



Operating System

Remote Storage

Beta 3 Technical Walkthrough

Abstract

This document provides sample procedures that demonstrate the installation and administration of the Remote Storage service, the hierarchical storage management solution provided in the Microsoft® Windows® 2000 Server operating system.

© 1999 Microsoft Corporation. All rights reserved.

THIS IS PRELIMINARY DOCUMENTATION. The information contained in this document represents the current view of Microsoft Corporation on the issues discussed as of the date of publication. Because Microsoft must respond to changing market conditions, it should not be interpreted to be a commitment on the part of Microsoft, and Microsoft cannot guarantee the accuracy of any information presented after the date of publication.

This BETA document is for informational purposes only. MICROSOFT MAKES NO WARRANTIES, EXPRESS OR IMPLIED, IN THIS DOCUMENT.

Microsoft, Windows, and Windows NT are registered trademarks of Microsoft Corporation. Other product or company names mentioned herein may be the trademarks of their respective owners.

*Microsoft Corporation • One Microsoft Way • Redmond, WA 98052-6399 • USA
0599*

CONTENTS

| | |
|---|----|
| INTRODUCTION | 1 |
| Levels of Data Storage | 1 |
| Retrieval of Stored Files | 1 |
| Coordination with Other Tools | 1 |
| Walkthrough Procedures | 2 |
| | |
| ADMINISTRATIVE WALKTHROUGHS..... | 3 |
| Prerequisites | 3 |
| Installing Remote Storage | 3 |
| Setting Up Remote Storage Service | 5 |
| Using the Remote Storage Administration Snap-in | 6 |
| Managed Volumes | 6 |
| Media | 7 |
| Event Viewer Logs | 7 |
| Removable Storage Manager | 7 |
| Changing Remote Storage Settings on a Managed Volume | 7 |
| Adding Include/Exclude Rules | 7 |
| Running a Remote Storage Copy Job on Demand | 8 |
| Running a Remote Storage Free Disk Space Job On Demand | 9 |
| Viewing Remote Storage Summary Properties | 10 |
| Changing the Schedule for a Remote Storage Copy Job | 10 |
| Recalling a File from Remote Storage | 11 |
| Changing the Runaway Recall Limit | 11 |
| Adding Another Volume for Management | 12 |
| Selecting Multiple Operations on Volumes | 12 |
| Using Windows Explorer to View Volume Properties | 13 |
| Using the Computer Management Snap-in to View Volume Properties | 13 |
| Copying Remote Storage Media | 14 |
| Creating and Managing Media Copy Sets | 14 |
| Recreating the Remote Storage Master from Media Copies | 15 |
| Using Windows 2000 Backup to Restore Files from Remote Storage | 15 |
| Backing up Remote Storage Files | 16 |
| Validating Remote Storage Volumes | 17 |
| Using the Remote Storage Administration Snap-in from the | |
| Windows 2000 Professional Admin Pack | 17 |
| Removing Volumes from Management | 18 |
| Uninstalling Remote Storage | 18 |
| | |
| FOR MORE INFORMATION | 20 |
| Before You Call for Support | 20 |
| Reporting Problems | 20 |

INTRODUCTION

The Microsoft® Windows® 2000 Server operating system Remote Storage feature makes it easy for you to extend disk space on your server computer without adding more hard disks. Remote Storage monitors the amount of free space available on a local volume, and then copies eligible files to a tape library automatically. In addition, Remote Storage allows you to customize the manner in which Remote Storage manages free space on your volumes.

When the amount of free space on a local volume dips below the level you specify, file data is copied to Remote Storage, leaving a cached copy of the data behind on the local volume. By setting the **File Size** and **Last Accessed Date**, you can define which files are eligible for Remote Storage. Remote Storage leaves a small placeholder file on the managed volume, which points to the copied file. Although Remote Storage changes the physical size of the file on the local volume, the logical size and the date/time (create, last modified, last accessed) of the file remains unchanged. Because removable tapes in a library are less expensive per megabyte (MB) than hard disks, this can be an economical way to provide both maximum data storage and optimal local disk performance.

Levels of Data Storage

Remote Storage data storage is hierarchical, with two defined levels. The upper level, called *local storage*, includes the NTFS 5.0 disk volumes of the computer running Remote Storage on Windows 2000 Server. The lower level, called *secondary storage*, is on the robotic tape library or stand-alone tape drive. Tape libraries are typically connected to the server computer by a SCSI-2 or SCSI-3 cable connector.

Remote Storage can manage the space on any local NTFS 5.0 volume. Remote Storage supports all SCSI class 4mm, 8mm and DLT tape libraries. However, using Remote Storage with Exabyte 8200 libraries is not recommended. Remote Storage does not support any QIC or mini-QIC tape libraries.

Retrieval of Stored Files

When you need to access a file on a volume managed by Remote Storage, you simply open the file as usual. If the data for the file is no longer cached on your local volume, Remote Storage recalls the data from secondary storage when you first read or write to the file. Because this can take slightly more time than usual, Remote Storage removes the data only from those files on your local volumes that you are least likely to need, based on criteria that you set.

Coordination with Other Tools

Remote Storage uses Windows 2000 Removable Storage Manager (RSM) to access the applicable tapes contained in libraries. Remote Storage also works with Windows 2000 Backup to correctly handle data recovery. Files copied to Remote Storage tapes can be catalogued and recovered using Windows 2000 Backup.

Note that Remote Storage is not a substitute for proper backup procedures. The server administrator should have a regular schedule of full and incremental backups for backing up the server's local volumes. In addition, the administrator should backup the Removable Storage Manager database and Remote Storage database regularly. For more details see online Help for Remote Storage.

Remote Storage also provides certain data recovery features, including the ability to generate multiple copies of data in secondary storage. Remote Storage can generate up to three media copy sets for the master media set, and the master media can be regenerated from its media copy. A media copy set should be updated and taken offline every time a full backup is done, and added to the backup set. This protects the data stored on Remote Storage media.

Walkthrough Procedures

The remainder of this paper provides sample procedures or pointers to sample procedures documented in online help that demonstrate what the administrator needs to do to use Windows 2000 Remote Storage. These are intended for your use when evaluating hierarchical storage management needs. Please walk through these examples sequentially. As you work through the procedures, use copies of real data. Do not use original data.

ADMINISTRATIVE WALKTHROUGHS

Prerequisites

Before setting up Remote Storage, you should make sure that the following tasks are completed.

1. Verify that you can log onto the server with administrative privileges.
2. Prepare the computer that will be managed by Remote Storage by installing Windows 2000 Server on it. Make sure that there are at least two volumes that you can manage using hierarchical storage management (HSM).
3. Go through online Help to learn about Remote Storage. To do this, from the Start menu, select Help and then choose the section "Storing Data" and the Help topic "Remote Storage."
4. Verify that you have a supported tape device on the system. Look at the hardware compatibility list for tape changers supported by Removable Storage. Of these, Remote Storage can use any 4mm, 8mm, or DLT tape libraries. Verify that Removable Storage Manager snap-in can see your tape changer.
5. Use the Removable Storage Manager snap-in to verify that storage tapes are available in the Free media pool.
6. Use NTFS to format or convert any volumes that will be managed by Remote Storage.
7. If you intend to use content indexing, set up indexing on this server beforehand.
8. If you intend to use compression on volumes, compress the volumes beforehand.
9. Ensure that the volumes to be managed are being backed up at regular intervals. Also ensure that the system volume on the server is also being backed up because it contains the metadata databases for both Removable Storage Manager and Remote Storage.

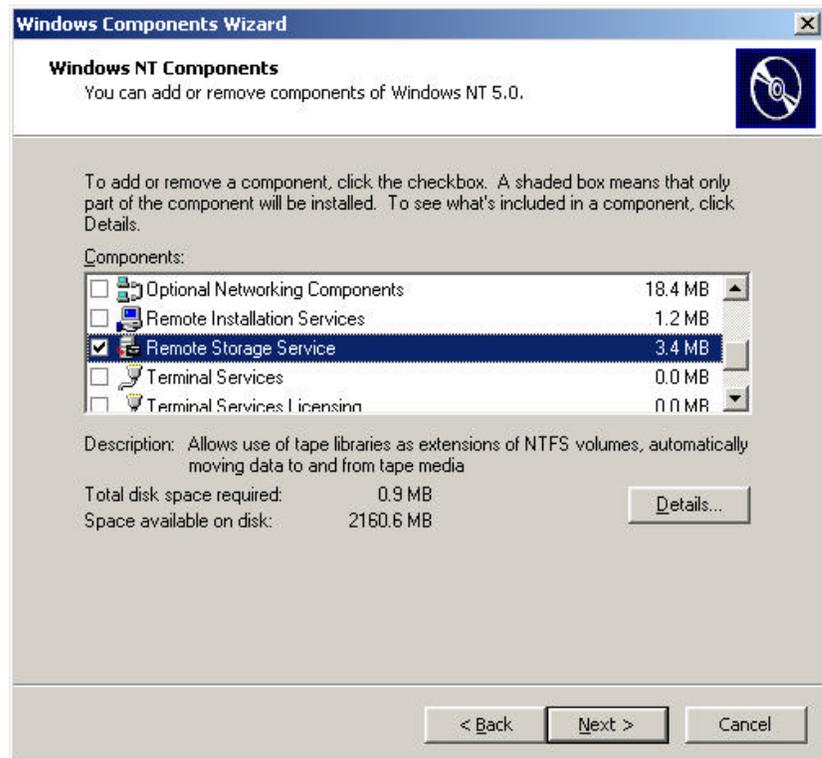
Installing Remote Storage

After you complete the steps above, install the Remote Storage service as explained next.

To install Remote Storage

1. From the Start menu, point to **Settings**, and then click Control Panel.
2. Click the **Add/Remove Programs** icon.
3. Select **Add/Remove Windows Components** in the left frame. This starts the Windows Component Wizard. Click **Next** on the first wizard page.

4. Select **Remote Storage Service** on the next wizard page, and then click **Next**.



5. The wizard runs through various optional components, configuring the components. It displays a **Files Needed** dialog to ask for a path to the program files. Enter the path to your Windows 2000 installation directory. The files are then copied to your system.
6. Click the Finish button on the final wizard page.
7. You will be asked to restart your computer to complete installation. Click **Yes** to restart your computer.
8. After you restart, run the Remote Storage Setup Wizard.

Setting Up Remote Storage Service

The Remote Storage Setup Wizard starts the first time you open the Remote Storage Administration snap-in.

To open the Remote Storage snap-in and set up Remote Storage services

1. From the **Start** menu, point to **Programs**, then point to **Administrative Tools**, and then click **Remote Storage**.

The Remote Storage Administration snap-in starts.

2. Click the **Remote Storage** node. This starts the Remote Storage Setup Wizard.



3. The first wizard page gives you an introduction to Remote Storage. Read this and click **Next**.
4. The wizard verifies that you have the administrative privileges needed to set up Remote Storage and determines whether a supported device type and media are available to hold data in Removable Storage. Enter all requested information. Click **Next**.
5. Select the buttons that define whether you want to use Remote Storage to manage all volumes or to manage selected volumes only. If you choose to manage selected volumes, use the checkboxes to select the volumes you would like to manage. After you select the volume(s) to manage click **Next**.

Caution: Be careful when migrating a system volume. If you choose to migrate a system volume to Remote Storage, do not be aggressive with the file criteria that you choose in the next step.

6. Specify the file criteria that Remote Storage uses to manage the selected volumes. For **Desired Free Space**, choose the percentage of total volume

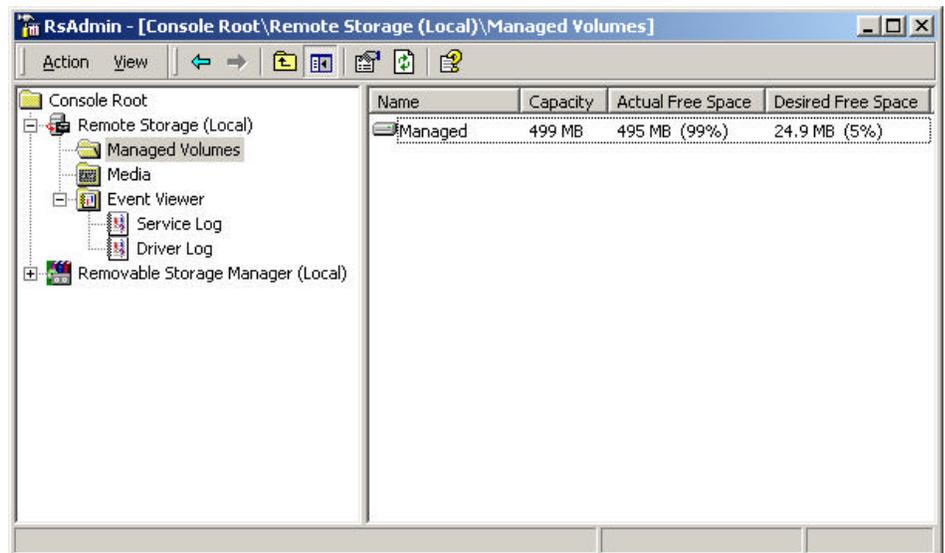
space that you would like to maintain as free space on the volume. Then, select the settings used to determine which files are eligible for copying to Remote Storage. Select a minimum file size and specify how old the file should be before it is copied to Remote Storage. Click **Next**.

7. Select the media type to use as Remote Storage media. Click **Next**.
8. Select the schedule to use for managing volumes. Remote Storage runs a job on this schedule to identify all files on the system that meet the management criteria and copies these files to Remote Storage. (Note that the space in these files is not freed during migration. When the space is actually needed, a truncate job frees up the space by deleting the data in these files.) After you define the schedule click **Next**.
9. The final Remote Storage Setup Wizard page shows a summary of the proposed configuration. If you need to edit your selections, click the **Back** button to return to the page you need to change. Click **Finish** to accept the settings.

The Remote Storage Administration (RsAdmin) snap-in is now configured and ready for use.

Using the Remote Storage Administration Snap-in

The Remote Storage Administration snap-in is used to configure and control the application. If you expand the Console Root and Remote Storage, you have access to Managed Volumes, Media, and the Event Viewer. The Removable Storage Manager is also accessible from this snap-in. Each of these areas is described below.



Managed Volumes

The Managed Volumes folder displays all configured managed volumes and

provides the volume name, capacity, actual free space, and desired free space.

Media

The Media folder shows any pieces of media in the Remote Storage Pool and gives the media name, description, capacity, free space, and status. When you first begin using Remote Storage, this folder is empty. Media is allocated as soon as a migrate job runs.

Event Viewer Logs

The Event Viewer is specific to Remote Storage, providing a service and driver log filtered for Remote Storage events.

Removable Storage Manager

The Removable Storage Manager snap-in is in the same Console Root as Remote Storage and provides information about the media pools, media physical location, drives, off-line media, as well as the work queue and operator requests.

Changing Remote Storage Settings on a Managed Volume

The volume you are managing should already be filled with data. If not, fill the volume with data before proceeding. Data is managed according to last access date, size and desired free space. You can change these settings for a managed volume.

To change a Remote Storage setting

1. Select **Managed Volumes**. A list of previously configured volumes appears in the right pane.
2. Right-click a specific volume, and select **Settings**.
3. The **Settings** tab appears. You can now change the setting you previously established for desired free space and file criteria for management (size and age of a file).
4. Make your changes, and then click **OK**.

Note: When data is copied onto the disk, the last access date will change to the current date. If all of the data on your disk is data that is copied new, change the remote storage setting for File Criteria Not accessed in to 0 days so that the data on the volume will meet the criteria for migration. Do not choose such aggressive migration criteria if the volume is the system volume or the volume already had data that has aged.

Adding Include/Exclude Rules

The administrator specifies the eligible files for management by setting include/exclude rules. For example, the rules **Exclude *.*** and **Include \PROG*.EXE** cause the file `\prog\test.exe` to be included and `\test.exe` to be excluded. There are some default rules used to exclude Windows 2000 system files and files used by Windows 2000 Explorer.

To add a file rule

1. Open the Remote Storage Administration snap-in from the console root.
2. Double-click **Remote Storage** (computer name), and then select **Managed Volumes**.
3. In the details pane (right windowpane), right-click the applicable volume, and select **Include/Exclude Rules**.
4. On the **Include/Exclude** tab, select **Add**.
5. In **Path**, type the full path to the file.
6. In **File Type**, type the file name extension.
7. To exclude files when the rule is applied, select **Exclude matching files**. To include files when the rule is applied, select **Include matching files**.
8. To apply the rule to any files stored in subordinate folders, select the **Apply rule to subfolders** check box.

To change or delete a file rule

1. Open the Remote Storage Administration snap-in, from the console root.
2. Double-click **Remote Storage** (computer name), then select **Managed Volumes**.
3. In the details pane (right windowpane), right-click the applicable volume, and then select **Include/Exclude Rules**.
4. To edit a rule, select the applicable rule, and then click **Edit**.
5. In the Edit **Include/Exclude Rule** dialog box, change the settings as required, and then click **OK**.
6. To delete a rule, select the applicable rule, click **Remove** and then click **OK**.

To change priority of file rules

1. On the **Include/Exclude** tab, select the applicable rule.
2. Select the Up arrow to give the rule a higher priority or the Down arrow to give the rule a lower priority.

Running a Remote Storage Copy Job on Demand

Now that you have defined your file criteria and include/exclude rules, you can use Remote Storage too make copies of eligible files. Remote Storage runs a copy process at the schedule you chose when you ran the setup wizard. However, you can run a Remote Storage copy job on demand by using the Remote Storage Administration snap-in

To run a copy job on demand

1. Right-click the desired managed volume.

-
2. Select **All Tasks**.
 3. Select **Copy Files to Remote Storage**.

Note: When a file is copied to Remote Storage, the data is left cached on the local volume until free space is actually needed. When free space falls below the "Desired Free Space" then a Remote Storage "Free Disk Space" thread that periodically monitors free space on managed volumes goes through and deletes cached data on the volume to free up space.

To monitor the status of the job, you can use the Scheduled Tasks tool to monitor the task *RemoteStorageJob_ManagedVolumeLetter_CopyFiles*.

To run the Scheduled Tasks tool

1. On the Start menu, point to **Settings** and then click **Control Panel**.
2. Double-click the **Scheduled Tasks** icon.

You should see a job in the scheduled tasks list that corresponds to the job that you started. The status is **Running**. Once the job completes, the status is cleared.

After the job completes successfully, you can use the Remote Storage Administration snap-in or Windows 2000 Explorer to view the statistics of Remote Storage managed volumes.

To view statistics for a managed volume

1. Start the Remote Storage Administration snap-in.
2. Right click the managed volume.
3. Select **Properties**.

These statistics indicate the amount of data in Remote Storage and cached on the volume, as well as the amount of volume free space and capacity.

Running a Remote Storage Free Disk Space Job On Demand

Remote Storage periodically monitors the free space on your managed volumes. If the free space on the volume is less than the desired free space, Remote Storage frees up space on your volume by removing cached data from all files that have been copied to Remote Storage.

To free disk space on demand

1. Start the Remote Storage Administration snap-in.
2. Right-click the managed volume.
3. Select **All Tasks**.
4. Select **Create Free Space**.

Remote Storage creates a task on the server to free all space used by cached Remote Storage data on the volume. To monitor the status of the job, you can use the Scheduled Tasks tool to monitor the task

RemoteStorageJob_ManagedVolumeLetter_FreeDiskSpace. The job status is shown as **Running** until the job completes.

After the job completes, look at the statistics on the volume to see the change in statistics. Also, refresh the Remote Storage Administration snap-in managed volumes pane to see how the free space on the volume has increased.

After a file is copied to Remote Storage and the space used by the file removed from the volume, Windows Explorer displays an icon overlay on a file to show that it is offline.

Viewing Remote Storage Summary Properties

To view the remote storage summary properties

1. Start the Remote Storage Administration snap-in.
2. Right-click the **Remote Storage** node.
3. Select **Properties**, and click the **General** tab.

You should see the status of the Remote Storage service, the number of volumes managed, the number of tape cartridges used, the amount of data that has been copied to Remote Storage and the versions of all services that make up Remote Storage.

4. Click **OK** when you finish viewing the properties.

Changing the Schedule for a Remote Storage Copy Job

When you ran the setup wizard, you chose a schedule for the Remote Storage Copy process.

To change the schedule

1. Right-click the **Remote Storage** node.
2. Select **Change Schedule**.
3. Change the schedule in the page that appears.
4. Select **OK** to apply the new schedule.

Recalling a File from Remote Storage

Remote Storage allows users to recall their remotely stored files whenever necessary.

To recall a file

1. From Windows Explorer, double-click a remotely stored file.
2. A notification window should appear, indicating that Remote Storage is recalling a file from tape. Notice that when a file is recalled, the Explorer's icon overlay is removed.



Changing the Runaway Recall Limit

Remote Storage implements a *runaway recall limit*, which specifies that no more than n number of files can be recalled by a user in a 15-minute interval. The default setting for runaway recalls is 60. This is an administrator-defined setting specified in the Remote Storage Administration snap-in.

To change this setting

1. Start the Remote Storage Administration snap-in:
2. Right-click the **Remote Storage** node.
3. Click **Properties**.
4. Choose the **Recall Limit** tab.
5. Change the **Maximum number of successive recalls** to the number you would like it to be.
6. If you want administrators to be exempt from this limit, then check the checkbox provided.
7. Click **OK**.

Adding Another Volume for Management

Because your walkthrough configuration has two or more volumes that you can manage, you can add a volume to the managed volumes list.

To add a volume

1. Open the Remote Storage Administration snap-in.
2. Expand the **Remote Storage** node.
3. Right-click **Managed Volumes**.
4. Click **New**, and then click **Managed Volume(s)...**
5. This starts the **Add Volume Management** wizard. The first page is a description. Click **Next**.
6. The list box presents all the volumes you can add to the managed list. Choose one or more volumes you would like to manage. Click **Next**.
7. The next page gives you the default settings for managing the volume. Change the settings to the desired settings. Click **Next**.
8. The final page gives a summary of your add volume management selections. Click **Finish** to accept these.

You see that the volume chosen appears in the list of managed volumes.

9. Use the steps described previously to run a Remote Storage copy job on demand and to create free space on demand.

Selecting Multiple Operations on Volumes

The Remote Storage Administration snap-in supports multi-select operations on volumes.

To use multi-select operations

1. Open the Remote Storage Administration snap-in.
2. Expand the **Remote Storage** node.
3. Click **Managed Volumes**.
4. Select multiple volumes: in the right pane, select one of the volumes and then hold the shift key down and click on another volume to extend the selection.
5. Right-click the volume list you selected, and select **Properties**.
6. Click the **General** tab. The statistics you see in the **General** properties page are a combination of the statistics for the individual volumes
7. Try other operations on the multi-selected list, such as running a copy files or creating free space on demand.

Using Windows Explorer to View Volume Properties

You can use the Windows Explorer to view volume properties.

To view the properties

1. Open Windows Explorer by right-clicking **My Computer** and then clicking **Explore**.
2. Right-click one of the volumes being managed by Remote Storage.
3. Click **Properties**.
4. Select the **Remote Storage** tab to see the Remote Storage properties for the volume. You can see the statistics for the volume as well as change the Remote Storage settings for the volume.
5. Change the Remote Storage settings, and then click **OK**.
6. Return to the Remote Storage Administration snap-in, and view the properties on the volume from the snap-in to verify that the properties are changed.

Using the Computer Management Snap-in to View Volume Properties

You can also use the Computer Management snap-in to view the properties of a Remote Storage volume.

To view the properties

1. On the **Start** menu, point to **Programs**, then point to **Administrative Tools**, and then click **Computer Management**. This starts the Computer Management snap-in.
2. Expand the **Storage** node.
3. Select the **Disk Management** node in the left pane.
4. Right-click a volume managed by Remote Storage, either in the Details view or the graphical representation.
5. Select **Properties**.
6. Click the **Remote Storage** tab to see the Remote Storage properties for the volume.
7. You can see the statistics for the volume, as well as change the Remote Storage settings for the volume. Change the Remote Storage settings and then click **OK**.
8. Return to the Remote Storage Administration snap-in, and view the properties on the volume to verify that the properties are changed.

Copying Remote Storage Media

The Remote Storage service provides the administrator the ability to make copies of remote storage media. You can maintain up to three media copy sets for each piece of media.

Producing media copies ensures that a single piece of media has multiple copies available to the administrator for media rotation and offsite storage for disaster recovery in the event of catastrophies such as flood, fire, and so on. In addition, data redundancy is important in case a tape becomes usable. You can remove media sets from changers, and store important data elsewhere if it is used infrequently. You can also store media sets with backup sets, thus providing a full set of managed data for recovery purposes. This is especially important when you consider that maintaining a full backup of Remote Storage files in a tape library is very expensive and time-consuming to produce.

Media copies should be a part of the normal backup procedure for the Remote Storage volume. Whenever data is copied into remote storage, the previous media copy becomes out-of-date and should be synchronized.

Creating and Managing Media Copy Sets

You must have more than one tape drive to create media copy sets. You must use identical media formats and have a blank piece of media for each copy.

To select the number of sets you would like to produce

1. Open the Remote Storage Administration snap-in.
2. Right-click the **Remote Storage** node.
3. Select **Properties**.
4. Select the **Media Copies** tab.
5. Use the control provided to enter the number of media copy sets.
6. Click **OK**.
7. Click **Media**. Additional columns appear in the right pane for the media copies listed. The column reports the synchronization state for each media copy.

To synchronize media copy sets

1. Open the Remote Storage Administration snap-in.
2. Right-click **Media**.
3. Select **Synchronize Media Copies**. This starts the Synchronize Media Copies wizard.
4. The first wizard page is the information page. Click **Next**.
5. From the list box, select the media copy set that you need to synchronize. The media copy for each media in the system corresponding to the copy set you chose is synchronized in one operation. Only one media copy set can be synchronized in one operation. Click **Next**.

-
6. The final wizard page tells you what you have selected. Click **Back** if you need to make changes. Click **Finish** to start the synchronize operation.
 7. This creates and runs the media copies job. You can use the Scheduled Tasks administrative tool to track the progress of the job.
 8. After you create a media copy set, use the Remote Storage Administration snap-in to monitor the copy state of each piece of Remote Storage media.

To monitor the copy state

1. Open the Remote Storage Administration snap-in.
2. Select **Media**.

The column for the synchronized media copy displays the correct state.

Recreating the Remote Storage Master from Media Copies

If a master copy of Remote Storage media is corrupted, use the Remote Storage Administration snap-in to recreate the master from a media copy set.

To recreate the master

1. Open the Remote Storage Administration snap-in.
2. Select **Media**.
3. Right-click the piece of media you would like to recreate.
4. Select **Properties**.
5. Select the **Recovery** tab.
6. Click **Recreate Master**.

Note: If the media copy sets are out-of-date and you recreate the master, you may lose data. Make sure to synchronize the media copies on a regular basis.

Using Windows 2000 Backup to Restore Files from Remote Storage

Remote Storage supports Microsoft tape format (MTF). If a disaster occurs and normal file system backups are not available, you can use the Windows 2000 Backup utility to identify all files copied to Remote Storage media.

To identify the files

1. Open the Remote Storage Administration snap-in.
2. Right-click the desired media.
3. Select **Media Copies**. This displays the state of all the media copies of this media.
4. Click **Delete Copy 1**.

Note: When you delete the media copy, the physical tape under Removable Storage is set to Idle, Available. The copy is accessible to Remote Storage and must be regenerated.

5. Open the Removable Storage Manager.
6. Click **Media Pool**.
7. Double-click the **Remote Storage Media Pool**.
8. Copy the media you would like to restore files from; this is the media that is set to **Idle Available**.
9. Double-click the **NTBackup Media Pool**. If this pool doesn't exist, create it as follows:
 - On the **Start** menu, point to **Programs**, then point to **Accessories**, and then click **System Tools**.
 - Click **Backup**, which creates the NTBackup media pool.
10. Paste the media into the **NTBackup Media Pool**.
11. If you haven't run Windows 2000 Backup, then run the program as follows:
 - On the **Start** menu, point to **Programs**, then point to **Accessories**, and then click **System Tools**.
 - Click **Backup**.
 - Click **Restore**. This starts the Restore wizard.
 - Click **Next**.
12. Catalog the Remote Storage tape.
13. After the initial catalog completes, choose the last backup set in the list to get the latest Remote Storage databases and most recent backup set to get copies of modified files.

Backing up Remote Storage Files

All files that are managed by Remote Storage have a reparse point on them. The reparse point provides the mechanism linking the current location of the file to the copy location on tape. These files must be protected by Backup. The protection of remote storage data should also encompass a regular plan for making media copies of Remote Storage master media. This approach provides the greatest recoverability of data associated with Remote Storage.

There are two methods that you can use to backup Remote Storage data: you can backup only reparse points or you can backup the complete file. The first method of backup provides a backup of the reparse point data on a volume, as well as all of the files that are not managed by Remote Storage. This is the default behavior of Windows 2000 Backup. Use the second method when you need to make a full copy of the files in Remote Storage. You should use this approach sparingly as it can take a long time to recall all of the files in Remote Storage.

To recover managed files from the system backup, perform the same restore operations as you would to restore files that are not managed by Remote Storage. Remote Storage detects when restore operations have occurred and automatically schedules a validate job to run against the restored volume.

Validating Remote Storage Volumes

The backup administrator should validate the Remote Storage databases and current status of copied files after restoring files to a volume or after disk errors on a volume. The validate operation should be run on a regular basis (once a month) to check local storage and to correct any inconsistencies.

To validate a remote storage volume

1. Open the Remote Storage Administration snap-in.
2. Right-click the desired managed volume.
3. Select **All Tasks**.
4. Click **Validate Files**.

Using the Remote Storage Administration Snap-in from the Windows 2000 Professional Admin Pack

The Remote Storage Administration snap-in is provided in the Windows 2000 Professional Admin Pack. This snap-in can be used to remotely manage a Remote Storage Server from a Windows 2000 Professional computer.

To run the snap-in

1. Install Windows 2000 Professional on one of your computers.
2. Install the Admin Pack on the same computer.
3. Ensure that the account that you are logged in has administrative privileges on the Remote Storage servers you are trying to manage.
4. Run the Remote Storage Administration snap-in: from the **Start** menu, point to **Programs**, point to **Administrative Tools**, and then click **Remote Storage**.
5. Click the **Remote Storage** node. A pop-up dialog box appears, asking for the Remote Storage server to manage.
6. Enter the name of the server to manage.

Note: The Removable Storage Administration snap-in is not redirected in this view. This is mentioned in the release notes. You need to open a separate Microsoft Management console, add the Removable Storage Manager, and then redirect it to the server you want to manage. Note also that once you direct the Remote Storage Administration snap-in to a server, you need to close the snap-in and restart it to point it at another server.

Removing Volumes from Management

At this stage, you should remove the volumes for management.

To remove a volume from management

1. Start the Remote Storage Administration snap-in.
2. Expand the **Remote Storage** node.
3. Click **Managed Volumes**.
4. Right-click the volume that you would like to remove from management.
5. Select **Remove...**
6. This starts the **Remove Volume Management** wizard. The first page is the introductory page. Click **Next**.
7. The next wizard page offer you two choices:
 - The default choice is to **Recall copied files from remote storage**. This brings returns all of the data to local storage, and makes the files normal files again. It also removes the volume from Remote Storage management, preventing it from being managed further.
 - The other choice is to maintain copied files in Remote Storage. Files that have been copied to Remote Storage continue to accessible from remote storage. However Remote Storage will not manage the volume and will not copy data from this volume to Remote Storage or maintain free space on the volume.
8. Because you have now two volumes that are managed, choose the default option for this volume. (When you repeat the process for removing the other volume being managed, choose the other option.) Click **Next**.
9. Click **Finish** on the last page to finish removal. The volume is removed from the list of managed volumes.

Uninstalling Remote Storage

To uninstall Remote Storage you must remove all managed volumes (see the previous section), and then remove the Remote Storage service.

To remove the Remote Storage service

1. On the **Start** menu, point to **Settings**, and then click **Control Panel**.
2. Click **Add/Remove Programs**.
3. Select **Add/Remove Windows Components** in the left frame. This starts the Windows Component wizard. Click **Next** on the first wizard page.
4. Clear the **Remote Storage** selection on the next wizard page, and then click **Next**.

The wizard runs through various optional components to configure the system.

If it finds any remotely stored files on the volumes on your computer, a dialog box displays to inform you where the files were found. This could happen if you removed a volume from management without recalling the files. The dialog box asks you whether you want to remove the Remote Storage service program files or remove both the program files and the remotely stored files that were left behind on the volume. If you choose to remove the program files only, you will be able to access the remotely stored files if you later reinstall the Remote Storage service.

5. Select the option to Remote Storage program files only, and click **OK**.
6. The wizard removes the remote storage program files and displays a progress bar. Then it presents a status page. Click **Finish** on this page.
7. You will be asked to restart your computer to complete installation. Click **Yes** to restart your computer. You must restart your computer for the changes to take effect.

FOR MORE INFORMATION

For the latest information on Microsoft Windows 2000 network operating system, visit our World Wide Web site at <http://www.microsoft.com/windows/server/> and the Windows NT Server Forum on the Microsoft Network (GO WORD: MSNTS).

For the latest information on the Windows 2000 Beta 3, check out the World Wide Web site at <http://ntbeta.microsoft.com>.

Before You Call for Support

Please keep in mind that Microsoft does not support these walkthroughs. The purpose of the walkthroughs is to facilitate your initial evaluation of the Microsoft Windows 2000 features. For this reason, Microsoft cannot respond to questions you might have regarding specific steps and instructions.

Reporting Problems

Problems with Microsoft Windows 2000 Beta 3 should be reported via the appropriate bug reporting channel and alias. Please make sure to adequately describe the problem so that the testers and developers can reproduce it and fix it. Refer to the Release Notes included on the Windows 2000 Beta 3 distribution media for some of the known issues.