 5: Configure a Client resource"	Configure a Client resource for each virtual server that is being backed up and each physical node in the cluster on which the virtual server may execute.
	Type the names of the physical nodes of the cluster in the <b>Remote Access</b> attribute of each virtual Client resource.
"Task 6: Configure privileges"	Set up NetWorker administrator privileges for each physical node and proxy client in the cluster.
"Task 7: Configure a proxy client"	If a hardware provider such as the EMC VSS Provider is being used, a proxy client must be configured for a clustered NetWorker VSS client.

## Cluster failover and backups

If a node within a cluster undergoes failover during a backup operation, the operation will not be successful. The next scheduled backup operation will be the next valid backup.

If you are using a hardware provider such as the EMC VSS Provider, use the disk management utilities provided with the associated hardware to delete any resources that may be left in an indeterminate state as a result of the failed backup. For example, a CLARiiON storage solution may have an InActive snapshot as the result

of a failed backup. In this case, use the EMC Navisphere® user interface or the NaviCLI command line interface to search for and delete the inactive snapshot.

---

## Moving a NetWorker VSS client to another NetWorker server

Do not set up scheduled backups for a NetWorker VSS client on multiple NetWorker servers. A NetWorker VSS client should be protected by only one NetWorker server.

To move a NetWorker VSS client to a different NetWorker server:

1. On the NetWorker server that you are moving from, disable or delete the client resources that are set up for the NetWorker VSS client.

You can disable a client resource for scheduled backup by unselecting the **Scheduled backup** attribute in the client resource.

2. On the NetWorker VSS client, open the NetWorker VSS client software and manually delete any snapshots for the client. For information about deleting snapshots manually, see [“Delete a snapshot” on page 83](#).

Before deleting the snapshots, you can manually roll them over to a conventional backup. In this way, the data in the snapshot can be recovered.

3. On the NetWorker server that you are moving to, set up scheduled backups for the NetWorker VSS client. For more information, see [“Backup configuration roadmap” on page 30](#)



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This chapter includes the following topics:

- ◆ Performing a recovery ..... 50
- ◆ Recovering file system snapshots that have not been rolled over ..... 59
- ◆ Performing a disaster recovery of the VSS client ..... 60
- ◆ Monitoring a recovery ..... 65
- ◆ Booting Windows in Directory Service Restore mode..... 65
- ◆ Performing an authoritative recovery of NTDS or FRS data..... 66
- ◆ Recovering the Windows system configuration to a pre-NetWorker VSS client state..... 67

## Performing a recovery

Review the following items before completing the procedures in this section:

- ◆ To recover Active Directory (AD) data, see [Chapter 5, "Active Directory Recover."](#)
- ◆ To recover data from a persistent snapshot that has not been rolled over to a conventional backup medium, see ["Recovering file system snapshots that have not been rolled over" on page 59.](#)
- ◆ To recover data, you must be a member of the following:
  - The NetWorker server Administrator's group. For information about adding users to the NetWorker server Administrator's group, refer to the *EMC NetWorker, Release 7.3.2, Multiplatform Version, Administration Guide* or later.
  - Either the Windows Administrators group or the Windows Backup Operators group.
- ◆ To recover backup data that was password-protected and encrypted with a non-NetWorker VSS Client, use the **recover.exe** command from the CLI (command line interface). For more information about the **recover.exe** command, refer to the *NetWorker Command Reference Guide*, release 7.3.2 or higher.
- ◆ Mount points:
  - Data that was backed up from a mount point is available for browsing at the root of the navigation tree. For example, if the drive H: \ has a mount point named H: \CAD\_Drawings, then a separate entry for the mount point H: \CAD\_Drawings will be available at the root of the navigation tree instead of as a subfolder under H: \.
  - To recover data to a mount point that has been deleted, manually re-create the mount point before recovering the data. Otherwise, the data will be recovered to a local directory whose name corresponds to the deleted mount point.
  - If the disk that is referenced by the mount point has been replaced, manually re-create the mount point.
- ◆ If a file was not backed up due to a skip directive, you may still be able to select the file for a recovery operation. In this case, although you can select the file, it is not recoverable.



### CAUTION

**If you are recovering File Replication Services (FRS) or NT Directory Services (NTDS) data, boot the NetWorker client in Directory Service Recovery mode before completing the recovery options in this section. For more information, see ["Booting Windows in Directory Service Restore mode" on page 65.](#)**

To recover system data:

1. Open the NetWorker VSS client software and select the NetWorker server on which the NetWorker VSS client was configured for backup.
2. If the NetWorker VSS client is part of a cluster, select the virtual client to which you are recovering data. The virtual client can be selected from the **Client** list attribute in the application toolbar.
3. From the left pane, select **Recover > System Recover Session**.

- In the **Navigation Tree**, select the items to be recovered.

By default, items displayed in the **Navigation Tree** are from the most recent backup. For the System Recover Session view, both snapshot and rollovers can be displayed in the same view.

- If the most recent backup for an item is a snapshot, the snapshot is displayed.
- If the most recent backup for an item is a rollover, the rollover is displayed.

To recover file system items from a previous backup:

- From the application toolbar, click the **Browse** calendar icon and select an earlier browse time.
  - To view versions of a backup item prior to the browse time, right-click on an item in the **Navigation Tree** and select **Versions** from the pop-up menu.
- To determine whether any volumes need to be mounted for a selected item, right-click the item and select **Required Volumes** from the pop-up list.
  - From the **Options** menu, select **System Recover Session Options**.
  - For information about options and considerations that correspond to the type of data to be recovered, see:
    - [“NetWorker recovery options” on page 51](#)
    - [“Exchange recovery options” on page 52](#)
    - [“ADAM recovery options” on page 53](#)
    - [“DFS recovery options” on page 54](#)
    - [“FRS recovery options” on page 55](#)
    - [“NTDS recovery options” on page 56](#)
    - [“SQL data recovery” on page 57](#)
  - From the **System Recover Session** toolbar, click **Start Restore**.
  - From the left pane, select **Monitor** to view messages related to the progress of the recovery operation.

---

**Note:** If you recovered items from a snapshot (instant recovery), the snapshot volume will be temporarily mounted during the recovery operation. The mounted volume is displayed in the Windows Explorer program. After the recovery is complete, you may have to refresh the Windows Explorer to update its view.

---

## NetWorker recovery options

To specify recovery options for file system data:

- From the **Options** menu, select **System Recover Session Options**.
- Select the **NetWorker** tab.
- In the **Relocate recovered data to:** field, type a location other than the location from which the data was originally backed up.

The location must be a local path. URL syntax such as `\\servername\share` is not supported.

4. Use the **Restore Type** field to determine the default recovery method.
  - Select **Conventional Restore** to recover from a conventional backup medium. If a conventional backup is not available for the selected browse time, an instant recovery is performed.
  - Select **Instant Restore** to recover from a snapshot. If a snapshot is not available for the selected browse time, a conventional backup is performed.  
 For instant restore, snapshot validation will occur prior to the restore. If the snapshot is invalid, the restore will fail. The invalid snapshot will be deleted automatically the next time the snapshot group runs. You can also delete a snapshot manually. For more information, see [“Delete a snapshot” on page 83](#).
5. Select **Use Microsoft best practices for selecting the system state** to enforce Microsoft recommendations that determine which system state items must be selected as a group for recovery. Unselect this attribute to select system state items individually.  
 There are some procedures, such as recovering Distributed File System (DFS) data, where you can unselect this attribute. However, unless instructed to do so, it is recommended that this attribute be selected. After each recovery operation, this option is automatically selected.
6. Click **OK**.

For more information about recovering data, see [“Performing a recovery” on page 50](#).

---

## Exchange recovery options

The following requirements must be met before recovering Microsoft Exchange data:

- ◆ The APPLICATIONS:\Microsoft Exchange Writer\ save set must have been backed up. For more information, see [Chapter 2, “Configuring a Scheduled Backup.”](#)
- ◆ For each Exchange database to be recovered, the Exchange checkbox titled **This database can be overwritten by a restore** must be selected in the Exchange SYSTEM Manager application. This is a Microsoft requirement. For information about this checkbox, refer to the Microsoft Exchange documentation.
- ◆ When new Microsoft Service Packs for Exchange Server are installed, transactions (log files) created with previous Service Pack versions of Exchange Server can generally not be recovered onto the updated Exchange server. Microsoft sometimes provides hotfix kits to address this Microsoft restriction.
- ◆ If you are recovering Exchange data that was backed up from a legacy NetWorker client by using the save set VSS USER DATA:\, then the Exchange databases to which data is being recovered must be unmounted before the recovery operation. After the recovery, the databases must be mounted.

To specify recovery options for Exchange data:

1. From the **Options** menu, select **System Recover Session Options** and then select the **Exchange** tab.
2. Select the type of recovery to perform.
  - To recover Exchange data and to retain all existing Exchange transactions that occurred after the time of backup, select **Include existing logs (Roll forward recovery)**.

- To recover Exchange data up to the time of backup only and to not include subsequent transactions, select **Include logs only from this restore (Point-in-time recovery)**. If you select point-in-time recovery, you cannot select an individual database for recovery. However, you can select to recover items at the Storage Group level or higher.



#### CAUTION

**If you perform a roll-forward recovery, perform a full backup after the recovery. Doing so enables you to recover data to a point-in-time that is after the point-in-time of the roll-forward recovery, if necessary.**

**Also be aware that a roll-forward recovery is not possible after performing a point-in-time recovery.**

3. To make the Exchange database available after the recovery, select **Put databases online after restore**.
4. Click **OK** to close the **System Recover Session Options** dialog box.
5. From the **Navigation Tree**, expand the **Applications** folder and the **Microsoft Exchange Writer** folder.
6. Select the Exchange storage groups and databases that are to be recovered.
7. From the **System Recover Session** toolbar, click **Start Restore**.

For more information about recovering system data, see [“Performing a recovery” on page 50](#).

## ADAM recovery options

You can specify whether to perform an authoritative or nonauthoritative recovery of Active Directory Application Mode (ADAM) data on this host.

A nonauthoritative recovery restores the most recent ADAM data from backups and then updates the recovered host with the most recent ADAM data from another ADAM server in the domain. A nonauthoritative recovery relies on at least one other ADAM server in the domain to have accurate, up-to-date ADAM data. Nonauthoritative recoveries are typically performed when the host is being recovered due to catastrophic loss of data such as a disk failure. A nonauthoritative recovery is performed by default.

An authoritative recovery restores the most recent ADAM data from backups, and then updates other ADAM servers in the domain with the recovered data. Perform an authoritative recovery only when corrupted or deleted ADAM data has been propagated to other ADAM servers.

**Note:** To recover ADAM data, the APPLICATIONS:\ADAM (*instancename*) Writer\ save set must have been backed up. For more information, see [Chapter 2, “Configuring a Scheduled Backup.”](#)

To specify recovery options for ADAM (Active Directory Application Mode) data:

1. From the **Options** menu, select **System Recover Session Options** and then select the **ADAM** tab.
2. Select one of the following options:
  - **Non Authoritative restore** to perform a nonauthoritative recovery.
  - **Authoritative Restore** to perform an authoritative recovery.
3. Click **OK** to close the **System Recover Session Options** dialog box.
4. In the **Navigation Tree**, expand the **Applications** folder and select **ADAM (instancename) Writer**.
5. From the **System Recover Session** toolbar, click **Start Restore**.

For more information about recovering system data, see [“Performing a recovery” on page 50](#).

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## DFS recovery options

You can specify whether to perform an authoritative or nonauthoritative recovery of Distributed File System (DFS) data on this host.

A nonauthoritative recovery restores the most recent DFS data from backups and then updates the recovered host with the most recent DFS data from another DFS server in the domain. A nonauthoritative recovery relies on at least one other DFS server in the domain to have accurate up-to-date DFS data. Nonauthoritative recoveries are typically performed when the host is being recovered due to catastrophic loss of data such as a disk failure. A nonauthoritative recovery is performed by default.

An authoritative recovery restores the most recent DFS data from backups, and then updates other DFS servers in the domain with the recovered data. Perform an authoritative recovery only when corrupted or deleted DFS data has been propagated to other DFS servers.

---

**Note:** To recover DFS data, the APPLICATIONS:\DFS Replication service writer save set must have been backed up. The DFS Replication service writer is available with Windows Server 2003 R2 or later. Additionally, the SYSTEM COMPONENTS:\ save set on the namespace server (usually the domain controller) that is associated with the DFS configuration must have been backed up. For more information, see [Chapter 2, “Configuring a Scheduled Backup.”](#)

---

To specify whether to perform an authoritative or nonauthoritative recovery:

1. From the **Options** menu, select **System Recover Session Options** and then select the **DFS** tab.
2. Select one of the following options:
  - **Non Authoritative Restore** to perform a nonauthoritative recovery.
  - **Authoritative Restore** to perform an authoritative recovery.
3. Click **OK** to close the **System Recover Session Options** dialog box.
4. From the **Navigation Tree**, expand the **Applications** folder and select **DFS Replication service writer**.
5. From the **System Recover Session** toolbar, click **Start Restore**.

6. After the DFS Replication service writer has been recovered, you must recover the Bootable System State components on the namespace server (usually the domain controller) that is associated with the DFS configuration.
  - a. Boot the namespace server in directory service restore mode as described in [“Booting Windows in Directory Service Restore mode”](#) on page 65.
  - b. Open the NetWorker VSS client software on the namespace server (usually the domain controller) that is associated with the DFS configuration.
  - c. From the **Options** menu, select **System Recover Configuration Options** and then click the **NetWorker** tab.
  - d. Unselect the **Use Microsoft best practices for selecting the system state** attribute and click **Yes** when asked to confirm your selection.
  - e. Click **OK** to close the dialog box.
  - f. From the left pane, select **Recover > System Recover Session**
  - g. From the **Navigation Tree**, expand the **SYSTEM COMPONENTS** folder and select **BootableSystemState**.
  - h. From the **System Recover Session** toolbar, click **Start Restore**.

After the recovery has completed, the **Use Microsoft best practices for selecting the system state** attribute is automatically selected.

For more information about recovering system data, see [“Performing a recovery”](#) on page 50.

---

## FRS recovery options

You can specify whether to perform an authoritative or nonauthoritative recovery of File Replication Services (FRS) data on this host.



### **CAUTION**

**Boot the NetWorker client in Directory Service Recovery mode before completing the recovery options in this section. For more information, see [“Booting Windows in Directory Service Restore mode”](#) on page 65.**

A nonauthoritative recovery restores the most recent FRS data from backups and then updates the recovered host with the most recent FRS data from another FRS server in the domain. A nonauthoritative recovery relies on at least one other FRS server to have accurate up-to-date FRS data. Nonauthoritative recoveries are typically performed when the host is being recovered due to catastrophic loss of data such as a disk failure. A nonauthoritative recovery is performed by default.

An authoritative recovery restores the most recent FRS data from backups, and then updates the other FRS servers in the domain with the recovered data. Perform an authoritative recovery only when corrupted or deleted FRS data has been propagated to other FRS servers.

**Note:** To recover FRS data, the SYSTEM COMPONENTS save set must have been backed up. For more information, see [Chapter 2, “Configuring a Scheduled Backup.”](#)

To specify whether to perform an authoritative or nonauthoritative recovery:

1. From the **Options** menu, select **System Recover Session Options** and then select the **FRS** tab.
2. Select one of the following options:
  - **Non Authoritative restore** to perform a nonauthoritative recovery.
  - **Authoritative Restore** to perform an authoritative recovery.
3. Click the **NetWorker** tab and then unselect the attribute titled **Use Microsoft best practices for selecting the system state**. Click **Yes** when asked to confirm your selection.
4. Click **OK** to close the **System Recover Session Options** dialog box.
5. From the **Navigation Tree**, expand the **System Components** folder and select **FRS**.
6. From the **System Recover Session** toolbar, click **Start Restore**.

If you are performing an authoritative recovery, complete the remaining steps in [“Performing an authoritative recovery of NTDS or FRS data” on page 66](#).

For more information about general recovery options, see [“Performing a recovery” on page 50](#).

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## NTDS recovery options

You can specify whether to perform an authoritative or nonauthoritative recovery of NT Directory Services (NTDS) data on this host.



### **CAUTION**

**Boot the NetWorker client in Directory Service Recovery mode before completing the recovery options in this section. For more information, see [“Booting Windows in Directory Service Restore mode” on page 65](#).**

A nonauthoritative recovery restores the most recent NTDS data from backups and then updates the recovered host with the most recent NTDS data from another NTDS server in the domain. A nonauthoritative recovery relies on at least one other NTDS server to have accurate up-to-date NTDS data. Nonauthoritative recoveries are typically performed when the host is being recovered due to catastrophic loss of data such as a disk failure. A nonauthoritative recovery is performed by default.

An authoritative recovery restores the most recent NTDS data from backups, and then updates other NTDS servers in the domain with the recovered data. Perform an authoritative recovery only when corrupted or deleted NTDS data has been propagated to other NTDS servers.

---

**Note:** To recover NTDS data, the SYSTEM COMPONENTS save set must have been backed up. For more information, see [Chapter 2, “Configuring a Scheduled Backup.”](#)

To specify whether to perform an authoritative or nonauthoritative recovery:

1. From the **Options** menu, select **System Recover Session Options** and then select the **NTDS** tab.
2. Select one of the following options:
  - **Non Authoritative restore** to perform a nonauthoritative recovery.
  - **Authoritative Restore** to perform an authoritative recovery.
3. Click the **NetWorker** tab and then unselect the attribute titled **Use Microsoft best practices for selecting the system state**. Click **Yes** when asked to confirm your selection.
4. Click **OK** to close the **System Recover Session Options** dialog box.
5. From the **Navigation Tree**, expand the **System Components** folder and select **NTDS**.
6. From the **System Recover Session** toolbar, click **Start Restore**.

If you are performing an authoritative recovery, complete the remaining steps in [“Performing an authoritative recovery of NTDS or FRS data” on page 66](#).

For more information about general recovery options, see [“Performing a recovery” on page 50](#).

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## SQL data recovery

The following requirements must be met to recover SQL databases:

- ◆ To recover SQL 2000 embedded databases, the SYSTEM COMPONENTS:\ save set must have been backed up.
- ◆ To recover SQL2000 standalone databases, the APPLICATIONS:\ MSDEWriter-SQL2000\ save set must have been backed up.
- ◆ To recover SQL 2005 standalone or express databases, either the APPLICATIONS:\ MSDEWriter-SQL2000\ save set or the APPLICATIONS:\ SQLServerWriter\ save set must have been backed up.

### Recovering SQL 2000 embedded databases

To recover SQL 2000 embedded databases:

1. Stop the SQL Server services for the SQL 2000 embedded database instances
2. From the **Options** menu, select **System Recover Configuration Options** and then click the **NetWorker** tab.
3. Unselect the attribute titled, **Use Microsoft best practices for selecting the system state** and click **Yes** when asked to confirm your selection.
4. Click **OK** to close the dialog box.
5. From the left pane, select **Recover > System Recover Session**
6. From the **Navigation Tree**, expand the **SYSTEM COMPONENTS** folder and the **MSDEWriter** folder.
7. Select the databases to recover.
8. From the **System Recover Session** toolbar, click **Start Restore**.
9. After the recovery is complete, start the SQL Server services for the SQL 2000 embedded database instances.

## Recovering SQL 2000 standalone databases

To recover SQL 2000 standalone databases:

1. Stop the SQL Server services for the SQL 2000 standalone database instances.
2. From the **Navigation Tree**, expand the **Applications** folder and the **MSDEWriter-SQL2000** folder.
3. Select the databases to recover.
4. From the **System Recover Session** toolbar, click **Start Restore**.
5. After the recovery is complete, start the SQL Server services for the SQL 2000 standalone database instances.

## Recovering SQL 2005 databases

If the SQL Server VSS Writer service was enabled during backup, then SQL 2005 express and standalone databases must be recovered from the SQLServerWriter save set. The SQL Server VSS Writer service is disabled by default when Microsoft SQL Server 2005 is installed. If the SQL Server VSS Writer service was disabled during backup, then SQL 2005 express and standalone databases must be recovered from the MSDEWriter-SQL2000 save set. In this case, follow the second set of steps in this section.

To recover SQL 2005 standalone or express databases that were backed up to the SQLServerWriter save set:

1. If restoring the master database, stop the SQL Server services for the SQL 2005 database instances.
2. From the **Navigation Tree**, expand the **Applications** folder and the **SQLServerWriter** folder.
3. Select the databases to recover.
4. From the **System Recover Session** toolbar, click **Start Restore**.
5. After the recovery is complete, start the SQL Server services for the SQL 2005 database instances.

To recover SQL 2005 standalone or express databases that were backed up to the MSDE-Writer-SQL2000 save set:

1. Stop the SQL Server services for the SQL 2005 database instances.
2. From the **Navigation Tree**, expand the **Applications** folder and the **MSDEWriter-SQL2000** folder.
3. Select the databases to recover.
4. From the **System Recover Session** toolbar, click **Start Restore**.
5. After the recovery is complete, start the SQL Server services for the SQL 2005 database instances.

## Recovering file system snapshots that have not been rolled over

The procedure to recover items in a file system snapshot differs depending on whether the snapshot has been rolled over to a conventional storage medium. This section describes how to recover items from a file system snapshot that has not been rolled over. For information about recovering file system snapshots that have been rolled over, see [“Performing a recovery” on page 50](#).

**Note:** If a snapshot volume has been mounted using a non-NetWorker VSS client utility such as the EMC NaviCLI interface or the Windows Disk Management utility, remove the mount point before performing the next backup or recovery operation. If the mount point is not removed, it will be removed at the end of the next NetWorker backup or recovery operation.

To recover items in a file system backup that has not been rolled over:

1. Connect to the NetWorker server on which the NetWorker client was configured for backup. For more information, see [“Opening the software and connecting to a NetWorker server” on page 25](#).

2. From the left pane, select **Recover > System Recover Session**.

3. In the **Navigation Tree**, right-click the snapshot and select **Mount Snapshot**.

If the **Mount Snapshot** option is unavailable, then the snapshot has been rolled over. In this case, follow the steps described in [“Performing a recovery” on page 50](#).

If another snapshot is currently mounted, a message displays that indicates that the currently mounted volume will be unmounted. Click **OK** to unmount the volume and to proceed with mounting the selected snapshot volume.

4. When the task bar animation stops and a green mark appears, click on the mounted snapshot.

The mounted snapshot item will expand in the **Navigation Tree**.

5. Under the expanded snapshot, select the items to be recovered. For more information about selecting items for recovery, see [“Selecting an item for recovery” on page 26](#).
6. Select any additional file system options if applicable. For more information, see [“NetWorker recovery options” on page 51](#).
7. From the **System Recover Session** toolbar, click **Start Restore**.  
Once the recovery starts, the snapshot is automatically unmounted.
8. From the left pane, select **Monitor** to view the progress of the recovery.

## Performing a disaster recovery of the VSS client

The following disaster recovery scenarios are included in this section:

- ◆ [“Performing an ASR disaster recovery” on page 60](#)
- ◆ [“Performing a disaster recovery of a clustered client” on page 64](#)

### Performing an ASR disaster recovery

ASR recovery should be used only if the failed computer requires a full disaster recovery (for example, if the system drive has failed).

An ASR recovery requires the following:

- ◆ A rolled over (conventional) backup of the SYSTEM COMPONENTS save set and the system volumes such as C:\ and D:\. A rolled over backup of the All save set automatically includes these required items.
- ◆ The Microsoft Windows Server 2003 installation CD for the computer you are recovering. ASR does not support recovery CDs of the original equipment manufacturer (OEM).
- ◆ The latest NetWorker rollover backup for the computer you are recovering.

If conventional NetWorker backup media is moved to an offsite location, ensure that all necessary volumes are available before starting the recovery. To list the media associated with the files to recover, run **mminfo -mv** from the command prompt. For more information about the **mminfo** command, refer to the *NetWorker Command Reference Guide*, release 7.3.2 or higher.

- ◆ Be aware of the limitations that are described in [“ASR recovery limitations” on page 61](#).

#### Notes:

If the ASR recovery fails with an error message similar to the following, use the legacy NetWorker disaster recovery method. For procedures, refer to the *EMC NetWorker Release 7.3.2 Multiplatform Version Disaster Recovery Guide*:

```
The recovery application "C:\WINDOWS\system32 \asr_pfu.exe
/restore /sifpath=C:\WINDOWS\repair\asr.sif" returned an error
code 0x2. Since this indicates an unrecoverable error, ASR
cannot continue on this machine.
```

If you use the legacy disaster recovery method, you may not be able to log in to the host using a domain account. In this case, rejoin the local host to the domain. Refer to Microsoft documentation for information about rejoining a host to a domain.

Snapshot recovery is not supported for ASR or legacy disaster recoveries. If you use the legacy disaster recovery method, you may see snapshot entries in the NetWorker VSS client **Navigation** tree. However, if the snapshot was on a volume that was lost due to a disaster, you cannot select the snapshot for a recovery operation.

ASR recovery consists of the following tasks:

- ◆ [“Task 1: Create the ASR disk media set” on page 61](#)
- ◆ [“Task 2: Perform the ASR recovery” on page 62](#)
- ◆ [“Task 3: Complete special handling of components” on page 62](#)
- ◆ [“Task 4: Verify the ASR recovery” on page 63](#)

## ASR recovery limitations

The following limitations apply to ASR recoveries:

- ◆ Recovery CDs from original equipment manufacturers (OEM) are not supported. Manufactures, such as Hewlett Packard and IBM provide a recovery CD or DVD with each system. These recovery disks cannot be used to perform an ASR recovery. To perform an ASR recovery, you must have an official Microsoft Windows installation CD.
- ◆ FAT16 partitions are not supported. After you have completed the ASR recovery and rebooted, recover a FAT16 partition in a separate, non-ASR NetWorker recovery operation. For more information, see [“Performing a recovery” on page 50](#).
- ◆ Vendor-specific drivers must be installed after Windows installation. ASR recovery can only be done on hardware components supported by the Windows installation media. Drivers for vendor-specific hardware must be installed after the Windows installation is complete. For example, the IBM Thinkpad network interface card (NIC) is not supported by the Windows installation media, and will cause ASR recovery to fail. For more information on hardware supported by the Windows installation media, refer to the Microsoft documentation.

### Task 1: Create the ASR disk media set

To create an ASR disk media set:

1. Open the NetWorker VSS client software on any backup client and connect to the NetWorker server on which the failed client was configured for backup. For more information, see [“Opening the software and connecting to a NetWorker server” on page 25](#).
2. From the left pane, select **Recover > System Recover Session**.
3. From the **System Recover Session** toolbar, click **ASR Disk Wizard**.
4. From the list of clients, select the client to be recovered. The local client is selected by default.

The files for the ASR disk are saved in the `temp` directory on the local client.

---

**Note:** The ASR Disk Wizard only supports recovery of conventional (rolled over) save sets. If the required save sets have not been rolled over, the client will not be available for selection.

---

5. When prompted, insert a blank disk into the A:\ drive and click **OK**.
6. When prompted about pausing the ASR recovery to select which save sets to restore, choose one of the following options:
  - Yes** — During recovery, ASR pauses and prompts you for the save sets to restore. If the ASR save set was backed up as a component of save set All, all of the client’s save sets can be selected for recovery except for application data save sets such as SQL or Exchange save sets.
  - No** — ASR performs a fully automated recovery of the NetWorker client host computer, without a pause. If the ASR save set was backed up as a component of save set All, all of the client’s save sets are recovered except for application data save sets such as SQL or Exchange save sets.

7. When notified that the ASR disk has been created successfully, remove the disk from the A:\ drive and label it.
8. Complete the wizard screens to create an ASR disk media set.

## Task 2: Perform the ASR recovery

To perform an ASR recovery on a NetWorker VSS client:

1. Start the computer from the Windows Server 2003 installation CD.  
You may need to run the BIOS setup program to configure the computer to boot from the CD-ROM drive. For instructions, refer to the computer manufacturer's documentation.
2. If prompted, press a key to boot from the CD-ROM drive.
3. During the text-mode phase of Windows setup, watch the lower portion of the screen. When prompted, press [F2] to display the ASR Recovery menu. Follow the instructions on the screen.
4. When prompted, insert the first ASR disk into the A:\ drive and press a key to continue. ASR formats the system partition, copies files, and begins the Windows installation.

If multiple diskettes are required for recovery, the recovery process may not prompt explicitly for the next diskette. Instead, a message might appear that is identical to the message that prompted you to insert the ASR diskette at the beginning of the recovery procedure. In this case, insert the next diskette and press any key to continue.

5. If you did not select the "pause during recovery" option while creating the ASR disk media set, a fully automated recovery is performed.

If you selected the "pause during recovery" option while creating the ASR disk media set, the NetWorker ASR Client dialog box appears during the graphical phase of the Windows installation.

- a. Expand **My Computer** to view the save sets to recover. The required save sets are selected by default.
- b. Click **Continue**.  
By default, the displayed save sets represent the most recent backup.
6. To view and select previous backups, click the **Browse** calendar icon in the application toolbar and select an earlier browse time.



### CAUTION

**Certain components cannot be correctly recovered during ASR recovery. To recover these components, see "Task 3: Complete special handling of components" on page 62.**

## Task 3: Complete special handling of components

Due to limitations in Microsoft ASR functionality, the following system state components cannot be correctly recovered during ASR recovery:

- ◆ COM+ Registration Database
- ◆ Disk Quota Database
- ◆ Windows Management Instrumentation Database
- ◆ VSS writers

To recover these components, perform the following procedure after an ASR recovery:

1. Start the NetWorker VSS client program.  
If you are recovering a domain controller, boot the host in Directory Services Restore Mode mode before starting the NetWorker VSS client program.
2. From the application toolbar, click the **NetWorker server** icon to select the NetWorker server on which the NetWorker client was configured for backup. For more information, see [“Opening the software and connecting to a NetWorker server” on page 25.](#)
3. From the left pane, select **Recover > System Recover Session**.
4. Select the required items for recovery. To view and select previous backups, click the **Browse** calendar icon in the application toolbar and select an earlier browse time.

For backups created with the NetWorker VSS client:

- From the **Navigation Tree**, open the System Components folder and select all items for recovery *except* for ASR Disk.

For backups created with a pre-NetWorker VSS client where VSS *was* licensed and enabled:

- Select all VSS save sets for recovery, *except* **VSS ASR DISK**.

For backups created with a pre-NetWorker VSS client where VSS was *not* licensed and enabled:

- a. From the **Navigation Tree**, expand the **SYSTEM STATE** save set folder and check for the presence of the **COM+ Registration Database** component. If it is present, select the **SYSTEM STATE** save set folder for recovery.
  - b. Expand the **SYSTEM DB** save set and check for the presence of the **Disk Quota Database** and the **Windows Management Instrumentation Database**. If either is present, select the **SYSTEM DB** save set folder for recovery.
5. From the **System Recover Session** toolbar, click **Start Restore**.

#### Task 4: Verify the ASR recovery

To verify the NetWorker client recovery:

1. Reboot the NetWorker client computer and verify that the NetWorker Remote Exec and NetWorker Power Monitor services have started.  
You can disable the NetWorker Power Monitor service if it is not needed. For more information, refer to the *EMC NetWorker, Release 7.3.2, Multiplatform Version, Administration Guide* or later.
2. Use the Windows Event Viewer to examine the event logs for errors. In particular, check for the following:
  - Service startup errors that are related to the Windows system state
  - Errors regarding the recovery of Windows system-protected files
 For information about how the NetWorker software handles the Windows system state and system-protected files, refer to the *EMC NetWorker, Release 7.3.2, Multiplatform Version, Administration Guide* or later.
3. Verify that any applications (such as Microsoft Office) that were running prior to the disaster have been properly recovered. To verify:

- a. Run each application.
- b. Open a previously saved document.

## Performing a disaster recovery of a clustered client

The following procedure describes how to recover a single node in a two node cluster. The procedure assumes that you are recovering Node\_B and that Node\_A is available.

1. Using the Cluster Administrator on Node\_A, evict Node\_B from the cluster.
2. At the command prompt, type the following to clean up MSCS:

```
cluster node Node_B /forcecleanup
```



### **CAUTION**

**After cleaning up the Cluster Server, You must reproduce the preexisting application environment on Node\_B so MSCS can administrator the applications as it did before the node failed. One way to reproduce the preexisting application environment is to perform a recovery for each application that was previously installed on the node.**

3. Using the cluster Administrator, select **Join an existing Cluster** and type the cluster name.
4. Using the Cluster Administrator on Node\_A, ensure that Node\_B appears available for failover operations.
5. Stop the cluster service in Node\_A by using one of the following methods:
  - Using the control panel service tool, stop the Cluster service.
  - At the command prompt, type the following:
 

```
net stop clussvc
```
6. Select the required items to be recovered for Node\_B. The procedure differs depending on whether or not the cluster service resides on a domain controller.
 

If the cluster service resides on a member server and is not a domain controller:

  - a. Open the NetWorker VSS client software on Node\_B.
  - b. From the left pane, select **Recover > System Recover Session**
  - c. Select all local drives *except* for the NetWorker VSS client installation directory.
  - d. Select the **SYSTEM COMPONENTS** folder.
  - e. From the **System Recover Session** toolbar, click **Start Restore**.

If the cluster service resides on a domain controller:

  - a. Boot the NetWorker VSS client in directory service restore mode as described in [“Booting Windows in Directory Service Restore mode”](#) on page 65.
  - b. Open the NetWorker VSS client software.
  - c. From the Options menu, select **System Recover Configuration Options** and click the **NetWorker** tab.
  - d. Unselect the **Use Microsoft best practices for selecting the system state** attribute and click **Yes** when asked to confirm your selection.
  - e. Click **OK** to close the dialog box.

- f. From the left pane, select **Recover > System Recover Session**.
  - g. From the **Navigation Tree**, expand the **SYSTEM COMPONENTS** folder and select **BootableSystemState**.
  - h. From the **System Recover Session** toolbar, click **Start Restore**.
  - i. After the Bootable System State is recovered, reboot the NetWorker VSS client.
  - j. Open the NetWorker VSS client software and select all local drives *except* for the NetWorker VSS client installation directory.
  - k. Repeat steps **c** to **e** to enable the selection of individual components under the **SYSTEM COMPONENTS** folder.
  - l. Select all **SYSTEM COMPONENTS** *except* for the **Bootable System State**.
  - m. From the **System Recover Session** toolbar, click **Start Restore**.  
When prompted, restart node\_B.
7. Start the Cluster service on node\_A by using one of the following methods:
    - Using the control panel service tool, Start the Cluster service.
    - At the command prompt, type the following:  
**net start clussvc**
  8. Using the Cluster Administrator on Node\_A, confirm that the cluster resources were recovered to the point in time when the backup occurred. If you have been performing regular scheduled backups, this will recover the cluster database to a point in time shortly before the loss of Node\_B.
  9. Using the Cluster Administrator on Node\_A, monitor the cluster "joining" status of Node\_B.
  10. Using the Cluster Administrator on Node\_B, verify that the cluster group can be moved between the nodes by right-clicking the group and selecting **Move group**.

## Monitoring a recovery

The progress of all recovery operations can be viewed from the Monitor window. For more information about the Monitor window, see [“About the NetWorker VSS client interface” on page 22](#).

## Booting Windows in Directory Service Restore mode

Before you can complete the following recovery operations, boot the NetWorker VSS client in Directory Service Restore mode:

- ◆ DFS recovery
- ◆ FRS recovery
- ◆ NTDS recovery
- ◆ Active Directory (AD) disaster recovery
- ◆ Legacy SYSTEM STATE or VSS SYSTEM BOOT save sets

To boot the NetWorker VSS client in Directory Service Restore mode:

1. On the NetWorker client domain controller, close all programs and restart Windows.

When the computer restarts, a list of startup choices appears. The startup choices and the duration of the startup display are based on the settings in the operating systems section and the boot loader section of the **boot.ini** file.

2. Choose the **Windows boot** option for the domain controller.
3. Press **F8** to display a list of special boot options.
4. Select **Directory Service Restore Mode (Windows Domain Controllers only)** from the list of special boot options.

When you boot in this mode, AD is taken offline.

5. Log on as administrator. Use the password that was specified when the domain controller was created.

Windows starts in safe mode.

6. Open the NetWorker VSS client application.
7. From the left pane, select **Recover > System Recover Session**.

Continue with the recovery options. For more information on:

- ◆ DFS recovery, see [“DFS recovery options” on page 54](#).
- ◆ FRS recovery, see [“FRS recovery options” on page 55](#).
- ◆ NTDS recovery, see [“NTDS recovery options” on page 56](#).
- ◆ AD disaster recovery, see [“Recovering all Active Directory data from a disaster” on page 76](#).
- ◆ SYSTEM STATE or VSS SYSTEM BOOT save set recovery, see [“Performing a recovery” on page 50](#). If you are recovering these savesets on a domain controller, see [“Recovering selected Active Directory objects and attributes” on page 74](#).

## Performing an authoritative recovery of NTDS or FRS data

Perform an authoritative recovery only when corrupted or deleted data has been propagated to other NT Directory Services (NTDS) or File Replication Services (FRS) servers. After the authoritative recovery, the domain administrator can delete any unnecessary newer objects.

NTDS and FRS objects may have associated group policies, for example, organizational units, domains, and site objects. Group policies are stored in the SYSVOL directory. A recovery of the SYSVOL directory cannot be separated from an authoritative recovery of NTDS or FRS.

To perform an authoritative recovery:

1. If you have not already done so, boot the NetWorker VSS client in **Directory Service Restore** mode. For more information, see [“Booting Windows in Directory Service Restore mode” on page 65](#).
2. If you have not already done so, complete the NTDS or FRS recovery options. For more information on:
  - FRS recovery, see [“FRS recovery options” on page 55](#).
  - NTDS recovery, see [“NTDS recovery options” on page 56](#).
3. From the command line, use the **xcopy** command to copy **sysvol\domain** to another location. This preserves group policy, and file and directory permissions.
4. Run the Windows **ntdsutil** utility.

5. At the `ntdsutil` prompt, type:  
**NTDSUTIL: authoritative restore**
6. To perform an authoritative recovery of the following:
  - Entire database, type:  
**NTDSUTIL: restore database**
  - Subtree or individual object, type:  
**NTDSUTIL: restore subtree *distinguished\_name***  
 For example,  
**NTDSUTIL: restore subtree**  
 OU=engineering,DC=Seattle,DC=jupiter,DC=com  
**NTDSUTIL: restore subtree**  
 CN=mars,CN=users,DC=Seattle,DC=jupiter,DC=com  
 For more information, refer to the Microsoft Windows Server Resource Kit documentation on Active Directory.
7. Exit the `ntdsutil` utility by typing **quit** at each successive `ntdsutil` prompt until the command prompt appears.
8. Copy the entire recovered **SYSVOL\domain** directory and all of its subdirectories to a new location.
9. Restart the domain controller in normal mode.
10. Log in to the domain controller.
11. Wait for the `SYSVOL` share to be published.  
 This can take several minutes while the recovered domain controller synchronizes with its replication partners.
12. After the `SYSVOL` share has been published, perform one of the following:
  - For an authoritative recovery of the entire database, copy the entire **SYSVOL\domain** directory tree from the new location (see step 8) to the existing **SYSVOL\domain** directory. When the copy operation prompts for confirmation, select **Yes to All**.
  - For an authoritative recovery of only a part of AD that includes Policy objects, copy the policy folders from the new location (see step 8) to the existing policy folders. Policy objects can be identified by their global universal ID (GUID). Policy folders are located in **SYSVOL\domain\Policies**.

## Recovering the Windows system configuration to a pre-NetWorker VSS client state

Hosts that were upgraded from a regular NetWorker client to a NetWorker VSS client can have their Windows operating system configuration recovered to a state prior to upgrading to the NetWorker VSS client.



### CAUTION

**If the Windows operating system was upgraded on the host, you cannot recover the Windows system configuration to the state it was in before the operating system software was upgraded.**

To recover the Windows system state to a point-in-time that precedes the installation of the NetWorker VSS client:

1. If the NetWorker VSS client is a Windows domain controller, boot the NetWorker VSS client in Directory Services Restore mode. For more information, see [“Booting Windows in Directory Service Restore mode” on page 65](#).
2. Recover the contents of the volume on which the Windows operating system was installed.
3. Recover the Windows configuration save sets:
  - If VSS was licensed and enabled, recover:
    - VSS SYSTEM BOOT
    - VSS SYSTEM FILESET
    - VSS SYSTEM SERVICES
  - If VSS was not licensed or enabled, recover:
    - SYSTEM STATE
    - SYSTEM FILES
    - SYSTEM DB

4. Update the recovered registry with NetWorker VSS client entries.

Because the registry was recovered to a pre-NetWorker VSS client state, you must update the registry with entries for the NetWorker VSS client. To update the registry, perform the following uninstall / install procedures.

- a. Uninstall the NetWorker VSS client software.
- b. Install the NetWorker VSS client software.
- c. Uninstall the PowerSnap™ software.

PowerSnap is installed with the NetWorker VSS client software.

- d. Uninstall the NetWorker VSS client software.
- e. Reinstall the NetWorker VSS client software.

For more information about the uninstall / install procedures, refer to the *EMC NetWorker VSS Client for Microsoft Windows Server 2003 First Edition Installation Guide*.

- f. Reinstall, as necessary, any other applications that were installed after the point-in-time to which the Windows operating system configuration was recovered.

---

This chapter includes the following topics:

- ◆ Performing a conventional AD or ADAM backup ..... 70
- ◆ Performing an AD or ADAM backup for disaster recovery ..... 72

## Performing a conventional AD or ADAM backup

A conventional Active Directory (AD) backup enables one to recover individual objects and object attributes. A conventional ADAM backup enables one to recover individual application partitions.

Unlike other types of NetWorker VSS client backups, a conventional backup does not use snapshot technology. Instead, the backup is routed directly to a conventional backup medium.

Complete the following tasks before performing a conventional AD or ADAM backup.

- ◆ [“Set searchFlags attribute on shared folder and DFS objects” on page 70](#)
- ◆ [“Set up local Windows SYSTEM account as an ADAM administrator” on page 70](#)

---

### Set searchFlags attribute on shared folder and DFS objects

To ensure that shared AD or ADAM folder objects and DFS objects are eligible for backup and recovery:

1. Log in to the AD or ADAM server as a Windows administrator.
2. Open the AD or ADAM schema.
3. Locate the property name.

For shared AD or ADAM folder objects, the property name is in the following format:

CN=UNC-Name

For DFS objects, the property name is in the following format:

CN=Remote-Server-Name, CN=PKT, and CN=PKT-Guid

4. Right-click the property name and select **Properties**.
5. Set the **searchFlags** attribute to **8**.
6. Click **Apply**.

You can now backup and recover DFS objects and shared AD or ADAM folder objects.

---

### Set up local Windows SYSTEM account as an ADAM administrator

The ADAM server, which is also a NetWorker client, relies on the NetWorker client's **nsrexecd** service to spawn the required binaries to perform a backup. The **nsrexecd** service and other binaries run under the Windows SYSTEM account. To ensure that these binaries can access ADAM data, the Windows SYSTEM account must be given access rights to each instance on the ADAM server.

To set up the Windows SYSTEM account with permissions on the local ADAM server:

1. Open the ADAM ADSI Edit utility.
 

The ADAM ADSI Edit utility is available with ADAM SP1.
2. Connect to the ADAM instance.
3. In the **Connection Settings** dialog box, select **Well-known naming context** and select **Configuration** from the list box.

4. Type the port number (typically 50000) of the ADAM partition in the **Port** box and click **OK**.
5. Select **CN=Roles** in the left pane
6. In the right pane, right-click on **CN=Administrators** and then select **Properties**.
7. In the **CN=Administrators Properties** dialog box, select the **Member Attribute** from the attributes list, and then click **Edit**.
8. Click **Add Windows Account** and add the local ADAM Server name.
9. Save your changes.

Repeat this procedure for each ADAM instance that you want to back up.

## Conventional backup tasks

The tasks involved in setting up a conventional AD or ADAM backup are similar to the tasks described in [Chapter 2, "Configuring a Scheduled Backup."](#) The differences are outlined in [Table 12](#).

**Table 12**     **Setting up a conventional AD or ADAM backup (1 of 2)**

Backup task	Considerations
Configure a backup pool	Use backup pools for conventional AD or ADAM backups that are different than the pools used for NetWorker VSS client backups that include snapshots. In this way, you can sort conventional AD and ADAM backups from other backups.
Configure snapshot policies	Do <i>not</i> use a snapshot policy for conventional AD or ADAM backups.
Configure a backup schedule	Full and incremental level backups are supported for conventional AD and ADAM backups. Level 1 to 9 backups are <i>not</i> supported.
Configure a backup group	Do <i>not</i> assign a snapshot policy or a snapshot pool to the backup group.
Configure a Client resource	Do <i>not</i> use the same Client resource for AD or ADAM conventional backups and other NetWorker VSS client backups including AD or ADAM backups for the purposes of disaster recovery.
Configure a Client resource, <b>Save Set</b> attribute	Specify domain objects in the following format: <ul style="list-style-type: none"> <li>• CN=Users,DC=domain,DC=com</li> </ul> For example: <ul style="list-style-type: none"> <li>• CN=Users,DC=corp,DC=xyz,DC=com where the backup includes Active Directory User objects for the domain name, corp.xyz.com.</li> <li>• CN=user123,CN=Users,DC=domain,DC=com where the backup includes Active Directory user123 objects for the domain name, users.domain.com.</li> </ul>

Table 12 Setting up a conventional AD or ADAM backup (2 of 2)

Backup task	Considerations
Configure a Client resource, <b>Backup Command</b> attribute	<ul style="list-style-type: none"> <li>AD objects Type the following command in the <b>Backup Command</b> attribute: <b>nsradsave.exe</b> Active Directory domain objects and application partitions on the domain host cannot be backed up in the same Client resource. Each type of data must be specified on a separate Client resource. For example, to back up an Active Directory domain or part of a domain, type the following in one Client resource: <b>nsradsave.exe</b></li> <li>ADAM objects To back up ADAM application partitions, type the following command in the <b>Backup Command</b> attribute: specify the port number 50000. For example, type the following in another Client resource: <b>nsradsave.exe -p 50000</b></li> </ul>
Configure privileges	In addition to the permission set up described in <a href="#">Chapter 2</a> , ensure that the steps described in <a href="#">“Set up local Windows SYSTEM account as an ADAM administrator” on page 70</a> are completed.
Configure a proxy client	Do <i>not</i> configure a proxy client for conventional AD backups.

## Performing an AD or ADAM backup for disaster recovery

Performing an AD backup for disaster recovery enables the recovery of the entire AD database in the event of a catastrophic loss such as a hardware failure. AD data that is protected for a disaster is recoverable on an all or nothing basis. You cannot choose individual objects for recovery, instead you must recover the entire AD database in one recovery operation.

To enable the disaster recovery of AD or ADAM data, create a snapshot-based scheduled backup as described in [Chapter 2, “Configuring a Scheduled Backup.”](#)

When specifying save sets for the scheduled backup, follow these recommendations:

- ◆ For an AD Client resource, specify the save set as:

**SYSTEM COMPONENTS:\ .**

**Note:** Microsoft best practices also recommends that a backup AD server be set up so that it can be promoted to the primary AD server, in the event of a disaster.

- ◆ For an ADAM Client resource, specify the save set as:

**Applications:\ADAM (*instance\_name*) Writer**

Where (*instance\_name*) is the name of the ADAM instance.

---

This chapter includes the following topics:

- ◆ Recovering selected Active Directory objects and attributes..... 74
- ◆ Recovering all Active Directory data from a disaster ..... 76

## Recovering selected Active Directory objects and attributes

You can individually select deleted Active Directory (AD) objects and their attributes for recovery.

**Note:** Due to AD limitations, there are some restrictions on the recovery of objects and attributes. For more information, see [“Recovery Restrictions for Active Directory” on page 75](#).

To recover an AD object or object attribute:

1. Start the NetWorker VSS client User program.

If you are recovering the SYSTEM STATE or VSS SYSTEM BOOT saveset, boot the host in Directory Services Restore mode before starting the NetWorker VSS client User program. For more information, see [“Booting Windows in Directory Service Restore mode” on page 65](#).

2. From the application toolbar, click the **NetWorker server** icon to select the NetWorker server on which the NetWorker client was configured for backup.
3. In the left pane, select **Recover > Active Directory Recover Session**.
4. In the **Navigation Tree**, select the AD objects to be recovered. By default, the objects displayed in the **Navigation Tree** are from the most recent backup.

To recover objects from a previous backup:

- From the application toolbar, click the **Browse** calendar icon and select an earlier browse time.
  - To view all versions of a backup object prior to the selected browse time, select an object in the **Navigation Tree**, right-click and select **Versions**.
5. To determine whether any volumes need to be mounted for a selected object, right-click an object and select **Required Volumes**.
  6. Recover the entire object or selected object attributes.

To recover the entire object:

- a. Select the object.
- b. From the **Active Directory Recover Session** toolbar, click **Start Recover** to begin the recovery operation.

To recover just selected attributes of an object:

- a. Right-click an object and select **Recover this Item**.

The Active Directory Recover Attributes dialog box appears.

- b. Select each attribute that is to be recovered.

If all attributes or no attributes are selected, the entire object is recovered.

- c. Click **OK**.

7. From the left pane, select **Monitor** to view the progress of the recovery.

---

## Recovery Restrictions for Active Directory

The following restrictions apply when recovering Active Directory (AD) objects and attributes:

- ◆ “Tombstone lifetime restriction” on page 75
- ◆ “System-Only attributes cannot be recovered” on page 75
- ◆ “Object password attributes” on page 76
- ◆ “Attributes with null values” on page 76
- ◆ “Schema objects” on page 76

---

**Note:** After starting an AD recovery, access the Monitor view to verify the status of the recovery.

---

For more information about Active Directory objects and attributes, refer to the Microsoft website.

### Tombstone lifetime restriction

When an AD object is deleted, it is sent to *tombstone*. It is better to recover a tombstone object instead of re-creating it because data such as the Security Identifier (SID) and the Global Unique Identifier (GUID) are stored with the tombstone object. This data is critical for additional data recoveries, such as assigned group permissions. For example, Access Control Lists (ACLs) use the SID of a security identifier object to store its permissions. A re-created group would get a new SID and GUID so that permissions assigned to the old group would be lost. Similarly, the SID and GUID are both used to recover a user profile. A user's profile would become unusable if a user with the same name is re-created. This is because the new profile would be given a new SID and GUID.

Objects in tombstone are deleted when they reach the tombstone lifetime age for the domain, which is, by default, 180 days. After an object is deleted from the tombstone, it cannot be recovered. This is an AD restriction. The tombstone lifetime is a configurable attribute of a Windows domain. For more information, refer to the Microsoft Windows 2003 Server documentation on AD.

### System-Only attributes cannot be recovered

Object attributes that are system-only cannot be backed up nor recovered. This is an AD restriction. The following partial list of system-only attributes are not backed up:

- ◆ distinguishedName
- ◆ dSCorePropagationData
- ◆ instanceType
- ◆ objectCategory
- ◆ objectClass
- ◆ objectGUID
- ◆ uSNChanged
- ◆ uSNCreated
- ◆ whenChanged
- ◆ whenCreated
- ◆ badPasswordTime

- ◆ badPwdCount
- ◆ lastLogoff
- ◆ lastLogon
- ◆ logonCount
- ◆ sAMAccountType
- ◆ userAccountControl

### Object password attributes

An object's password is not recovered. After recovering an object with a password attribute, the Windows administrator must reset the password.

### Attributes with null values

Attributes with null values are not backed up and therefore, are not recovered. For example, if an attribute for a phone number was empty (null), then the null Phone Number attribute would not be backed up. This is an AD restriction and is intended to prevent the unintentional overwriting of valid attribute values. For example, if a Phone Number attribute was null when a snapshot was taken but later a valid phone number was added, subsequent recovery operations would not overwrite the valid phone number with a null value.

### Schema objects

Schema objects cannot be recovered and therefore, should never be deleted.

---

## Recovering all Active Directory data from a disaster

The steps in this procedure assume that any damaged hardware has been replaced and that all software has been reinstalled.

To ensure the successful disaster recovery of the Active Directory (AD) server, the backup steps described in [“Performing an AD or ADAM backup for disaster recovery” on page 72](#) must have been completed.

**Note:** If you have followed Microsoft best practices, you will have a backup AD server that can be promoted to the primary AD server in the event of a disaster. This is the preferred method to recover an AD server from disaster. If you do not have a backup AD server that can be promoted to the primary AD server, complete the steps in this section to recover from a disaster of the AD server.

To recover AD server data from a disaster:

1. If you have not already done so, boot the NetWorker VSS client in Directory Service Recovery mode. For more information, see [“Booting Windows in Directory Service Restore mode” on page 65](#).
2. Open the NetWorker VSS client software and select the NetWorker server on which the NetWorker VSS client was configured for backup.
3. In the left pane, select **Recover > System Recover Session**.
4. From the **Navigation Tree**, open the **System Components** folder.

By default, the objects displayed in the **Navigation Tree** are from the most recent backup.

To recover from a previous backup:

- From the application toolbar, click the **Browse** calendar icon and select an earlier browse time.
  - To view all versions of a backup object prior to the selected browse time, right-click an object in the **Navigation Tree** and select **Versions**.
5. Select items to recover:

If the AD server is *not* in a clustered environment:

    - Select all of the items under the **System Components** folder.

If the AD server is part of a cluster environment:

    - a. From the **Options** menu, select **System Recover Session Options** and then select the **NetWorker** tab.
    - b. Unselect the attribute titled **Use Microsoft best practices for selecting the system state**. Click **Yes** when asked to confirm your selection.
    - c. Click **OK** to close the **System Recover Session Options** dialog box.
    - d. Select all of the items under the **System Components** folder *except* for the **Cluster Writer**.
  6. To determine whether any volumes need to be mounted, right-click the selected item and select **Required Volumes**.
  7. From the **System Recover Session** toolbar, click **Start Restore**.
  8. If you want to perform an authoritative recovery of the AD server, complete the steps to perform an authoritative recovery of NTDS or FRS data. For more information, see [“Performing an authoritative recovery of NTDS or FRS data” on page 66](#).
  9. After the AD recovery is complete, reboot the host to restart the AD server.
  10. If the AD server is part of a cluster environment, select the **Cluster Writer** for recovery.
  11. Recover any remaining volume or application data. For more information, see [Chapter 3, “Recovering Data.”](#)



---

This chapter includes the following topics:

- ◆ Roll over a snapshot..... 80
- ◆ Roll back a snapshot ..... 80
- ◆ Delete a snapshot ..... 83

---

## Roll over a snapshot

A rollover is the process of creating a conventional backup from a snapshot. Conventional backups include backup to tape, file type, or advanced file type devices. Rollover policies are typically controlled automatically through snapshot policy settings on the NetWorker server. For more information, see [Chapter 2, "Configuring a Scheduled Backup."](#)

However, you can perform a rollover manually if necessary. For example, before recovering a database that currently exists only as a persistent snapshot, consider rolling over the snapshot to tape to protect the data in case the snapshot becomes corrupted during the recovery process.

Another reason to perform a rollover manually, is to rollover only selected save sets from the snapshot. For example, if a snapshot contains two save sets: D:\ and E:\, you can select to rollover only the data in the E:\ save set.

To roll over a snapshot:

1. Open the NetWorker VSS client software and select the NetWorker server on which the NetWorker client was configured for backup.
2. In the left pane, select **Snapshot Management**.
3. In the **Navigation Tree**, select the snapshot and expand the snapshot to view the savesets. Select the snapshot or snapshot save sets to be rolled over.
4. From the **Snapshot Management** toolbar, click **Rollover** to begin the rollover operation.
5. In the left pane, select **Monitor** to view the progress of the rollover operation.

---

## Roll back a snapshot

A rollback recovery is the process of returning data to an earlier point-in-time. The entire contents of a persistent snapshot is recovered during a rollback recovery. You cannot select individual components in a rollback recovery operation. A rollback recovery is the fastest way to recover the contents of a persistent snapshot.

A rollback recovery is known as a "destructive" recovery because all changes that were made after the selected snapshot was taken are overwritten. For example, suppose that a snapshot of a database is taken every hour. At 5:30 P.M., it is determined that the database is corrupt and that the last known consistent database snapshot was taken at 5:00 P.M. When the database host is rolled back to the 5:00 P.M. snapshot, all database transactions between the time of the 5:00 P.M. snapshot and 5:30 P.M. are overwritten.

---

### Rollback recovery requirements

To perform a rollback operation, the following requirements must be met:

- ◆ The snapshot to be rolled back must reside on a CLARiiON or Symmetrix storage system that is supported with the EMC VSS Provider. For more information, refer to the *EMC NetWorker VSS Client for Windows First Edition Installation Guide*.
- ◆ The NetWorker VSS client to which the snapshot is to be rolled back must be supported with a proxy client and the snapshot must have been created using a proxy client. For more information about a proxy client, see [Chapter 2, "Configuring a Scheduled Backup."](#)

- ◆ The nested mount points on file systems are dismounted prior to performing the rollback restore.
- ◆ The Microsoft Exchange checkbox titled **This database can be overwritten by a restore** is selected for each Exchange database that is to be recovered. This checkbox can be found by using the Exchange SYSTEM Manager application.
- ◆ The databases are detached for each Microsoft SQL Server database that is to be recovered.
- ◆ A storage array descriptor file is created and placed in the `nsr\res` directory on the NetWorker VSS client host. This file contains information about the storage arrays connected to the proxy client data mover.

To create a storage array descriptor file:

1. Using a text editor, create a file and name it **sa.ini**.
2. In the sa.ini file, add a heading for storage arrays and specify the total number of storage arrays connected to the proxy client. For example, if there are two storage arrays, type the following value:

```
[Storage_Array]
Storage_Array_Count=2
```

3. For each storage array, specify the storage array ID. For example, entries for two storage array IDs might look like the following:

```
Storage_Array_1=APM00052106710
Storage_Array_2=APM00052211461
```

4. Add a heading for each storage array ID and specify information about the storage array. For example, a CLARiiON storage array ID entry might look like the following:

```
[APM00052106710]
Array_Type=CLARiiON
Array_model=CX500
Array_user=user_name
Array_pass=password
Array_SPA=IP_Address_of_Storage_Processor_A
Array_SPB=IP_Address_of_Storage_Processor_B
```

5. Save the sa.ini text file and place it in the `<NetWorker_install_path>\nsr\res` directory on the NetWorker VSS client host.

### Sample CLARiiON sa.ini file

A sample sa.ini file for two CLARiiON storage arrays would look similar to the following:

```
[Storage_Array]
Storage_Array_Count=2
Storage_Array_1=APM00052106710
Storage_Array_2=APM00052211461

[APM00052106710]
Array_Type=CLARiiON
Array_model=CX500
Array_user=sbarma
Array_pass=7dn2dG9A
Array_SPA=122.222.111.128
Array_SPB=122.222.111.129

[APM00052211461]
Array_Type=CLARiiON
Array_model=CX300
Array_user=jdinge
Array_pass=s16GH792
Array_SPA=122.222.110.121
Array_SPB=122.222.110.122
```

### Sample Symmetrix sa.ini file

A sample sa.ini file for a single Symmetrix storage array would look similar to the following:

```
[Storage_Array]
Storage_Array_Count=1
Storage_Array_1=000187461273

[000187461273]
Array_type=Symmetrix
Array_sid=197
Array_Model=DMX-800
```

---

## Performing a rollback recovery

Before performing a rollback recovery, ensure that the rollback requirements have been met. For more information, see [“Rollback recovery requirements” on page 80](#).

To perform a rollback recovery:

1. Open the NetWorker VSS client and select the NetWorker server on which the NetWorker client was configured for backup.
2. In the left pane, select **Snapshot Management**.
3. If you are performing a rollback for EMC Symmetrix configurations that use RAID5 Business Continuance Volumes (BCVs), perform the following steps:
  - a. Delete all snapshots for the Standard EMC Disk (STD), except for the snapshot to be rolled back. For information about deleting snapshots, see [“Delete a snapshot” on page 83](#).

The deletion operation will put the snapshot BCVs in the established state. Once you have completed the deletions, there should be only one snapshot BCV in the split state, and that this is the snapshot BCV that is to be rolled back.

**Note:** To prevent the loss of data from a snapshot that is to be deleted, perform a rollover of the snapshot before the deletion operation. For information about rolling over a snapshot, see [“Roll over a snapshot” on page 80](#).

- b. Use the **SYMCLI** commands to disassociate the BCVs and Virtual Devices (VDEVs) that are in the established state.
  - c. If the snapshot used multiple STDs, perform the previous steps for each STD.
4. In the **Navigation Tree**, select the snapshot to be rolled back.
  5. Right-click the selected snapshot and select **Rollback**.
  6. In the left pane, select **Monitor** to view the progress of the rollback operation.
  7. When rollback processing has completed, reboot the host to complete the rollback operation.
  8. If you performed a rollback on an Exchange or SQL database, remount the database. If you performed a rollback on a file system that had nested mount points, remount the nested mount points.

## Delete a snapshot

Snapshot deletion policies are typically controlled automatically through snapshot policy settings on the NetWorker server. For more information, see [Chapter 2, “Configuring a Scheduled Backup.”](#)

However, you can delete a snapshot manually. For instance, if space must be made available immediately on the storage system, you can manually roll over and then delete snapshots.



### CAUTION

**If a snapshot is deleted without the use of the NetWorker VSS Client user interface, the snapshot may still appear to be recoverable in the NetWorker VSS client user interface. If such a snapshot is selected for recovery, the recover operation will fail. A snapshot could be deleted by a user in another application. A snapshot could also be deleted by VSS or the storage subsystem if resources are exhausted due to high input/output rates on the volumes.**

To delete a snapshot:

1. Open the NetWorker VSS client software and select the NetWorker server on which the NetWorker client was configured for backup. For more information, see [“Opening the software and connecting to a NetWorker server” on page 25](#).
2. In the left pane, select **Snapshot Management**.
3. In the **Navigation Tree**, select the snapshot to be deleted.
4. Right-click the selected snapshot and select **Delete**.
5. In the left pane, select **Monitor** to view the progress of the delete operation.



---

This chapter includes the following topics:

- ◆ [Specifying ranges for service and connection ports..... 86](#)
- ◆ [Specifying a password..... 86](#)

## Specifying ranges for service and connection ports

A service port is a listener port that provides services to NetWorker VSS client hosts. The default range for service ports is 7937 to 9936. A connection port is used to contact a service, whether it is on a NetWorker server, storage node, or client. The default range for connection ports is 10001-30000.

To implement an enhanced security environment, it may be necessary to reduce the range of available ports. For more information about determining the size of the port range, refer to the *EMC NetWorker, Release 7.3.2, Multiplatform Version, Administration Guide* or later.

To reduce the range of available ports:

1. From the **Options** menu, select **Configure Options**.

The **Configure Options** dialog box is displayed.

2. In the **Service Ports** attribute, enter the range of available ports.
3. In the **Connection Ports** attribute, enter the range of available ports.
4. Click **OK**.

---

**Note:** If a firewall exists between the NetWorker client and any NetWorker servers, ensure that the firewall is configured to accept the port ranges entered in the Configure Options dialog box.

---

## Specifying a password

The password is used to protect items that will be backed up with either PW1 password-protection or PW2 encryption and password-protection. PW1 and PW2 protection is enabled on the NetWorker server with a local or global directive. For more information about PW1 and PW2 protection, refer to the *EMC NetWorker, Release 7.3.2, Multiplatform Version, Administration Guide* or later.



### **CAUTION**

**Changing the password does not change the password for files that have already been backed up. To recover PW1 or PW2 password-protected files, you must provide the password that was in effect at the time of the backup.**

To change the PW1 password:

1. From the **Options** menu, select **Configure Options**.

The **Configure Options** dialog box is displayed.

2. In the **Old password** attribute, type the password that is currently in effect.
3. In the **New password** attribute, type the new password.
4. In the **Confirm password** attribute, retype the password.
5. Click **OK**.

The new password will be applied to future scheduled backups for the NetWorker VSS client where password-protection has been enabled with a global or local directive.

---

This chapter includes the following topics:

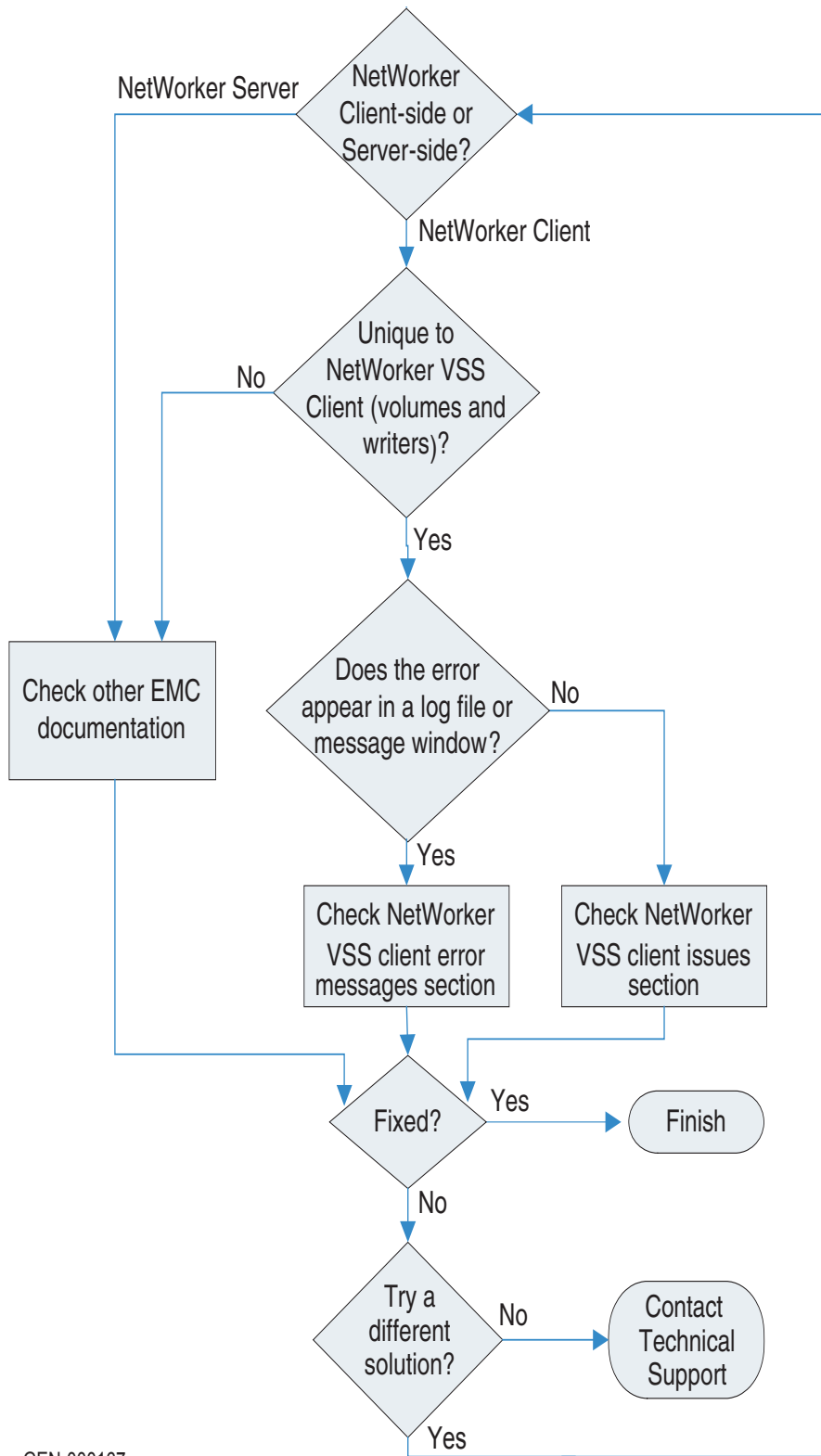
- ◆ The troubleshooting process..... 88
- ◆ NetWorker VSS client error messages..... 90
- ◆ NetWorker VSS client issues..... 92
- ◆ Checking log files ..... 96
- ◆ Manually stopping and starting services..... 98
- ◆ Other troubleshooting resources..... 99

## The troubleshooting process

NetWorker and the NetWorker VSS Client for Microsoft Windows provide many resources to help discover and isolate problems. Setting up these resources before problems occur can help if and when troubleshooting problems occur later.

If the problem is not with the NetWorker VSS client, there are other NetWorker resources and documentation that may provide a solution.

The following flowchart, [Figure 10, "Troubleshooting process,"](#) provides an overview of the process and sections of this chapter for troubleshooting a scheduled backup or recovery problem.



GEN-000167

Figure 10 Troubleshooting process

## Setting up notifications

Set up NetWorker software and NetWorker VSS client software to send notifications about events. These notifications can be sent to several locations, including log files, SNMP printers, SNMP management console, and email messages. The *EMC NetWorker, Release 7.3.2, Multiplatform Version, Administration Guide* describes how to set up notifications.

## Finding errors

When a problem occurs, a notification or message might be displayed, or appear in a log file. [Table 13 on page 90](#) describes several ways that NetWorker server, NetWorker VSS client, and other NetWorker features provide information about problems.

**Table 13**      **Notifications and errors**

Type	Description
Email notification of a NetWorker event	A NetWorker client can be set up to send an email notification about NetWorker events.
Error message windows	Appear on the NetWorker server when an error occurs during backup or recovery operations.
NetWorker Monitor window	Displays details of current NetWorker server activities, operations related to devices and libraries, and events that require user intervention.
Event viewer	Alerts users that user intervention is required on the NetWorker server.
Log files	Log files are created for each operation and process. Separate log files are available for NetWorker and various features, depending on what features are installed and in use: <ul style="list-style-type: none"> <li>• NetWorker VSS Client for Microsoft Windows</li> <li>• NetWorker</li> <li>• NetWorker PowerSnap™</li> <li>• Replication Manager</li> <li>• Solutions Enabler</li> <li>• EMC VSS Provider</li> </ul> The logging level of the log file is controlled by the debug level of the process.

## NetWorker VSS client error messages

Error messages help to identify which product is having a problem. The following sections describe error messages that are specific to the NetWorker VSS client.

### E\_VOLUME\_NOT\_SUPPORTED

This error occurs when CLARiiON is down, an array is unmanaged, or the CLARiiON disk is not visible. This error also occurs when Data Mover is used to take a local volume replica. The error message will appear in NetWorker VSS client and Replication Manager logs.

#### **Solution**

Check in the CLARiiON array for storage allocation.

## E\_VETO\_PROVIDER

There are several possible causes for this error:

- ◆ Storage resources such as Symmetrix clones or CLARiiON BCVs have been added but the Replication Manager service was not recycled to rebuild the storage resource cache. The provider finds the LUN as hosted by the storage array, but fails to find storage resources in the storage resource cache.
- ◆ There is a load on the CLARiiON array, and replica creation fails.
- ◆ A CLARiiON snapshot is performed when there are not enough LUNs in the reserved LUN pool. In this case, the **rmsnap** command fails.
- ◆ A CLARiiON snapshot is performed, but the number of established snapshot sessions to the LUN has already reached the limit.

### Solution

Use the **net stop** and **net start** commands to stop and restart the EMC VSS provider, Microsoft VSS services, and Replication Manager services.

For example, to stop and restart the Replication Manager service:

1. From the command line, stop the **rmagentps** service.

```
net stop rmagentps
```

2. Start the **rmagentps** service.

```
net start rmagentps
```

## VSS\_E\_WRITERERROR\_RETRYABLE error code 0x800423f3

This error occurs if a savegroup is rerun, and it was stopped previously while a replica was being taken and the replica did not complete.

### Solution

Stop EMC VSS provider, Microsoft VSS services, and Replication Manager services. Then start those services. Also restart Exchange Information store if it was running and was backed up.

## VSS CLIENT... Invalid Writer Selection ... for APPLICATIONS

This error might occur if Microsoft Exchange services are not up or if SQL databases are offline.

Another cause of this error is if there is a typographical error in writing Applications:\Microsoft Exchange Writer.

### Solution

For Microsoft Exchange applications, start the Exchange services. If Exchange services were already up, dismount and mount the databases and then start the savegroup.

For SQL Server applications, bring the databases online.

### Solution

Retype the words correctly or use the **nsrsnap\_vss\_save -?** command, as described in [“Displaying valid application data save sets” on page 41](#), to display a listing of all valid application save sets on the NetWorker VSS client.

---

## NetWorker VSS client issues

The following section describes some common problems and possible solutions for NetWorker VSS client. Check this section first when there appears to be a problem but there is no specific error message in monitoring or event logs.

---

### Savegroup failed in scheduled backup

A notification appears in the NetWorker Monitor window that a savegroup failed.

#### **Solution**

Check the savegroup details for the failed save set. This may provide an exact cause, or a general error, which should indicate whether it is a client-side or server-side issue. The *EMC NetWorker, Release 7.3.x, Multiplatform Version, Administration Guide* provides information about viewing group backup details.

If there is not enough information in the savegroup details, check the NetWorker VSS client log and other client-side logs.

[“Checking log files” on page 96](#) provides more information about the log names, locations, and details.

---

### In progress backup fails

If a node within a cluster undergoes failover during a backup operation, the operation will not be successful. The next scheduled backup operation will be the next valid backup.

#### **Solution**

If you are using a hardware provider such as the EMC VSS Provider, use the disk management utilities provided with the associated hardware to delete any resources that may be left in an indeterminate state as a result of the failed backup. For example, a CLARiiON storage solution may have an inactive snapshot as the result of a failed backup. In this case, use the EMC NaviCLI interface to search for and delete the inactive snapshot.

---

### NetWorker is blocked by Windows Firewall

After installing Microsoft Windows Server 2003 (SP1), The Windows Firewall may be blocking NetWorker processes from sending information through the firewall.

#### **Solution**

The *EMC NetWorker VSS Client for Windows Server 2003 First Edition Installation Guide* provides information about how to extend the Security Configuration Wizard or manually configure Windows Firewall exceptions.

---

### Need to run utility to obtain Exchange Server information

The utility **nwexinfo.exe** runs when NetWorker VSS client is installed on an Exchange Server. This utility gathers the Exchange username, password, and domain, and then inserts this information in the registry.

**Solution**

Rerun the utility if any of the following conditions occurs:

- ◆ Exchange Server is installed after NetWorker VSS client is installed.
- ◆ The Exchange username, password, or domain values change after the NetWorker VSS client is installed.

To run the utility:

1. Navigate to the following folder:  
`<NetWorker_install_path>\nsr\bin`
2. Run **nwexinfo.exe**.
3. Change the Exchange password, username, and domain as required.

---

### Requesting a snapshot for a volume on hardware that is not transportable

When volumes are added to the NetWorker VSS client snapshot set, an error might appear if a transportable hardware snapshot is requested and the volume that is being replicated is not a volume that resides on special hardware that is transportable. The following error message might also appear:

```
VSS_E_VOLUME_NOT_SUPPORTED_BY_PROVIDER.
```

**Solution**

The Exchange server and Proxy server (if one is set up for Exchange) must have matching volumes or alternate mount path in PowerSnap (PS) attribute. An Exchange backup that is mounted on a Proxy server needs either matching volumes or an alternate location to mount Exchange databases and logs.

An example of matching volumes would be D: to D: and E: to E:.

An example of alternate location would be "G:\altpath" on the Proxy server. In this example, the snapshot of "D:\" would be mounted on the Proxy server as "G:\altpath\D\" and the snapshot of "E:\" would be mounted on the Proxy server as "G:\altpath\E\".

To use the alternate mount path, set the PowerSnap attribute NSR\_ALT\_PATH in the Client resource. In the preceding example of an alternate location, the attribute would be set to "NSR\_ALT\_PATH=G:\altpath." ["Task 5: Configure a Client resource" on page 38](#) provides more information about creating a Client resource.

---

### PowerSnap service must be restarted after the NetWorker service is restarted

After restarting the NetWorker service, if the PowerSnap service is not restarted, the first retention or rollover will fail. The following message appears:

```
RPC send operation failed. A network connection could not be established with the host.
```

The PowerSnap service will re-establish the connection on the next operation, so this failure will only occur once.

**Solution**

To fix this problem, restart the PowerSnap service after restarting the NetWorker service, before running a PowerSnap operation.

---

### PowerSnap validation for recovery fails

When the service is not stopped, recovery fails while validating PowerSnap for recovery. Some VSS writers require that the service be stopped while recovering. For example, the SQL writer requires that the service be stopped while recovering the SQL database.

**Solution**

To fix this problem, stop the service before recovering.

---

### Snapshot backup may fail with writer errors

A snapshot backup may fail with VSS writer errors that indicate the writer may be in an unstable state, such as the following:

VSS\_E\_WRITERERROR\_NONRETRYABLE

VSS\_E\_BADSTATE

VSS\_E\_UNEXPECTED\_WRITER\_ERROR

**Solution**

Contact EMC Technical Support.

---

### Microsoft I/O write error when taking a replica in a CLARiiON array

This problem might occur when a replica is taken in a CLARiiON array LUN backup.

**Solution**

To fix this problem, stop the EMC VSS provider, Volume Shadow Copy Service and Replication Manager services. Then start those services.

---

### Creating a replica takes a long time in CLARiiON environment

Older version of FLARE<sup>®</sup> OS running on CLARiiON may take a long time to create a replica.

**Solution**

To fix this problem, update CLARiiON FLARE OS to the latest version.

---

### Cannot recover Exchange database due to overwrite prevention error

If an Exchange database has not been selected for recovery in the Exchange System Manager, recovery for that database will fail. When a recovery attempt fails, several entries are displayed in the NetWorker Monitor window. For example:

```
"VSS CLIENT... Database "Mailbox Store 2 (SERVERX)" in Storage Group
  "Second Storage Group" does not have the "This database can be
  overwritten by a restore." checkbox marked."
```

```
"VSS validation and preprocessing failed for Microsoft Exchange
Writer."
```

```
"nsrsnap_vss_recover: Recovery operation failed. Refer to log file(s)
for details."
```

The following message may be displayed by Microsoft Exchange:

The database files in this store were replaced with older versions by an offline restore. To use the restored files, open the database property page for this store, select "this database can be overwritten by a restore", wait for active directory replication, and try again.

Error ID: C104173A  
Exchange System Manager

#### **Solution**

Search for "KB293324" on the Microsoft Help and Support website, and go to the article "XADM: "C104173A" Error Message Occurs After You Restore the Database." Follow the instructions for changing the setting in Exchange System Manager.

---

### **Incremental backups within NetWorker Module for Exchange Client may be promoted to full backups**

If the NetWorker VSS User Client is installed, requests for an incremental backup through the NetWorker Module for Exchange Client are automatically promoted to a full backup. This does not affect NetWorker VSS User Client incremental backups of volumes.

For example, suppose that NetWorker Module for Exchange Client requests an incremental backup for Exchange server "EXSRV1." If NetWorker VSS User Client is installed, then the NetWorker Module for Exchange Client promotes its own incremental backup to a full backup to maintain the integrity of the backup and prevent data loss. However, the NetWorker VSS User Client can still perform an incremental backup of a volume, such as "D:\\" on "EXSRV1."

---

### **Incremental backups within NetWorker Module for SQL Server Client may be promoted to full backups**

If the NetWorker VSS User Client is active and configured to back up the SQL database, requests for an incremental backup through the NetWorker Module for SQL Client are automatically promoted to a full backup to maintain the integrity of the backup and prevent data loss. Installation of the NetWorker VSS User Client itself does not automatically promote NetWorker Module for SQL Client incremental backups to full backups. This does not affect NetWorker VSS User Client incremental backups of volumes.

For example, suppose that the NetWorker Module for SQL Client requests an incremental backup for SQL server "SQLSRV1." If the NetWorker VSS User Client is installed, and the NetWorker VSS User Client performs backups of the SQL database, then the NetWorker Module for SQL Client automatically promotes the incremental backup to a full backup.

However, if the NetWorker VSS User Client is installed but does not perform backups of the SQL database, then a request through the NetWorker Module for SQL Client for an incremental backup is allowed. In either case, the NetWorker VSS User Client can still perform an incremental backup of a volume, such as "D:\\" on "SQLSRV1."

## Checking log files

There are many log files generated by NetWorker VSS client and associated features. These log files include errors that occur during the processes. Check the log files in the following order:

1. "NetWorker VSS client" on page 96
2. "PowerSnap client" on page 96
3. "Replication Manager" on page 97
4. "Solutions Enabler" on page 97
5. "Active Directory" on page 97
6. "NetWorker Server" on page 98

In addition, third party providers generate their own logs in place of the Solutions Enabler log (hwprov.log). For more information, check the third party documentation.

---

### NetWorker VSS client

#### Log file

- ◆ vssclient.log

#### Location

Applogs folder. For example, C:\Program Files\Legato\nsr\applogs\.

#### Description

Both save and recover CLIs write to this file. The log file is cumulative, so it is appended with each run. The logging level of the log file is controlled by the debug level of the process (-D).

---

### PowerSnap client

#### Log files

NetWorker VSS Client Interface Library:

- ◆ libvsspsclnt.XXXXXX.log

PowerSnap Client Core Processes. There are log files for each process that runs:

- ◆ nsrbragent.XXXXXX.log
- ◆ nsrsnapagent.log
- ◆ nsrsnapbwragent.log
- ◆ nsrsnapck.log

#### Location

Logs folder. For example, C:\Program Files\Legato\nsr\logs\.

#### Description

Usually the PowerSnap Client creates one set of log files for each backup or recover session, and a debug and trace log are created. These log files are tied together by using the Snapshot Session ID.

The logging level of the log files is controlled by setting a variable in NSR\_PS\_DEBUG\_LEVEL in NetWorker Server, in client configuration.

Error messages in PowerSnap Client log files also appear in the standard user interface outputs for NetWorker VSS client.

---

## Replication Manager

### Log files

- ◆ erm\_clientXXXXX\_debug.log
- ◆ erm\_clientXXXXX\_detail.log
- ◆ erm\_clientXXXXX\_summary.log

### Location

Replication Manager Agent Service log files are in the logs\client folder of the RM installation. For example, C:\Program Files\EMC\rmagentps\logs\client\

### Description

The log files are cumulative, and will wrap once they reach a certain length.

The debug level can be set through the registry key HKLM\SOFTWARE\RMService\RMAgentPS\Client\4.0.0\CC\_DEBUG\_LEVEL. The default value is 2, but can be changed to 3. To change the value, stop RM Services, change the value in the registry, and then restart RM Services.

Error messages in Replication Manager log files also appear in the standard user interface outputs for NetWorker VSS client.

---

## Solutions Enabler

### Log files

The log files include a log file for the EMC VSS Provider and SYMAPI

- ◆ hwprov.log
- ◆ symapi-<date>.log

### Location

The Solutions Enabler product creates log files in the SYMAPI\logs folder of the Solutions Enabler installation. For example, C:\Program Files\EMC\SYMAPI\log\

### Description

The log files are cumulative, or based on the date. The logging level of the EMC VSS Provider log file is controlled by a registry key.

Error messages in Solutions Enabler log files do not appear in the standard user interface outputs for NetWorker VSS client

---

## Active Directory

### Log files

- ◆ nsradsave.log
- ◆ nsradrecover.log

### Location

Applogs folder. For example, C:\Program Files\Legato\nsr\applogs\

## NetWorker Server

### Log files

The NetWorker server creates several log files, which are documented in the *EMC NetWorker, Release 7.3.x, Multiplatform Version, Administration Guide*.

## Manually stopping and starting services

NetWorker VSS Client processes may need to be manually stopped and started in conjunction with configuration and troubleshooting activities. The *EMC NetWorker, Release 7.3.x, Multiplatform Version, Administration Guide* provides more information about starting and stopping services on Windows and UNIX hosts, Console server, NetWorker Server, Client, or Storage Node.

[Table 14 on page 98](#) lists the services for NetWorker, PowerSnap, and Replication Manager that are active on the system.

**Table 14 Services used in NetWorker VSS Client (1 of 2)**

Executable	Product	Category	Function
Nsrexecd	NetWorker	Service	Authenticates and processes the NetWorker server's remote execution requests and executes the save programs on the client.
Nsrpsd	PowerSnap	Service	Provides PowerSnap Client services, including snapshot consistency check function, to apply retention policy and backup functions to rollover snapshots.
Irccd.exe	Replication Manager	Service	Provides Replication Manager Client application and storage services for creating VSS-based snapshots and for rollback of VSS-based snapshots for EMC storage.
RMServer.exe	Replication Manager	Service	Provides Replication Manager Server services for executing workflow for creating VSS-based snapshots.
Rm_api.dll	Replication Manager	Library	Library that provides Replication Manager Client interface library for NetWorker, used by NetWorker backup and recover processes.
Nsrsnap	PowerSnap	Process	Temporary process active during snapshot groups that provides client-side workflow for snapshot groups, including applying retention policy, spawning process to create the snapshot, and spawning process to rollover the snapshot.
Nsrsnap_vss_save	NetWorker	Process	Temporary process active during snapshot groups that is responsible for executing the client-side workflow to create the snapshot for the savesets specified in the client resource. It is spawned by 'nsrsnap' and will communicate with irccd.exe to create the VSS-based snapshot, and then will communicate with PowerSnap services to register the snapshot.
Libpsvssclnt.dll	PowerSnap	Library	Library that provides PowerSnap Client Interface for NetWorker backup and recover processes.

**Table 14 Services used in NetWorker VSS Client (2 of 2)**

Executable	Product	Category	Function
Nrsnapagent		Temporary Service	Temporary service active during snapshot backup and restore operations that provides snapshot management functions to import and assign drive letters to a snapshot.
Nrsnapbwragent		Temporary Service	Temporary service active during snapshot backup and file system snapshot browse operations that provides the ability to read the file system on the snapshot.
Winworkr	NetWorker	Process	Provides graphical user interface for NetWorker.

## Other troubleshooting resources

Does the problem appear to be on the NetWorker server or on a NetWorker client?

If it appears on the NetWorker server, or otherwise seems to be on the server side, check to make sure that the NetWorker server is installed and configured correctly. Also, check the log files and error message documentation for the NetWorker server.

If the problem appears to be with PowerSnap or Replication Manager, and is not unique to NetWorker VSS Client for Microsoft Windows, check other documentation. The following documents provide specific error message, troubleshooting, or other documentation outside of NetWorker VSS Client for Microsoft Windows:

- ◆ *EMC NetWorker Release 7.3.2 Multiplatform Version Installation Guide*
- ◆ *EMC NetWorker, Release 7.3.2, Multiplatform Version, Administration Guide*
- ◆ *EMC NetWorker Release 7.3 Multiplatform Version Error Message Guide*
- ◆ *PowerSnap Module Installation and Administration Guide*
- ◆ *Replication Manager Administration Guide*



---

This glossary contains terms related to disk storage subsystems. Many of these terms are used in this manual.

## A

- ad hoc backup** A backup that a user requests from the client. The user specifies the files, file systems, and directories to backup. An ad hoc backup is also known as a manual backup.
- Administrators group** A Microsoft Windows user group whose members have the rights and privileges of users in other groups, plus the ability to create and manage the users and groups in the domain.
- Application Specific Module (ASM)** A program that is used in a directive to specify how a set of files or directories is to be backed up or recovered. For example, **compressasm** is a NetWorker directive used to compress files.
- archive** Backing up directories or files to an archive volume to free disk space. Archived data is not recyclable.
- archive volume** A volume used to store archive data. You cannot store archive data on a [backup volume](#) or a [clone volume](#).
- ASM** See [Application Specific Module \(ASM\)](#).
- auto media management** A feature that enables the storage device to automatically label, mount, and overwrite an unlabeled or recyclable volume.
- autochanger** See [library](#).
- autochanger sharing** See [library sharing](#).

## B

- backup** An operation that saves data to a volume.  
See also [conventional backup](#) and [snapshot](#).
- backup components metadata document** See [metadata document](#).
- backup group** See [group](#).

<b>backup level</b>	See <a href="#">level</a> .
<b>backup volume</b>	A volume used to store backup data. You cannot store backup data on an <a href="#">archive volume</a> or a <a href="#">clone volume</a> .
<b>bootstrap</b>	A save set that is essential for NetWorker disaster recovery. A bootstrap is composed of two components that reside on the NetWorker server: the <a href="#">media database</a> , and the resource database. The bootstrap also provides information that is essential to recover a <a href="#">client file index</a> .
<b>browse policy</b>	A policy that determines how long backed up data is available for quick access. See also <a href="#">retention policy</a> .

## C

<b>carousel</b>	See <a href="#">autochanger</a> .
<b>client</b>	A host, workstation, or fileserver whose data can be backed up or recovered. See also <a href="#">Client resource</a> .
<b>client file index</b>	A database that tracks every database object, file, or <a href="#">file system</a> that is backed up. The NetWorker server maintains a single client index file for each client.
<b>client-initiated backup</b>	See <a href="#">ad hoc backup</a> .
<b>Client resource</b>	A NetWorker server resource that identifies the save sets to be backed up on a client. The Client resource also specifies information about the backup, such as the schedule, browse policy, and retention policy for the save sets. Multiple Client resources can be configured for one client host. For example, you could create one Client resource to back up business data and another to back up operating system files. See also <a href="#">client</a> and <a href="#">resource</a> .
<b>clone</b>	A reliable copy of backed up data. Unlike volumes created with a simple copy command, clone volumes can be used in exactly the same way as the original backup volume. Single save sets or entire volumes can be cloned.
<b>clone volume</b>	A volume used to store clone data. You cannot store clone data on an <a href="#">archive volume</a> or a <a href="#">backup volume</a> .
<b>cluster</b>	Two or more nodes that are connected and appear to network users as a single, highly available system.
<b>command prompt</b>	A window in which you type commands.
<b>component</b>	<ol style="list-style-type: none"> <li>1. A group of related data that must be treated as a single unit for backup and recovery.</li> <li>2. In Microsoft VSS terminology, a component is a subordinate unit of a <a href="#">writer</a>.</li> </ol>
<b>components metadata document</b>	See <a href="#">metadata document</a> .
<b>consistency</b>	The application view of a set of data is in a state that is consistent with the application's usage of the data at any point-in-time when the application is active.

<b>Console server</b>	NetWorker servers and clients are managed from the NetWorker Console server. The Console server also provides reporting and monitoring capabilities for all NetWorker servers and clients.
<b>conventional backup</b>	A NetWorker backup to a conventional backup device such as a tape library. Compare to <a href="#">snapshot</a> .
<b>D</b>	
<b>data mover</b>	The NetWorker client that processes and backs up a snapshot. This may be the client whose data is the source of the snapshot, or it may be a different client, which is known as a proxy client. See also <a href="#">proxy client</a> .
<b>data retention policy</b>	See <a href="#">retention policy</a> .
<b>datawheel</b>	See <a href="#">autochanger</a> .
<b>datazone</b>	A group of hosts administered by a NetWorker server.
<b>DDS</b>	See <a href="#">Dynamic Drive Sharing (DDS)</a> .
<b>device</b>	<ol style="list-style-type: none"> <li>1. A storage unit that reads from and writes to backup volumes. A storage unit can be a tape device, optical drive, <a href="#">autochanger</a>, or file connected to the <a href="#">server</a> or <a href="#">storage node</a>.</li> <li>2. When dynamic drive sharing (DDS) is enabled, refers to the access path to the physical drive.</li> </ol>
<b>DFS</b>	See <a href="#">Distributed File System (DFS)</a> .
<b>directed recovery</b>	A recovery method used to recover data that originated on one NetWorker client host to another NetWorker client host.
<b>directive</b>	Instructions to take special actions on a given set of files for a specified client during a backup or recover operation.
<b>disk subsystem</b>	An integrated collection of storage controllers and/or HBAs, disks, and any required control software that provides storage services to one or more hosts, such as CLARiiON arrays.
<b>Distributed File System (DFS)</b>	A Microsoft Windows add-on that allows you to create a logical directory of shared directories that span multiple machines across a network.
<b>domain controller</b>	A host that manages user interactions with a domain, including logon, authentication, directory searches, and access to other shared resources.
<b>Dynamic Drive Sharing (DDS)</b>	A feature that allows NetWorker software to recognize shared drives.

## F

**file index** See [client file index](#).

**file system**

1. A file tree located on a specific disk partition or other mount point.
2. The entire set of all files.
3. A method of storing files.

**full backup** See [level](#).

## G

**group** A NetWorker server resource that specifies the scheduled backup time for a client or group of clients.

## H

**highly available system** A system that allows cluster-aware services to continue despite a hardware or software failure.

**host ID** A serial number that uniquely identifies a host computer.

## I

**inactivity timeout** The number of minutes to wait before a client is considered to be unavailable for backup.

**incremental** See [level](#).

**instant backup** The process of creating a persistent snapshot (point-in-time copy) of a group of files, volume, or filesystem from a single client to a storage disk volume that can be recovered (used as a backup copy). The instant backup may or may not be written to tape.

**instant recovery** The process of copying back the saved group of files or a filesystem from a mounted storage disk volume of a single client, which was created using instant backup.

General term for capabilities that enable near-instant access to production data in the event of data corruption to a production database. Includes both mounting replicas to an alternate host for recovery purposes and restoring the replicas to the production host.

## J

**jukebox** See [autochanger](#).

## L

**label** A NetWorker assigned label that uniquely identifies a volume. Templates can be used to define label parameters.

**legacy backup method** The use of special case Microsoft APIs that are required for backup and recovery of operating system components, services, and specific applications.

<b>level</b>	A measurement that determines how much data is saved during a scheduled or ad hoc backup.
<b>library</b>	A mechanism that uses a robotic arm to move media among various components in a device. The term library is synonymous with autochanger, autoloader, carousel, datawheel, jukebox, and near-line storage.
<b>library sharing</b>	Shared access of servers and storage nodes to the tape drives in a library.
<b>local cluster client</b>	A NetWorker client that is not bound to a physical machine, but is instead managed by a cluster manager. It is also referred to as a logical or virtual client.
<b>locale settings</b>	Settings that specify the input and output formats for date and time, based on local language conventions.
<b>LUN address</b>	The SCSI identifier of a logical unit number (LUN) within a device target. Each LUN address identifies a device on a SCSI bus that can perform input/output (I/O) operations.
<b>M</b>	
<b>manual backup</b>	See <a href="#">ad hoc backup</a> .
<b>media</b>	The physical storage medium, such as magnetic tape, optical disk, or file system to which backup data is written.
<b>media database</b>	Indexed entries about the location and the life cycle status of all data and volumes that the NetWorker server manages. See also <a href="#">volume</a> .
<b>media index</b>	See <a href="#">media database</a> .
<b>metadata document</b>	VSS Information stored in an XML document that is passed from the <a href="#">writer</a> to the <a href="#">requestor</a> . Metadata includes the writer name, files and components to back up, a list of components to exclude from the backup, and the methods to use for recovery. See also <a href="#">shadow copy set</a> .
<b>mount</b>	To make a volume physically available so that backup data can be written to it.
<b>mount point</b>	See <a href="#">volume mount point</a> .
<b>N</b>	
<b>NDMP</b>	See <a href="#">Network Data Management Protocol (NDMP)</a> .
<b>Network Data Management Protocol (NDMP)</b>	A TCP/IP-based protocol that specifies how heterogeneous network components communicate for the purposes of backup and recovery.
<b>NetWorker administrator</b>	A user who can add to or change the configuration of the NetWorker server, media devices, and libraries. NetWorker administrators must have their usernames included in the NetWorker server Administrator list.
<b>NetWorker client</b>	See <a href="#">client</a> .
<b>NetWorker Console server</b>	See <a href="#">Console server</a> .

<b>NetWorker Management Console</b>	See <a href="#">Console server</a> .
<b>NetWorker server</b>	The host running the NetWorker server software, which contains the <a href="#">online indexes</a> and provides backup and recovery services to the clients on the same network.
<b>NetWorker storage node</b>	See <a href="#">storage node</a> .
<b>nonclone pool</b>	Pools that contain data that has not been cloned.
<b>nonpersistent snapshot</b>	A snapshot that is rolled over to tape and then deleted from disk is said to be nonpersistent.
<b>O</b>	
<b>online indexes</b>	Databases on the NetWorker server that contain information about client backups ( <a href="#">client file index</a> ) and backup volumes ( <a href="#">media database</a> ).
<b>operator</b>	The person who monitors the server status, loads backup volumes into storage devices, and executes day-to-day NetWorker tasks.
<b>P</b>	
<b>pathname</b>	Instructions for accessing a file. An <i>absolute pathname</i> indicates how to find a file starting from the root directory. A <i>relative pathname</i> indicates how to find the file starting from the current directory.
<b>persistent snapshot</b>	A snapshot that is retained on disk. A persistent snapshot may or may not be rolled over to tape.
<b>PIT</b>	Point-in-time.
<b>point-in-time copy</b>	A fully usable copy of a defined collection of data, such as a consistent filesystem, database, or volume, which contains an image of the data as it appeared at a single point in time. A PIT copy is also called a <a href="#">shadow copy</a> or a <a href="#">snapshot</a> .
<b>policy</b>	A set of constraints that specify how long data is available for recovery. Each Client resource has a browse policy and a retention policy.
<b>pool</b>	A feature to sort backup data to selected volumes.
<b>PowerSnap</b>	EMC technology that provides point-in-time snapshots of data. NetWorker software backs up data from the snapshot. This allows applications to continue to write data during the backup operation, and ensures that open files are not omitted.
<b>provider</b>	A software component defined by Microsoft VSS, that plugs into the VSS environment. A provider, usually produced by a hardware vendor, enables a storage device to create and manage snapshots.
<b>proxy client</b>	A host that acts as a remote <a href="#">data mover</a> during snapshot operations. A proxy client performs the NetWorker save operation for the NetWorker VSS client that requested the backup. A proxy client is required to perform a <a href="#">serverless backup</a> .

## Q

**quiescing** Stopping all writes to disk and flushing the filesystem cache. Quiescing the database prior to creating the snapshot provides a transactionally consistent image that can be remounted without filesystem checks or database consistency checks. Quiescing a database is the most common way of creating a database snapshot.

## R

**recover** To recover files from a backup volume to a client disk.

**Registry** A Microsoft Windows database that centralizes all Windows settings and provides security and control over system, security, and user account settings.

**requestor** Interfaces with the Microsoft VSS infrastructure to initiate the creation and destruction of [shadow copy](#). NetWorker software is a requestor.

**replica** See [shadow copy](#).

**resource** A component that describes the NetWorker server or its clients. Clients, devices, schedules, groups, and policies are all NetWorker resources. Each resource has attributes that define its properties.

**retention policy** Determines how long backup data is available for recovery, though not necessarily immediate recovery. See also [browse policy](#).

**retrieve** To locate and recover archived files and directories.

**rollback** The process of returning data to an earlier snapshot in response to a recovery operation. A rollback is a complete recovery of a storage subsystem from a point-in-time copy to a standard volume without host involvement.

Because no host process is involved in copying data and data does not get retrieved from tape to disk, this type of recovery is faster in comparison to traditional recovery operations from offline media.

Rollbacks are destructive by nature, which means the entire contents of the file system are overwritten during a rollback operation.

**rollover** The process of backing up a snapshot to a conventional backup medium such as tape. Whether or not the snapshot is retained on disk depends on the snapshot policy.

**root** The highest level of the system directory structure.

## S

**save set** A group of files or a file system that is backed up on storage media.

**save set ID** An internal identification number assigned to a save set.

**save set recover** To recover data by specifying save sets rather than by browsing and selecting files or directories.

**save set status** An attribute that indicates whether a save set is browsable, recoverable, or recyclable. The save set status also indicates whether the save set was successfully backed up.

**server** See [NetWorker server](#) and [Console server](#).

<b>server index</b>	See <a href="#">client file index</a> .
<b>serverless backup</b>	A backup method that uses a <a href="#">proxy client</a> to move the data from primary storage on the application server host to secondary storage on another host. Serverless backups free up resources on the application server by offloading the work of processing snapshots to a secondary host.
<b>service port</b>	A port used to listen for backup and recover requests from clients through a firewall.
<b>shadow copy</b>	A point-in-time copy of data created during an instant backup. A shadow copy is created by interaction between a requestor and the Shadow Copy infrastructure at a specific point in time. See also <a href="#">Volume Shadow Copy Service (VSS)</a> .
<b>shadow copy set</b>	A complete roadmap of what was backed up at a single instant in time. The shadow copy set contains information about the writers, their components, metadata, and the volumes. A backup components metadata document containing that information is created and returned to the requestor after the snapshot is complete. NetWorker uses this document with the corresponding saveset at recover time.
<b>shadow copy technology</b>	A defined and standard coordination between business application, file system, and backup application that allows a consistent copy of application and volume data to exist for replication purposes.
<b>skip</b>	A backup <a href="#">level</a> in which designated files are not backed up.
<b>snap clone</b>	An exact copy of a snap set data backup. The clone operation is an archive operation without the deletion of the source data. A new snap ID is assigned to the cloned copy.
<b>snap ID</b>	Also known as a snapid, a unique 64-bit internal identification number for a snap set.
<b>snap set</b>	The group of files, volumes, or filesystems from a single client, describing the collection of data for which a point-in-time copy is created on an external disk subsystem, such as a storage array.
<b>snapshot</b>	Also known as a <a href="#">shadow copy</a> , a snapshot is a point-in-time copy of data created during an instant backup.
<b>snapshot expiration policy</b>	The policy that determines how long snapshots are retained before their storage space is made available for the creation of a new snapshot.
<b>snapshot policy</b>	A set of rules that control the lifecycle of a snap set. The snapshot policy specifies the frequency of snapshots, and how long snapshots are retained before recycling.
<b>snapshot retention policy</b>	The policy that determines how many PIT copies are retained in the media database and thus are recoverable.
<b>ssid</b>	See <a href="#">save set ID</a> .
<b>staging</b>	Moving data from one storage medium to a less-costly medium, and later removing the data from its original location.
<b>stand-alone device</b>	A storage device that contains a single drive for backing up data.
<b>storage device</b>	The hardware that reads and writes data during backup, recovery, or other NetWorker operations.

---

**storage node** A host that has a storage device and the NetWorker storage node software installed. A storage node's backup operations are controlled by the NetWorker server.

## V

**volume**

1. The physical storage medium, such as magnetic tape, optical disk, or file system to which backup data is written.
2. An identifiable unit of data storage that may reside on one or more host disks.

**volume ID** An internal identification that NetWorker software assigns to a backup volume.

**volume mount point** A disk volume that is grafted into the namespace of a host disk volume. This allows multiple disk volumes to be linked into a single directory tree, and a single disk or partition to be linked to more than one directory tree.

**volume name** The name assigned to a backup volume when it is labeled. See also [label](#).

**volume pool** See [pool](#).

**Volume Shadow Copy Service (VSS)** A Microsoft technology that creates a point-in-time [shadow copy](#) of a disk volume. NetWorker software backs up data from the shadow copy. This allows applications to continue to write data during the backup operation, and ensures that open files are not omitted.

**VSS** See [Volume Shadow Copy Service \(VSS\)](#).

**VSS component** A subordinate unit of a [writer](#).

## W

**writer** A database, system service, or application code that provides [metadata document](#) information about what to back up and how to handle [VSS components](#) and applications during backup and recovery operations. A Writer provides information to requestors to ensure that application data is consistent, application files are closed and ready for a slight pause to make a Shadow Copy.



**A**

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