

# Win2000: Remote Storage Services

*Once enabled, Remote Storage makes it possible to migrate files from relatively expensive online storage to cheaper offline media, such as standalone tape drives or automated tape libraries.*

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From servers to desktops to notebooks, hard disk storage has never been so vast or affordable. Be that as it may, storing the entire data content of a medium-sized to large company on fixed hard drives is still far from cheap. One way to reduce the total cost of ownership is to store seldom-used data to another medium, such as tape. Tape has always been a popular media for backups, and in terms of cost per megabyte it is likely to remain so for some time to come. Hence, companies that regularly save vast amounts of information can use tape to reduce the total cost of ownership. This is typically achieved with the help of a Hierarchical Storage Management (HSM) system. HSM solutions are designed to reduce storage and administration costs, while keeping less-frequently used data available on backup storage media. Typically, an HSM system can free up valuable hard disk space by moving data that has not been accessed within a user-specified time period to a slower but less costly storage device.

## Advances

At first glance, HSM might seem like overkill for many small to medium-sized enterprises; however, recent advances in robotics has brought automated tape libraries to within easy reach of the average IT department. Microsoft recognised this fact, and tasked HighGround Technologies ([www.highground.com](http://www.highground.com)) with producing an HSM product for Windows 2000. The result is Remote Storage Services (RSS), so-called because it contains a combination of four services that collectively provide HSM support. It should be pointed out, however, that RSS only comes as standard with server versions of Windows 2000. Users of Windows 2000 Professional can make use of it as clients only. It is also worth noting that, unlike some proprietary HSM systems, RSS storage is limited to just 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, known as secondary storage, is on the robotic tape library or standalone tape drive.

In the case of end-users (depending on the speed of the tape unit and the number of files involved) deploying RSS often makes little apparent difference, with only the more observant users noticing that icons of offline files are marked in Explorer with a small clock in the bottom left corner.

## Four RSS Services

The four Remote Storage Services consist of:

- The Remote Storage Engine - which helps to coordinate the services and provides the interface for the admin console, Rsadmin.exe.
- The Remote Storage File System Agent - which filters files for the Remote Storage system.
- The Remote Storage Subsystem - which manages the media required for RSS.
- The Remote Storage User Link - which acts as a client interface.

RSS should not be confused with another Windows 2000 feature, the Removable Storage Management (RSM) service. Typically, RSM is used by the system to initiate media cleaning cycles, and control and maintain media libraries such as tape libraries and CD-ROM jukeboxes, for example. Remote Storage also takes advantage of RSM to shuffle media into and out of its tape library and to call up new media from the offline pool.

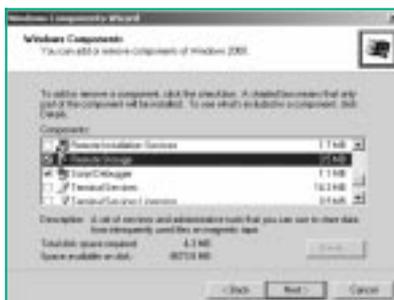


Figure 1 - Click the checkbox to install Remote Storage Services.

## Caveats

Unlike some alternative HSM solutions, Microsoft recommends its Remote Storage feature to be used on 4mm, 8mm, or Digital Linear Tape (DLT) tape libraries only. Note that Exabyte 8200 libraries are not recommended. RSS does not support quarter-inch cartridge (QIC) or mini-QIC tape libraries. Removable drives such as magneto-optical (MO) drives, CD-R drives, and Zip and JAZ drives are not (officially) supported either. Note that Remote Storage can manage files on NTFS 5.0 volumes only. This is because RSS uses reparse points, a fundamental component of the NTFS 5.0 specification. Reparse points act as soft links to other points on the file system, and enable Remote Storage to point to the exact location of the offline files. Although reparse points can be used by other applications or services, the downside in this case is that their employment effectively stops the migration of files held on older NT shares.

Though coordinating Remote Storage and normal backups from one tape device on a single server is possible, usually it is better to employ two tape units (one for each task) or use two servers (one for RSS and one for backups). Naturally, RSS should not be considered a replacement for performing normal backups. That said, certain data recovery features are provided by RSS, including the ability to generate multiple copies of data in secondary storage. Up to three media copy sets can be generated for the master media set, and the master media can be regenerated from its media copy. Generally speaking, it is good practice for media copy sets to be updated and taken offline every time a full backup is performed, to help safeguard offline files. To reinstall Windows on a system that contains offline files, administrators must first re-create the original volumes, recover the Remote Storage databases, and then remount the original tapes before files can be accessed.

One further point: applications such as the notorious FindFast sometimes scan files by opening them. If such an application attempted to scan too many offline files at once then the system could literally be overcome with recalls. All told, very few systems actually gain anything from using FindFast, while a great many systems can be improved upon by having it disabled. Thus, administrators who enable RSS should almost certainly disable FindFast.

## Installation

Like so many other Windows 2000 features, Remote Storage is not a default option during the standard Windows 2000 Server installation procedure. Fortunately, provided the original Windows 2000 Server CD is available, setting up RSS manually and performing an initial configuration is a fairly simple task.

Here is how it is done. Insert the Windows 2000 Server CD into the CD-ROM drive,



Figure 2 - Adding a volume for Remote Storage to manage.

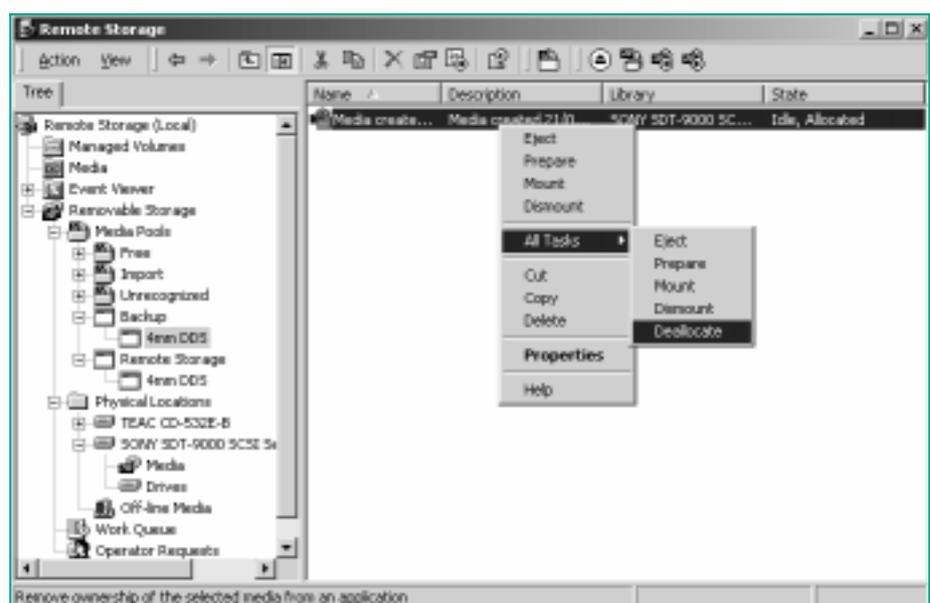


Figure 3 - De-allocating media previously used by Backup.

go to the Control Panel, double-click the Add/Remove Programs icon and select Add/Remove Windows Components from the left pane of the window displayed. This fires up the Windows Component Wizard. Select the Remote Storage option (see Figure 1), and click Next to install the RSS drivers and configure registry entries. Click Finish to close the wizard and click Yes to restart the computer. When the system is back up and running, administrators will need to configure RSS to best manage the space on volumes local to the server. In order to do so, launch the Remote Storage console by selecting Start, Programs, Administrative Tools, Remote Storage. Note that the first time this console is run it invokes the Remote Storage Setup Wizard.

At the Welcome screen, click Next. After checking that the computer meets certain requirements, such as administrative privileges and the presence of suitable offline storage media, RSS opens the Volume Management window. The most important thing to remember here is that, while RSS can manage the space on any local NTFS 5.0 volume, administrators should avoid selecting the system/boot drive and opt to manage data volumes only. Failure to do so could eventually lead to operating system DLLs and other executables being migrated to tape. Select a drive to manage (see Figure 2) and click Next. The Volume settings window opens to display the default migration values for the managed volumes. RSS copies the data in these files offline and leaves a cached copy of the data behind in the files on the managed volume. Bear in mind, though, that programs that make use of the file size, such as Disk Quota, are not affected by RSS operations.

The default number for the Desired Free Space value is 5% free space. Depending on the system, however, this figure can be on the low side. Increasing this figure to around 15% is generally more acceptable since it leaves room on the disk for reading large files back from tape. Notice also that it is possible to increase the minimum size of files to be copied, and to change the number of days before files that have not been accessed are copied to Remote Storage.

Click Next to open the Media Type window. Assuming one or more tape systems are installed on the server, select the unit to be employed by RSS and click Next. This opens the Schedule For Copying Files window. The default is to copy files at 2 am every day, though this setting can be changed via the Change Schedule button. Note that multiple schedules can also be configured. Click Next to display a summary of chosen options, and click Finish to accept the settings. This action closes the wizard and opens a new Microsoft Management Console (MMC), called the Remote Storage console.

### **The Console**

A close look at the Remote Storage console should reveal not one console but two: the Remote Storage snap-in and the Removable Storage snap-in. The latter is required to manage Remote Storage media. An Event Viewer is also available from here and helps to simplify the task of monitoring and gathering information about problems relating to the two services.

Before media can be used for Remote Storage, it must be assigned to the Remote Storage media pool. This applies to new media and to media previously used by the Windows 2000 Backup utility. Be warned, though, that Backup media must be de-allocated from its prior assignment before it can be used for Remote Storage. To de-allocate Backup media, insert the media and expand the Removable Storage tree. The media will be listed in the right pane of the window under Backup. Right-click the media name, and from the fly-out menu select All Tasks, Deallocate (see Figure 3). Click Yes to acknowledge a message that the action will cause loss of data on the media, click Yes in response to a similar warning and to de-allocate the media. Note that, in the right pane under the State column, the media will now show the message "Idle And Available". The media is now ready to be assigned to the free media pool. Right-click the Media icon and select Prepare from the fly-out menu. Click Yes to acknowledge the message that all data on the media will be destroyed, then click Yes to confirm. This action is sufficient to write a Free Media label to the tape and move it to the Free section of the media pool. The tape is now ready to begin storing files offline.



Figure 4 - The Properties window for a managed volume.

### **Moving Files Offline**

The next step is to define the type of files to be stored offline. Right-click a managed volume and select Include/Exclude Rules from the fly-out menu. This opens the

Properties window for the managed volume (see Figure 4) and includes three tab options: General, Settings, and Include/Exclude Rules. The General and Settings tabs are used to change entries made with the Remote Storage Setup Wizard. From the Include/Exclude Rules tab, click Add and enter the path and file extensions of any files required for inclusion or exclusion in Remote Storage. For example, it is possible to exclude .exe and .dll files from offline storage, and include only .doc and .pdf files. Note that rules are read from top to bottom and that rules in a folder take precedence over rules inherited from the folder's parent.

The Remote Storage Console also makes it possible to manually control migration jobs. To initiate a file copy to offline storage, right-click the Managed Volume and from the fly-out menu select All Tasks, Copy Files To Remote Storage. Click OK to begin the process. Unfortunately, administrators will not be able to monitor offline migration from here. To keep an eye on things they will need to head for the Scheduled Tasks administrative tool, which is accessed via the Control Panel. The Scheduled Tasks window shows which Remote Storage tasks are scheduled, and their status. To discover additional details about the task and to apply further settings, right-click a scheduled task and select Properties from the fly-out menu.

Returning to the Remote Storage Console we note that, among the other options available from here, the Runaway Recall limit is worth getting to know. The Recall Limit places a maximum value on the number of files an individual user can recall during the same session. This option is extremely useful, because a low value can stop users from accidentally recalling dozens of offline files and thereby overwhelming the target disk. The default maximum number of successive recalls is set quite high at 60, though this default number can easily be changed. Right-click the Remote Storage icon at the top of the tree and select Properties from the fly-out menu. Select the Recall Limit tab and enter a more conservative number, such as 30, for example. At the same time it is a good idea to check the Exempt Administrators From This Limit option, but remember to warn other administrators of the danger of an inadvertent mass recall.

### Removing Data Volumes

For various reasons, there may come a time when Remote Storage is not required on a volume. Be warned, though, that while it is possible to leave the remote files on tape, the RSS databases must be left intact, since recovering remote files without them is difficult. To remove a volume or cancel Remote Storage for a volume, return to the Remote Storage Console and click Managed Volumes. Right-click the volume in question and select Remove from the fly-out menu. This opens the Remove Volume Management Wizard. Click Next and the Removal Options window appears. There are two options:

- **Maintain Copied Files In Remote Storage.** This option leaves the remote files on tape, but removes the selected volume management. Although remote files can still be recalled, no more files are migrated to tape on that volume.
- **Recall Copied Files From Remote Storage.** Use this option to move the data held on Remote Storage back to the volume and to cancel Remote Storage management of the volume.

Select the required option and click Next. Click Yes to confirm, and click Finish to close the window and return to the console.

### Conclusion

It is reasonable to assume that the majority of small companies running modest servers will have little to gain from using Remote Storage, and in such cases simply adding another disk drive will be the more cost-effective option. That said, RSS is relatively easy to put to work and manage, and many medium to large organisations could certainly benefit from its use. All told, then, RRS is not for every company, but it will be extremely cost-effective for many.

**PCNA**

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Latest application compatibility information.

[www.microsoft.com/windows-2000/compatible](http://www.microsoft.com/windows-2000/compatible)

Step-by-step guides to Windows 2000 features and services.

[www.microsoft.com/Windows-2000/library/planning/walk-throughs](http://www.microsoft.com/Windows-2000/library/planning/walk-throughs)

Resource kits, including troubleshooting guides.

[www.microsoft.com/WINDOWS-2000/library/resources/reskit/](http://www.microsoft.com/WINDOWS-2000/library/resources/reskit/)

Provider of HSM solutions.

[www.computerassociates.com](http://www.computerassociates.com)

Manufacturer of online and offline media.

[www.seagate.com](http://www.seagate.com)

Alternative provider of HSM software.

[www.veritas.com](http://www.veritas.com)

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