Module 8: Performing NetWorker Recoveries

Upon completion of this module, you should be able to:
- Describe and perform browsable, save set, directed recoveries
- Describe how to perform filesystem Snapshot Recoveries

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This module focuses on how to perform recoveries of client data in NetWorker. We will look at all the types of client recoveries that are supported by NetWorker, including: Browsable, save set, directed and filesystem snapshot recoveries .

Module 3: Performing NetWorker Recoveries
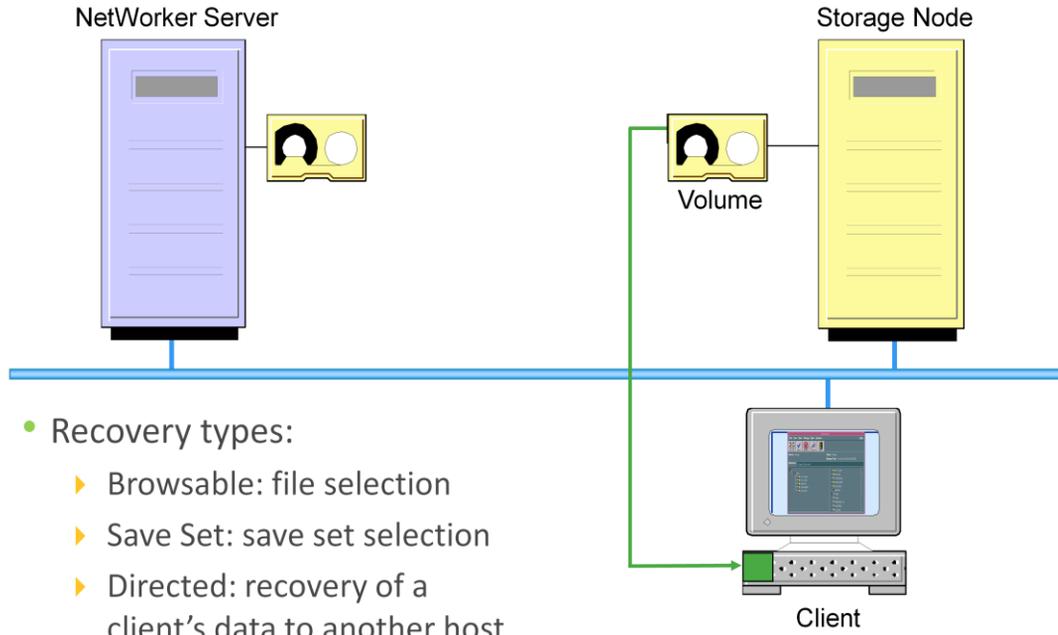
Lesson 1: NetWorker Recovery Overview

During this lesson the following topics are covered:
- Describe the various ways of restoring client data
- Explain the roles of source, destination and administering clients in a recovery
- NetWorker recoveries
  - Describe and perform Browsable recoveries
  - Describe and perform Save Set recoveries
  - Describe and perform Directed recoveries

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This lesson covers an introduction to the three types of NetWorker recoveries, how to use the various NetWorker recovery utilities, as well as volume and storage node selection for recoveries.

NetWorker Recoveries

NetWorker Server

Storage Node

Volume

- Recovery types:
  - Browsable: file selection
  - Save Set: save set selection
  - Directed: recovery of a client's data to another host

Client

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A recovery restores data to its original state at a specific point in time. NetWorker is flexible in how recoveries are performed while at the same time maintaining necessary security to avoid recovery of data by non-authorized persons. NetWorker supports restoring one or more individual files, directories or file systems from NetWorker client backups. The three types of recoveries that we discuss in this module are: Browsable, Save Set, and Directed.

Recoveries can be categorized by the method used to recover the data. In a **Browsable Recovery**, the administrator or user browses and selects the set of files and directories to be recovered using interfaces that require information from the client file index.

In a **Save Set Recovery**, data is recovered by selecting a save set.

A **Directed Recovery** is any recovery in which data that was backed up from one computer is recovered to another.

Browsable Recoveries are the most flexible and easy to use method of recovering data. Consider using a browsable recovery when you want to recover only the files that you mark for recovery and no other files. Also, when you don't know the exact name of a file, the file can be located by browsing through the file system. When recovering an entire directory or file system, a point-in-time recovery is automatically performed. This restores the directory or file system to the way it looked as of the most recent backup. Because of the point-in-time feature, browsable recoveries are useful when the most recent backup is not a full backup and files have been deleted or renamed since the full backup. The recovery will not restore a file that has been deleted and will recover a renamed file only with its current name.

A **Save Set Recovery** can be performed at any time for any save set. By default, an entire save set is recovered. However, you can recover individual files and directories. A save set recovery is commonly done:

- When the last backup was a full backup and you want to recover the entire save set.

- When a large number of files are being recovered from a single save set. If a save set has millions of files, the process of marking each file for recovery during a browsable recovery can take a considerable amount of time. A save set recovery does not require marking each file and thus can lead to faster file recovery.

- When the save set being recovered is no longer browsable, it can only be recovered using save set recovery.

Client Roles in a Recovery
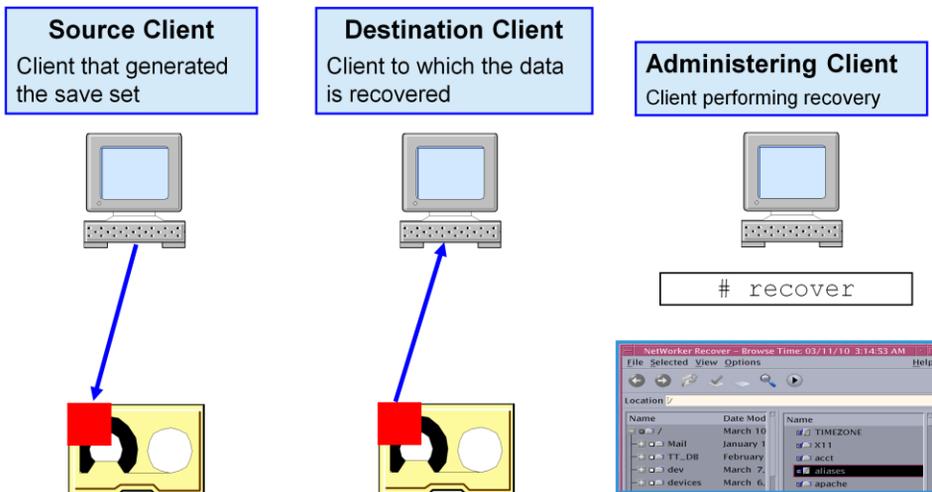
Source Client
Client that generated the save set

Destination Client
Client to which the data is recovered

Administering Client
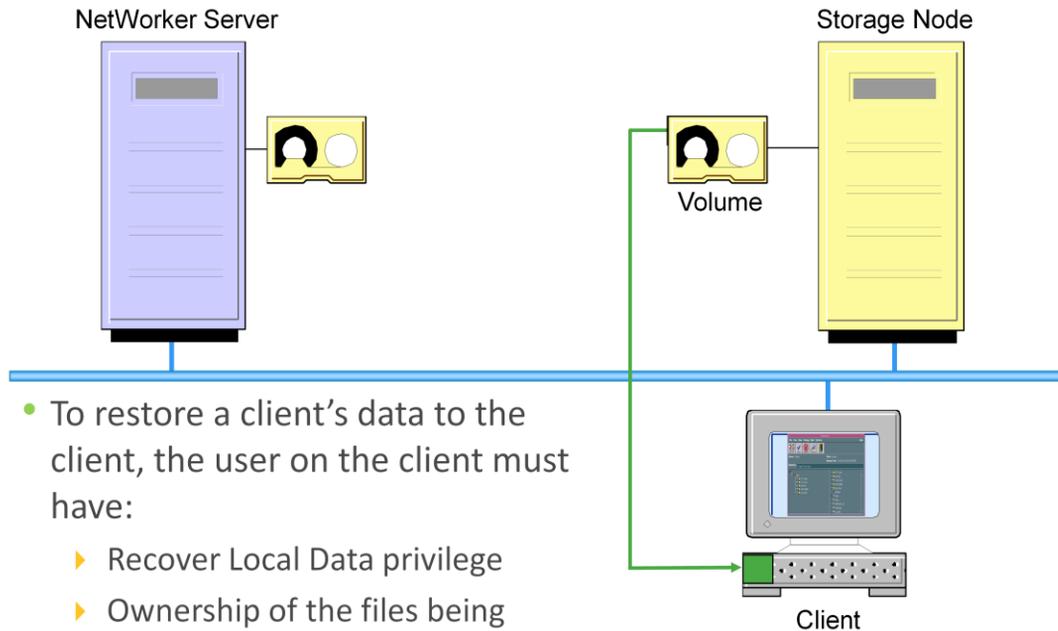Client performing recovery

`# recover`

In any recovery, there are three client roles - administering client, source client, and destination client - that are performed by one or more NetWorker hosts.

Following is a description of the three client roles in a recovery:

- **Source client:** The NetWorker client from which the data being recovered was originally backed up.
- **Destination client:** The NetWorker client to which the data is being recovered.
- **Administering client:** The NetWorker client (local host) performing the recovery.

The most common recovery is where a single NetWorker client performs all three roles. For example, you might be logged in on hostA (administering client), recovering data previously backed up from hostA (source client), to its original location on hostA (destination client). Another example of a common recovery is initiating a recovery of a remote client's files from a central administering client. For example, the administrator may perform a recovery from HostB (administering client) of a file backed up from HostA (source client) to HostA (destination client).

Client and User Privileges for Recoveries

NetWorker Server

Storage Node

Volume

- To restore a client's data to the client, the user on the client must have:
  - ‣ Recover Local Data privilege
  - ‣ Ownership of the files being recovered

Client

When a single client performs all three client roles in a recovery, there are no security issues; a client's data can always be recovered back to the client. The user on the client must belong to a NetWorker user group that has the **Recover Local Data** privilege (members of the NetWorker Administrators and Users user groups automatically have this privilege.) The user also must have operating system ownership of the files being recovered and have write privileges to the directories where the data is recovered.

NetWorker Recovery Utilities

Windows: NetWorker User

All platforms: recover

All platforms: Recovery Wizard

Recoveries in NetWorker are manual processes initiated from a NetWorker client. NetWorker does not schedule recoveries or perform them automatically.

From Microsoft Windows clients, recoveries can be performed using the NetWorker User graphical user interface. Select **NetWorker User** from **Windows > Start** or from the **Start** menu in NetWorker Administration.

Recoveries may also be performed from the command line by using the command, `recover,` on any NetWorker client.

Additionally with NetWorker 8.1 and higher the Recovery Wizard has been introduced. The recovery Wizard allows you to perform most NetWorker recoveries through the NetWorker Management Console without having to log into the client or any other application.

Performing Recoveries Using NetWorker User
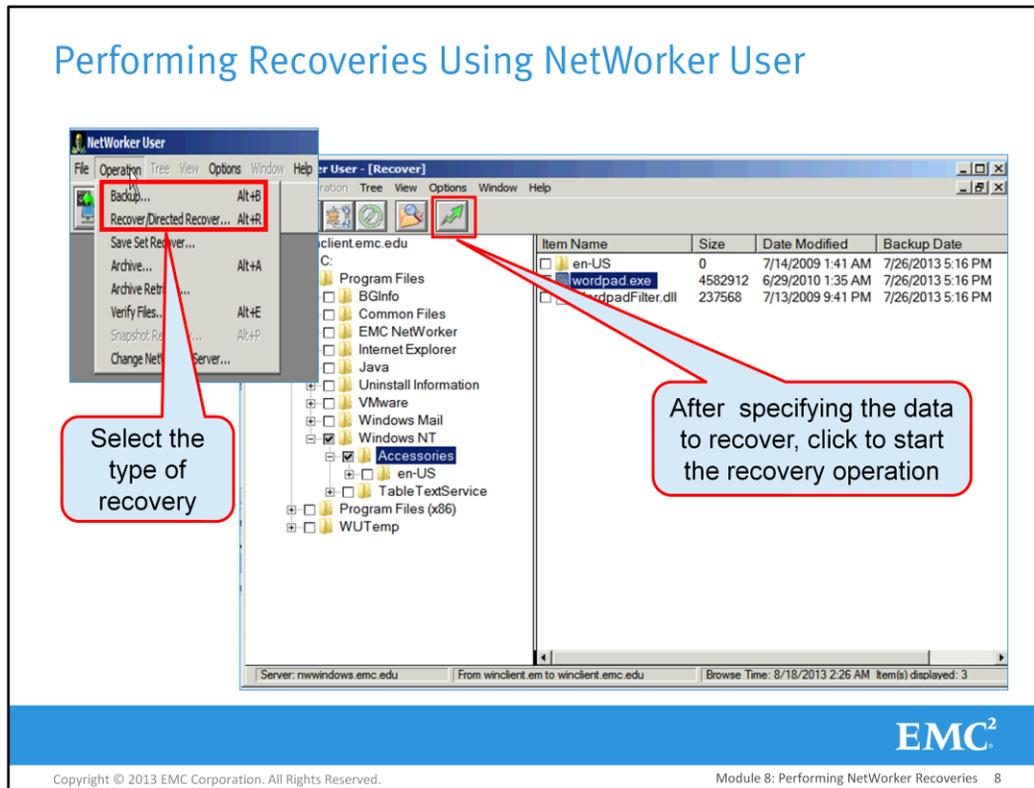
To restore a client's data using **NetWorker User**, first select the type of recovery that you want to perform. From the **Operation** menu select **Recover/Directed Recovery** to run a browsable recovery; select **Save Set Recovery** to perform a save set recovery. You are then prompted for the source client whose data you will restore. The *Source Client* window only contains clients for which the administering client has remote access privileges. When performing a browsable recovery, you are then prompted for the destination client. This is the same as the source host unless you are performing a directed recovery. After selecting the data to be recovered (either by file or by save set selection), click **Start** (green lightening-bolt) to begin the recovery.

Performing Recoveries Using recover

```
leg1-sun9:/ >recover -s leg1-win10
Current working directory is /
recover> cd /etc
recover> add init.d
/etc/init.d
50 file(s) marked for recovery
recover> recover
Recovering 50 files into their original locations
Volumes needed (all on-line):
      01.RO at E:\ADV_FILE\_AF_readonly
Total estimated disk space needed for recover is 88 KB.
Requesting 50 file(s), this may take a while...
./init.d/PRESERVE
./init.d/PRESERVE file exists, overwrite (n, y, N, Y) or rename (r, R) [n]?
```

Browsable recovery in interactive mode

Saveset recovery in non-interactive mode

```
leg1-sun9:/ >recover -a -s leg1-win10 -S 3971585115
Total estimated disk space needed for recover is 73 KB.
Recovering files into their original locations.
./init.d/PRESERVE
./init.d/PRESERVE file exists, overwrite (n, y, N, Y) or rename (r, R) [n]? N
Skipping recover of ./init.d/PRESERVE
./init.d/README
```

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The NetWorker **recover** command is available on all NetWorker clients. The recover command runs in either of two modes: interactive (default mode) or non-interactive (-a option). Interactive mode allows you to use subcommands in a shell-like environment. With the subcommands, you can navigate the CFI, mark files for recovery, and perform most of the functions available when using NetWorker User or NetWorker Recover.

recover(1m) syntax:

```
recover [ -options ] [ pathname ... ]
```

recover automatically assumes the source client is the same as the administering client. To specify a different source client, use the –c option. If the administering client is configured as a NetWorker client in multiple data zones, you can use the –s option to specify the NetWorker server that will control the recovery.
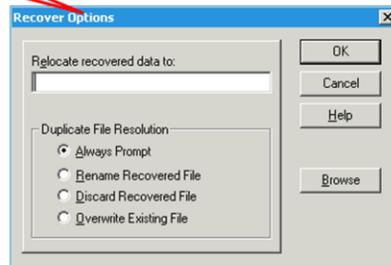
The pathname argument is either the path to set as the initial working directory for browsing (interactive mode) or, if the -a option is used (non-interactive mode), the path(s) to recover. The default initial working directory is the current directory.

Note: See The EMC NetWorker Command Reference Guide for more information including a description of the command options and subcommands.

Common Recovery Options: File Name Conflicts

- File Conflict Resolution:
  - Rename
  - Discard
  - Replace
- Relocating Recovered Files
  - Specify full pathname of relocation directory

NetWorker User

Recover Options

Relocate recovered data to:

Duplicate File Resolution
- Always Prompt
- Rename Recovered File
- Discard Recovered File
- Overwrite Existing File

OK
Cancel
Help
Browse

By default, NetWorker recovers data by attempting to return a file to its original folder using its original file name. However, if another file with the same name already exists in the folder, a file naming conflict occurs. NetWorker prompts you for how to resolve the conflict. The choices are:

- Rename the file being recovered. The existing file is untouched and the file being recovered is recovered to the same folder, but with a different file name. By default, a tilde (~) is placed in front of the original name, but when prompted, you can specify any name you like. If another file with a name of ~filename already exists, an additional tilde is pre-pended to the new name. As many tildes will be added as is necessary to make the filename unique.

- Discard the file being recovered. The existing file is untouched and the recovered file is discarded.

- Overwrite the existing file. The existing file is deleted and replaced by the recovered file.

Alternatively, you can choose to relocate the recovered data to a different directory. The folder you specify in the **Relocate recovered data to** field will be created if it does not exist. Subfolders are created as necessary to retain the folder hierarchy that existed when the files were backed up. There may be times when you want to recover a set of files to a location other than the folder from which they were backed up. Relocating recovered files is useful for comparing an existing set of files with the same set of files that were previously backed up.

Note: In NetWorker User, you can select the action to be performed when a file naming conflict occurs prior to beginning the recovery.

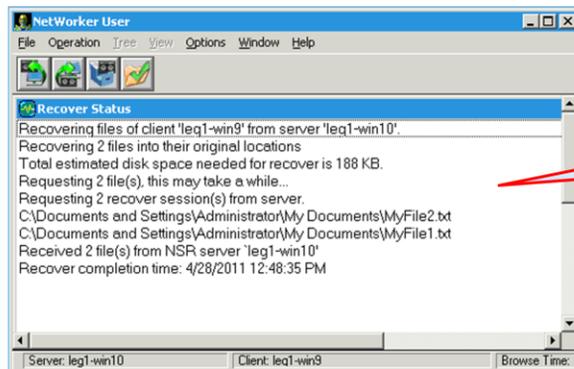Listing Required Volumes: NetWorker User
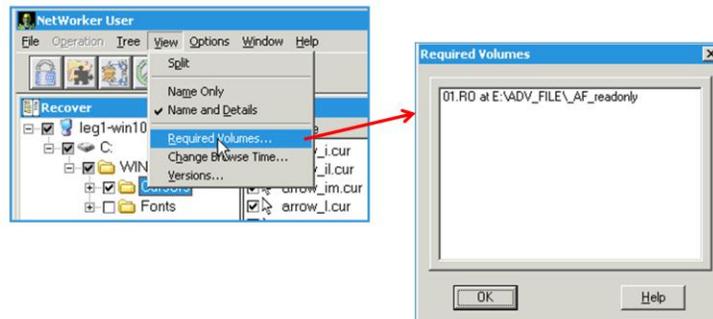
After making a selection of the data to be recovered, users can view a list of the volumes needed to recover the data marked for recovery. If a volume is currently mounted, the device on which it is mounted is also displayed.

Recovery Status

NetWorker User

recover

You can monitor the recovery in the *Status* window which opens as soon as the recovery begins when using NetWorker User and NetWorker Recover.

Important: Do not close the *Status* window until a recover completion message is displayed. Prematurely closing the window aborts the recovery.

When running `recover`, information about each file in the recovery can be displayed by using the **verbose** subcommand.

Selecting a Volume for Recovery

- Where there is more than one volume, NetWorker gives priority to the volume with:
  1. Complete, non-suspect save set status
  2. Mounted volume
  3. Media type (AFTD, file type, other)
  4. Media location (library, onsite, offsite)
- No special operation is required to recover cloned data

In this example, the save set status on the backup volume was marked suspect. When the save set was recovered, it was recovered from the clone volume.

Volume Save Sets

Volume: 01

Client	Save Set	SSID	Status
leg1-win10	C:\WINDOWS\Cursors	2999558145	browsable, suspect

Recover Sessions

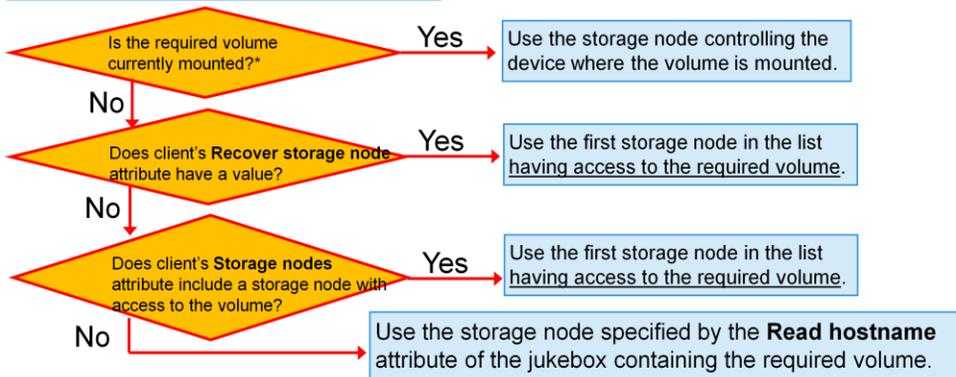| Client Name	Save Set	Start Time	Duration	Device	Volume
leg1-win10	C:\WINDOWS\Cursors (5/10...	5/11/11 2:25:52 PM	37	F:\Clone_Location_AF_readonly	leg1_win10_c.00...

Where there is potentially more than one volume for recovery, the highest priority is given to the volume containing a complete, non-suspect save set status. If all volumes still have equal priority, then priority is given to the volume that is mounted. If all the volumes are mounted, then priority is given according to media type, with AFTD having top priority. Next in priority is location, with highest priority given to volumes in a library.

Note: Save set status can be changed with options available in the NetWorker Administration *Media* window and with the `nsrmm` command.

Determining a Storage Node to Use For Recovery

Determine the volume required for recovery.

Is the required volume currently mounted?* — **Yes** → Use the storage node controlling the device where the volume is mounted.

No ↓

Does client's **Recover storage node** attribute have a value? — **Yes** → Use the first storage node in the list having access to the required volume.

No ↓

Does client's **Storage nodes** attribute include a storage node with access to the volume? — **Yes** → Use the first storage node in the list having access to the required volume.

No → Use the storage node specified by the **Read hostname** attribute of the jukebox containing the required volume.

koala1

flute — Recovery Request → bongo — alto

When a recovery is initiated, the NetWorker server selects the storage node to read the volume(s) based on the following prioritized criteria:

1. If the volume to be read is already mounted on a device, the storage node controlling that device is used.

2. The first storage node listed in the **Recover storage nodes** attribute of the NetWorker client resource that is being recovered having access to the required volume.

3. The first storage node listed in the **Storage nodes** attribute of the NetWorker client resource that is being recovered having access to the required volume.

4. The storage node listed in the **Read hostname** attribute of the jukebox resource, or if this is empty, storage nodes on which a device in the library is configured. The **Read hostname** attribute in the *Configuration* tab of the jukebox resource specifies the storage node to use for recoveries and cloning if a client's preferred storage nodes are not available. The default value of this attribute is the hostname of the storage node controlling the first drive in the library.

NetWorker Recover Wizard (1 of 4)
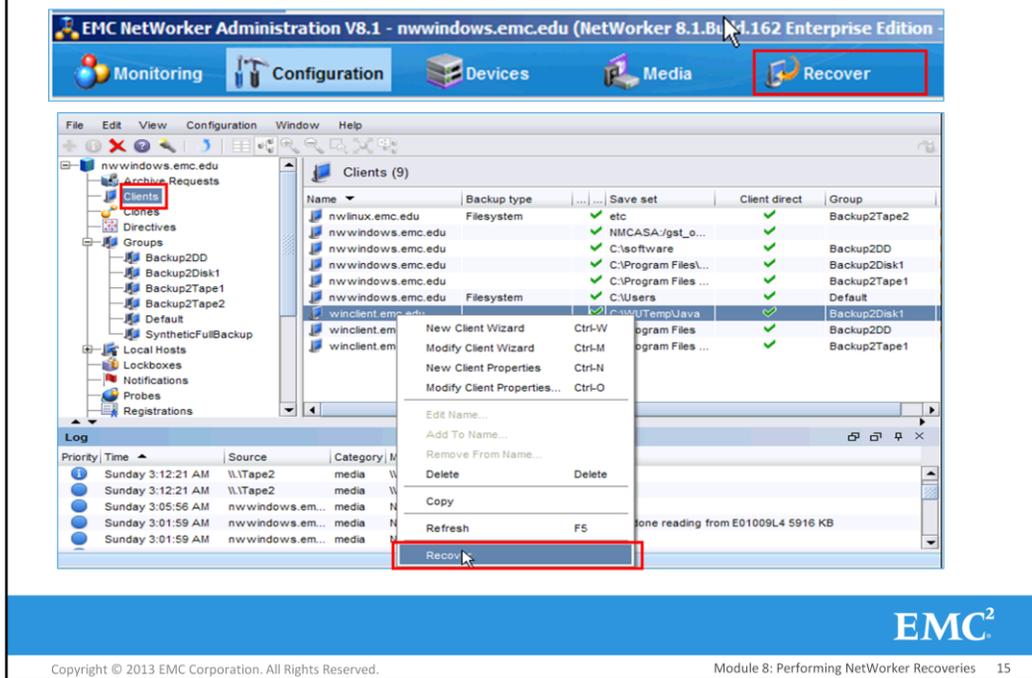
NetWorker 8.1 includes a new recovery wizard that allows you to recover data from a NMC GUI. The recovery wizard supports browsable, save set and directed recoveries. This wizard does not support cross-platform recoveries . The recovery wizard allows you to create and save a configuration that you can reuse and modify later.

NetWorker Recover Wizard (2 of 4)

Select the source host , destination host and the recovery type. Before starting the recovery wizard ensure the following requirements. The destination host is a client of the NetWorker server and are running on Networker 8.1 or later software. And for the directed recovery , the remote access attribute of the source client must contain the host name of the destination client.

Before you recover data to a different host , ensure that remote access attribute under the properties of the source host must contain the name of the destination host.

NetWorker Recover Wizard (3 of 4)
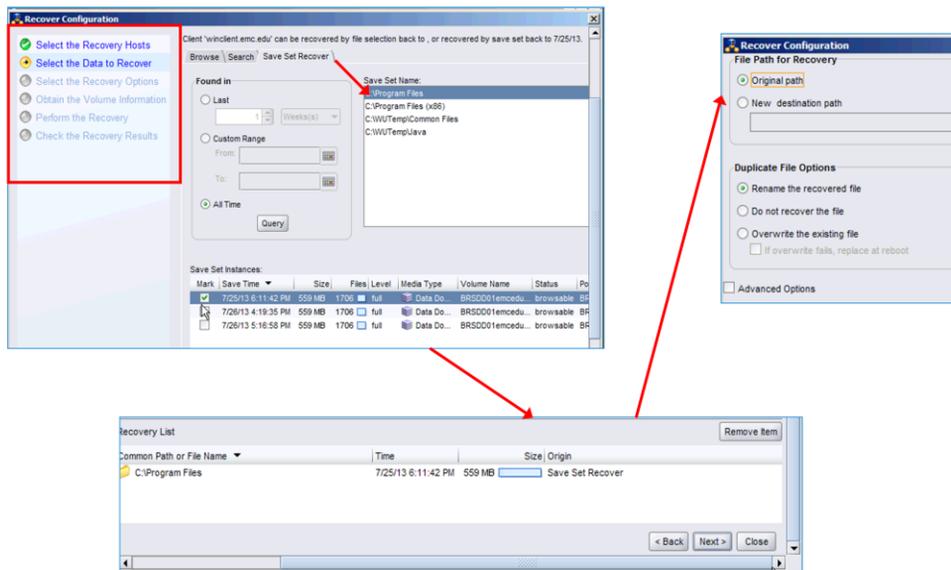
The browse tab in the window provides you with the ability to browse for the files and directories to perform a by file selection recovery from a specific date and time. Follow the other attributes and tabs to browse and recover specific required files or directories . Recovery list table displays the information about the files and folders that are marked for recovery. The recovery wizard organizes the information in following sortable columns. The recover wizard enables you to customize the location of the recovered data. The file path for recovery group box has two options. 1. Original Path 2. New destination path.

NetWorker Recover Wizard (4 of 4)

Next the window enables you to determine how the recovery wizard selects the volume required for data recovery.

This has two options

1. Allow NetWorker to select the required volumes for recover
2. View the required volumes and optionally select alternate volumes of cloned data if available.

The required volume provide a list of volumes to perform the recovery operation. Now you can start the recover now or schedule the recovery to start later.

Module 8: Performing NetWorker Recoveries

Lesson 1: Summary

During this lesson the following topics were covered:
- Types of recoveries: browsable, save set and directed
- Roles of source, destination and administering clients in a recovery
- Using the NetWorker recovery utilities: NetWorker User and recover
- Volume and storage node selection for recoveries

EMC²

This lesson covered an introduction to the three types of NetWorker recoveries, how to use the various NetWorker recovery utilities, and volume and storage node selection for recoveries.

Module 8: Performing NetWorker Recoveries

Lesson 2: Performing Browsable Recoveries

During this lesson the following topics are covered:
- Defining a browsable recovery
- Recovering as of a specific point-in-time
- Using NetWorker interfaces to perform browsable recoveries

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This lesson covers browsable recoveries including performing a point-in-time recovery and using the features of the NetWorker interfaces to perform a browsable recovery.

Browsable Recovery - Details

Media DB CFI

User

NetWorker Server
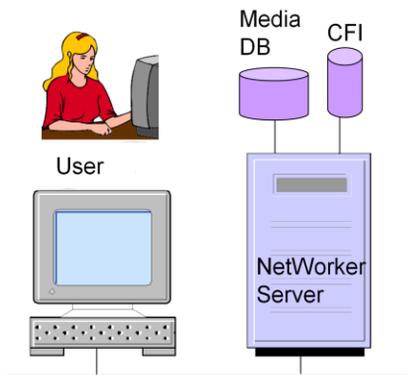
- User selects the set of files and directories to be recovered
- Operating system permissions are adhered to
- "Point-in-time" recovery is performed
- Useful when many files have been deleted or renamed since full backup

A **browsable recovery** can only be performed on a browsable save set. Any user is able to perform a browsable recovery. However, only those files for which the user has read permission can be recovered. During a recovery, the user selects the set of files and directories to be recovered.

When recovering an entire directory or file system, a point-in-time recovery is automatically performed. This restores the directory or file system to the way it looked as of the most recent backup.

Browsable Recovery - Point-in-time Recovery

Point-in-time Recovery:
- Only supported by browsable save sets (requires CFI information)
- Automatically recovers full backup and any dependent save sets
- Destination client is restored to its condition as of last backup
- Files deleted since full backup are not recovered
- Files renamed since full backup are recovered only under new name
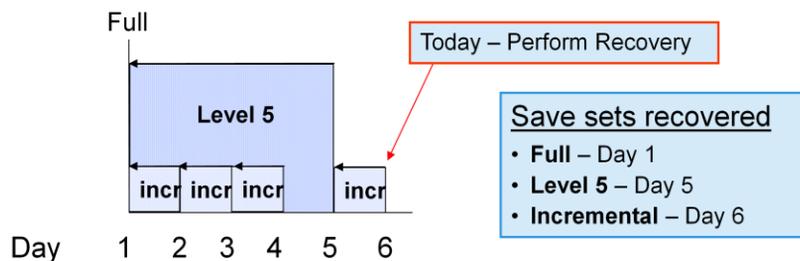
Full

Today – Perform Recovery

Level 5

incr incr incr   incr

Save sets recovered
- **Full** – Day 1
- **Level 5** – Day 5
- **Incremental** – Day 6

Day   1   2   3   4   5   6

If the recover program determines that multiple save sets (a full and its dependent save sets) are required for the recovery, it uses the CFI to determine if any files were deleted in the time between the most recent full backup and the most recent non-full backup. These deleted files are not recovered. Likewise, the CFI is used to determine if a file was renamed since the most recent full backup. If it was, the file will be recovered only with its most recent name.

By default, a browsable recovery restores data as of the most recent backup. A browsable recovery can also be performed to restore data as of a date in the past.

Marking Files to Recover: NetWorker User
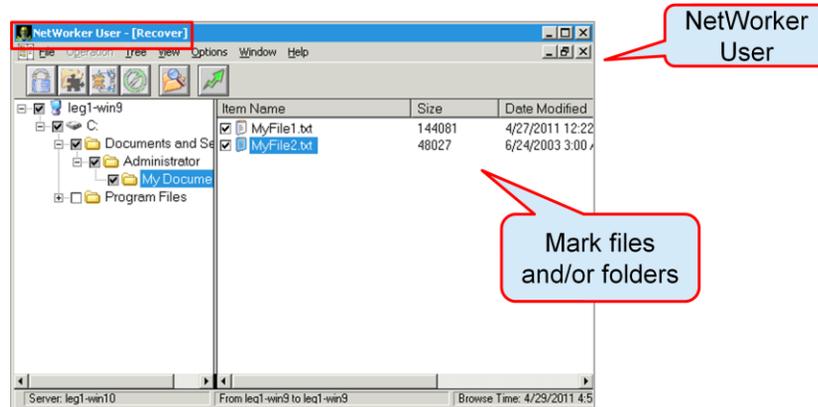
In a browsable recovery, the recovery interface shows a representation of a client's directory structure as it existed at a specific point in time. This representation is generated from the contents of the client's CFI and can be browsed much the same way you would traverse a file system in Windows Explorer. However, the difference is, for a recovery, you are viewing the contents of the CFI and not the files residing on disk.

By default, NetWorker recovers the most recent version of each file selected for recovery. When recovering an entire folder or file system, it may be that some files are restored from the most recent full backup while others are restored from a more recent incremental or level backup. Recovered files retain the same file attributes (modification time, permissions, etc.) they had when they were backed up.

When a folder is selected, file details, including the date and time of last backup, the size of the file, and the date last modified, are displayed. You can change the fields that are displayed with the options in the **View** menu in NetWorker User.

Viewing Versions of Browsable Files
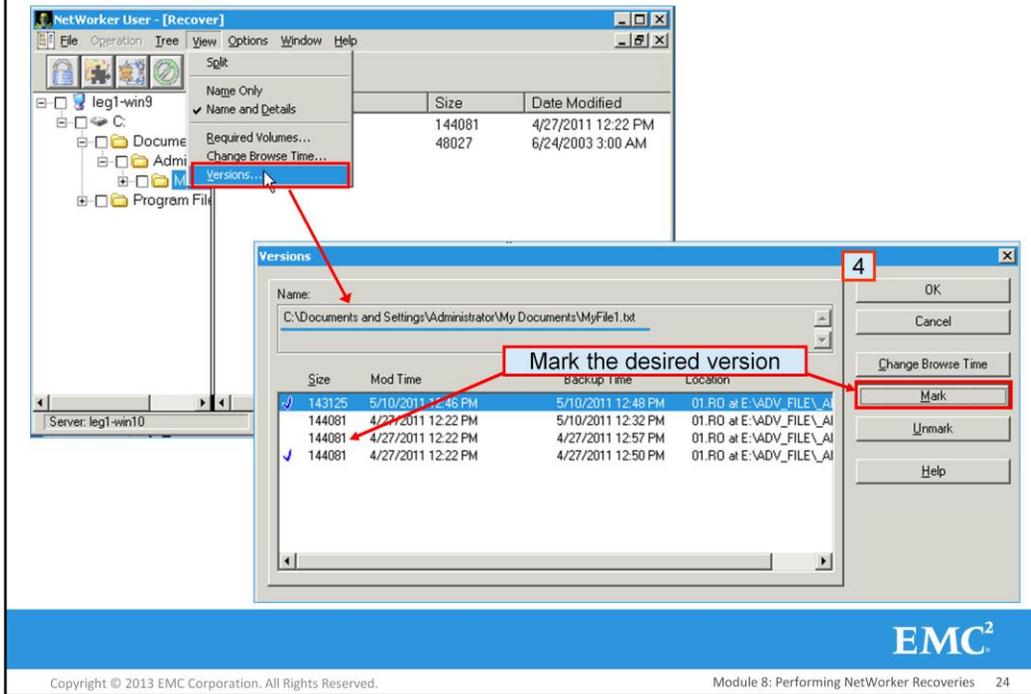
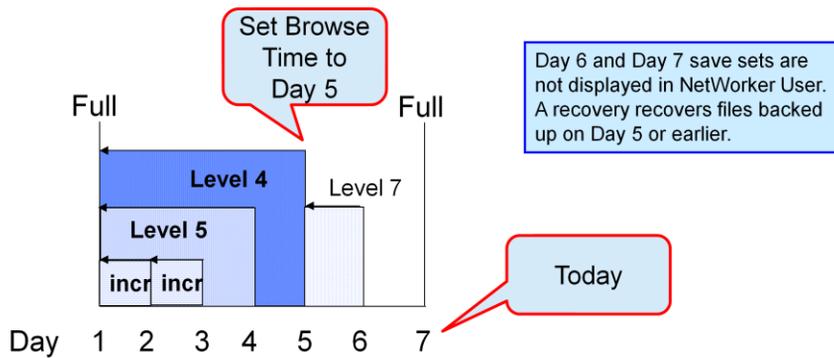It is possible to recover a version of a file other than the most recent version. First, highlight the file you want to recover. Then, select **Versions** from the **View** menu. NetWorker displays all versions of the file. One or more versions of a file can be selected for recovery.

To view the versions of a file using NetWorker Recover, select **Versions** from the **Selected** menu.

Recovery Browse Time

Set Browse Time to Day 5

Full   Full

Level 4   Level 7

Level 5

incr incr

Day   1 2 3 4 5 6 7

Day 6 and Day 7 save sets are not displayed in NetWorker User. A recovery recovers files backed up on Day 5 or earlier.

Today

The *browse time* sets the view to a prior date and time. Changing the browse time allows you to view your backed up data as it existed on the selected date and time.

The set of files displayed within a recovery utility is determined by the recovery **browse time**. By default, the browse time is the current date and time. Based on the CFI contents from the most recent full backup and subsequent level and incremental backups, NetWorker is able to determine what the directory structure on disk looks like as of the most recent backup. That directory structure is what you are presented with in the recovery interface. Thus, if you mark and recover all files that are displayed, your computer will be restored to how it was at the time of the last backup.

Changing the Recovery Browse Time
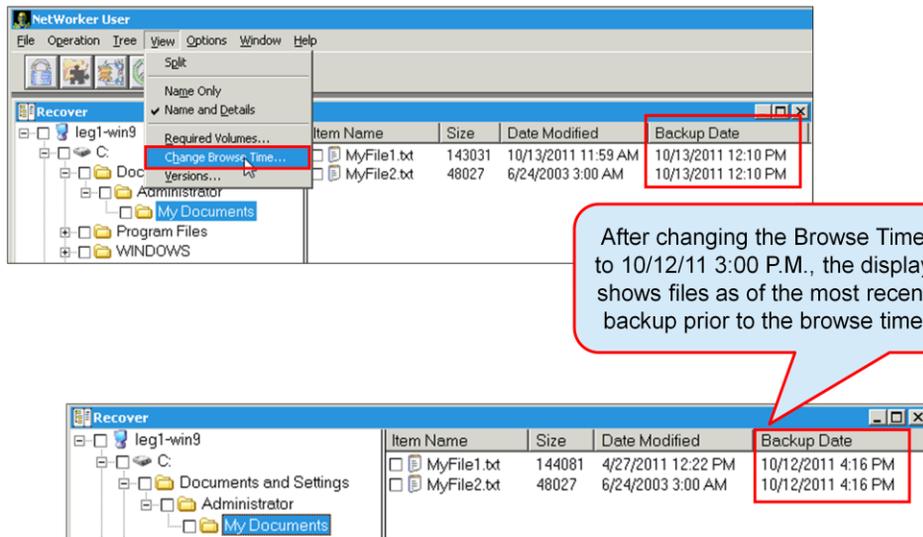
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You can change the browse time to a date in the past, causing the NetWorker recovery interface to display (and recover) only files backed up prior to the browse time. Marking a file for recovery automatically selects the most recent version of the file backed up prior to the browse time.

You might want to change the browse time if you need to:

- Retrieve an old version of multiple files.

- Retrieve an old version of an entire directory, file system, or client.

- Look for a file that is still browsable but is not displayed in the GUI. This can happen if the file was deleted prior to the most recent full backup.

Changing the browse time is an option in all NetWorker recovery interfaces. In NetWorker User, the option is found in the **View** menu; in NetWorker Recover, the option to change the recovery browse time is located in the **Options** menu; use the `changetime` subcommand with the `recover` command to change the browse time.

Important: If you need to recover files from different points in time, either use the **View Versions** feature for each file or perform multiple recoveries with different browse times.

Searching a CFI

- Locate a file in another directory
- Locate a file that was removed prior to the most recent full backup
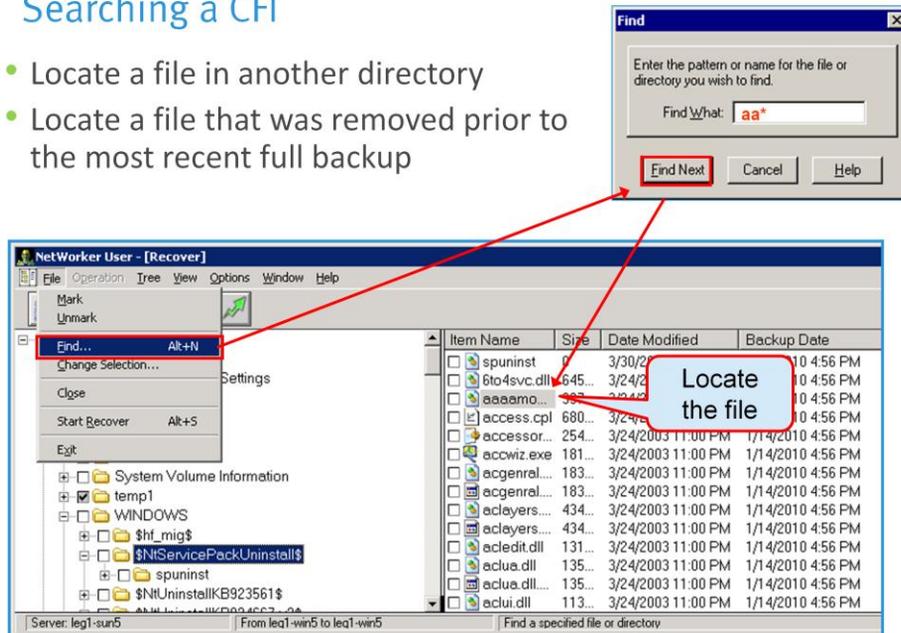
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The **find** feature allows you to locate a file or directory by typing its name. This feature is particularly useful in situations where:

- You do not know which directory contains the file you want to recover.
- You want to recover a file that is still browsable but was deleted from disk before the last full backup. Recall that the recovery interfaces support point-in-time recovery by displaying only those files it believes were on disk as of the most recent backup.

Find is an option under the **File** menu for both the NetWorker User and NetWorker Recover utilities. When specifying the file or directory to locate, the wildcards '*' (match zero or more occurrences of any character) and '?' (match any one character) are allowed. The search is not case-sensitive. The search begins with the highlighted folder or specified directory and descends into its subfolders. Files and directories matching the search criteria are displayed and can be selected for recovery.

Note: The ability to view file properties is especially important in NetWorker Recover because the search results pane does not display the directory location of the matching items. Where there are multiple files with the same name in different directories, use the properties feature to determine the location of the file to be recovered.

Performing Browsable Recoveries Using recover

```
leg1-sun9:/ >recover -s leg1-win10
Current working directory is /
recover> cd /etc
recover> add init.d
/etc/init.d
50 file(s) marked for recovery
recover> recover
Recovering 50 files into their original locations
Volumes needed (all on-line):
        01.RO at E:\ADV_FILE\_AF_readonly
Total estimated disk space needed for recover is 88 KB.
Requesting 50 file(s), this may take a while...
./init.d/PRESERVE
./init.d/PRESERVE file exists, d
```

Recovering files in /etc/init.d

```
leg1-sun10:/nsr/logs >recover
Current working directory is /var/nsr/logs/
recover> versions myfile

Versions of '/var/nsr/logs/myfile':

   1 -rw------t root      root           80 May 11 11:34 myfile
       save time:  May 11, 2011 11:37:59 AM EDT
       location:  01.RO at E:\ADV_FILE\_AF_readonly

 112 -rw------t root      root       102400 May 10 16:24 myfile
       save time:  May 10, 2011  4:31:02 PM EDT
       location:  01.RO at E:\ADV_FILE\_AF_readonly

recover> changetime 05/11/11 01:00
6497:recover: time changed to May 11, 2011  1:00:00 AM EDT
recover> add myfile
1 file(s) marked for recovery
recover> list
/var/nsr/logs/myfile @ May 10, 2011  4:31:02 PM EDT
1 file(s)_marked for recovery
```

Recovering a previous version of /var/nsr/logs/myfile

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With recover, the default method of recovery is by file selection. In the example on the left of the slide, the files in the /etc/init.d directory are being recovered. The **add** command is used to add the current version of the file to the recovery list.

In the example on the right , the **versions** command is used to determine that a previous version of the file, myfile, was backed up on May 10. To recover that version of the file, the **changetime** command is used to change the browse time to a time early in the morning of May 11 making the backup on May 10 the most current version prior to the new browse time. After adding that version of the file to the recovery list, the **list** command is used to verify that it was added.

Note: See the *NetWorker Command Reference Guide* for more information including a description of the command options and subcommands.

Module 3: Performing NetWorker Recoveries

Lesson 2: Summary

During this lesson the following topics were covered:
- Defining a browsable recovery
- Recovering as of a specific point-in-time
- Using NetWorker interfaces to perform browsable recoveries

This lesson covered browsable recoveries including performing a point-in-time recovery and using the features of the NetWorker interfaces to perform a browsable recovery.

Module 3: Performing NetWorker Recoveries

### Lesson 3: Performing Save Set Recoveries

During this lesson the following topics are covered:
- Defining a save set recovery
- Recovering to a point in time with save set recoveries
- Identifying save sets to recover
- Using NetWorker interfaces to perform save set recoveries

This lesson covers save set recoveries including recovering to a specific point in time and using the features of the NetWorker interfaces to perform save set recoveries.

Save Set Recovery - Details

Media DB CFI

System Administrator (root / administrator)

NetWorker Server
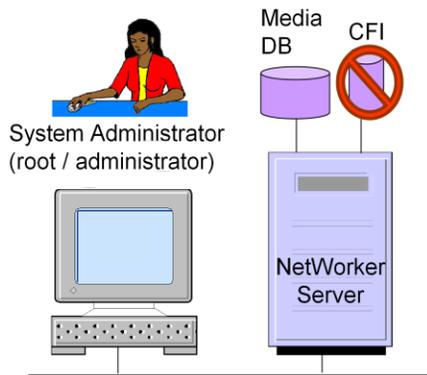
- Useful for recovering non-browsable save sets.
- By default, an entire save set is recovered. However, you can recover individual files and directories.
- May be faster than a browsable recovery.
- Can only be performed by an administrative user.

A **save set recovery** is useful when recovering non-browsable save sets but can be performed for any save set. After a save set goes from a browsable status to recoverable, it can only be recovered using a save set recovery. System administrator privileges are required to perform a save set recovery.
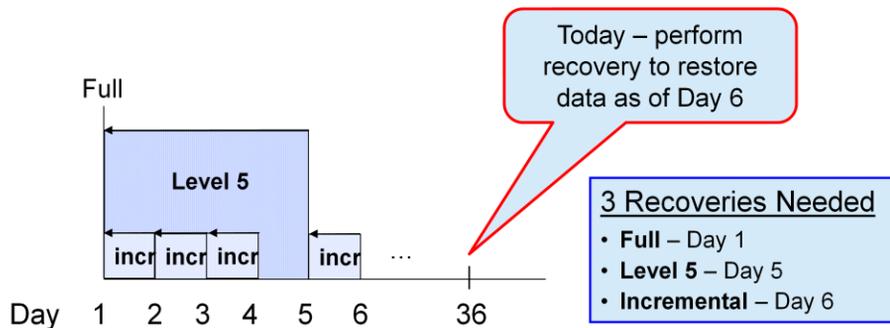
One or more save sets are specified during the recovery. Although the default behavior is that each save set is entirely recovered, you can specify a set of individual files or directories to be recovered instead.

Since a save set recovery does not utilize CFI information, it does not perform a point-in-time recovery.

Save Set Recovery – Recovering to a Point in Time

Using save set recoveries to restore a file system to the way it was on Day 6 requires the following steps:

1. Recover Full backup from Day 1
2. Recover Level 5 backup from Day 5
3. Recover Incremental backup from Day 6
4. If needed, delete files that were deleted or renamed between days 1 and 6

Today – perform recovery to restore data as of Day 6

Full

Level 5

incr incr incr   incr   ...

Day   1   2   3   4   5   6   36

3 Recoveries Needed
- **Full** – Day 1
- **Level 5** – Day 5
- **Incremental** – Day 6

The ability to automatically recover to a point in time is not supported using a save set recovery.

Let's assume that save sets backed up on Days 1-6 were browsable for only one month. Now, on Day 36, none of those save sets are browsable and you want to recover the file system to the way it looked after the incremental backup on Day 6. The following steps must be performed:

1. Recover the Day 1 Full save set.
2. Recover the Day 5 Level 5 save set.
3. Recover the Day 6 incremental.
4. If no files were deleted or renamed between Day 1 and Day 6, the file system is now fully and accurately recovered. However, if deletions occurred, files which didn't exist on Day 6 were recovered in the Day 1 or Day 5 recoveries. Additionally, if a file was renamed, it will now exist under both its original and new names. For the recovered file system to accurately reflect the Day 6 file system, you must determine which deletions and renames occurred and manually perform them again.

The number of full and incremental save sets needed for recovery depends on the schedule (backup levels) used immediately prior to the point in time you wish to recover the data.

To identify the save sets you need for a save set recovery:

1. Identify the most recent full backup of the save set.

2. Identify the most recent backup at each level, starting with Level 1 and ending with Level 9. Ignore unused levels.

3. Identify the oldest incremental backup (if incrementals are used) that was performed after the most recent level backup.

4. Identify the next oldest incremental backup.

5. Repeat Step 4 until you reach the desired point in time.

In the example shown on the slide, a recovery is performed after Day 7's backup. To perform the recovery, you need the Full save set from Day 1, the Level 7 save set from Day 4 and the incremental save sets from Days 5, 6, and 7.

Cleaning up Directories After a Recovery

A save set recovery does not reference the client file index.

```
# recover -S ssid
```

CFI
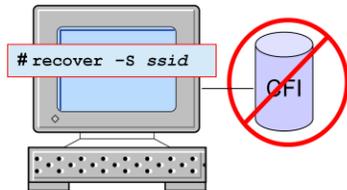
If recovering an old save set, files and directories deleted or renamed since the save set was backed up may be recreated. These unwanted files/directories must be handled manually.

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A save set recovery does not reference the client file index where deleting and renaming of files is recorded. This leads to the following behavior:

- Directories and files deleted during the backup cycle are recovered.
- Directories and files renamed during the backup cycle are recovered multiple times, once for each name by which they were known.

When you have recovered the last save set required to restore your data to a specific point in time, you may need to perform additional file handling. This could include deleting files and directories that were deleted during the backup cycle and renaming files that were renamed during the backup cycle.
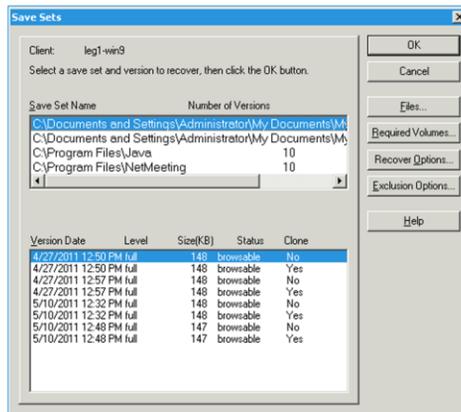
Performing Save Set Recoveries

NetWorker User

File | Operation | Tree | View | Options | Window | Help | [Recover]

Backup...   Alt+B
Recover/Directed Recover...   Alt+R
Save Set Recover...

Archive...   Alt+A
Archive Retrieve...
Verify Files...   Alt+E
Snapshot Recover   Alt+P
Change NetWorker Server...

Tree | View | Options | Window | Help

Item Name	Size	Date Modified	Backup Date
en-US	0	7/14/2009 1:41 AM	7/26/2013 5:16 PM
wordpad.exe	4582912	6/29/2010 1:35 AM	7/26/2013 5:16 PM
WordpadFilter.dll	237568	7/13/2009 9:41 PM	7/26/2013 5:16 PM

emc.edu
gram Files
GInfo
Common Files
EMC NetWorker
nternet Explorer
ava
Uninstall Information
VMware
Windows Mail
Windows NT
     Accessories
      en-US
     TableTextService
Program Files (x86)
WUTemp

Select the type of recovery

Server: nwwindows.emc.edu | From winclient.em to winclient.emc.edu | Browse Time: 8/18/2013 2:26 AM | Item(s) displayed: 3

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From the NetWorker User application select the operation menu and select Save Set Recover.

When performing a save set recovery, the recovery utility displays a list of save set names backed up from the client. After selecting the save set, all save sets with that name are displayed. One or more versions may then be marked for recovery.

As with browsable recoveries, you can perform searches and view properties, versions and volumes for selected items.

Recovering Portions of a Save Set
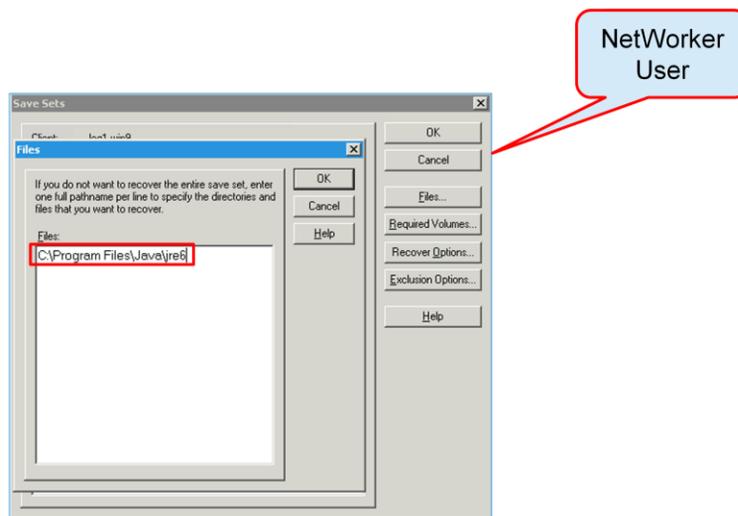
Be default, save sets are recovered in their entirety. If paths are specified for a save set, then only the specified files or directories are recovered. Any path name beginning with a value specified in the field is recovered.

Performing Save Set Recoveries Using recover

To perform a save set recovery with the `recover` command, use the –S option followed by the SSID of the save set. Multiple –S options can be used in the same command. A save set recovery using the command line is always non-interactive.

Notes: Before performing the recovery, determine the SSID of the save set to be recovered using NetWorker Administration or the `mminfo` command.

See the *NetWorker Command Reference Guide* for more information including a description of the command options and subcommands.

Module 8: Performing NetWorker Recoveries

Lesson 3 : Summary

During this lesson the following topics were covered:
- Defining a save set recovery
- Recovering to a point in time with save set recoveries
- Identifying save sets to recover
- Using NetWorker interfaces to perform save set recoveries

This lesson covered save set recoveries including recovering to a specific point in time and using the features of the NetWorker interfaces to perform save set recoveries.

Module 8: Performing NetWorker Recoveries

## Lesson 4: Performing Directed Recoveries

During this lesson the following topics are covered:
- Defining a directed recovery
- Privileges and platform requirements
- Using NetWorker interfaces to perform a directed recovery

This lesson covers directed recoveries including privileges and platform requirements and using the features of the NetWorker interfaces to perform directed recoveries.

Directed Recovery

Administering
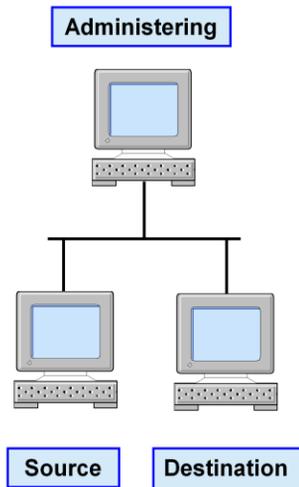
A directed recovery is useful when:
- You want to perform all recoveries from a single NetWorker client
- A computer is inoperable or unreachable on the network
- You want to transfer files from one client to another

Source   **Destination**

A **directed recovery** is defined as a recovery in which the data that was backed up from one computer is recovered to another.

The benefits of performing a directed recovery include being able to:

- Obtain files from a source computer which is inoperable.
- Perform all recoveries from a single NetWorker client in the data zone, thereby providing central recovery management and control.
- Transfer files from one client to another.

Directed Recovery – Required Privileges

1
NSR usergroup: **Administrators**
Users:
    user=*user*, host=tuba

2
NSR client: soprano
Remote access:
    user=root, host=flute

NetWorker Server

bongo

Administering Client (Win2K)

tuba

1. *user*@tuba must be a Windows Administrator; **user must have NetWorker Remote Access All Clients privilege**

2. The source client must allow the destination client access to its backed up data.

3. The destination client must allow remote execution from administering client.

soprano

Source Client (UNIX)

flute

nsrexecd

3
/nsr/res/servers
bongo
bongo.bigwidget.com
tuba
tuba.bigwidget.com

Destination Client (UNIX)

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The following access rights are required for directed recoveries:

1. Recovery must be launched by the root user (UNIX) or Windows Administrator on the host performing the recovery. This host must be a NetWorker client of the NetWorker server. The user must have the **Remote Access All Clients** privilege on the NetWorker server. Note that users in the Administrators group on the NetWorker server are automatically granted the necessary privileges.

2. The **Remote access** attribute in the source client's client resource must contain the destination client if the user@destination client does not have the **Remote Access All Clients** privilege.

3. The destination client must allow remote execution requests from the administering client. Remote execution is performed by nsrexecd. Remote execution privileges are controlled by the following methods:

   ▸ The /nsr/res/servers file on the destination client lists the hosts authorized to make remote execution requests.

   ▸ nsrexecd on the destination client can use the −s option to specify a host authorized to make remote execution requests. If this option is used, the /nsr/res/servers file is ignored.

   ▸ Optionally, the **Disable directed recover** attribute can be set to **yes** in a NetWorker client's resource database, /nsr/res/nsrladb. This disallows directed recoveries from any remote host. (nsradmin −d /nsr/res/nsrladb)

Directed Recovery – Platform Requirements

Because backed up data has a specific data format, source and destination clients must have similar:

- Operating systems
- File system formats

Administering Client	Source Client	Destination Client
UNIX	UNIX	UNIX
	Windows	Windows
Windows	UNIX	UNIX
	Windows	Windows

The source and destination clients must be of the same platform type. You can perform directed recoveries between UNIX NetWorker clients and between Windows NetWorker clients. You cannot recover data backed up from UNIX clients to non-UNIX clients, and vice versa. The administering host may be a different platform type from the other clients.

Additionally, you may not be able to recover files between dissimilar file system formats. For example, you cannot recover data from an NTFS file system on a Windows client to a FAT file system because of the way file permissions are handled. However, files from a FAT file system can be recovered to an NTFS file system because there are no permissions in a FAT file system; NTFS gives recovered files the permissions of the directory they are recovered to.

Note: SYSTEM and VSS SYSTEM save sets cannot be recovered using a directed recovery.
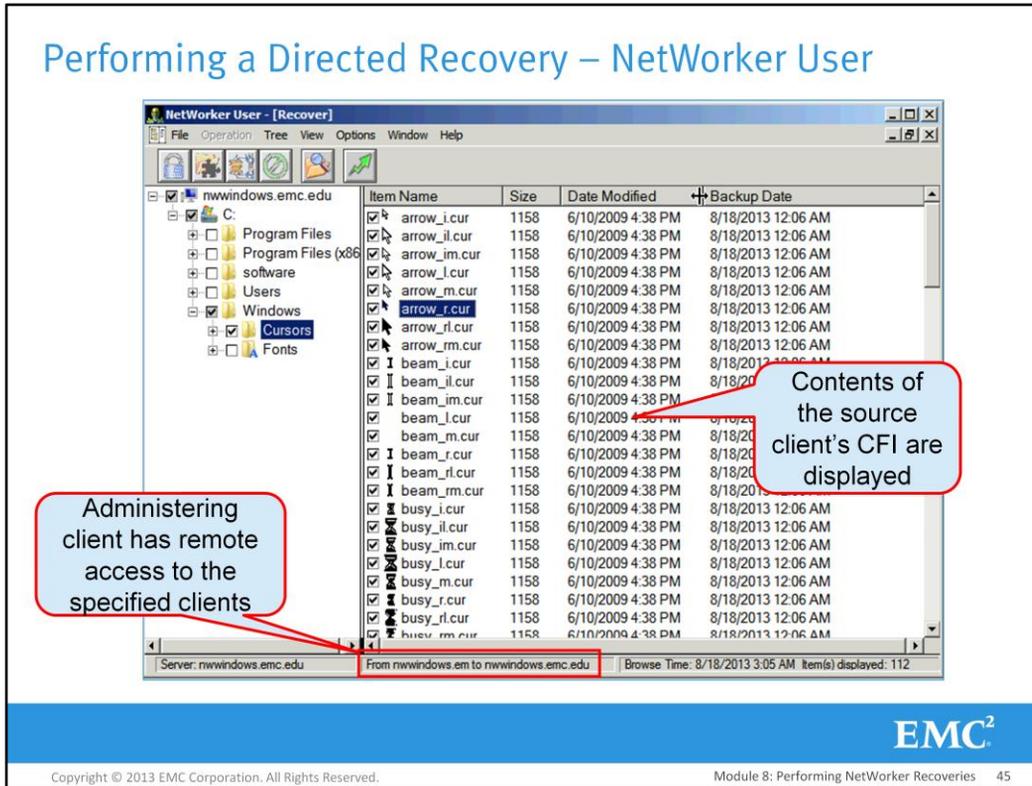
Performing Directed Recoveries
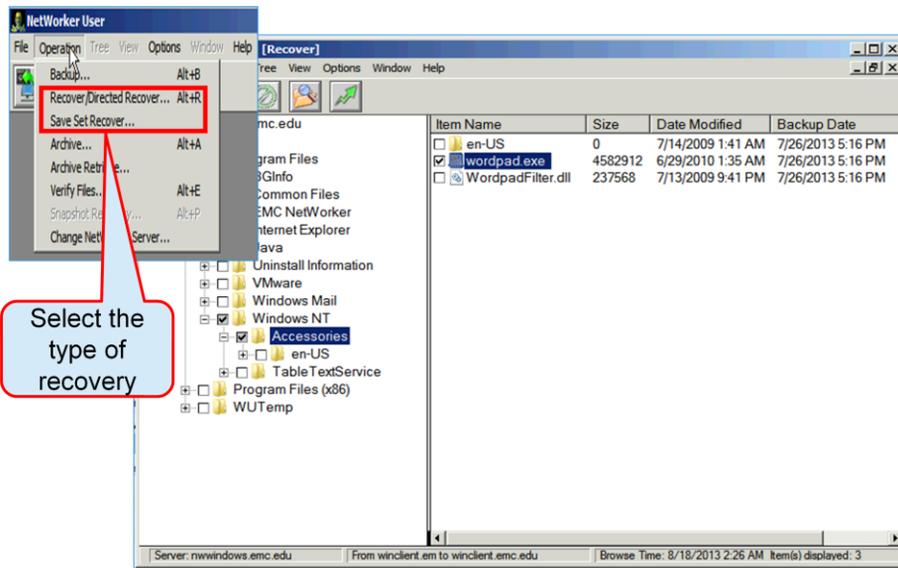
Select the type of recovery

From the NetWorker User application select the operation menu and select Recover/Directed Recover

Performing a Directed Recovery – NetWorker User

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To perform a directed recovery using NetWorker User, perform a browsable recovery. First select the source and destination clients. In the slide, nwwindows.emc.edu is the administering client, nwwindows.emc.edu is the source client and nwwindows.emc.edu is selected as the destination client.

Only clients for which nwwindows.emc.edu has remote access privileges are displayed in the client selection windows.

After you have selected the source and destination clients, the contents of the source client's CFI is displayed, allowing you to browse and mark files for recovery in the exact same manner as in a normal browsable recovery.

Upon initiating the actual recovery, the administering client contacts nsrexecd on the destination client and requests that it execute recover with the list of files provided.
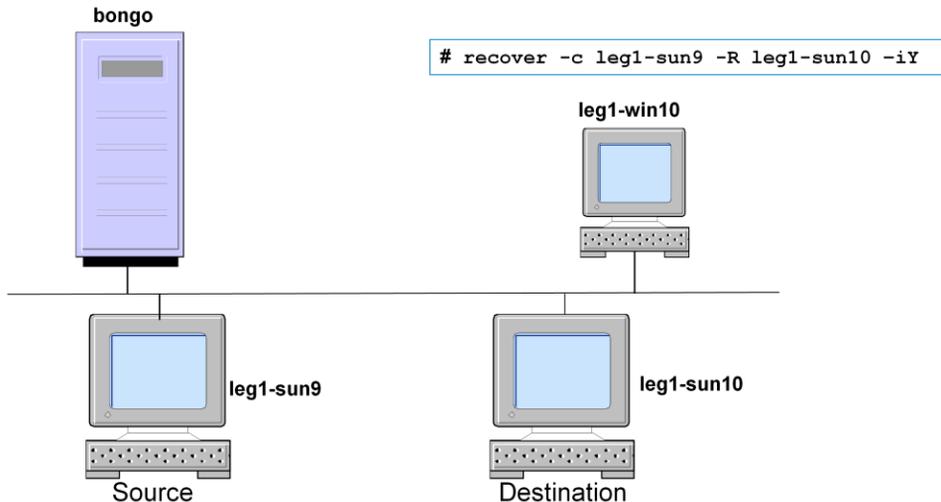
Directed recoveries can also be performed using the `recover` command.

The `-c client` option specifies the source client and the `-R client` option specifies the destination client. The required `-i [YNR]` option specifies what the destination client should do in response to file naming conflicts.

As an example of a directed, browsable recovery, the following command is executed from leg1-win10 and recovers files backed up from leg1-sun9 to the client leg1-sun10, overwriting existing files:

```
recover -c leg1-sun9 -R leg1-sun10 -iY
```

To perform a directed save set recovery using recover, use this command format:

```
recover -s nw_server -R destination_client -i{NYR} -S ssid
```

Argument	Description
Y	Overwrite the existing file.
N	Do not restore (discard) the recovered file.
R	Rename the recovered file.

Table 3-2: Arguments for `-i` option

Module 8: Performing NetWorker Recoveries

Lesson 4 : Summary

During this lesson the following topics were covered:
- Defining a directed recovery
- Privileges and platform requirements
- Using NetWorker interfaces to perform a directed recovery

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This lesson covered directed recoveries including privileges and platform requirements and using the features of the NetWorker interfaces to perform directed recoveries.

Module 3: Performing NetWorker Recoveries

Lesson 5: Performing Filesystem Snapshot Recoveries

During this lesson the following topics are covered:
- Snapshot Recovery Types
- Recover Wizard for NSM

This lesson covers snapshot recoveries including privileges and platform requirements and using the features of the NetWorker interfaces to perform directed recoveries.
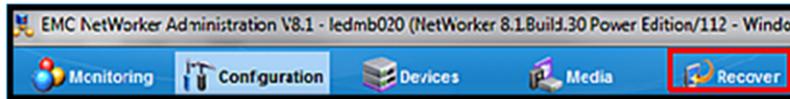
There are three recovery types available from a snapshot backup. They are snapshot , rollover and rollback recoveries. Fast and easy recovery is another benefit for NSM. The NetWorker Recovery User interface steps the NetWorker through the recovery from a snapshot backup, as well as other backup types. The recovery from snapshot management includes the ability to perform a rollback which will overwrite the original data , as well as mount the save set from browse and recovery.

You can perform a rollback, which reverts the entire disk to state to the time of the snapshot. This is done at the array-level. For example file systems E:\, F:\, and G:\ live on LUN 02E. Rolling back G will restore everything on LUN 02E including E:\ and F:\.

You can also recover from the snapshot, either full or partial. If the data was rolled over to backup media… In short ""Whatever you can do with a NetWorker created backup to media, you can do with an NSM generated backup to media. "

Note: NSM does not support Checkpoint Restart or Synthetic Full backups.

Recover Wizard for NSM

EMC NetWorker Administration V8.1 - Iedmb020 (NetWorker 8.1.Build.30 Power Edition/112 - Window

Monitoring | Configuration | Devices | Media | **Recover**

- Prior to NetWorker 8.1, all PowerSnap restores handled via `nsrsnap_recover`
  - ‣ `nsrsnap_recover` is invoked when the recover is run
  - ‣ Uses values collected by the wizard
- Supports three types of snapshot recovery:
  - ‣ Snapshot recovers
  - ‣ Rollover
  - ‣ Standard media recoveries
- Progress is visible in the Wizard and the NMC Monitoring interface

Prior to NetWorker 8.1, all PowerSnap restores handled via the nsrsnap_recover CLI. NetWorker 8.1 introduces a Recover Wizard to provide a GUI-based recovery workflow. When a client is selected, if NSM is detected, the recover UI will detect all available Snapshots and save sets, and choices and visibilities related to recovering the data. When the actual recover takes place, nsrsnap_recover is invoked, using the values collected by the wizard.

The Wizard supports snapshot recovers, rollover, standard media recoveries. The progress is visible in both the Wizard and the NMC Monitoring interface. Operations are also logged to the standard recovery logs.

Performing Snapshot Recoveries – Wizard (1 of 3)

Monitoring · Configuration · Devices · Media · Recover

File   Edit   View   Recover   Window   Help

Source Host

Name:	ab01-vmax-app
OS:	Windows NT Server on Intel
NetWorker version:	8.1.Build.110
Earliest backup:	Jun 15, 2013 10:05:50 AM
Latest backup:	Jun 15, 2013 10:05:50 AM

Destination Host

⦿ Recover to the same host
◯ Select a destination host

Name:	
OS:	
NetWorker version:	

Available Recovery Types

Types of Backups ▼	Backups Found in Last Week	Number Found
Block Based Backup		0
Block Based Backup (cloned to tape)		0
Filesystem	✓	1
Snapshot Management	✓	1

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You can use the NMC recovery wizard GUI to restore file system data from a snapshot stored on a supported array. Run NMC in the enterprise view to launch application. Complete the select client to recover page, specify the application host whose production data is the source for the snapshot. Specify the application host an alternative client on which you want to restore the snapshot data. Available recovery types table list the different types of recoveries that are available for recover. Supported recovery types are Blocked based backup(BBB) , BBB(clone to tape) , Filesystem and Snapshot Management.

Performing Snapshot Recoveries – Wizard (2 of 3)

The window provides you with the ability to browse the snapshots to recover. Mount the save set for recovery and select the storage node. Then choose the destination for the recovery.

Performing Snapshot Recoveries – Wizard (3 of 3)

Snapshots

Snapshot Time ▼	Save Sets in Snapshot
6/15/13 10:05:47 AM	E:\data1

○ Mount save set and browse for recovery

◉ Rollback snapshot

⚠ Rollback is a destructive operation. Use care with this operation

⚠ Rollback is a destructive operation. Use care with this operation.

E:\$RECYCLE.BIN
E:\data2
E:\newfile.txt
E:\System Volume Information

☑ Confirm these extra files will be affected by the rollback

Snapshot Rollback

1. Choose from available snapshots
2. Choose rollback
3. Warned about data outside of the saveset that will be affected by the snapshot
4. Must confirm before rolling back

Lab 8: Perform Recoveries

In this lab, you will perform browsable, save set and scheduled recoveries using the NetWorker Recovery Wizard.

- Lab Exercise 8-1: Perform Browsable Recoveries
- Lab Exercise 8-2: Perform Save Set Recoveries
- Lab Exercise 8-3: Perform a Scheduled Recovery

In this lab, you will perform:

- A browsable recovery using NetWorker Recovery Wizard
- A save set recovery using the NetWorker Recovery Wizard
- A scheduled recovery using the NetWorker Recovery Wizard

Module 8: Performing NetWorker Recoveries

Lesson 5: Summary

During this lesson the following topics were covered:
- Snapshot Recovery Types
- Recover Wizard for NSM

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This lesson covered directed recoveries including privileges and platform requirements and using the features of the NetWorker interfaces to perform directed recoveries.

Module 3: Summary

Key points covered in this module include:

- Various recovery options
- The roles of source, destination, and administering clients in a recovery
- The procedures for performing browsable recoveries
- The procedures for performing save set recoveries
- The procedure for performing snapshot recoveries

This module covered how to perform recoveries of client data in NetWorker using the NetWorker User and recover interfaces. We looked at the three types of client recoveries that are supported by NetWorker: browsable, save set ,directed and snapshot.