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Legato NetWorker®

Module for Microsoft® Exchange 2000 Server

Release 3.1
Microsoft® Windows® Version

Administrator's Guide

Legato NetWorker Module for Microsoft Exchange 2000 Server, Release 3.1, Microsoft Windows Version, Administrator's Guide

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Preface

This guide provides information on configuring and using the Legato NetWorker® Module for Microsoft® Exchange 2000 Server.

Audience

The information in this guide is intended for administrators and others responsible for data storage management for Microsoft Exchange 2000 Server. This guide assumes that you have a working knowledge of Microsoft Exchange 2000 Server and the Legato NetWorker client and server software.

To apply the information in this guide, you must first install the NetWorker Module software on the Microsoft Exchange 2000 Server host computer.

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- discusses conventions for shortened product names.
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Convention	Indicates	Example
boldface	Names of line commands, daemons, options, programs, or scripts	The **nsradmin** command starts the command line version of the administration program.
italic in text	Pathnames, filenames, computer names, new terms defined in the Glossary or within the chapter, or emphasized words	Displayed messages are also written to */nsr/logs/daemon.log*.
italic in command line	A variable that must be provided in the command line	`nwadmin -s `*`server-name`*
`fixed-width`	Examples and information displayed on the screen	`media waiting: recover waiting for 8mm 5GB tape volume name`
`fixed-width, boldface`	Commands and options that must be typed exactly as shown	**`nsr_shutdown -a`**
Menu_Name> Command	A path or an order to follow for making selections in the GUI	Volume>Change Mode>Appendable
Important:	Information that must be read and followed to ensure successful backup and recovery of data	⚠ ————————— **Important:** Use the **no_verify** option with extreme caution.

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Chapter 1: NetWorker Module Overview

This chapter gives an overview of how the NetWorker Module backs up and restores Microsoft Exchange 2000 Server data. It includes the following sections:

About the NetWorker Module

The NetWorker Module for Microsoft Exchange Server provides services that enable the NetWorker software to back up and restore Microsoft Exchange 2000 Server data. Backup and restore operations can be performed while the Exchange Server is online. The NetWorker Module software integrates this capability into the centralized data management solution that NetWorker software provides for distributed, heterogeneous enterprise networks.

Without regular system backups, you risk losing data. Like other computer data, Microsoft Exchange Server data can be lost due to hardware failures, software problems, procedural flaws, or operator errors. If the Exchange Server transaction logs are lost, data can be recovered only to the time of the last full backup. Without a full backup and logs of the subsequent transactions, the data cannot be recovered at all. A well-considered backup strategy and disaster recovery plan can prepare you for restoring Exchange data in the event that it becomes lost or unavailable.

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NetWorker Module Features

The NetWorker Module provides the following functionality:

- Disaster recovery for all Exchange Server data
- Automatic mount and dismount of information store databases
- Interoperability with Microsoft Cluster Server (MSCS)
- Graphical user interface (the NetWorker User for Exchange Server program) and command line interface
- Windows Performance Monitor support, including performance counters of concurrent backup and restore operations
- Concurrent, automated installation of the NetWorker Module software on a large number of client hosts using Microsoft System Management Server (SMS)

What the NetWorker Module Backs Up and Restores

The NetWorker Module provides backup and restore capability for:

- The Exchange Server information store as a single entity
- Individual or multiple Exchange databases and storage groups
- Individual or multiple private mailboxes (also called "user mailboxes" or simply "mailboxes")
- Key Management Server (KMS)
- Site Replication Server (SRS)

With release 3.1, the NetWorker Module backs up and restores:

- Individual items in private mailboxes, such as e-mail messages, tasks, contacts, and calendar items
- Public folders
- Individual items in public folders

The primary save and recover operation provided by the Exchange Server is a database operation, also referred to as an *information store* (IS) operation. The IS is the collection of mailbox and public folder databases associated with an Exchange Server. A database backup uses the Exchange backup API to save all information in a database, and it also manages the log files. Restoring a database backup is the only way to recover from a disaster situation. The NetWorker Module's primary role is to provide the mechanism that integrates the Exchange database backup technology with the Legato NetWorker feature set.

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Items in mailboxes and public folders can be recovered from a database backup. However, this requires recovering the entire database to a separate recovery server (see "Directed Recoveries" on page 65). To solve this problem, the NetWorker Module also provides support for item-level backup of mailboxes and public folders. When you perform a mailbox or public folder backup, all items are backed up individually. This allows for easy recovery of any items in the mailbox or public folder to the original Exchange server.

Note: Item level backups cannot be used to restore a database or perform a disaster recovery; only database backups can be used to recover from a disaster.

Other things to keep in mind about mailbox/public folder level backups include:

- They take much longer than a database backup, and have a negative impact on the memory and CPU of the Exchange Server while it is running.
- They do not take advantage of the Exchange concept of single-instance storage, and the save sets produced may be many times the size of the original data.
- They rapidly increase the size of the NetWorker client file index. This may require additional disk space on the NetWorker server.

Important: Anything under the *information store* hierarchy (MSEXCH:IS/...) is backed up and recovered at the database level. This also includes Site Replication Server (MSEXCH:SRS) and Key Management Server (MSEXCH:KMS) because these applications use the Exchange backup API.

Objects under the *private mailboxes* (MSEXCH:MB/...) or *public folder trees* (MSEXCH:PF/...) hierarchy are backed up and recovered at the item level. You cannot perform an item level recover operation unless you have performed an item level backup operation.

Using the NetWorker Module with NetWorker Software

The NetWorker software provides back up and restore capability for filesystem data only. A filesystem backup, however, does not save Exchange Server data in recoverable form.

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This NetWorker Module is an extension of the NetWorker software that connects the NetWorker software to the Exchange Server for the purpose of backing up and restoring Exchange data.

The Exchange Server software can reside on either the same computer as the NetWorker server software, or on a separate computer. *In general, it is best to have the NetWorker server software and Exchange Server software on different computers.*

However, the NetWorker Module and the NetWorker client software must be installed on the same computer as the Exchange Server software. Figure 1 provides a sample configuration with the NetWorker Module on the Exchange Server host, and the NetWorker server on a separate computer.

Figure 1. NetWorker Module Software on the Exchange Server Host
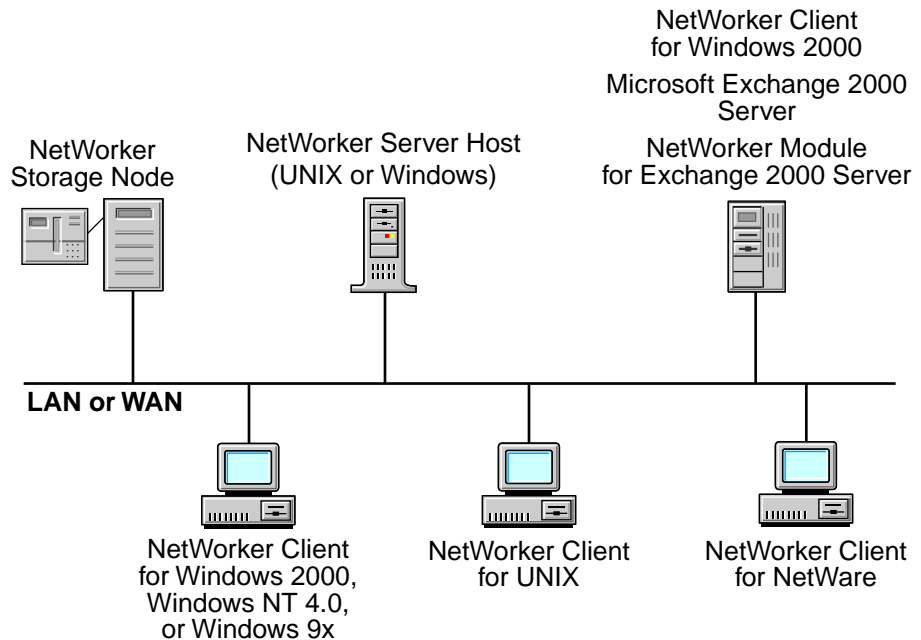
In addition, the Exchange Server host computer must be configured as a client of the NetWorker server. For configuration information, refer to the *Legato NetWorker Administrator's Guide.*

About Exchange Database Backups

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The Exchange Server application programming interface (API) and the NetWorker Module define backup levels in terms of operations involving databases and transaction logs. This is different than how the NetWorker software defines and uses backup levels. For information about NetWorker backup levels, refer to the *Legato NetWorker Administrator's Guide.*

Exchange Server *databases* can be backed up at four different levels: full, copy, incremental, and differential (see Table 1). Databases must be backed up at level full or copy before an incremental or differential backup can be performed.

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Important: Private mailboxes, public folders, and the individual items they contain, can *only* be backed up at level full. For more information on operations involving mailboxes and public folders, see "Chapter 5: Mailbox and Public Folder Operations" on page 69.

Table 1. Exchange Server Database Backup Levels

Exchange Server Backup Level	Backs Up	Committed Transaction Logs Truncated After Backup
Full	All databases and transaction logs	yes
Copy		no
Incremental	All transaction logs created since the last backup	yes
Differential	All transaction logs created since the last full or incremental backup	no

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Exchange Transaction Log Files and Truncation

In the standard transaction logging Exchange uses, each database transaction in a storage group is written to a *transaction log file* and then to the database. When a log file reaches 5 MB, a new log file is started. As the number of transactions grows, log files accumulate. Transactions may be recovered by restoring the data from the log files.

Exchange transaction log files are stored on the Exchange Server host computer. Because transaction log files may accumulate quickly over time, the Exchange Server software allows transaction log files to be *truncated* (deleted) to shorten backup and recover times and conserve disk space. For this reason, after any successful full or incremental backup, the NetWorker Module software truncates those transaction log files containing transactions that have already been committed to the Exchange database.

The NetWorker Module can perform a database backup at any of the available backup levels. summarizes the function of each backup level.

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Important: Never manually delete transaction logs. You can only delete transaction logs by performing a full or incremental backup.

Circular Logging

Circular logging is an Exchange Server operation that overwrites and reuses the first log file after the data it contains has been written to the database. Circular logging is disabled by default. By enabling circular logging, you reduce drive storage space requirements. However, without complete transaction log files, you cannot recover anything more recent than the last full backup. Therefore, in a normal production environment, circular logging is *not* recommended. It is used primarily for public folder stores that hold Network News Transfer Protocol (NNTP) news feeds, where log file sets are not required.

It is strongly recommended that you disable circular logging in Exchange 2000 Server. Exchange 2000 Server does not permit incremental or differential backups if circular logging is enabled.

For information about disabling circular logging, refer to the Microsoft Exchange 2000 Server documentation.

Backup Operations

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Like the NetWorker server software, the NetWorker Module enables you to perform scheduled backups as well as unscheduled, or manual, backups. Only scheduled backups automatically save all the information the NetWorker software needs to restore an entire filesystem in the event of a disaster. A manual backup does not automatically save the NetWorker client file indexes or generate a NetWorker bootstrap file.

Manual Backups

You can request a backup independent of scheduled backups. This is called a *manual* backup. In this case, the NetWorker Module begins the backup immediately. For more information, see "Chapter 2: Manual Backups" on page 29.

You can start a manual backup using either of two interfaces running on the Exchange Server host:

- The *NetWorker User for Exchange Server* program, the NetWorker Module graphical user interface.

  For information on how to use this program for manual backups, see "Performing a Manual Backup" on page 30.

- A Windows command prompt (the *cmd.exe* command line interface). For information on how to start a manual backup from a command prompt, see "NetWorker Module Backup Commands" on page 106.

Scheduled Backups

You can set up a backup to start automatically at a particular time. This is called a *scheduled* backup.

- To set up a scheduled backup, you must use the NetWorker Administrator program, which is the graphical user interface for the NetWorker software. For more information, see "Chapter 3: Scheduled Backups" on page 39.

How Backups Work

When a scheduled backup for a Microsoft Exchange Server client is triggered by **nsrd** on the NetWorker server, **savegrp** executes the NetWorker Module backup command (**nsrxchsv**) on the client instead of performing a standard save. The **nsrxchsv** program sends the backup data received from Microsoft

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Exchange Server to the NetWorker server through an X-Open Backup Services Application Programming Interface (XBSA). The final results of the **savegrp** execution are sent back to the server and are included in the savegroup completion report, which is sent according to the notification set up in the NetWorker Administrator program for the Savegroup event.

The NetWorker software performs the scheduling and storage management tasks. The NetWorker Module software passes the data from the Microsoft Exchange Server to the NetWorker server. Figure 2 shows the functional relationship between the NetWorker server, the NetWorker Module, and the Microsoft Exchange Server during a scheduled backup.

**Figure 2. NetWorker Client/Server Interaction
During a Backup Initiated by the NetWorker Module**
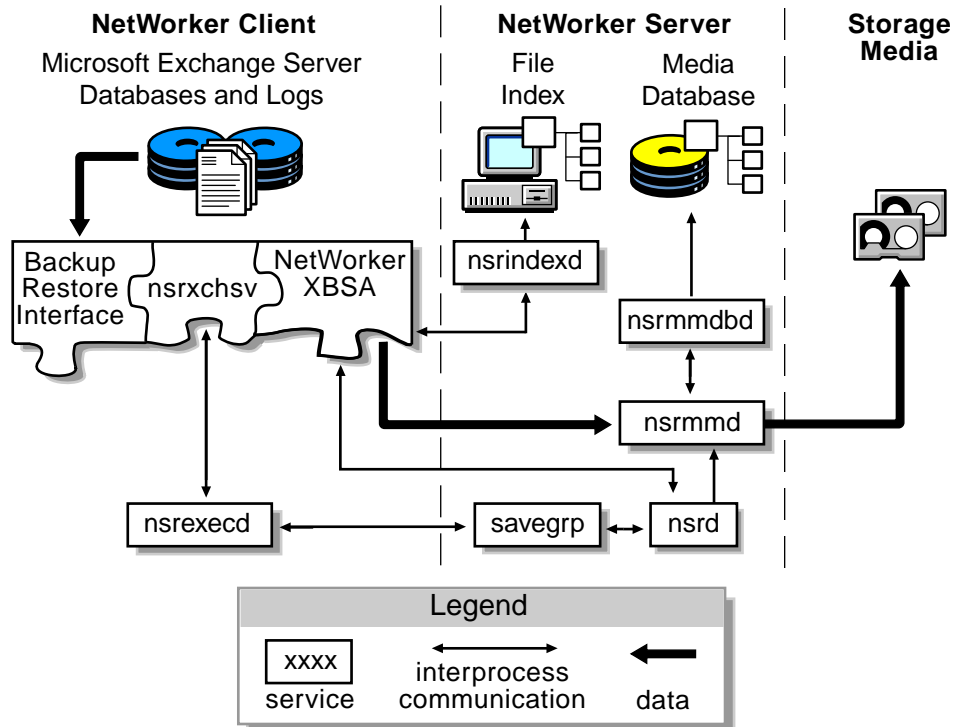
Running Backups in Parallel

For a given operation, the NetWorker server software starts a separate backup process on the client host for each save set specified. For example, if you open the NetWorker Administrator program and specify **MSEXCH:IS** in the Save Set

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attribute on the General tab of the client resource, the server software starts *one* process on the client host to back up the entire Exchange Server Information Store.

If multiple save sets are specified, the server starts a corresponding number of processes in parallel on the client host. For example, specifying two storage groups for backup causes the server to start two backup processes in parallel: one for each storage group. Thus you can back up all the storage groups on the Exchange server in parallel. However, you cannot back up multiple databases within the same storage group in parallel.

Backup Recommendations

The log files for a storage group contain the database transactions for all mailbox stores or public folder stores in the group. For this reason, the storage group is the best unit for backup, because backups automatically include the transaction logs for all mailbox stores or public folder stores in the group.

To improve post-recovery processing of Exchange databases, minimize the number of transaction logs that are backed up by increasing the frequency of full backups. As a rule of thumb, schedule a full backup when there are more than 50 log files.

It is strongly recommended that you use the NetWorker client/server software to schedule *regular*, frequent backups of the following critical Windows 2000 components on both the Exchange Server host and the domain controller for that host:

- The Windows system partition (the drive on which Windows is installed, for example, C:). This includes the Windows system directory.
- SYSTEM STATE (this includes the Active Directory). A backup of the Active Directory is required whenever configuration changes are made.
- SYSTEM FILES
- SYSTEM DB

It is important to back up these components *at the same time.* The easiest and safest way to do this is to open the NetWorker Administrator program and specify All in the Save Set attribute on the General tab of the client resource used for the filesystem backup (see for instructions). When you restore these components, it is also important to restore them all at the same time. Failure to back up or recover these components *together* will yield unpredictable results.

1

Note: The save set **MSEXCH:DS** is obsolete in NetWorker Module release 3.0 and later, because Exchange 2000 Server stores directory information in the Active Directory, instead of in its own directory store.

For more information about backing up and recovering the Windows 2000 components and filesystem, refer to the sections specific to Windows 2000 in the *Legato NetWorker Administrator's Guide, Windows Version.*

Restore Operations

Using the NetWorker Module with NetWorker software and the Exchange Server, you can initiate a restore operation of Exchange data at any time. For more information, see .

Restore and Recover Phases

Strictly speaking, *recovery* is the process that returns backed-up data to its previous state, so that data is once again accessible for designated users running the Exchange Server software. The recovery process occurs in two main phases:

- The *restore* operation, which is performed by the NetWorker Module software—In the restore phase, the NetWorker Module retrieves backed-up data from a storage device and copies the data to a specified destination so that it is available to the Exchange Server software. (At this point the data is not yet accessible by Exchange users).

- The subsequent *recover* operation, which is performed by the Exchange Server software—In the recover phase, the Exchange Server software processes the data restored by the NetWorker Module. Exchange applies any restored transaction logs to the restored databases as necessary, ensuring the databases are consistent. This returns the Exchange Server objects to the state they were in at the time of the backup.

  With the NetWorker Module software, depending on the context, "recover" refers to *either*:

  - The processing by the Exchange Server software of the data restored by the NetWorker Module software.

  - The entire process that begins with the NetWorker Module restore operation and ends with the Exchange objects returned to the state they were in at the time of the backup—at which point the data is once again accessible by Exchange users.

How Restores Work

A restore request invokes the NetWorker Module recover command, **nsrxchrc**. The NetWorker XBSA API translates the object names requested by the NetWorker Module into a format the NetWorker software understands, and forwards them to the NetWorker server **nsrd** service. The media service, **nsrmmd**, invokes **nsrmmdbd** to search the NetWorker server's online media database for the media volumes that contain the objects requested.

After the media is mounted, **nsrmmd** sends the data through the NetWorker XBSA API to **nsrxchrc**, which recovers the data to the Microsoft Exchange Server directories.

Figure 3 shows how data moves from the NetWorker server to the Exchange server during a NetWorker Module restore session.

**Figure 3. NetWorker Client/Server Interaction
During a Recovery Initiated by the NetWorker Module**

1
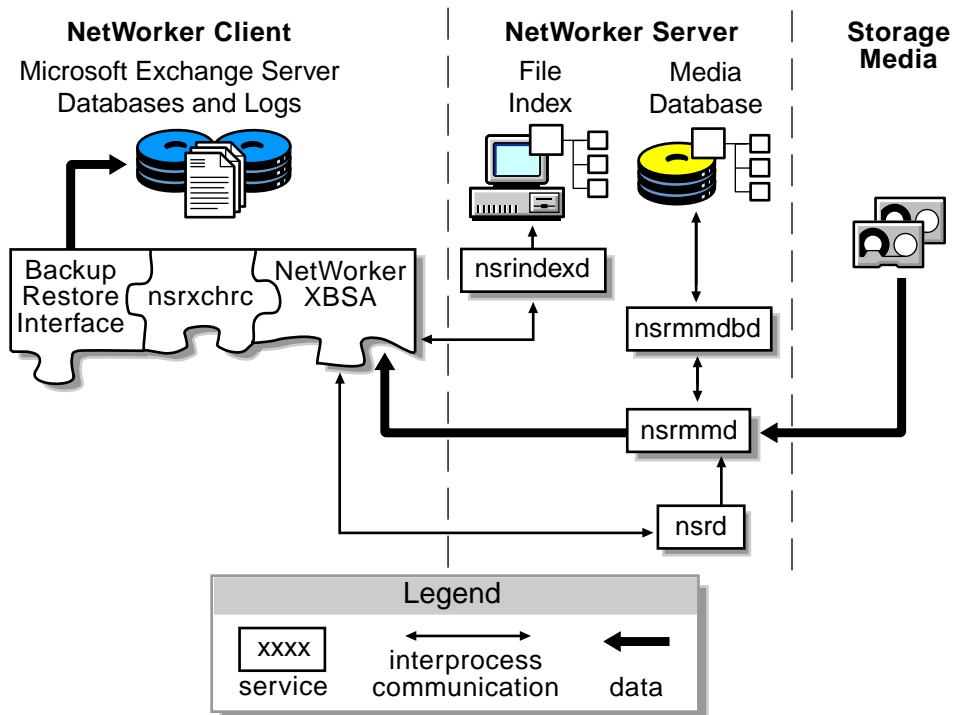
Recovering Component Objects from a Backup

The choice of which Exchange objects get backed up determines the objects that can be recovered. This is due to the way the Exchange Server processes and stores data. It is important to understand this when configuring Group and Schedule resources in the NetWorker Administrator program for scheduled backups.

When backing up the IS, storage groups, and databases, keep the following in mind.

- The IS can be backed up as a single entity. From an IS backup, the NetWorker Module software can restore individual or multiple storage groups or databases, but not private mailboxes or public folders. To restore private mailboxes and public folders from a database backup, perform a directed recover of the database. See "Directed Recoveries" on page 65 for instructions.

- The IS cannot be recovered from a backup of multiple private mailboxes or public folders.

- A *mailbox store* (a database containing several mailboxes) can be recovered *only* from the following backups:
  - Entire Exchange Server
  - Storage group that contains the mailbox store
  - Mailbox store as a single entity

  A mailbox store cannot be recovered from an operation that backs up every mailbox in the store separately.

- Similarly, a *public folder store* (a database containing several public folders) can be recovered *only* from the following backups:
  - Entire Exchange Server
  - Storage group that contains the public folder store
  - Public folder store as a single entity

  Note: A database *cannot* be recovered from a backup of individual objects in the database. For example, a public folder store cannot be recovered from a backup of every individual, separate public folder.

Table 2 lists the Exchange objects that can be backed up and recovered.

Table 2. Objects Recoverable from Backups

Object Backed Up	Objects Recoverable from the Backup
Information Store (IS)	• IS (all storage groups and databases) • One or more storage groups • One or more databases, for example, a public folder store and a mailbox store • One or more mailboxes and public folders (by performing a directed recover operation, as described in "Directed Recovery of a Mailbox or Public Folder from a Database Backup" on page 74)
Storage group	• The storage group • One or more databases in the storage group, for example, a public folder store
All public folders	• Each public folder tree • A specific public folder • Public folder items
A public folder hierarchy	• Public folder hierarchy • One or more folders in the public folder store • One or more items in the public folders
A single public folder	• The public folder • Individual items in the public folder
A private mailbox	• One or more mailboxes • One or more folders or items in the mailbox
A single mailbox	• The mailbox • Individual items in the mailbox
One or more individual mailbox items or public folder items	The individual items

1

1

Chapter 2: Manual Backups

This chapter describes how to use the NetWorker User for Exchange Server program for manual backups. This chapter includes the following sections:

- "About Manual Backups" on page 29
- "Performing a Manual Backup" on page 30

About Manual Backups

You can initiate a backup at any time, independent of a schedule. An unscheduled backup is called a *manual* backup because it begins immediately. Manual backups are sometimes called *on-demand* or *ad hoc* backups. When a backup is started manually, items marked for backup are processed sequentially.

The best way to protect Exchange Server data is to schedule backups to occur automatically on a regular basis. For this reason, manual backups are generally performed only when you do not want to wait until the next scheduled backup. Although you will probably not perform manual backups often, the procedure is introduced here to get you started quickly with using the NetWorker Module software. *Scheduled* backups are configured in the NetWorker Administrator program. For information on configuring scheduled backups, see "Chapter 3: Scheduled Backups" on page 39.

Performing a Manual Backup

You can perform a manual backup from either of two interfaces on the Exchange Server:

- NetWorker User for Exchange Server program, the NetWorker Module graphical user interface. To use the NetWorker User for Exchange program to perform a manual backup, see "Task 1: Open the NetWorker User for Exchange Server Program" below.

- Windows command prompt (the *cmd.exe* command line interface) on the NetWorker client host. To start a manual backup from a command prompt, see "NetWorker Module Backup Commands" on page 106.

For instructions on performing backups and restores from the command line, see "Appendix A: Save Set Notation and Command Syntax" on page 103.

To perform a manual backup, complete the following tasks:

- "Task 1: Open the NetWorker User for Exchange Server Program" on page 30
- "Task 2: Configure the Backup" on page 31
- "Task 3: Set the Backup Options" on page 34
- "Task 4: Start and Monitor the Backup" on page 37
- "Task 5: Complete the Backup Process" on page 38

Task 1: Open the NetWorker User for Exchange Server Program

1. From the Windows Start menu, open the NetWorker User for Exchange Server program. The main window appears, as shown in Figure 4 on page 31.

2. The NetWorker server to which the NetWorker client is currently connected appears at the bottom of the main window in the status bar. To specify a different NetWorker server, select Select NetWorker Server from the Operation menu, as shown in Figure 4 on page 31.

Figure 4. Main Window: Select NetWorker Server

2
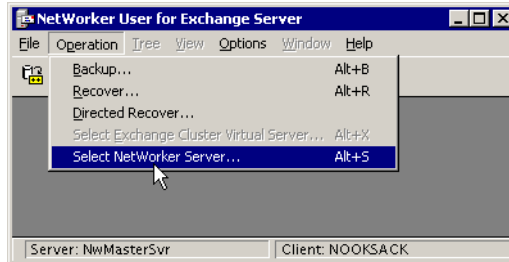
3. Select a server from the list and click OK.

   The name of the server appears in the status bar at the bottom of the main window.

Task 2: Configure the Backup

1. Click the Backup button on the toolbar, as shown in Figure 5.

Figure 5. Main Window: Backup Button
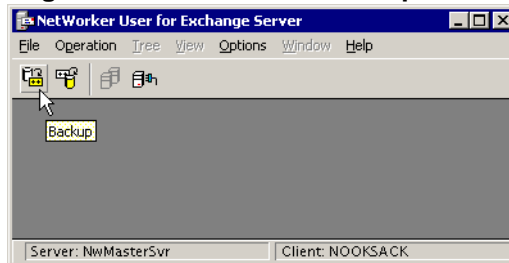
The Backup window opens, as shown in Figure 6 on page 32. In the Backup window, you can browse Exchange Server objects that can be backed up, mark objects for backup, and start a backup operation. The Backup window displays Exchange objects in a hierarchy, similar to the way drive letters, folders, subfolders, and individual files are depicted in the Windows Explorer interface.

Figure 6. Backup Window
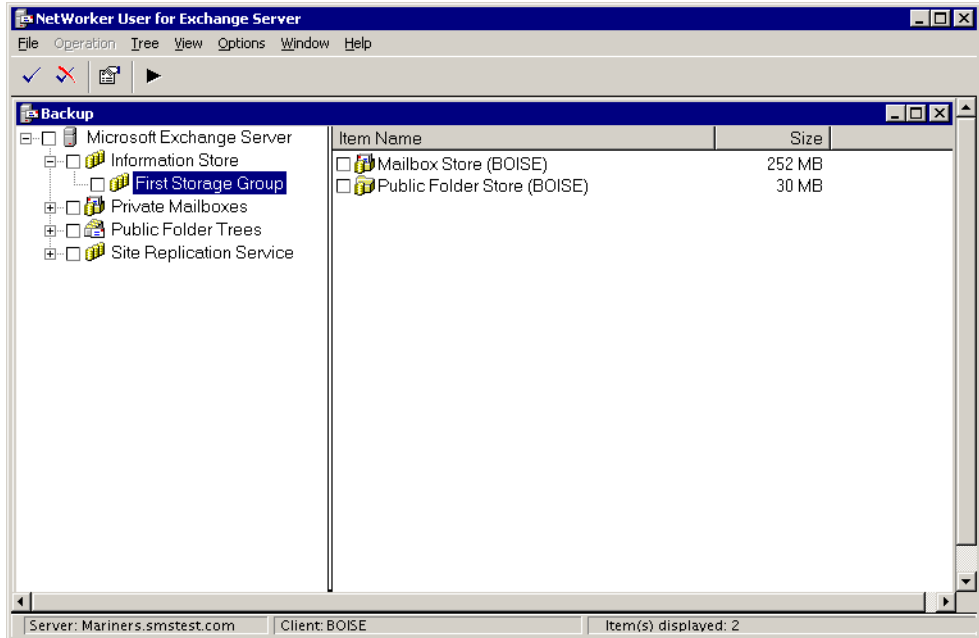
2

2. Click the plus sign next to any object to expand the object to the next sublevel. For example, click the plus sign next to Microsoft Exchange Server, then expand a storage group to see the databases in the storage group. You can browse and mark objects down to the individual items in mailboxes and public folders.

3. Mark the Exchange objects to back up. To mark an Exchange object, either:

   • Click the check box next to the object.

   • Right-click the object and select Mark.

   • Click the object you want to back up or restore. Then do one of the following:

     — Select Mark from the File menu.

     — Click the Mark button on the toolbar.

   Table 3 on page 33 indicates the correspondence of what is marked to what is backed up. For example, marking the Information Store specifies a backup (which occurs sequentially) of all databases contained in every storage group on the Exchange Server. Marking a storage group specifies a (sequential) backup of each database in the storage group.

Keep the following in mind when marking items:

- Marking an item automatically marks all sub-items.
- An item is partially marked if some, but not all, sub-items are marked.
- Marking all sub-items will automatically mark the item above it.

Table 3. Effect of Marking Particular Exchange Objects

To Back Up...	Mark This Object
All databases in all storage groups	Information Store
All databases in a particular storage group	*<storage_group_name>*
A particular database	*<database_name>*
All private mailboxes	Private Mailboxes
A particular mailbox	*<mailbox_name>*
A particular mailbox item	*<mailbox_item_name>*
All public folders	Public Folder Trees
A particular public folder	*<public_folder_name>*
A particular public folder item	*<public_folder_item_name>*

For information on which objects must be backed up for successful recoveries, see "Exchange Transaction Log Files and Truncation" on page 20.

Note: The Backup window does not retain the marking of objects once the window is closed. If you close and reopen the Backup window, you must select Exchange objects anew for the next backup operation.

4. (Optional) To unmark an item, select it and then click Unmark. With a multibutton mouse, the secondary button alternately marks and unmarks objects.

Task 3: Set the Backup Options

1. Click the Backup button on the toolbar.

2. In the Backup window, select Backup Options from the Options menu.

3. In the Backup Options dialog box, shown in Figure 7, set the backup options. The Backup Options dialog box has three tabs, providing options for Exchange, NetWorker, and NetWorker Module.

   Note: When marking Exchange objects for backup, the Backup window does not retain the backup options selected once the Backup window is closed. If you close and reopen the Backup window, you must specify backup options anew for the next backup operation.

4. For backing up one or more databases (*not* individual mailbox items or public folder items), set the backup level in the Exchange tab, shown in Figure 7. Click the level you want for this backup: full, copy, incremental, or differential. For a description of these levels, see Table 1 on page 19.

   Note: The first backup of Exchange Server data is *always* a full backup.

Figure 7. Backup Options Dialog Box: Exchange Tab
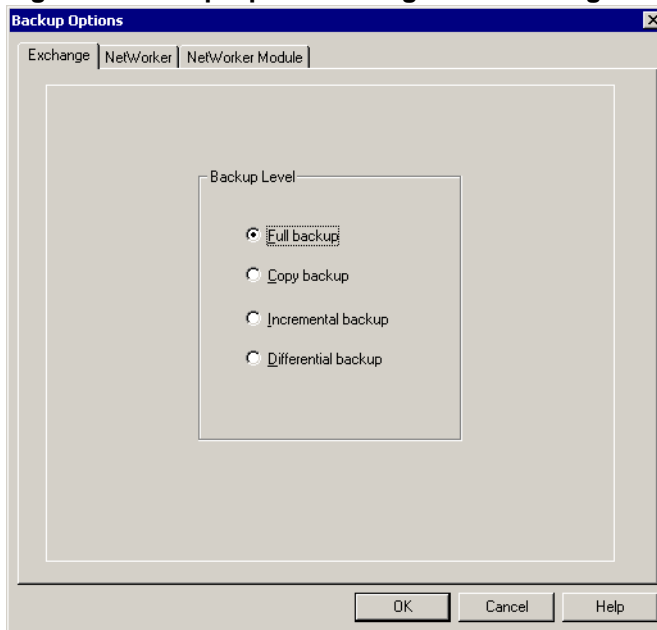
5. Set backup options that pertain to the NetWorker software in the NetWorker tab, shown in Figure 8.

- **Save Set Expiration Time** — Specify how long save set entries are browsable and the associated media volumes are excluded from automatic recycling. The expiration time cannot be set if the browse time or retention time is set.

- **Save Set Browse Time** — Specify how long save set entries are browsable. The browse time cannot be set if the expiration time or retention time is set.

- **Save Set Retention Time** — Specify how long save set entries are excluded from automatic recycling. The retention time cannot be set if the expiration time or browse time is set.

- **Group Selection** — Specify the group that NetWorker server saves the backup data to. NetWorker server saves the data to the pool associated with the group selected. This option cannot be set if the Pool option is set.

- **Pool Selection** — Specify the pool that NetWorker server saves the backup data to. This option cannot be set if the Group option is set.

Figure 8. Backup Options Dialog Box: NetWorker Tab
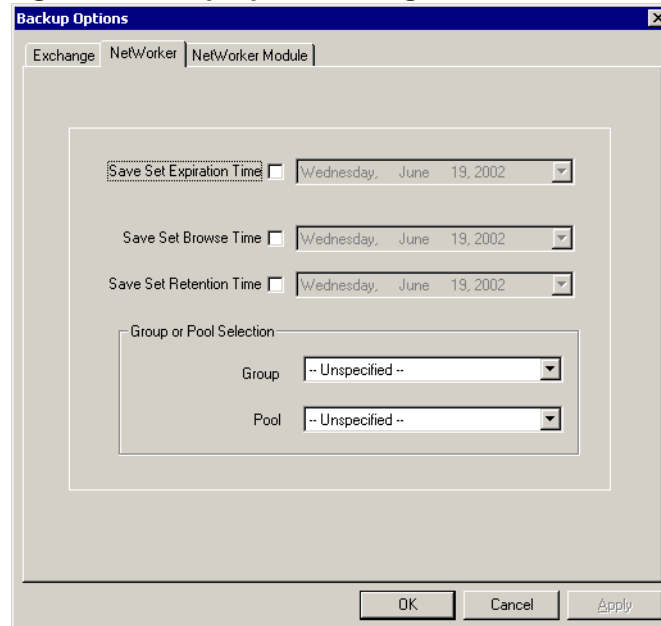
6. Set backup options that pertain to the NetWorker Module software in the NetWorker Module tab, shown in Figure 9 on page 37.

- **Diagnostic Output Level** — Specify the amount of diagnostic output that will appear in the Backup Status window and be saved in the *<NetWorker_install_path>\applogs\nsrxchsv.log* file. In general, set this level above zero only when you are troubleshooting or closely monitoring a backup.

- **Input File** — Specify an input file to configure a scheduled backup of a large number of individual Exchange components, such as multiple private mailboxes (rather than the entire mailbox database). The -**I** *input-file* command option reads the database, mailbox, and/or public folder names to be backed up from the Input file. For more information on input files, see "Using an Input File to Specify Multiple Items for Backup" on page 70.

- **Temporary Folder Location** — Specify the folder for temporary files during the backup operation.

  The NetWorker Module creates temporary files during any backup that includes one or more individual mailboxes, mailbox folders, and/or mailbox items. A temporary file as large as 2 GB may be created during backup of a single large mailbox or mailbox folder. The default location of these temporary files is *<NetWorker_install_path>\tmp*.

2

Figure 9. Backup Options Dialog Box: NetWorker Module Tab

2
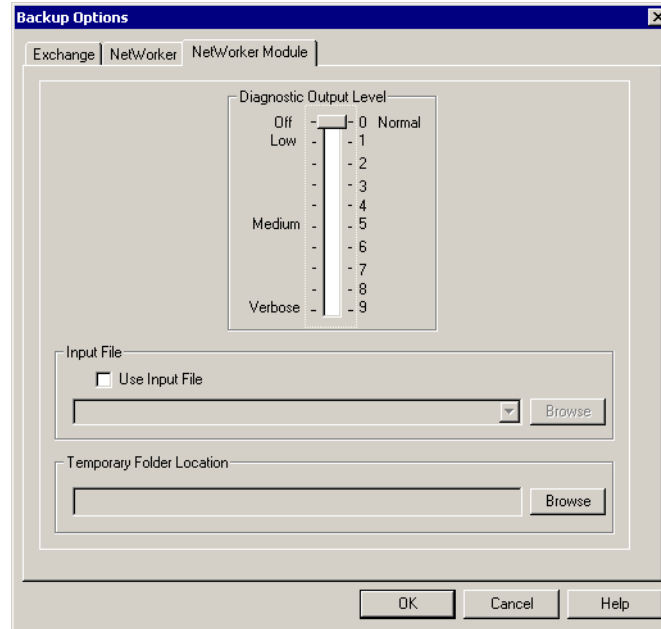
7. After setting the appropriate backup options, click OK to save the settings and exit the Backup Options dialog box.

Task 4: Start and Monitor the Backup

1. After marking objects and setting the backup options, click the Start button.

2. During the backup, you can monitor the progress of the backup in the Backup Status window of the NetWorker User program. Figure 10 on page 38 shows a Backup Status window indicating a successful backup.

3. You can cancel a backup at any time by selecting End Backup from the File menu or by closing the Backup browse window while the backup is in progress.

Task 5: Complete the Backup Process

2

1. After the backup is finished, close the Backup Status window shown in Figure 10.

Figure 10. Backup Status Window
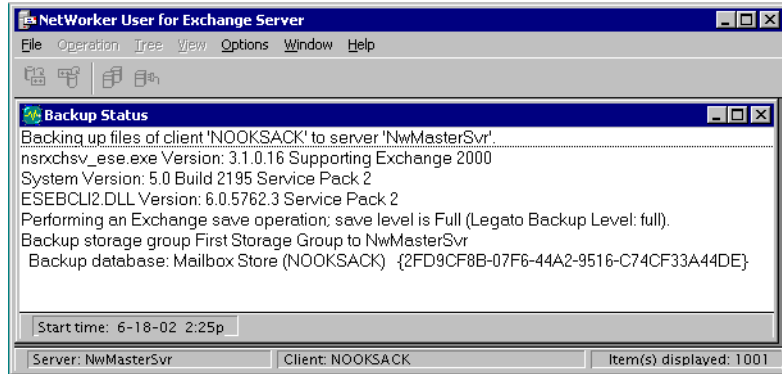
Chapter 3: Scheduled Backups

This chapter explains how to use the NetWorker Module software with the NetWorker Administrator program to configure scheduled backups. It includes the following sections:

About Scheduled Backups

The most reliable way to protect Exchange data is to configure backups to start and run automatically at regular intervals. As with filesystem backups, scheduled backups of Exchange data are configured using the NetWorker Administrator program (the graphical user interface for the NetWorker software). The process of scheduling Exchange backups is similar to scheduling regular filesytem backups, and requires a working knowledge of the NetWorker client and server software.

Windows and Exchange Permissions for Mailbox Backups

To perform a mailbox backup, the Windows domain account you use to log on to the NetWorker server host must:

- Belong to the Backup Operators group of Windows users
- Have permissions for Exchange 2000 Server and the Exchange private mailbox database

Configuring a Scheduled Backup

This section explains how to configure scheduled backups of the Information Store, Key Management Server (if installed) and Site Replication Server (if installed). Perform the steps in this section in the NetWorker Administrator program. The major tasks are:

For detailed instructions on configuring NetWorker resources, refer to the *Legato NetWorker Administrator's Guide*.

Task 1: Create a Group Resource

In the NetWorker Administrator program, you need to create one or more backup Group resources for the Exchange Server data. The Group resource defines the backup start time, backup level, and schedule.

To create a group resource:

1. In the NetWorker Administrator program, click Manage Groups from the Configure tab.

2. Right-click the main Groups icon, and select Create from the pop-up menu. The Create Group dialog box appears, as shown in .

Figure 11. Create Group Dialog Box

3. For the Name attribute, enter the name of the group.

4. The optional Comment attribute can be used to enter a description of the group.

5. For the Start Time attribute, enter a new time, unless you want to keep the default time of 3:33 a.m.

6. For the Autostart attribute, select Enabled.

7. For the Client Retries attribute, change the number of retries, if necessary.

   This value specifies the number of times the NetWorker software attempts to back up a failed client.

8. Select a backup level in the Level attribute or select a schedule with the levels that you want in the Schedule attribute.

   a. If the Level and Schedule attributes are not visible, close the Create Group dialog box.

   b. In NetWorker Administrator, open the Options menu, select Customize, and click the Window Configurations tab.

   c. Select the Display Hidden Attributes option.

   d. Click Ok to save your setting and exit.

   e. Re-open the Create Group dialog box. The Level and Schedule attributes are visible. Select the level or schedule you want.

9. Click the Preferences tab.

10. For the Clones attribute, select Yes if you want to automatically clone the group's backed-up data.

Note: If you select No, do not complete the subsequent clone-related attributes.

11. For the Clone Pool attribute, select the appropriate clone pool for the cloned data (requires cloning to be enabled).

12. Complete the other attributes as necessary and click OK.

When you select a start time for your different groups, make sure you schedule them far enough apart so that one group has completed backing up before the next group starts.

When you finish creating a backup group, the group appears as a choice in the Create Client dialog box (see) where you assign each client individually to a group.

Task 2: Create a Client Resource

Each Exchange Server host must be set up as a NetWorker client. Create and configure a Client resource in the NetWorker Administrator program for the Exchange Server on which the NetWorker Module is installed.

The NetWorker software provides a preconfigured backup Group resource named Default. You can use the Default group for Exchange backups, although it might not be best for segregating and organizing data into subgroups. You can modify the Default group's attributes, but you cannot delete the Default group from the list of NetWorker groups.

To create a client resource:

1. In the NetWorker Administrator program, click Manage Clients from the Configure tab.

2. Right-click the Clients icon, and select Create. The Create Client dialog box appears, as shown in Figure 12.

Figure 12. Create Client Dialog Box

3. In the Name attribute, enter a name for the client. Often, this is the client's hostname.

4. The Comment attribute can be used to enter a description of the client. This may be helpful to distinguish multiple Clients resources that use the same name.

5. In the Save Set list, enter the name of the save sets for the Exchange Server objects that you want backed up on this client.

   Note: Until release 3.0 of this NetWorker Module software, a full backup was always performed when **MSEXCH:** was specified. In release 3.0 and later, the backup level specified in the backup group schedule is used.

   For further information on save set specifications, see "Appendix A: Save Set Notation and Command Syntax" on page 103.

6. From the Group list, select a group to which the client will be added. For information on creating group resources, see "Task 1: Create a Group Resource" on page 40.

7. From the Schedule list, select a schedule. For information on creating schedules, see "Task 3: Create a Schedule and Set the Backup Level" on page 46.

8. From the Directive list, select a directive. For more information on creating directives, see "Creating Custom Directives" on page 51.

9. From the Browse Policy list, select a browse policy. Preconfigured values are: Week, Month, Quarter, Year, and Decade. If you created custom policies, they appear in this list.

10. From the Retention Policy list, select a retention policy. Preconfigured values are: Week, Month, Quarter, Year, and Decade. If you created custom policies, they appear in this list.

11. Select the Preferences tab, as shown in Figure 13.

Figure 13. Preferences tab
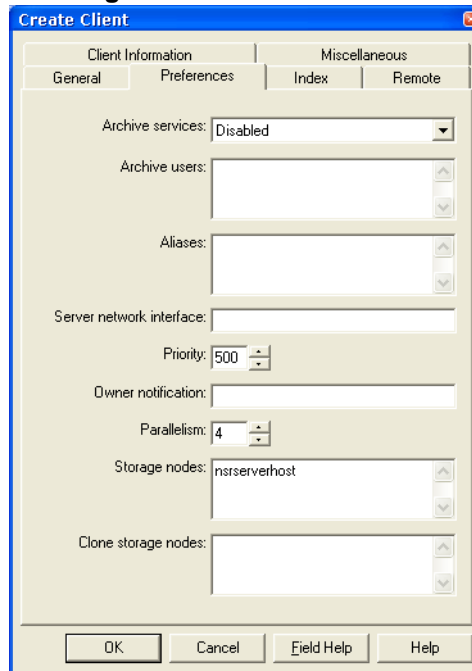
12. In the Archive Users list, enter each user that is authorized to use the archive services. If no users are listed, then only administrators are allowed to use the archive services on the client. The \ and @ characters are not allowed in the user names for this attribute.

13. In the Aliases list, enter the nicknames for the client computers that queries can match. Otherwise, queries match only the client name.

14. If a storage node exists, enter the name of each storage node to which the client can back up data in the Storage Nodes list. The client backs up to each active enabled storage node in the order they appear in the list. The default storage node, nsrserverhost, represents the server.

15. If cloning is desired, enter the storage node names for cloned data in the Clone Storage Nodes list in the same manner as the previous step .

16. Select the Remote tab, as shown in Figure 14.

Figure 14. Remote Tab

3

17. In the Remote Access list, enter users who are allowed to back up and recover this client's files. If left empty, only users logged into this client are valid.

    Note: If you already have NetWorker administrator rights, you automatically have remote access rights.

18. In the Remote User attribute, enter the domain\username of the remote users that can run remote commands on this client and access application specific data. This step is only required for mailbox backups.

19. In the Password attribute, enter the password for the Remote User account. The Remote User account must have a non-blank password. This step is only required for mailbox backups.

20. In the Backup Command attribute, enter the NetWorker Module backup command and any command options that you need. For example:

    `nsrxchsv.exe`

21. (Optional) In the Executable Path attribute, enter the path to the NSR executables on this client. For example:

    `<NetWorker_install_path>\nsr\bin`

22. Complete any other attributes as necessary and click OK.

Task 3: Create a Schedule and Set the Backup Level

The NetWorker server backs up each client computer across your network according to a backup schedule. A client's backup schedule tells the NetWorker software what level of backup operation (for example, full or incremental) to perform on a given day for specified save sets.

The type and scope of the backup is determined by the backup level you specify. These levels can be set to back up a client's entire filesystem, or only data that has changed since the last full backup.

You customize each client's backup schedule in the Schedules dialog box to best suit your needs. For example, some clients may have data you want to back up at the full level every three days, with incremental backups in-between. Other clients may have less critical data that only needs a full backup once a month, with incremental backups and/or level backups on other days.

Backing up Exchange Servers can take several hours because of the size of items that must be backed up. A full backup takes longer than an incremental or differential backup. Generally, the backup schedule is set so that a full

backup of each Exchange Server is performed periodically, for example, once a week. Incremental or differential backups, may be performed more frequently, usually once a day.

If there's a particular group that you want backed up at the same level every time, you don't need to use the Schedules dialog box. Instead, you can set the backup level using the Level attribute in the Edit Group dialog box (see Figure 16 on page 49).

To create a backup schedule:

1. In the NetWorker Administrator program, click Manage Schedules from the Configure tab.

2. Right-click the main Schedules icon, and select Create. The Create Schedule dialog box appears, as shown in Figure 15.

Figure 15. Create Schedule Dialog Box
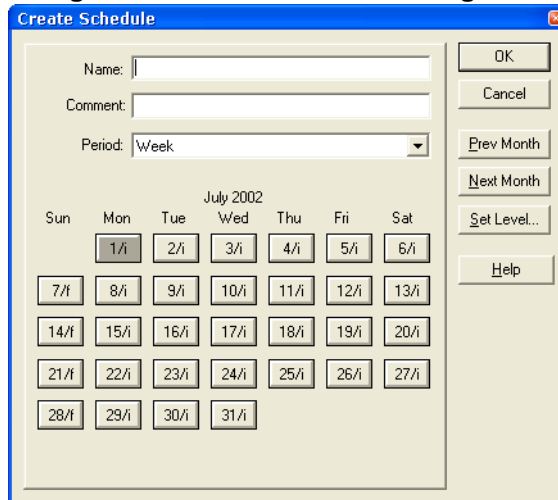
3. For the Name attribute, enter the name of the schedule.

4. The optional Comment attribute can be used to enter a description of the schedule.

5. For the Period attribute, select Week or Month. The value you select changes the way levels set for each day are duplicated:

   • **Week** — Levels selected for each day of the week are duplicated to the corresponding day of each subsequent week. For example, if you select a full backup for a Friday, every Friday is configured for a full backup.

   • **Month** — Levels selected for each date in the month are duplicated to the corresponding date in each subsequent month. For example, if you select a full backup for the first of the month, every month has a full backup on the first of the month.

6. Select a backup level for each day of the period (week or month) displayed in the Schedules dialog box:

   a. Select the day.
   b. Click the Set Level button.
   c. Select the appropriate backup level and click OK.

7. Click Prev Month or Next Month to see the backup calendars for preceding or future months.

8. Click OK.

You can set up as many NetWorker backup schedules as you want, as long as you give each one a unique name.

To assign a backup schedule to a client, you must assign the appropriate schedule for the Schedule attribute in the Create Client or Edit Client dialog box.

To back up a group at the same level every time:

1. In the NetWorker Administrator program, click Manage Groups from the Configure tab.

2. Right-click the icon of the group you want to edit, and select Edit. The Edit Group dialog box appears, as shown in Figure 16 on page 49.

Figure 16. Edit Group Dialog Box
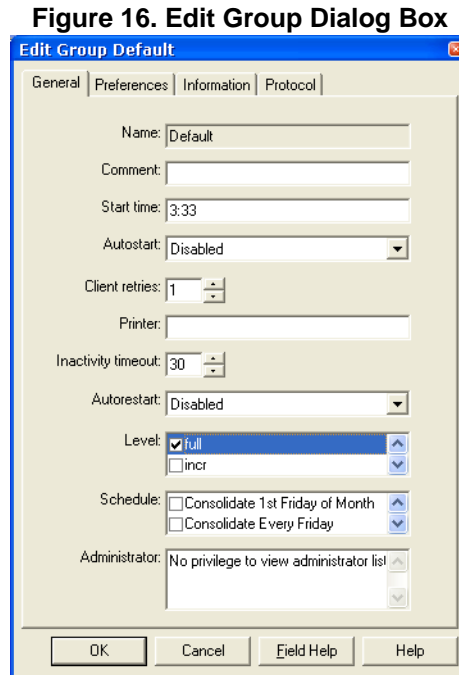
3. Select a backup level in the Level attribute and click OK.

Task 4: Test the Configuration

You can test the backup configuration by starting a scheduled backup group manually (on demand). Each client in the group is backed up at a level corresponding to the level for the day of the manual backup. This is defined by the schedule identified in the client's Schedule attribute (see).

To start a backup group manually:

1. In the NetWorker Administrator program, click Manage Groups from the Configure tab.

2. Right-click the group you want to start, and select Start.

3. Click Yes to start the group.

NetWorker immediately backs up the clients in the group, overriding the scheduled backup start time.

Refer to the *Legato NetWorker Administrator's Guide* for detailed information on starting backup groups.

Note: You can write the results of a scheduled backup to a log file by entering the following in the Action attribute of the Create Notification dialog box:

nsrlog -**f** *filename*

Refer to the *Legato NetWorker Administrator's Guide* for details on using the NetWorker administration program to customize your notifications.

Checking Backup Results

NetWorker provides several methods of verifying the results of a backup:

- A series of messages written to the NetWorker Module for Exchange Server log files on the Exchange Server host (*nsr\applogs\nsrxchsv.log*).

- A scrolling list of messages displayed in the Group Control window of the NetWorker administration program.

  These messages are displayed in three lists: pending save sets, completed save sets, and failed save sets.

- A "savegroup completion" notice upon completion of a scheduled backup.

- The backup level that was specified can be viewed in the Volumes tab or Indexes tab in the NetWorker Administrator program. Table 4 shows the media database notation for each backup level.

Table 4. Media Index Entries for Backup Levels

Backup Level	Notation in NetWorker Media Database
Full	full
Copy	copy
Incremental	incr
Differential	diff

Excluding the Exchange Installable File System from Backups

In Exchange 2000 Server, the Exchange Installable File System (ExIFS) allows file level access to various items in the Information Store. In Windows (for example, in Windows Explorer), the ExIFS is displayed as a disk drive, using the drive letter M:.

A scheduled filesystem backup attempts to back up files on the M: drive. This will not be successful because the Information Store files will have many of its files open. It is also not possible to restore the Exchange Server databases by recovering a backup of the ExIFS. For this reason it is usually best to skip ExIFS during a filesystem backup. This can be done easily by creating a *custom directive*. See "Creating Custom Directives" below for instructions.

3

Creating Custom Directives

Directives are special programs that control how the NetWorker server processes files and directories during backup and recovery. A directive contains instructions to assist the backup process, maximize the efficiency of a backup, and handle special files.

There are two types of directives: local and global.

- Local directives reside on the NetWorker client filesystem, and are stored in local directive files named *nsr.dir*. Each directory on the filesystem that requires a local directive must have a local directive file residing in the directory.
- Global directories are resources that reside on the NetWorker server, and are configured in the Directive resource of the NetWorker Administrator program. Directive resources are then specified in the Directive attribute of the Client resource for each NetWorker client.

Both local and global directives use the same format, except that global directives contain an additional line indicating the directory on the client computer that is acted upon by the directives. This additional line uses the format *<<directory>>*.

How to Create a Custom Directive

To create a custom directive to skip the file system backup of ExIFS as discussed in "Excluding the Exchange Installable File System from Backups" on page 51:

1. In the NetWorker Administrator program, click Manage Directives from the Configure tab.

2. Right-click the Directives icon, and select Create. The Create Directive dialog box appears, as shown in Figure 17.

Figure 17. Create Directive Dialog Box
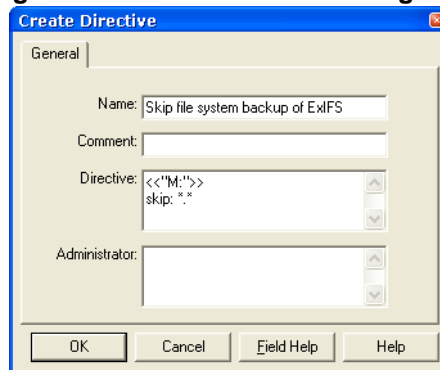
3. In the Name attribute, enter a name for the new directive.

4. In the Directive list, enter the following commands:

   << **"M:"** >>

   skip: *.*

5. Click OK.

6. Next you need to edit the Client resource that is used for the filesystem backup of the Exchange server. Right-click the icon of the client you want to edit, and select Edit. The Edit Client dialog box appears, as shown in Figure 18 on page 53.

Figure 18. Edit Client Dialog Box

7. From the Directive list, select the name of the custom directive you just created.

8. Click OK.

Improving Performance

To improve backup performance:

- Dedicate separate physical drives for the log files of the storage groups. When each set of log files has its own physical drive, server performance improves. To optimize fault tolerance, use hardware mirroring with redundant array of independent drives (RAID).

- Set backups for private mailboxes at separate times from backups of the Information Store. Even when they are in different backup groups, network congestion may result from performing these backups simultaneously.

- Set start times for different backup groups far enough apart that each backup operation can finish before the next backup operation starts.

- Set scheduled backups for times when the network is less busy, for example, nights and weekends.
- Do not back up the Exchange Installable File System. For more information, see "Excluding the Exchange Installable File System from Backups" on page 51.

3

Chapter 4: Restoring Data from a Backup

This chapter explains how to use the NetWorker User for Exchange Server program to restore data. It contains the following sections:

Interfaces for Restore Operations

You can perform a restore operation at any time from the Exchange Server host using either of the following two interfaces:

- The NetWorker User for Exchange Server program. For instructions on performing a restore from the NetWorker User for Exchange Server program, see "Performing the Restore Operation" below.
- The command line (using the **nsrxchrc.exe** command and appropriate command options). For instructions on performing restore operations from the command line, see "Appendix A: Save Set Notation and Command Syntax" on page 103.

Performing the Restore Operation

Use the following roadmap to perform a restore of the Exchange data:

"Task 1: Set Exchange Database Properties to Allow a Recovery" on page 56

"Task 2: Select a Backup Version (Optional)" on page 57

Task 1: Set Exchange Database Properties to Allow a Recovery

To recover an Exchange database, you must first set the database properties to allow the database to be overwritten with the restored data.

Note: This is not necessary for recovering the Key Management Server (KMS), the Site Replication Server (SRS), mailboxes, or public folders.

To allow an Exchange database to be overwritten:

1. Open the Exchange System Manager.

2. Right-click the Exchange database you want to restore and select Properties.

3. In the Database Properties dialog box opens, select the Database tab.

4. In the Database tab, select "The database can be overwritten by a restore" (see Figure 19 on page 57).

4

**Figure 19. Exchange System Manager
Database Properties Dialog Box**
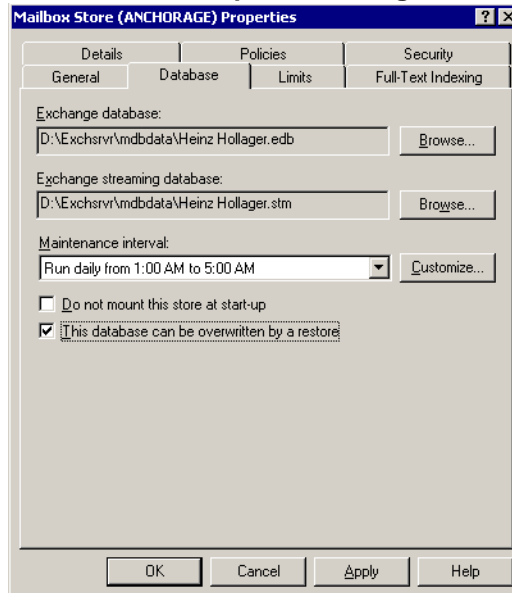
Task 2: Select a Backup Version (Optional)

To view and select available backups (versions) of an object:

1. Start the NetWorker User for Exchange Server program.

2. From the main window, select Recover from the Operation menu.

3. In the Recover window select an object for recovery.

4. From the View menu, select Versions.

5. The Versions window lists the date and time of each available backup of the selected object. Versions are sorted according to backup times, most recent first. Object size, backup time, and backup volume location are also shown for each version. If the backup media volume is currently online, the volume location includes an identifier for the storage device.

Task 3: Check or Specify the Backup Time (Optional)

If you want to recover an object from a backup prior to the most recent backup, you can specify the date and time of a backup to restore. This is called the *browse time.* For any particular browse time selected, the Recover window displays a directory tree of recoverable objects for that specific backup point in time.

The current browse time appears at the bottom of the Recover window, on the status line at the right. By default, the browse time is the current date and time. When you change the browse time, you are instructing the NetWorker Module to recover to a different point in time.

When selecting the browse time, ensure the time falls between two previous backup times. Do not set a browse time to closely coincide with the time of a previous backup, when backup data was perhaps being written to the NetWorker server. The NetWorker Module software uses the browse time as a reference point for identifying the files that must be restored to fulfill a particular request.

If you select a browse time that is earlier than the time of the first backup, the file index is empty. If you change the browse time to a future time, you see the objects as of the most recent backup.

4

Example: How Browse Time Affects Files Used for Recovery

This example illustrates how the set of files required for recovering Exchange Server objects changes according to the selected browse time.

The timeline in shows a hypothetical sequence of backup operations: a full backup followed by three incremental backups, and a final full backup.

Following the figure is a list of the sets of files required for recovering Exchange objects to the states they were in at different points along the timeline.

Figure 20. Browse Time Selection
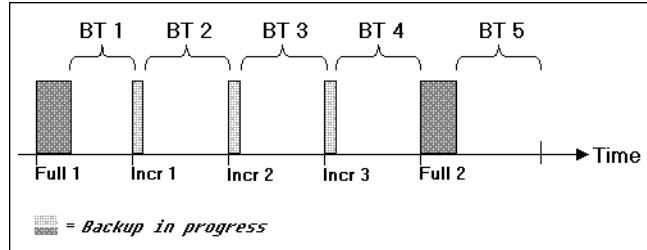
- To recover the data backed up during the first full backup (Full 1), select a browse time in the range BT1 (that is, any point after Full 1 ends, but before Incr 1 begins).

- To recover both Full 1 and Incr 1, select a browse time in the range BT 2 (that is, any point after Incr 1 ends, but before Incr 2 begins).

- If no browse time is selected, the NetWorker Module defaults to the current time. In Figure 20, this has the effect of selecting Full 2.

Table 5 summarizes the backups that are recovered for each Browse Time range shown in Figure 20.

Table 5. Effects of Browse Time Selection

Browse Time Selection Range	Backup That Is Recovered
BT 1	Full 1
BT 2	Full 1 + Incr 1
BT 3	Full + Incr 1 + Incr 2
BT 4	Full + Incr 1 + Incr 2 + Incr 3
BT 5	Full 2

To change or check the browse time of a backup to recover:

1. Start the NetWorker User for Exchange Server program.

2. From the main window, select Recover from the Operation menu.

3. In the Recover window, select Change Browse Time from the View menu.

4. The Change Browse Time dialog box opens. Whenever the Change Browse Time dialog box is opened, the browse time is reset to the default date and time.

5. In the Change Browse Time dialog box, select a new date from the calendar. Use Previous Month or Next Month to change from the current month.

6. Enter a new time (for example, 10:28p) and click OK. Valid values are:

   • Hours: 0 through 12
   • Minutes: 0 through 60
   • "a" (for a.m.) or "p" (for p.m.)

Task 4: View the Required Media Volumes (Optional)

You can check which media volumes the NetWorker Module needs for the restore operation. This may be useful when:

• The default browse time is changed to a time in the distant past.
• You are restoring from a large backup that used multiple storage volumes.

To restore from an incremental or differential backup, the NetWorker software needs access to certain media volumes. Table 6 shows the media volumes necessary to perform a restore from each type of backup.

Table 6. Media Volumes Needed to Restore Data

Backup Level	Restore the Data from the Volumes That Contain...
Full	The full backup
Copy	The copy backup
Incremental	• The full backup immediately preceding the given incremental backup • All incremental backups that occurred between the full backup and the given incremental
Differential	• The full backup immediately preceding the given differential backup • The differential backup

To view the required volumes:

1. Start the NetWorker User for Exchange Server program.

2. From the main window, select Recover from the Operation menu.

3. In the right pane of the Recover window, click the icon of the items to recover and click the Mark button.

4. Select Required Volumes from the View menu.

    The Required Volumes window opens and displays a list of the volumes required to perform the restore operation.

Task 5: Set the Recover Options (Optional)

Before starting a restore operation, check the recover option settings. To change the recover option settings:

1. In the Recover window, select Recover Options from the Options menu.

2. On the Exchange tab, shown in Figure 21 on page 62, set the following options for how the Exchange Server behaves following the NetWorker Module restore operation.

    a. Select "Replay only logs for this restore" to restore a database to a particular point in time, or to replay all logs to minimize the loss of transactions.

        This option causes the Exchange Server software to ignore new log files built after the most recent NetWorker Module backup and restores to the point in time when the backup was performed.

        If this option is not selected, Exchange will use new log files built after the most recent NetWorker Module backup and restores to the point in time when the system crashed. This could be after the point in time when the most recent backup was performed.

    b. Select "Put databases online after recover" to automatically mount the recovered databases after completing the recover operation.

        When this option is not selected, the Exchange Server software does not put the databases online after the recover operation. In this case the database must be put online *manually* after the data is recovered.

4

Figure 21. Exchange Tab in Recover Options Dialog Box
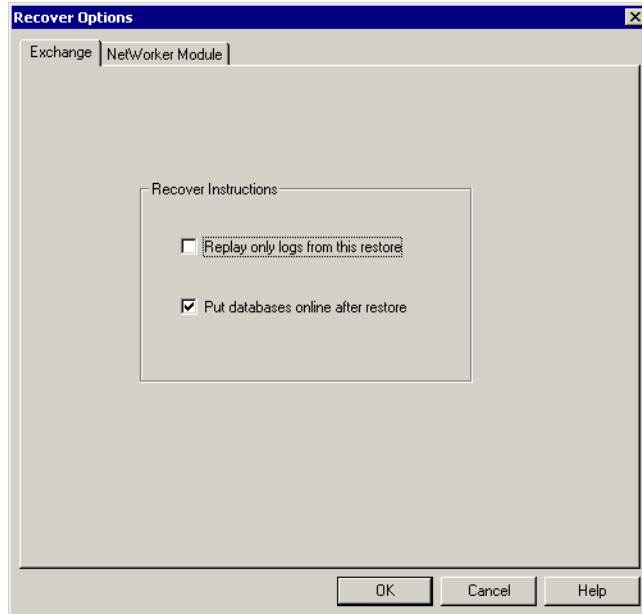
4

3. In the NetWorker Module tab, shown in Figure 22 on page 63, set the following options for the behavior of the NetWorker Module during the restore operation.

   a. Diagnostic Output Level — Specify the level of detail for display of diagnostic messages

   b. Input File — Specify an input file to select the names of the databases, mailboxes, public folders, and any objects marked for recovery. For more information on input files, see "Using an Input File to Specify Multiple Items for Backup" on page 70.

   c. Temporary Folder Location — Specify a location to store the temporary files. These files are deleted after the restore is completed. If no location is specified, the location defaults to *<NetWorker_install_path>\tmp*.

**Figure 22. NetWorker Module Tab
in Recover Options Dialog Box**

4
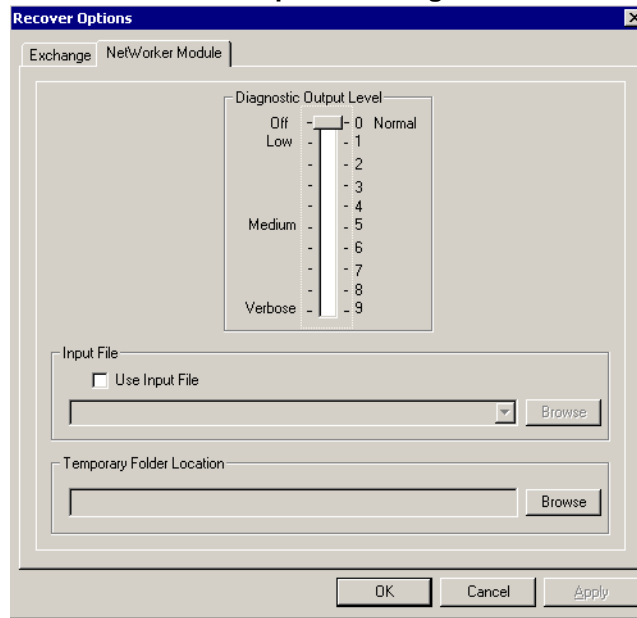
Task 6: Start the Recover Operation

Note: Before you perform a recovery, ensure that objects marked for recovery are not currently being backed up.

To start a recover operation:

1. Open the Recover Window.

2. In the right pane of the Recover window, click the icon of the item to recover and click the Mark button.

3. A check mark appears beside the item selected. To unmark an item in the Recover window, click the Unmark button.

4. Click the Start button.

If the backup volume containing the objects is loaded in the device attached to the NetWorker server, the recovery starts.

If the recover operation does not begin, the wrong volume might be mounted. Contact the system administrator for assistance. You can cancel the recovery by selecting End Recover from the File menu.

When the recovery is complete, NetWorker Module displays messages in the Recover Status window.

Note: For instructions on performing recoveries within a Microsoft cluster, see .

Task 7: Verify the Recovery

To verify recovery of the Exchange objects:

1. Log on to the Exchange recovery server host using a Windows 2000 account with Exchange Server permissions.

2. Before the restore, if you did not select the "Put databases online after restore" option on the Exchange tab of the Recover Options dialog box in the Exchange Module, use the Exchange System Manger to put the databases online now.

3. Verify that the recovered Exchange Server database is present in the Exchange Server System Manager directory tree.

4

Recovering the Key Management Server

The KMS does not provide an automated way to take a database offline prior to performing a recover. It also requires the user to provide a password whenever the KMS service is started. For these reasons the KMS recover process requires more manual steps than the recover process for Exchange or SRS.

KMS recovery also requires the Active Directory to contain the user accounts of administrators who were given full permission to manage the KMS. If the Active Directory containing the KMS administrator accounts is lost or damaged, it must be recovered before you can recover the KMS.

How to Recover the KMS Database

To recover the KMS database:

1. Verify that the required KMS administrator accounts exist in the Active Directory. Restore the Active Directory if necessary.

2. Stop the KMS service (**MSExchangeKMS**).

3. When the KMS service is stopped, move any existing KMS files from the KMS installation folder (*KMSDATA)* to a temporary folder.

4. Start the KMS service.Verify that it is ready for a recover operation by making sure the application event log shows the following error message:

```
KMS cannot mount the key database. Either the database is
missing or it is corrupted. The service started, but
Admin/User can not do any operation except restoring the
database from a backup set. After restoring, please stop
and restart the service.
```

5. Open the NetWorker User for Exchange Server program.

6. In the Recover window, mark the version of KMS that you want.

7. Click the Start button to begin the recover operation.

8. Stop and restart the KMS service following the recovery.

9. Delete the files you saved to the temporary folder.

Directed Recoveries

In case of a problem recovering to the original Exchange Server host, such as a disk drive crash, you can perform a directed recovery to recover data to a different Exchange Server host. The Directed Recover operation allows you to recover a backup of the original Exchange host to a different Exchange host. You can use the recovered data to configure a new Exchange host.

4

How to Configure the NetWorker Administrator Program

Before performing a directed recover, ensure the following in the NetWorker Administrator program:

- Your username is included in the Administrator attribute of the NetWorker server that backs up the source client's data. Click Set Up Server from the Configure tab to open the Set Up Server dialog box, then select the General tab.

- Your hostname, or <*user@hostname*>, is entered in the Remote Access attribute on the Remote tab of the NetWorker client from which the data was backed up. Click Manage Clients from the Configure tab and right-click the client to which you want remote access, then select Edit.

For detailed instructions on configuring the NetWorker Administrator program for directed recovery, refer to the *Legato NetWorker Administrator's Guide.*

Important: You *cannot* recover an Exchange 5.5 database to an Exchange 2000 server, or vice versa.

How to Start a Directed Recover

You must manually create a target database on the recovery server if it does not exist. The database name must *exactly* match the name of the database being recovered. Set the "database can be overwritten" property in the Exchange System Manager Database Properties dialog box shown in Figure 19 on page 57.

To perform a directed recover to a recovery server:

1. In the NetWorker User for Exchange Server program on the administering client, select Directed Recover from the Operations menu.

2. In the Source Client dialog box, select the name of the client whose files you are recovering and click OK.

3. In the Directed Recover window, mark the database to recover.

4. Click the Start button on the toolbar to perform the directed recovery.

For more information about directed recover operations, refer to the *Legato NetWorker Administrator's Guide.*

Replaying Transaction Logs

After Exchange Server files are restored, the Exchange software may take a long time to replay the transaction logs. The time required to replay the logs depends on the system configuration, Exchange Server parameters, and the number of logs restored. You can monitor transaction log progress with the Windows Event Viewer. The following message appears while the transaction logs are replaying:

```
The database engine is replaying log file exxnnnnn.log
```

where:

xx is the storage group number starting with 00

nnnnn is a five-digit hexadecimal number.

If there is a gap in the log file sequence, the Exchange Server cannot replay any existing or restored logs. This causes the following Exchange Server error:

```
Log file gap detected. Max recovered log: exxnnnnn.log
```

This situation can occur in various ways, as for example when a filesystem recovery (which restores some log files) is performed prior to recovery of Exchange Server databases. To prevent such an error, the NetWorker Module causes only recovered logs to be replayed when it detects a log file gap.

4

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Chapter 5: Mailbox and Public Folder Operations

This chapter addresses special considerations for operations with mailboxes and public folders. It includes the following sections:

Mailbox and Public Folder Backup and Restore Requirements

To back up or restore a mailbox or public folder, the operator must be logged on to the Exchange Server host as a member of the Exchange Administrators group. In addition, the following permissions must be set for the operator in the Exchange System Manager:

- List contents
- Read properties
- Administer information store
- View information store status
- Receive as
- Send as

Backing Up Mailboxes and Public Folders

Consider the following when planning mailbox and public folder backups:

- Because a mailbox or public folder backup includes all attributes of each individual item in the mailbox, backing up a large number of individual mailboxes can take much longer, and require more disk space, than backing up the Information Store or any particular database. The Exchange Server must have sufficient space to accommodate temporary files that the NetWorker Module software creates during mailbox backups.

- Mailboxes and public folders can be backed up only at level full. This contributes to the time required for private mailbox backup operations, but is necessary to ensure reliable data recovery.

- The Information Store cannot be rebuilt by recovering a backup of private mailboxes and public folders.

Using an Input File to Specify Multiple Items for Backup

You can use an input file to configure a scheduled backup of a large number of individual Exchange components, such as multiple private mailboxes (rather than the entire mailbox database). The -**I** *input-file* command option reads the mailbox names to be backed up from the Input file.

Use the following roadmap to create an input file and specify it for use during a backup:

- "Task 1: Create the Input File" on page 70
- "Task 2: Specify the Input File in the Client Resource" on page 72

Task 1: Create the Input File

Input files can be created either manually or automatically.

To manually create an input file:

1. Use any text editor to create a list of items in a *.txt* file (plain ASCII text format). Enter each item name on a separate line, as shown in Figure 23 on page 71.

Figure 23. Mailbox Names in Input File
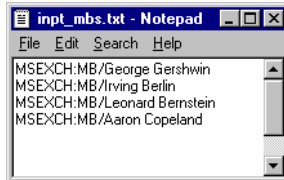
2. Save the file to the path for NetWorker executables that was specified when the NetWorker client software was installed. The default installation path for the NetWorker executables is:
   %SystemDrive%\Program Files\Legato\nsr\bin.

When the NetWorker User for Exchange Server program performs a manual backup or a restore operation, a list of marked items is automatically written to *<NetWorker_install_path>\tmp\NME_Marked_Items.txt*. This file is in a format that is suitable for use as an input file. This is a temporary file, so it will be overwritten by each subsequent manual backup or restore operation.

To automatically create an input file containing specific items:

1. In the NetWorker User for Exchange Server program, in the Backup or Restore window, mark the items to be included in the backup or restore operation.

2. Start the backup or restore operation.

3. Copy the resulting *NME_Marked_Items.txt* file to a permanent location (*<NetWorker_install_path>\bin* is recommended) and rename it.

4. In the NetWorker Administrator program, specify the input filename in the Backup Command attribute under the Remote tab (NetWorker Administrator>Edit Client>Remote Tab).

   If the input file is not located in *<NetWorker_install_path>\bin* directory, specify the full pathname to the file in the Backup Command attribute under the Remote tab, using double backslashes instead of single backslashes in the pathname. For an example, see Figure 24 on page 72.

To add or remove individual items, such as mailbox names, you can simply edit the input file.

5

Task 2: Specify the Input File in the Client Resource

Edit the Client resource as follows:

1. In the NetWorker Administrator program, click Manage Clients.

2. In the list of clients, right-click a client name and select Edit.

3. For the Backup Command attribute in the Remote tab of the Edit Client dialog box:

   a. If the input file is in the default directory (*<NetWorker_install_path>\bin*), enter the backup command, the command option, and the name of the input file:

   nsrxchsv.exe -I *input_file*

   b. If the input file is located in a directory other than the default, enter the backup command, the command option, and the full path to the file, using quotation marks and double backslashes as shown in Figure 24:

   nsrxchsv.exe -I *"C:\\my_folder\\input_file.txt"*

Figure 24. Specifying an Input File

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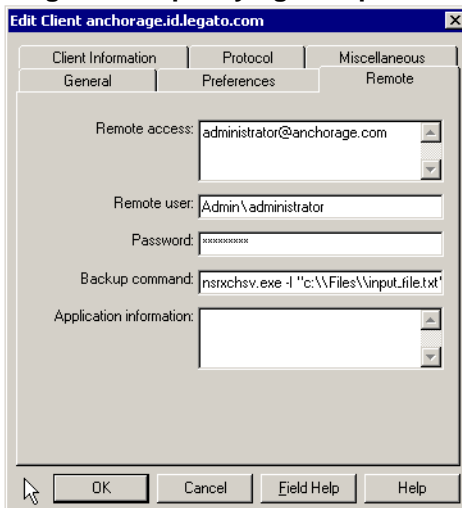
Recovering Mailboxes and Public Folders

This section covers methods for recovering mailboxes, public folders, and individual items.

Note: When an Exchange user is having mail delivered to personal folders on a client computer, the user is responsible for the recovery. The user can recover the personal folders and Personal Address Book from a filesystem backup if these items were stored on a mapped server drive. If the user has not performed any local backups and no fileserver backups are available, the user's data is lost.

Deleted Item Retention

Versions of Microsoft Outlook and Microsoft Exchange Server earlier than Exchange 2000 Server allowed you to use the Exchange Server to recover an Outlook folder or item, even after deleting it. With Exchange 2000 Server, the Exchange administrator can set a retention period, or a length of time, deleted items remain stored on the Exchange Server. Within the retention period, a user with the proper permissions can use the Exchange Server to recover an entire mailbox, public folder, or individual item therein. For details on setting retention periods, refer to the Microsoft documentation.

Restoring Mailboxes and Public Folders

To restore a mailbox, public folder, or individual item from a backup, see "Performing the Restore Operation" on page 55.

Mailbox items are recovered to a folder in the original mailbox whose name consists of the date and time of the restore and the words *Recovered Items.* A separate Recovered Items folder is created in each mailbox that is recovered. In the Recovered Items folder, the hierarchy of folders and messages in the original mailbox is preserved.

You should move the recovered items to a different folder and then delete the Recovered Items folder.

5

Directed Recovery of a Mailbox or Public Folder from a Database Backup

The easiest way to recover an individual user's mailbox or a directory in a public folder is through the recovery of a mailbox or public folder save set. If these are not available, you can recover a mailbox or public folder from a database backup using the Directed Recover feature in the NetWorker User for Exchange Server program.

To do this, you must recover the original Microsoft Exchange database to a new Microsoft Exchange Server host or virtual server. In the following procedures, *production server* means the original Microsoft Exchange Server host. The *recovery server* is the computer or virtual server to which you plan to recover the object.

After you recover the user mailbox to the recovery server, you must merge the recovered mailbox with the user's mailbox on the original production server.

Software and Hardware Requirements

To set up the recovery server, configure a Microsoft Exchange Server host identical to the original Exchange Server host. Software and hardware requirements include:

- Windows 2000
- Microsoft Exchange 2000 Server
- Legato NetWorker 6.*x* or later
- Legato NetWorker Module for Microsoft Exchange Server, release 3.0 or later
- Software versions and service packs on production and recovery servers must match those in use at the time the backup was made.
- Sufficient hard disk capacity to accommodate temporary and restored Exchange Server files (varies with size of databases)

How to Prepare the NetWorker Server for the Recover Operation

To prepare the NetWorker server host for the recover operation:

1. Start the NetWorker Administrator program.

2. Create a Client resource for the recovery server, if one does not already exist.

3. In the Remote Access attribute of the Client resource for the production server, add:
Administrator@recovery_server_name

For more information about NetWorker resources and resource attributes, refer to the *Legato NetWorker Administrator's Guide.*

How to Set Permissions for Public Folder Recovers

To recover individual items from public folders, you must have the proper Exchange permissions. This is the case for public folders, such as the Internet Newsgroups folder, created during the Exchange Server installation.

To set the permissions for items in a public folder:

1. Open the Exchange System Manager.

2. Open the Properties dialog box for the public folder (see Figure 25).

3. On the Permissions tab in the Properties dialog box, select the following:

   – Create Items
   – Read Items
   – Create Subfolders

Figure 25. Public Folder Properties Dialog Box: Permissions Tab

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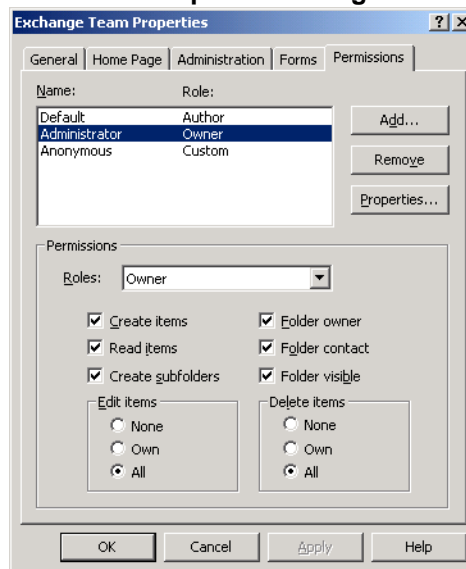
How to Recover a Mailbox

This procedure assumes:

- The user's mailbox was deleted and purged.
- The user account was not removed from the Active Directory.

To recover a mailbox:

1. Create a target database on the recovery server with the same name as the database being recovered. The names of the storage group and database on the recovery server must **exactly** match the original. Set the database properties to allow the database to be overwritten with the restored data. For information, see .

2. On the recovery server, start the NetWorker Module for Exchange User program.

3. Select Directed Recover from the Operation menu.

4. In the Source Client dialog box, select the NetWorker client hostname (the name of the original Exchange Server). Click OK.

5. Mark the database to be recovered.

6. Click the Start button.

7. After the recover operation is finished, start the Exchange System Manager program.

8. Ensure the recovered database is online.

9. Right-click the database and select Run Cleanup Agent. A red mark beside the mailbox name indicates it is not attached to an Active Directory user.

10. Right-click the desired mailbox and select Reconnect.

11. Specify the name of an existing Active Directory user account that corresponds to the mailbox.

12. Run the Exchange Active Directory Users and Computers program.

13. Right-click on the user name and select Exchange Tasks.

14. Select the Move Mailbox option and follow the wizard to specify the desired target server and mailbox store. This will move the mailbox from the database on the recovery server to the desired production server.

5

How to Recover a Public Folder

To recover a public folder:

1. Create a target database on the recovery server with the same name as the database being recovered. The names of the storage group and database on the recovery server must **exactly** match the original. Set the database properties to allow the database to be overwritten with the restored data. For information, see "Task 1: Set Exchange Database Properties to Allow a Recovery" on page 56.

2. On the recovery server, start the NetWorker Module for Exchange User program.

3. Select Directed Recover from the Operation menu.

4. In the Source Client dialog box, select the NetWorker client hostname (the name of the original Exchange Server). Click OK.

5. Mark the database to be recovered.

6. Click the Start button.

7. After the recover operation is finished, start the Exchange System Manager program.

8. Ensure the recovered database is online.

9. On the recovery server, move the public folder back to the original server using one of the following methods:

   • Use Microsoft Outlook to export the folder to a PST file, then on the original server import the PST file. For more information, refer to the Microsoft Outlook documentation.

   • Use the Microsoft Exchange System Manager to replicate the folder contents back to the original server. For more information, refer to the Microsoft Exchange documentation.

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Chapter 6: Backup and Recovery of an Exchange Server in a Microsoft Cluster

This chapter describes how to configure and use NetWorker software with the NetWorker Module in an MSCS environment. It includes the following sections:

Using the NetWorker Module in a Microsoft Cluster

You can use the NetWorker Module and NetWorker software release 5.7 or later to back up a Microsoft Exchange Server operating in an MSCS configuration. The procedures for using NetWorker Module in a cluster (on a virtual server) are similar to those used on a stand-alone Exchange Server host. However, certain configuration procedures should be followed to ensure reliable backups and to simplify recovery. To use these instructions, the reader should be familiar with Microsoft clustering technology. For more information about MSCS, refer to Microsoft documentation.

Important: If a failover occurs or a group goes offline during a backup or recover operation, the operation is immediately terminated. The user must start the operation again when the virtual server is back online.

Scheduled Backups in a Microsoft Cluster

To run scheduled backups, see the following procedures:

How to Configure Scheduled Backups within a Microsoft Cluster

Perform the following installation and configuration procedures to enable the NetWorker Module software to perform backups and recoveries of Exchange servers in a cluster. In the following instructions, *node_a* and *node_b* represent the names of the physical nodes, and *virtual_server_name* represents the network name of the Exchange server running on the node.

1. Install the NetWorker client software and the NetWorker Module for Exchange Server software on the local disk of *<node_a>* and the local disk of *<node_b>*. You may have as many as four physical nodes in a cluster. For detailed instructions on installing the NetWorker software in a Microsoft Cluster, refer to the *Legato NetWorker Installation Guide, Windows Version*.

   When you install the NetWorker client software, you can specify the NetWorker server hosts that may be used to back up the cluster data.

   a. To modify the list of authorized servers after the installation, edit the *<NetWorker_install_path>\res\servers* file.

   b. After editing the file, restart the NetWorker Remote Exec Service.

2. Install the enabler for NetWorker Module on the NetWorker server host.

How to Schedule a Backup within a Microsoft Cluster

To schedule a backup within a Microsoft cluster, in the NetWorker Administrator program on the NetWorker server host:

1. Create a Group resource to perform the Exchange backup. For instructions, see "Task 1: Create a Group Resource" on page 40.

2. Create a Client resource for each physical node and virtual server: *node_a*, *node_b*, and *virtual_server_name*. If you have more than one virtual server, create a Client resource for each one. You may have as many as four virtual servers in a cluster.

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3. Make sure that the NetWorker server receives an authoritative DNS reply for at least one of the names in the Client resource alias list. The reply is authoritative when the reply message does not say "non-authoritative." To check for an authoritative DNS reply, enter the following command:

%*SystemRoot*%:**nslookup** *alias_name*

where *alias_name* is the name that is listed for the Alias attribute in the Client resource.

4. Edit the Client resource for *virtual_server_name*:

In the Edit Client dialog box, click the General tab and enter a value in the Save Set attribute for the type of backup you want. For save set specifications, see "Using Save Sets" on page 103.

Whether or not to use the -**c** option depends on whether or not the virtual server name and client names match. Also keep in mind that if you use both the -**a** option and the -**c** option with different client names, you must perform a directed recover.

- If the virtual server name and the client name *do not match*, enter the following for the Backup Command attribute (for each NetWorker Client resource for Exchange):

  nsrxchsv -a *virtual_server_name* **-c** *client_name*

- If the virtual server and client names *match*, enter the following command in the Backup Command attribute:

  nsrxchsv -a *virtual_server_name*

Note: During a *scheduled* backup, the NetWorker server automatically sends the -**c** option (specifying the client name) to the NetWorker Module backup program. If the client and virtual server names match, the backup operation succeeds. If -**a** and -**c** do not match when a backup operation is performed, the same options must be used to recover that particular backup.

Important: Some older versions of the NetWorker server software do not send the -**c** option. You can see if the -**c** option was sent by checking the activity logged in *<NetWorker_install_path>\applogs\nsrxchsv.log*. If the -**c** option does not appear in the log, add the -**a** and/or -**c** options to the Backup Command attribute in the NetWorker Client resource in the NetWorker Administrator program.

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5. Edit the Remote Access list to include the following literal strings:

   system@node_a
   system@node_b

6. Edit the Group resource for the Exchange backup group. Set the backup level as shown in Table 4 on page 50.

7. Start the group manually, or wait for the next scheduled backup to occur.

8. After the backup operation is finished, use the Networker Administrator program's Index tab to verify that the backup was indexed using the Exchange server's network name, *virtual_server_name.*

Manual Backups in a Microsoft Cluster

The procedure for starting a manual backup operation within a Microsoft Cluster is similar to starting a manual backup on a stand-alone Exchange server host. The only difference is selecting the virtual server to make active in the NetWorker User for Exchange Server software.

This section explains how to select the virtual server to make active in the NetWorker User for Exchange Server software in a Microsoft cluster. After the virtual server is selected, perform backups and recoveries just as you would normally. For instructions on manual backups, see "How to Start a Manual Backup in a Microsoft Cluster" below.

How to Start a Manual Backup in a Microsoft Cluster

To start a manual backup in a Microsoft Cluster:

1. Open the NetWorker User for Exchange Server program from within a Microsoft Cluster.

2. In the Exchange Servers window, select a virtual server from the list of online virtual servers in the cluster (see Figure 26 on page 83).

3. In the NetWorker User for Exchange Server main window, follow the procedures in "Chapter 2: Manual Backups" on page 29.

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Figure 26. Exchange Servers Dialog Box
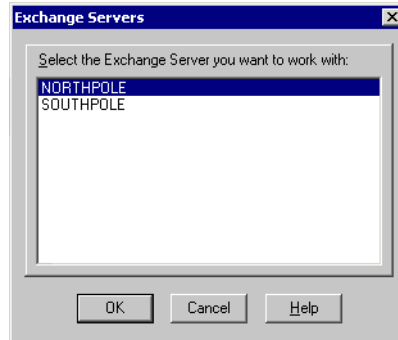
How to Change the Virtual Server

To switch to another virtual server:

1. In the NetWorker User for Exchange Server program, close the Backup or Recover window, if either is open.

2. From the Operation menu, click Select Exchange Server.

3. In the Exchange Servers dialog box, select the name of the virtual server to open, and click OK (see Figure 26).

How to Start a Manual Backup from a Command Prompt in a Cluster

To start a manual backup of an Exchange virtual server in a Microsoft Cluster from the Windows command line interface:

1. From the Windows command prompt on *node_a* or *node_b*, enter the **nsrxchsv** command with the -**a** and -**c** options. For example:

   nsrxchsv -s *NetWorker_server* **-a** *virtual_server_name* **-c** *client*
   -l *Backup_level* **MSEXCH:IS**

   where -**a** and -**c** identify the Exchange virtual server and the NetWorker client index.

   For information on save set syntax, see "Save Set Notation" on page 104. (If you do not enter a valid save set parameter, the program returns an error message and closes.)

   Note: It is not necessary to use both the -**a** and -**c** options when the *virtual_server_name* and *client* are the same.

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2. When the backup is complete, use the Index tab in the NetWorker Administrator program to verify that the backup was indexed using *virtual_server_name.*

Using an Input File for an Operation in a Microsoft Cluster

To use the -**I** *Input_file* option to list the names of mailboxes to be backed up on a virtual server in a Microsoft cluster, the Client resource must specify a uniquely named input file for each virtual server in the cluster. The input files must be identically located in the *<NetWorker_install_path>\bin* directory of each physical node.

The input file can be specified in the NetWorker Administrator program or on the command line. For detailed instructions about how to create and specify an input file, see "Using an Input File to Specify Multiple Items for Backup" on page 70.

Example:

1. Create an input file named *vserver1.txt.* Place copies of the file in the *<NetWorker_install_path>\bin* directory on *node a* and in the *<NetWorker_install_path>\bin* directory on *node b.*

2. Create an input file named *vserver2.txt.* Place copies of the file in the *<NetWorker_install_path>\bin* directory on *node b* and in the *<NetWorker_install_path>\bin* directory on *node a.*

3. Edit the Client resource for *node_a* by entering:

    nsrxchsv.exe -I *vserver1.txt* **-a** *vserver1*

4. Edit the Client resource for *node_b* by entering:

    nsrxchsv.exe -I *vserver2.txt* **-a** *vserver2*

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Recovering an Exchange Server Database in a Cluster

The procedure for starting a recover operation within a Microsoft Cluster is similar to starting one on a stand-alone Exchange server host. The only difference is selecting the virtual server to make active in the NetWorker User for Exchange Server program.

This section explains how to select the virtual server to make active. After the virtual server is selected, you can perform regular backups and recoveries.

How to Start a Recovery in a Microsoft Cluster

To start a recovery in a Microsoft Cluster in the NetWorker User for Exchange Server program:

1. Start the NetWorker User for Exchange Server program. (When you open the program from within a Microsoft Cluster with multiple active virtual servers, the Exchange Servers dialog box opens before the main window opens.)

2. In the Exchange Servers dialog box, select a virtual server in the cluster from the list and click OK (see Figure 26 on page 83).

3. After the main window opens (see Figure 4 on page 31), perform the recovery as you normally would, beginning with Step 1.

To start a recovery in a Microsoft Cluster from a command prompt:

When recovering an Exchange Server database that resides on a virtual server, use the **nsrxchrc** command with the -**a** and/or -**c** options to identify the Exchange virtual server and the NetWorker client, and set the recover values required for the virtual server. For details on command line syntax, see "NetWorker Module Restore Commands" on page 108.

Note: The -**a** and -**c** options are *both* required when performing a directed recover.

To recover an Exchange virtual server:

1. Set the database properties to allow the database to be overwritten with the restored data. For information, see "Task 1: Set Exchange Database Properties to Allow a Recovery" on page 56.

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2. At a Windows command prompt, following command, replacing the values shown in the example with the values you require:

nsrxchrc -erq -c *client* **-s** *NetWorker_server_name*
-a *virtual_server_name* **MSEXCH:IS**

where -**a** and -**c** identify the Exchange virtual server and the NetWorker client index.

Note: It is not necessary to use both the -**a** and -**c** options when the *virtual_server_name* and *client* are the same.

Important: After the files are recovered, the Exchange Server may require a long time to replay the transaction logs, depending on the system configuration, Exchange Server parameters, and the number of logs recovered. You can monitor transaction log progress with the Windows Event Viewer. The advisory message indicates "The database engine is replaying log file exxnnnnn.log", where xx is the storage group number starting with 00, and nnnnn is a five-digit hex number.

Recovery Recommendations

Keep the following tips in mind when performing backup and recovery operations:

- To improve post-recovery processing of Exchange databases, minimize the number of transaction logs that are backed up. You can do this by increasing the frequency of full backups. For example, schedule a full backup whenever incremental or differential backups contain more than 50 log files.
- Test your recovery procedures on a regular basis.

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Chapter 7: Disaster Recovery

This chapter describes the procedures for recovering Exchange Server data in the event of a disaster. It includes the following sections:

Disaster Recovery Scenarios

For the purpose of this guide, a *disaster* is any situation in which normal day-to-day access to data on the Exchange Server host is disrupted due to damage to critical hardware, software, or data on the host.

Plan for the possibility that a disaster recovery may become necessary at some point. Proper disaster-recovery planning begins long before a failure occurs. An Active Directory recovery plan can include clustering, RAID, and backup and restore procedures, as well as ensure that you have an adequate number of domain controllers for each domain and geographical location. Knowing the minimum information that you need to back up in order to perform a successful restore will help determine the best recovery method for your situation.

A disaster may entail losing files, the operating system, or the entire computer. The extent of the loss determines the method for recovering to the predisaster state. In this chapter, it is assumed that all Exchange Server data on the computer is entirely lost.

This chapter addresses two scenarios for disaster recovery:

- Rebuilding the Exchange Server on the original host computer. In this case, you partially install and configure the operating system with only those files that enable the computer to communicate over the network. After partially installing and configuring the operating system, you perform a NetWorker filesystem recovery to recover the remaining operating system and configuration files.

- Building a new Exchange Server host on a new computer. This is necessary if the original Exchange Server host is being replaced. In this case, it is best to perform a complete installation and configuration of the operating system.

The disaster recovery procedure described in this chapter pertains to both scenarios, except where noted.

Recovery Requirements

To recover the Windows 2000 operating system to its predisaster state, you should have the following information about the state of the computer immediately prior to the disaster:

- Operating system version and all previously applied patches, hot fixes, service packs, and option packs
- Hardware components and configuration
- TCP/IP properties
- Other protocols installed (in addition to TCP/IP)
- IP address
- Default gateway
- Subnet mask
- DNS server
- Host properties:
    - Computer name (also called the hostname)
    - Full domain name
    - Administrator account name and password
    - Date / time properties
    - Virtual memory settings

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Performing the Recovery

Use the following roadmap to recover an Exchange Server after a disaster:

Task 1: Install the Operating System on the Exchange Server Host

1. If you're building a new Exchange Server host on a new computer, format the new drive.

2. Install the same Windows 2000 version, patches, hot fixes, service packs, and options that were in use immediately prior to the disaster. *Use the information gathered during the disaster planning phase to match the predisaster software configuration on the Exchange Server host exactly.* For more information, see "Recovery Requirements" on page 88. Install to the same disk, partition (drive letter, for example, C:), and path used previously. For installation information, refer to the operating system documentation.

3. *While installing the operating system on the Exchange Server host,* start the Active Directory Users and Computers program *on a domain controller.*

4. Right-click the Exchange Server hostname in the main window, then click Reset Account. *(Do not delete the account.)* Resetting the computer account allows the (rebuilt) computer to rejoin the domain using the same name. If this command is carried out when the computer is not reinstalled, the computer cannot authenticate in the domain.

5. *Install the computer into a workgroup, not a domain.* If the computer being recovered was previously a domain controller or a member of a domain, it will be restored to the correct domain when the recovery is complete.

6. Configure the computer properties to match the original configuration. This includes the local administrator account name and password, hostname (the computer name), and fully qualified domain name.

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For example, the fully qualified domain name for a computer named *mt_rainier* in a domain named *legato* would be:

mt_rainier.legato.com

Note: If the original hostname is not used, you cannot recover the data that was saved by the NetWorker software using the original hostname.

To ensure the correct domain name is specified:

   a. On the desktop, right-click My Computer and select Properties.

   b. In the System Properties dialog box, select the Network Identification tab.

   c. In the Network Identification dialog box, click the Properties button.

   d. In the Identification Changes dialog box, click the More button.

   e. In the DNS Suffix and NetBIOS Computer Name dialog box, ensure that the Primary DNS Suffix Of This Computer text box contains the domain name. If it does not, enter the domain name in this text box.

7. Configure the TCP/IP properties to match the original configuration, with the same fully qualified domain name, IP address, default gateway, subnet mask, and DNS server. To view the TCP/IP properties, enter the following at the Windows command prompt:

   ipconfig /all

   If the IP address for the new computer does not match the original address, the NetWorker software will assign a new host ID to the computer and you must reregister the NetWorker software. For more information, refer to the *Legato NetWorker Installation Guide*.

8. Ensure that the *hosts* file (*%SystemRoot%\system32\drivers\etc\hosts*) includes an entry with the IP address and computer name of the NetWorker server to be used in the recovery. The NetWorker software requires this entry when either of the following conditions holds:

   • DNS is not in use or no DNS server is available.

   • The NetWorker server host being used in the recover operation is a DNS server.

   In either case, the entry in the *hosts* file should be on one line in the following form:

   IP_ address fully_qualified_domain_name hostname

   as in the following example:

   123.56.890.474 charon.pluto.legato.com charon

9. Configure the Date/Time Properties as they were configured before.

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After the operating system is installed, the installation process should restart the computer automatically.

Task 2: Configure the Exchange Server Host for the Recovery

To configure the Exchange Server host for recovery:

1. Set the computer virtual memory settings to match the original configuration by selecting Control Panel>System>Advanced> Performance options>Virtual Memory>Change.

2. If the computer is to be a domain controller, edit *%SystemRoot%\system32\drivers\etc\hosts*, adding the following information about the NetWorker server host:

   • IP address
   • Fully qualified domain name
   • Any aliases that will be used for the recovery

   Save and close the *hosts* file.

3. Verify network connectivity to the NetWorker server host. To do this, run the following command from a Windows command prompt on the Exchange Server host:

   ping *NetWorker_server_name*

4. Install release 5.7 or later of the NetWorker client software in the directory where it was installed on the original Exchange Server host.

Task 3: Recover the Filesystem to the Exchange Server Host

![warning icon]

Important: Perform this task only if you are rebuilding the same Exchange Server host (the same physical computer) used previously.

To recover the filesystem to the Exchange Server host:

1. Open the NetWorker User client program.

2. Click the Recover button.

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3. In the Recover window, select, mark, and recover all of the following items at the same time:

   - All local physical disk drives
   - SYSTEM STATE
   - SYTEM FILES
   - SYSTEM DB

4. From the Options menu in the Recover window, select Recover Options.

5. In the Recover Options window, select Overwrite Existing File.

6. Click the Start button to start the recovery.

7. Reboot the computer when the recovery operation is finished. This will complete the filesystem recovery on the Exchange Server host to the predisaster state.

Task 4: Recover the Exchange Server Data

The filesystem recovery performed in Task 3 restored some of the Exchange Server application files. To complete the recovery:

1. Log on to the Exchange Server host with Windows 2000 domain administrator privileges and Exchange Full Administrator privileges (*not just Exchange Administrator privileges*). If you are logged on without the proper privileges, you will not be able to run the Exchange 2000 Server setup program in disaster recovery mode (in step 3 of this task).

2. Load the Exchange Server CD-ROM, or use Windows Explorer to navigate to a network location where the Exchange Server installation files are stored.

3. From a Windows command prompt, run the Exchange 2000 Server setup program in disaster recovery mode using the following command:

   `setup.exe /DisasterRecovery`

   (There is no space character in /DisasterRecovery.)

4. Use the update program to install all Exchange 2000 Server service packs and hot fixes that were installed on the Exchange host when it was backed up before the disaster. Run the program using the following command:

   `update.exe /DisasterRecovery`

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5. If you rebuilt an existing Exchange Server:

    From each storage group directory, delete all existing *e*.log* files (*except for e01.log, e02.log, e03.log, and e04.log*).

6. If you built a new Exchange Server from scratch:

    a. In Exchange Server System Manager, re-create the storage groups and databases that existed at the time of the backup to be recovered.
    b. For *each* database to be recovered:
        –   Right click the database name and select Properties.
        –   In the Database Properties dialog box, select "Allow database to be overwritten by a restore."
    c. Install the Legato NetWorker software.
    d. Install the NetWorker Module for Microsoft Exchange Server software.

7. Open the Recover window in the NetWorker User for Exchange Server program.

8. In the Recover window, specify the browse time and recover options to use. For information about setting browse time and recover options, see "Chapter 4: Restoring Data from a Backup" on page 55.

9. Mark the Exchange Server objects to recover, and click Start to begin the recover operation.

10. When the recover operation finishes, reboot the computer.

If you encounter any security errors after this procedure (for example, an "access denied" message or the System Attendant fails to start), run the Exchange 2000 reinstall program to repair incorrect settings on the server.

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Chapter 8: Troubleshooting

This chapter provides helpful troubleshooting information. It contains the following sections:

Backup or Restore Operation Does Not Start

The amount of time that NetWorker Module takes for a backup depends on various factors, including the amount of data to be transferred, network traffic, server load, and positioning of the recording medium (8mm tape, for example) on the media volume.

A backup or restore operation may not start promptly if:

- **Another operation is already in progress.** Before requesting a manual backup, ensure that a scheduled backup or restore is not already in progress.

- **No media volume is mounted.** A backup cannot run if there is no writable media volume mounted at the NetWorker server or *storage node* (backup device). Therefore, it is best to have a labeled media volume mounted in the storage device at all times. The volume should be labeled for the volume pool where the backup is to be directed. If there is no

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volume in the backup device when a scheduled backup is triggered, no messages will appear in the status window, and the backup will wait for operator intervention.

NetWorker Module Log Files

The activity of each NetWorker Module backup and restore operation, including error messages, is logged on the Exchange Server host. The backup log file is *nsrxchsv.log*. The recover log file is *nsrxchrc.log*. Both files are located in the *<NetWorker_install_path>\applogs* directory (for example, *c:\Program files\nsr\applogs*). The **nsrxchsv.exe** and **nsrxchrc.exe** commands append current activity to an existing log, or create a new log if none exists. You can delete these logs files if you do not need the information.

These log files should be provided for Legato technical support if a problem occurs.

Specifying the Level of Diagnostic Output

The diagnostic output level for a backup or restore operation specifies the amount of diagnostic output that appears in the Backup or Recover Status window of the NetWorker User for Exchange Server program. The diagnostic output level is saved in the following files:

- *<NetWorker_install_path>\applogs\nsrxchsv.log* file (for a backup operation)
- *<NetWorker_install_path>\applogs\nsrxchrc.log* file (for a restore operation).

The diagnostic output level can be set in the Backup Options or Recover Options dialog boxes of the NetWorker User for Exchange Server program. In general, you may only want to set the diagnostic output level above zero when you are troubleshooting or closely monitoring a backup or restore operation.

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Alternatively, you may set the diagnostic output level from the Windows command prompt using the -**D** option with the **nsrxchsv.exe** and **nsrxchrc.exe** commands. The syntax for this option is:

nsrxchsv.exe –D *n*

nsrxchrc.exe –D *n*

where *n* is a number between 0 (no output) and 9 (highest output).

Problems with Scheduled Mailbox Backups

Scheduled backups are initiated by the NetWorker Remote Exec service (**nsrexecd.exe**) on the client machine. The NetWorker Client installation configures this service to run under the local System account. This causes problems with scheduled mailbox backups because the local System account does not have the required privileges. For example, the scheduled backup may fail with the following error:

```
OpenMsgStore() = 0x8004011d: The Microsoft Exchange Server
computer is not available. Either there are network problems or
the Microsoft Exchange Server computer is down for maintenance.
(Microsoft Exchange Server Information Store)
```

To identify which account is being used for the scheduled backup, check the *nsrxchsv.log* file for the user name that invokes the backup. The following example was taken from a backup that was run from the local System account:

```
Computer Name: ITCHY User Name: SYSTEM
```

To correct this problem, edit the NetWorker Client resource for each Exchange server to specify the name of an account with sufficient privileges to back up Exchange mailboxes, as follows:

1. Open the NetWorker Administrator program.

2. Click Manage Clients.

3. In the Clients window, right-click the name of the client and select Edit.

4. In the Edit Client dialog box, select the Remote tab.

5. For the Remote User attribute, enter the correct user name, and enter the password in the Password attribute. (This is typically the name of the account used to install the Exchange Server.)

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6. Ensure the following requirements are met:

   a. The user must be logged on to the Exchange Server host as a member of the Exchange Administrators group

   b. The following permissions must be set for the user in the Exchange System Manager:

      – List contents

      – Read properties

      – Administer information store

      – View information store status

      – Receive as

      – Send as

Displaying Client File Index Contents

The **nsrinfo** NetWorker client program may be used to display the contents of the client file index. This can be useful to determine whether a particular Exchange object has ever been backed up, or to display the files that were backed up during a given backup sequence.

To display the contents of the client file index, enter the following command at the Windows command prompt:

```
nsrinfo –s server –n msexch client
```

where *server* is the name of the NetWorker server, and *client* is the name of the desired client (that is, the Exchange Server).

For details about using the **nsrinfo** command, see , or refer to the *Legato Command Reference Guide.*

Using the Windows 2000 Event Log

The Windows 2000 application event log can be a useful source of information regarding backup or restore activity. Both the Exchange Server and the NetWorker Module write information to the event log. This makes it possible to follow the sequence of events that occur during a backup or restore.

It is also possible to save the contents of the event log to a file (either *.evt* or *.txt*). In the event that a problem occurs, this event log file can be provided to Legato technical support.

Using Windows 2000 Support Tools

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The Windows 2000 CD provides support tools that can be helpful for diagnosing problems. Two of the more useful tools provided include:

- **nltest** — verifies that the locator is functioning. The following command lists information about the specified domain:

  nltest /dsgetdc:domain

- **netdiag** — performs network diagnostic tests to identify configuration or connection problems.

Refer to the *sreadme.doc* file in the *\Support\Tools* directory for a complete list of the tools provided. To install the tools, run *\Support\Tools\setup.exe* on the Windows 2000 CD. For more information, refer to the Active Directory Support Tools section of the Windows 2000 online help.

Active Directory Connection Problems

Active Directory connection problems are often caused by DNS configuration errors. Both the primary and secondary DNS server must have a valid entry for the host. This can be verified by using the following commands at the Windows command prompt:

nslookup *host_name primary_dns_server*

nslookup *host_name secondary_dns_server*

where *host_name* is the name of the Windows 2000 computer.

Windows 2000 Advanced Server allows Power Management to turn off the network interface card. Make sure that this option is not enabled.

In an MSCS cluster, the private network configuration is important to ensure correct operation. Refer to Microsoft Knowledge Base article Q258750, "Recommended Private 'Heartbeat' Configuration on a Cluster Server" for recommendations on configuring the cluster private network.

Cluster failover problems can occur if DNS is not configured correctly. The primary and secondary DNS server must have valid host entries for each physical node and each virtual server. Failover will not work if the virtual server host entries are not valid.

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Monitoring Backups and Recoveries

The Windows 2000 Performance Monitor is a tool for measuring the performance of one or more computers on a network. It allows you to view the behavior of objects such as processors, memory, cache, threads, and processes. The Performance Monitor provides charting, alerting, and reporting capabilities that reflect both current activity and ongoing logging. You can use the Performance Monitor to monitor NetWorker Module backup and restore operations. Because the NetWorker Module supports multiple Performance Monitor instances, it is possible to monitor parallel operations.

This section explains how to use Windows 2000 to monitor backup and recovery operations using the Performance Monitor.

Using the Performance Monitor

The Performance Monitor displays the NetWorker Module software in the Performance object submenu during a backup or recovery operation.

To use the Performance Monitor:

1. Open the Performance Monitor by selecting Start>Programs> Administrative Tools >Performance Monitor (see).

2. From the toolbar in the right-hand window pane, select the plus icon.

3. In the Add Counters dialog box, make sure that the correct server is selected in the Select Counters From computer attribute.

4. Open the NetWorker User for Exchange program and start a backup or recovery, then return to the Add Counters dialog box.

5. From the Performance Object list, select NetWorker Module for Exchange Server.

6. From the Select Counters From list, select any of the counters that are supported for the NetWorker Module and click Add.

   Supported counters include:

   Average Rate — Average throughput rate for all files in the current operation.

   File Bytes — Number of bytes processed by the current operation.

   File Count — Number of Exchange files or mailboxes processed by the current operation.

File Rate — Throughput rate for the current file.

Total Bytes — Total number of bytes processed during the current operation.

The Performance Monitor window shown in Figure 27 reflects the system activity as the backup or recovery operation proceeds.

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Figure 27. Performance Monitor Window

8
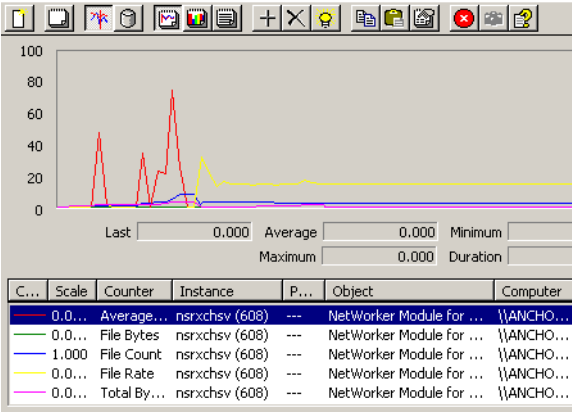
Appendix A: Save Set Notation and Command Syntax

This appendix provides command syntax, save set notation, and related information for this NetWorker Module. It contains the following sections:

Using Save Sets

You use save sets to specify Exchange 2000 Server objects for the following NetWorker Module operations:

- Backups or restores from the command line. For example, to back up a private mailbox named Ben Franklin and the database named Engineering in the storage group named Engineering Group, enter the following at the command prompt:

  nsrxchsv "MSEXCH:MB/Ben Franklin" "MSEXCH:IS/Engineering Group/Engineering"

- Scheduled backups. For scheduled backups, save sets are specified in the Save Set attribute (one save set per line) of the Client resource in the NetWorker Administrator program, as shown in Figure 28 on page 104.

**Figure 28. Private Mailbox Save Sets in Edit Client Dialog Box
in NetWorker Administrator Program**

A
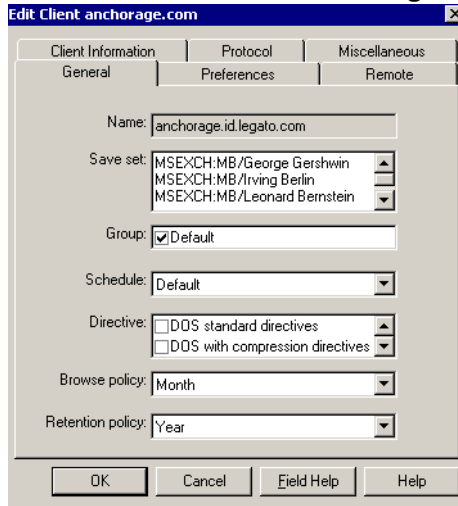
Save Set Notation

Table 7 shows notation for the save sets that can be specified for NetWorker
Module backup and restore operations.

Note: Items containing white space must be enclosed in double quotations
when entered on a command line. Double quotes are not required when
entering save sets in the NetWorker Administrator program, or in an input
file.

Table 7. Save Set Notation (Part 1 of 2)

Save Set	Description
MSEXCH:	All Extensible Storage Engine (ESE) enabled applications on the server. This includes IS, SRS, and KMS; it does *not* include private mailboxes and public folders.
MSEXCH:IS	All storage groups
MSEXCH:IS/*storage_group*	All databases in a storage group
MSEXCH:IS/*storage_group/ database*	A specific database in a storage group

Table 7. Save Set Notation (Part 2 of 2)

Save Set	Description
MSEXCH:KMS	All KMS storage groups
MSEXCH:KMS/*storage_group*	A specific KMS storage group
MSEXCH:KMS/*storage_group*/*database*	A specific KMS database in a storage group
MSEXCH:SRS	All SRS storage groups
MSEXCH:SRS/*storage_group*	A specific SRS storage group
MSEXCH:SRS/*storage_group*/*database*	A specific SRS database in a storage group
MSEXCH:MB	All private mailboxes
MSEXCH:MB/*mailbox*	A specific private mailbox
MSEXCH:MB/*mailbox/folder/*	A specific folder in a private mailbox
MSEXCH:MB/*mailbox/folder/subject_line*	An individual item in a specific folder in a private mailbox
MSEXCH:PF	All public folders
MSEXCH:PF/*folder_tree*/*folder/*	A specific public folder
MSEXCH:PF/*folder_tree/folder/subject_line*	An individual item in a specific public folder

![warning icon]

Important: Use only the save set specifications in Table 7 on page 104 for backing up Exchange Server objects. The NetWorker save set All is used only for backing up an entire *filesystem—save set All is not a valid NetWorker Module save set and cannot be used for backing up Exchange Server objects.* This is because the NetWorker server software does not interact with the Exchange Server application programming interface (API) for backup and restore operations; that is the purpose of this NetWorker Module.

Specifying Multiple Save Sets Using an Input File

To specify multiple save sets, such as several individual user mailboxes, you can use the -**I** command. See "Using an Input File to Specify Multiple Items for Backup" on page 70.

A

NetWorker Module Backup Commands

For scheduled backups of Exchange Server data, specify the **nsrxchsv** backup command and command options in the Client resource of the NetWorker Administrator program. The NetWorker Administrator software supports the **nsrxchsv** command line options.

For manual operations from the command line on the NetWorker client host, enter **nsrxchsv**, the backup command, or **nsrxchrc,** the restore command, with appropriate command options.

Backup Command Syntax

Table 8 lists the command syntax for the **nsrxchsv** backup command. Table 9 lists the function of each command option.

Table 8. Backup Command Syntax

Function	Command Syntax
Backup	**nsrxchsv** [**-a** *virtual_server*] [**-b** *pool*][−**c** *client_name*] [**-C**] [**-D** *debug_level*] [-**e** *date*][1] [**-g** *group*] [-**I** *input_filename*] [-**l** *backup_level*] [**-m** *masquerade*] [**-N** *name*] [**-q**] [**-s** *NetWorker_server_name*] [**-v**][**-w** *browse_date*] [**-p** *temp_dir*] [**-y** *retention_date*] *save_set1* [*save_set2 save_set3 ...*][1]

[1] See Table 7 on page 104 for information about notation for specifying save sets.

Table 9. Backup Command Options (Part 1 of 3)

Command Option	Function
-**a** *virtual_server_name*	Specify MSCS virtual server name
-**b** *pool*	Specify NetWorker volume pool name
-**c** *client_name*	Specify NetWorker client name (name of client host whose data is to be recovered)

Table 9. Backup Command Options (Part 2 of 3)

Command Option	Function
-**D** *diagnostic_level*	Specify level of diagnostic output, which can be used for troubleshooting. Valid values are in the range 0 through 9; 0 is the default (when -**D** is not specified, there is no diagnostic output).
-**e** *date*	Specify retention date. Refer to the *NetWorker Administrator's Guide* for details about using this option and any restrictions that apply.
	Specify expiration date. Refer to the *NetWorker Administrator's Guide* for details about using this option and the restrictions that apply to using it with either the -**w** or -**y** option.
-**g** *group*	Specify group name
-**I** *input_file*	Specify text file that lists Exchange objects and/or save sets to back up. Additional Exchange objects and save sets may also be specified on the same command line, for example: **nsrxchsv -I** *my_input_file* **MSEXCH:MB**/*ceo_mailbx_name* For complete information about using input text files, see "Using an Input File to Specify Multiple Items for Backup" on page 70.
-**l [full	incr	diff	copy]**	Specify backup level: use the -**l** option with the level parameter you want, such as **incr**, in the command: **nsrxchsv -s** *NW_server_name* **-l incr**
-**m** *masquerade*	Specify masquerade
–N	Specify save set name
–p *temp_dir*	Specify path to directory that stores temporary files
–q	Save in quiet mode
–s *NW_server_name*	Specify the NetWorker server that is to back up the Exchange data

Table 9. Backup Command Options (Part 3 of 3)

Command Option	Function
-**w** *browse_date*	Specify browse date (not available with NetWorker server release 5.7). With NetWorker server release 6.1, this option may be used with the **-y** option but not with the **-e** option.
-y *retention_date*	Specify retention date (NetWorker server release 6.1 only). With NetWorker server release 6.1, this option may be used with the **-w** option but not with the **-e** option.

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NetWorker Module Restore Commands

Table 10 lists the command syntax for the **nsrxchrc** restore command. Table 11 lists the restore command options.

Table 10. Recover Command Syntax

Function	Command Syntax
Recover	**nsrxchrc** [-*erqv*][**-a** *virtual_server_name*] [**-c** *client_name*] [-**D** *Debug_level*] [-**I** *input_file*] [**-p** *temp_dir*] [**-s** *NetWorker_server_name*] [-**t** *browse_time*] *save_set1* [*save_set2 save_set3 ...*][1]
[1] See Table 7 on page 104 for information about notation for specifying save sets.	

Table 11. Recover Command Options (Part 1 of 2)

Option	Function
-**a** *virtual_server_name*	Specify MSCS virtual server name
-**c** *client_name*	Specify client name for directed recover
-**D** *diagnostic_level*	Specify level of diagnostic output, which can be used for troubleshooting. Valid values are in the range 0 through 9; 0 is the default (when -**D** is not specified, there is no diagnostic output).
-**e**	Replay only recovered logs

Table 11. Recover Command Options (Part 2 of 2)

Option	Function
-**I** *input_file*	Specify Input filename
-**p** *temp_dir*	Specify path to directory that stores temporary files
-**q**	Quiet mode
-**r**	Remount database
-**s** *NetWorker_server_name*	Specify NetWorker server
-**t** *browse_time*	Specify browse time

A

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Appendix B: Messages

This appendix lists NetWorker Module error and information messages you might encounter. Suggestions are provided for resolving problems described in the messages.

This appendix contains the following sections:

- "Microsoft Exchange Server Messages"
- "NetWorker Administrator Messages" on page 112
- "NetWorker Module Messages" on page 112

Microsoft Exchange Server Messages

When the NetWorker Module encounters a Microsoft Exchange Server error or condition requiring a warning during a backup or recover operation, it writes a description of the error to the following files:

- *nsrschsv.log*
- *nsrxchrc.log*
- Event log

The NetWorker Module cannot correct errors caused by the Exchange Server. For information on resolving Exchange Server error messages, refer to the Microsoft Exchange Server documentation, the Microsoft Knowledge Base on the Microsoft web site, or Microsoft technical support.

NetWorker Administrator Messages

NetWorker error messages appear in the NetWorker Administrator window. The display lists the messages encountered during the past 24 hours.

For complete information about NetWorker error messages, refer to the *Legato NetWorker Error Message Guide.*

NetWorker Module Messages

The messages in this section are specific to the NetWorker Module software.

Table 12. NetWorker Module Error Messages (Part 1 of 7)

Message	Description
`ADsOpenObject error error_code for object_name`	An error occurred when the program attempted to bind to the Active Directory object. Check communication problems with Active Directory.
`A full backup will be performed.`	A backup level other than full was specified but cannot be performed. Verify that circular logging is not enabled. Also verify that a full backup is performed for all databases in a storage group before attempting an incremental or differential backup.
`Backup_item failed for item_url`	An error occurred while backing up the specified item.
`Backup level converted from n to 1.`	The backup program converts any differential level between 2 and 9 into a level 1.
`Backup_pf failed for folder`	An error occurred while performing a backup of the specified folder.
`Backup_pf_tree failed for pf_tree`	An error occurred while performing a backup of the specified folder tree.
`Bad backup level`	An invalid backup level was specified with the **–l** option.

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Table 12. NetWorker Module Error Messages (Part 2 of 7)

Message	Description
Can't get name or virtual directory for PF tree *pf_tree*	The program cannot determine properties of the specified folder. Check communication problems with Active Directory.
Check spelling of PF tree name: *pf_tree*	The folder tree name may be spelled incorrectly on the command line.
Checking for marked PF tree items	The backup program is verifying that all marked items exist.
Cluster backup requires use of -c or -a (or both).	In the Microsoft cluster environment you must use the –**a** and/or –**c** options to identify the virtual server name and client index.
Cluster recover requires use of -c or -a (or both).	In the Microsoft cluster environment you must use the –**a** and/or –**c** options to identify the virtual server name and client index.
Connect_pub_folders failed for *url*	The recover program was unable to connect to the public folder tree.
Could not determine overwrite status for *sg_name* / *db_name*	The recover program could not determine if the specified database has been set to be overwritten by a restore.
Create_folder failed for *folder*	The recover program was unable to create a folder.
Created folder *folder_url*	The recover program created the specified folder.
Database *sg_name* / *db_name* cannot be overwritten by restore.	The specified database has not been set to be overwritten by a restore. A database cannot be restored unless this property is set.
Error binding to rootDSE: *error_code*	The program was unable to bind to the directory server. Check communication problems with Active Directory.
Error creating folder *folder_url* *error_text*	The recover program was unable to create the specified folder.

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Table 12. NetWorker Module Error Messages (Part 3 of 7)

Message	Description
Error creating PerfMon update *thread. error_text*	The backup or recover program was unable to start the Performance Monitor update thread.
Error: *db_name* database not mounted	An attempt was made to back up a database that is not online. Mount the database and repeat the backup.
Error (*error_code*) getting database CN for *database*	The program was unable to get the database CN property. Check communication problems with Active Directory.
Error (*error_code*) getting parent LDAP path for *database*	The program was unable to get an LDAP path from Active Directory. Check communication problems with Active Directory.
Error (*error_code*) getting storage group CN for *storage_group*	The program was unable to get the storage group CN property. Check communication problems with Active Directory.
Error getting defaultNamingContext: *error_code*	The program was unable to get the *defaultNamingContext* from Active Directory. Check communication problems with Active Directory.
Error getting homeMDB for *mailbox*	The program was unable to identify which database contains the mailbox. Check communication problems with Active Directory.
Error loading ESE dll. Status: *error_code*	An error occurred when NetWorker Module attempted to load the Exchange backup *.dll* file.
Error on *get_server_dn*: *error_code*, *error_text*	The NetWorker Module was unable to obtain the server distinguished name from Active Directory. This may be caused by a network connection problem with the domain controller.
Error opening file: *file_name*	The backup or recover program was unable to open the file specified with the **–I** option. Verify that the file name is spelled correctly and the file exists.
Error opening stream for: *item*	The program was unable to open the specified item.

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Table 12. NetWorker Module Error Messages (Part 4 of 7)

Message	Description
Error parsing parameter: *param_string*	The format of the specified command line parameter is incorrect.
Exchange Server *server_name* was not found.	The NetWorker Module was unable to locate the specified Exchange server. Verify that the server name is spelled correctly.
ExOLEDB connection failed for *pf_tree*	The backup or recover program was unable to establish a connection to the specified public folder tree.
Folder *folder_url* does not exist. Attempting to recreate.	The public folder does not exist. The recover program is re-creating the folder.
Folder *name* is not replicated locally	The specified folder is not replicated to the local server.
Found all marked PF tree items.	All public folder items marked for backup exist.
Get_extra_properties failed to get *property* for class *object_class*	The backup program was unable to get the specified property for the object.
Internal system error, please see *nsr\applogs\xbsa.messages* on the client system for reason.	An error occurred between the backup or recover program and the NetWorker server (for example, the NetWorker server does not have the required enablers).
Invalid database: *sg_name* / *db_name*	An invalid database name was specified. Make sure the database name is spelled correctly and exists on the Exchange server.
Invalid storage group: *sg_name*	An invalid storage group name was specified. Make sure the storage group name is spelled correctly and exists on the Exchange server.
Invalid target storage group: *sg_name*	The specified storage group does not exist on the server. Make sure the storage group name is spelled correctly.
Invalid time specified: *time_string*	The format of the specified browse time is invalid.

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Table 12. NetWorker Module Error Messages (Part 5 of 7)

Message	Description
`Item not found: item_name`	The specified item was marked for backup but was not found in the public folder.
`Log file gap detected. Max recovered log: exxnnnnn.log`	A gap was detected between the highest sequence number of the recovered logs and the existing log files. The **–e** option will be used to specify the replay of only recovered logs.
`Mailbox_name <service mailbox – no IPM data>`	An attempt was made to back up a service mailbox that does not contain IPM data. Only user mailboxes can be backed up. (IPM is a Microsoft abbreviation for inter-personal message, or e-mail message.)
`MSEXCH:DS saveset is obsolete. Continuing...`	**MSEXCH:DS** was specified as a target for the backup or recover program. **MSEXCH:DS** is obsolete for Exchange 2000. The backup or recover program will continue processing other valid targets.
`No authority for backup operation`	The account used to perform a backup is not a member of the Backup Operators group.
`No authority for recover operation`	The account used to perform a recover is not a member of the Backup Operators group.
`No backup found, cannot recover without backup`	A recover operation cannot be performed on an object that has not been backed up.
`No backup target.`	An Exchange object name was not specified for the backup program.
`No databases are mounted.`	The storage group specified for backup does not have any databases mounted. Mount the databases and repeat the backup.
`No IPM data`	A mailbox contains no messages. (IPM is a Microsoft abbreviation for inter-personal message, or e-mail message.)
`No recovery target.`	An Exchange object name was not specified for the recover program.

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Table 12. NetWorker Module Error Messages (Part 6 of 7)

Message	Description
`No Storage Group match for sg_name`	An invalid storage group name was specified for the backup program. Make sure the name is spelled correctly and the storage group exists on the server.
	An attempt was made to recover a mailbox that was never backed up.
`Not enough storage is available to process this command.`	The NetWorker Module was unable to allocate memory. It may be necessary to reduce the number of programs that are currently running.
`No virtual directory found for PF tree: pf_tree`	The program was unable to determine the name of the folder tree virtual directory. Check communication problems with Active Directory.
`object_name backup not found. Continuing...`	The recover program could not find a backup of the specified object. This could happen if all items in a folder were not backed up. The recover continues.
`Open Cluster error: msg_string`	An error occurred when the NetWorker Module attempted to open a handle to the cluster.
`Out of disk space backing up mailbox`	The disk containing *nsr**tmp* does not have enough free space to back up a mailbox.
	Use the temporary folder location (-p) to specify a directory with more available space.
`Previous mailbox_item backup not found`	The recover program could not find a backup of the specified object. This could happen if all items in a folder were not backed up.
`Previous object_name backup not found`	An attempt was made to recover a storage group or database that was never backed up.
`Record open failed for record_url. Error: error_code`	The recover program was unable to re-create the specified item.
`Recovering folder_path...`	The recover program is recovering items for the specified folder.

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Table 12. NetWorker Module Error Messages (Part 7 of 7)

Message	Description
`Restore must be performed on virtual server active node.`	A restore operation was attempted from the node that is not hosting the virtual server. Perform the restore on the same node that is currently hosting the virtual server.
`Some marked PF tree items not found.`	Some public folder items marked for backup were not found.
`Starting backup of folder tree:` *pf_tree*	A backup is starting for the specified folder tree.
`Unable to determine active node for virtual server` *server_name*: `error_text`	Could not determine which physical node is currently hosting the virtual server.
`Unable to get DN for storage group` *sg_name*	The NetWorker Module was unable to obtain the storage group distinguished name from Active Directory. This may be caused by a network connection problem with the domain controller.
`Unable to get log file path for storage group` *sg_name*	The NetWorker Module was unable to determine the path to the Exchange log files.
`Unable to locate esebcli2.dll Status: error_code`	The NetWorker Module was unable to locate the Exchange backup *API DLL*. This could occur if the Exchange System Management components are not installed.
`Unable to locate folder tree virtual directory for` *pf_tree*	The program was unable to identify virtual directory for the folder tree. Check communication problems with Active Directory.
`Unknown host` *host_name*	The virtual server name specified with the **–a** option does not exist. Check the spelling of the server name.

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Glossary

This glossary contains terms and definitions found in this manual. Most of the terms are specific to NetWorker products.

Administrator group	Members of this Windows NT user group usually have all the rights and abilities of users in other groups, plus the ability to create and manage all the users and groups in the domain. Many NetWorker functions can only be accomplished by members of the Administrator group.
API	Acronym for Application Programming Interface, an agreed-upon set of computer library routines used to accomplish a task.
autochanger	Mechanism that uses a robotic arm to move media among various components located in a device including slots, media drives, media access ports, and transports. Autochangers automate media loading and mounting functions during backups and recovers.
backup group	A NetWorker client or group of clients configured to start backing up files to the NetWorker server at a designated time of day.
Backup Operators group	A Windows NT group whose members have the capability to log onto a domain from a workstation or a server, back it up, and restore the data. Backup Operators also can shut down servers or workstations.

backup volume	Backup media, such as magnetic tape or optical disk. *See also* "media volume."
bootstrap	Information that includes the server index, media index, and configuration files needed for recovering NetWorker after a disk crash.
browse policy	Policy that determines how long entries for your files remain in the online file index.
client file index	Database of information maintained by NetWorker which tracks every file or filesystem backed up. *See also* "online client indexes."
clone	Process by which NetWorker makes an exact copy of saved data (save sets). NetWorker can clone individual save sets or the entire contents of a backup volume.
clone volume	Duplicated volume. NetWorker can track four types of volumes: backup, archive, backup clone, and archive clone. Save sets of different types cannot be intermixed on one volume.
command line	Shell prompt, where you enter commands (for example, a DOS or C shell). NetWorker has several command line utilities that perform the same function as many of the commands available through the graphical interface. *See also* "shell prompt."
daemon	Program that is not invoked explicitly, but lies dormant waiting for a specified condition(s) to occur. *See also* "service."
device	Backup device (tape drive, optical drive, or autochanger) connected to the NetWorker server; used for backing up and recovering client files.
enabler codes	Special codes provided by Legato that allow you to run your NetWorker software product. Look for the 16-character enabler code on the certificate included with your software.

Glossary

Exchange Server object	Any Exchange Server data that can be backed up and recovered as a single entity. This includes the IS, any storage group, database, mailbox, private folder, and individual item in a mailbox or public folder.
filesystem	1. A File tree that is on a specific disk partition or other mount point. 2. The entire set of all files on a computer. 3. A method of storing files.
heterogeneous	Heterogeneous networks are networks with systems of different platforms that interact meaningfully across the network.
information store	The repository on a Microsoft Exchange Server host that includes the private information store and public information store. The public store holds all public folder hierarchies and public folder replicas configured for that store. The private store holds all private folders and associated information, such as individual mailbox messages and attachments. In addition, the client can have a personal folder file that consists of folders stored on the client host computer.

The information store:

- Delivers messages addressed to users on the same home server as the sender.
- Forwards messages addressed to recipients on other servers and systems to the message transfer agent (MTA) for delivery.
- Provides rules and views.

Maintains storage and age limits.

information store databases	The public database and private database that hold the information in the public and private information stores.
interoperability	Ability of software and hardware on multiple computers from multiple vendors to communicate meaningfully.
IS	See *information store*.

Key Management Server (KMS)	A Microsoft Exchange 2000 Server component that may be installed on a designated server in an administrative group. KMS provides centralized administration and archival of private keys, and maintains every user's private encryption key in an encrypted database. The keys are used for encrypting e-mail messages and signing messages with digital signatures. There can be one Key Management server per administrative group.
log files	See transaction log files.
mailbox store	The part of Information Store that maintains information in user mailboxes. A mailbox store consists of a rich-text .edb file, plus a streaming native Internet content .stm file.
MAPI (Microsoft Messaging API)	Set for messaging applications that is widely supported by messaging vendors, primarily attributable to Microsoft.
media index	Database of information maintained by NetWorker which tracks every backup volume.
media manager	The NetWorker component that tracks save sets to backup volumes. The **nsrmmdbd** service is responsible for making entries in the NetWorker online media index.
media volume	A unit, such as a magnetic tape or optical disk, on which backed-up data is stored. *See also* "backup volume."
Microsoft Cluster Server (MSCS)	Built-in feature of Windows NT Server, Enterprise Edition. It is software that supports the connection of two servers into a "cluster" for higher availability and easier manageability of data and applications.
Microsoft Exchange Client	Program that a client uses to read, write, and manipulate the post office and folders.
mount	To make a database available for use or to place a removable tape or disc into a drive.

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Multiple Information Stores and Storage Groups	Exchange supports multiple databases contained within a storage group. A storage group includes one to five databases and one set of transaction log files for all databases in the storage group. You can create a maximum of four storage groups on one server. If each storage group contains the maximum of five databases, you can create a maximum of 20 databases on one server. You can use multiple databases to increase the number of simultaneous users on a server and lessen the risk of a damaged database. Because the size of each database is decreased, data recovery is faster and does not require the server to be offline.
multiplex	Method of transmitting multiple streams of data simultaneously through the same channel.
NetWorker Administrator program	The graphical user interface (GUI) for the NetWorker server software.
NetWorker client	A computer that can access the backup and recover services from a NetWorker server. Clients may be workstations, PCs, or fileservers.
NetWorker server	Computer on a network running the NetWorker software, containing the online indexes, and providing backup and recover services to the clients on the same network.
NetWorker User for Exchange Server	The graphical user interface for the NetWorker Module for Microsoft Exchange Server software. From this interface you can initiate unscheduled backups as well as recoveries.
nsrhost	Logical *hostname* of the computer that is the NetWorker server.
object	See "Exchange Server object."
online client indexes	Databases on a NetWorker server that contain information pertaining to client backups and backup volumes. *See also* "client file index."

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OST (offline message store)	Message store (typically on a user's hard disk) that stores messages locally and allows for replication of information between the client and the server.
PAB (personal address book)	User's list of recipients. The file physically resides on the user's workstation.
pathname	Instructions for accessing a file. An *absolute pathname* tells you how to find a file beginning at the root directory and working down the directory tree. A *relative pathname* tells you how to find the file starting where you are now.
PDC (primary domain controller)	Server in a Windows NT Server domain where changes are made to user accounts.
permission	Rights given to a user to perform specific actions on an object. **Read**-**only** is an example: It allows a user to read, but *not* alter a file.
properties	Attributes of an object, such as the display name of a recipient.
pst file	The filename extension of a file created by Exchange Server to store individual mailbox items (such as e-mail messages). The *pst* files typically reside on the workstation of the user who owns the mailbox.
public folder store	The part of the Exchange Information Store that maintains information in public folders. A public folder store consists of a rich-text *.edb* file, plus a streaming native Internet content *.stm* file.
recover	The NetWorker command used to browse the server index and recover files from a backup volume to a client's disk.
recycle	A volume whose data has passed both its browse and retention policies and is available for relabeling and reuse.

Glossary

registry | Database of configuration information central to Windows NT operations. The overall effect centralizes all Windows NT settings and provides control over system, security, and user account settings.

resource | Resource represents a component of the NetWorker software that describes the NetWorker server and its clients. Devices, schedules, clients, groups, and pools are all examples of NetWorker resources. Each resource contains a list of attributes, defining the parameters to use for the configured NetWorker resource. Use the NetWorker administration program to configure NetWorker resources and their attributes.

retention policy | Policy that determines how long to retain entries in the media index for recovery.

save | The NetWorker command that backs up client files to backup volumes and makes data entries in the online index.

save set | Set of files or a filesystem that NetWorker has backed up onto backup media during a backup session. Save sets are assigned a "save set id," an internal number which identifies the backup session to NetWorker for subsequent restoration to primary disk.

save set ID | Internal identification number assigned to a save set by NetWorker.

scanner | The NetWorker program used to read a backup volume when the online indexes are no longer available.

scheduled backup | The type of backup that is set to start automatically at a specified time. You use the NetWorker Administrator program to set up and configure scheduled backups. A scheduled backup is initiated by the NetWorker server software.

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service	Program that is *not* invoked explicitly, but lies dormant waiting for a specified condition(s) to occur. *See also* "daemon."
shell prompt	Cue for input in a shell window where you enter a command. *See also* "command line."
Site Replication Service (SRS)	A directory service (similar to the directory used in Exchange Server 5.5) implemented in Exchange 2000 to allow the integration with downstream Exchange 5.x sites using both RPC and mail-based replication. Site Replication Service works in conjunction with Active Directory Connector to provide replication services from Active Directory to the Exchange 5.x Directory Service.
stand-alone device	Backup device that contains a single drive for backing up data. Stand-alone devices cannot store or automatically load backup volumes.
storage group	A collection of mailbox stores and public folder stores that share a set of transaction log files. Exchange manages each storage group with a separate server process.
storage manager	Application that manages the storage devices and media used for backup and restore requests. NetWorker Module is a storage manager that connects NetWorker services to Microsoft Exchange Server to provide storage management for databases and transaction logs.
transaction log files	The log files for a storage group, which contain the database transactions for all mailbox stores or public folder stores in the group.
truncation	*Truncation* is an Exchange Server operation that deletes an Exchange transaction log file.
volume	Backup media, such as magnetic tape or optical disk. *See also* "media volume."

volume ID — Internal identification assigned to a backup volume by NetWorker. The volume ID is entered in the NetWorker server's media database for volume policy management.

volume name — Name you assign to a backup volume when it is labeled internally by NetWorker.

volume pool — Feature that allows you to sort backup data to selected volumes. A volume pool contains a collection of backup volumes to which specific data has been backed up.

Windows NT Server domain — Collection of Windows NT servers administered as a single unit.

XBSA — Acronym for X/Open Backup Services Application Programming Interface, which connects NetWorker functionality to NetWorker Module. For more information about X/Open, visit the X/Open web site at *www.xopen.org*.

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