Maintaining System and Data Availability on a Microsoft Windows NT Network

By Stephen Force

R egardless of what you read in some computer industry trade magazines, Microsoft's Windows NT is a powerful, robust and stable 32-bit operating system. It is here to stay. Installing Windows NT is simple. Networking Windows-based systems to Windows NT is straightforward and easy.

Those charged with Windows NT data administration can breathe a sigh of relief. Unlike other operating systems on the market, backing up data on a Windows NT system is remarkably easy, logical and intuitive. Because Windows NT is a true multi-tasking system, the backup task can safely run in the background.

Backups Available for Windows NT

The following backups are available on Windows NT.

■ **Normal** - Back up, and mark as such, all selected files on the disk. A normal backup is synonymous with full backup.

■ **Copy** - Back up, but do not indicate as such, all selected files on the disk.

■ **Incremental** - Back up, and mark as such, only those selected ranges of files which have been modified.

■ **Differential** - Back up, but do not indicate as such, only those selected ranges of files which have been modified.

■ **Daily** - Back up, but do not mark as such, only those selected files that have been modified that same day on the disk.

This article briefly describes how to install, implement and use data backup and recovery utilities provided by Microsoft's Windows NT and a commonly available tape drive: the Colorado Memory Systems Jumbo 250. These procedures can also be used to maintain data availability in Windows NT and Windows for Workgroup (WFW) 3.11 networking scenarios. Finally, the article describes how to create, test and use recovery diskettes in case of an emergency.

Setting Up Tape Drives in Windows NT

Most commonly available tape drives are supported out of the box by Windows NT. This avoids obtaining the tape driver from the vendor. Normally, if the tape drive was installed and properly configured when Windows NT was

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initially installed, no further work is necessary. The Windows NT install process "learns" the hardware configuration and, if it can identify the hardware device, will install the proper driver and configure the appropriate software component.

If you must later add or remove a tape drive from your system, Windows NT must be reconfigured. This is done by choosing the appropriate Add/Remove command from the Options menu in the Windows NT setup object. Only members of the administrator's group are authorized to make these changes.

To add a driver for a tape drive:
1. Choose Add/Remove Tape Devices from the Options menu in Windows NT setup.
2. Follow the instructions as they are presented on the screen.
3. When driver installation is complete, choose Continue to return to Windows NT setup.

Windows NT must be rebooted for these changes to become active. When ready to reboot Windows NT, do so by choosing Shutdown from Program Manager's file menu. Do not hit the power/off switch. This can corrupt the Windows NT system. Use the normal shutdown procedure.

Backing Up Disk Files to Tape

Data is the most important resource on an enterprise network. It is critical to create backup policies for disaster avoidance rather than just recovery.

Adopt your enterprise data policy into your Windows NT backup procedures. If there is no enterprise data policy, it behooves you to create one.

Choosing Files to Back Up

Choosing files for back up is like working with Windows File Manager. You can select either all the files on a disk or individual files only, as in File Manager. Once the files are selected, click on the toolbar Check button to select each file's checkbox. Click on the checkbox for each filename.

Normally, all disk drives mounted by the Windows NT system are open when activating the Backup program. If the desired drive file window is not open, open it by either double clicking on the Drives icon or choosing Drives from the Windows menu.

Disk and Tape File selection windows are organized the same as in File Manager, with the same options for viewing the directory tree structure, and directory and filenames list.

To back up all the files on a disk:

1. Open the desired source drive window (described previously).
2. From the Select menu, choose the Check command or the toolbar Check button. In the Drives window, select the checkbox for the appropriate disk drive.

To select individual files:

1. Open the Disk File Selection window.
2. To choose a few files, select the checkbox for each filename. To choose several files, select the first filename and do one of the following:

■ press and hold down the shift key and select the last contiguous filename.
■ drag the mouse to the last contiguous filename.
■ press and hold down the ctrl key and select each noncontiguous filename.

3. Choose the Check command from the Select menu, or the Check button on the toolbar to select each files's checkbox.

Several disk drives can be chosen. All selected disk drives and directory checkboxes have a gray background.

Setting the Tape Options

After making the backup selections, select the Backup command from the Operations menu to open the Backup Information dialog box. If there is any previous information stored on the tape in the tape drive, the upper section provides information on this tape. You can then choose whether to append the newly selected backup set or overwrite the old set with the new.

For confirmation that the tape was accurately backed up, click on the Verify After Backup checkbox. To add a copy of the Windows NT registry files to the backup set, click on the Backup Local Registry checkbox.

Using Batch Files to Perform Back Ups

For those who prefer to work from the command line, Windows NT provides most of the same functionality as the graphical user interface (GUI). Batch files are useful for automated backup routines.

Sometimes, although rarely, Windows NT does not start properly. Before taking drastic measures, do everything possible to determine what is wrong. Often, the problem is simple and easily solved.

Figure 1 is an example of a command line back up. This totally backs up drives C and D and verifies the data being backed up. Also, it labels both backup sets with a "Full Disk Backup" description, and logs the backup results to a disk log file titled, "C:\TAPELOG\BKUP.TXT."

Restoring Tape Files to Disk

To restore backed up files, Windows NT provides a Restore command giving access to tapes, backup sets and files for restoring as needed.

According to Microsoft, restoration policies for everyday maintenance, as well as disaster recovery, are just as important as backup policies. Practice ahead of time on spare drives, though, so there is no risk to real data. Also, periodically perform trial restorations to check whether or not files have been backed up properly. These verification restores can check for possible hardware problems that do not appear with the software or whose symptoms are not easily recognized. For this reason, also keep a backup status log and check it regularly for error messages.

It is imperative to know how data is backed up for successful file restoration. If the backup method chosen was either differential or incremental, first restore the selected files from the most recent normal backup, then from all subsequent incremental backups of those files. Only

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"GOOD NEWS! I'VE FOUND A WAY TO STORE TWICE AS MUCH GOBBLEDYGOOK ON ONE DISK!"

then can the most recent differential backup be performed after the last incremental backup is restored. Any other restoration order will guarantee improper data in the file system.

The Windows NT Backup program places the following information on each tape:

■ user-specified tape name;
■ an original tape creation date plus the date and time each backup set was created;
■ the Windows NT system name and name of the user who created the tape; and
■ tape sequence number (for multitape backup sets).

Choosing Restore Parameters

Depending on which files have to be restored, one can choose to restore either the current tape, one or more backup sets, or individual files. To choose the necessary file restoration procedure, open the Tapes window and make selections the same way you did for file backup.

Windows NT writes all catalog information on the corresponding tape for that backup set. Files backed up as family sets will have the information written on the last backup tape associated with this family.

The tape name appears in the left panel of the Tapes window to the right

of each tape icon. The following information is shown in the right panel of the Tapes window:

■ disk drive backed up;
■ backup set number;
■ tape number and what number is a set of tapes;
■ backup type;
■ date and time of backup; and
■ description of backup (if one is provided at backup time).

Only information on the first backup set appears in the right panel after backup tape insertion. For total tape restoration, first load the tape's catalog to display a list of any other backup sets. For

files associated with each backup set, load the individual catalogs for each backup set.

Here is how the catalog of the backup sets on a tape are loaded:

1. In the Tapes window, select the tape whose catalog is to be loaded.

2. Double click that tape's icon. Or, from the Operations menu, choose Catalog (or choose the Catalog button on the toolbar.)

The catalog status dialog box appears and provides the option of stopping the cataloging process.

A complete list of backup sets appears in the Tapes window with question marks displayed in each of their icons to show their individual catalogs have yet to be loaded.

Here is how to load an individual backup set catalog:

1. Select the backup set whose catalog is to be loaded from the Tapes window.

2. Double click on that backup set's icon (from the Operations menu, choose Catalog or the Catalog button on the toolbar).

The Catalog Status dialog box will appear. If desired, the catalog information process can be stopped at any time.

A complete directory and file listing in this backup set will appear in the Tape File Selection window. The list in the Tapes window now appears with a "+" in the backup set's icon to show it has been cataloged. Any corrupt files (files not backed up correctly because of an error) and their corresponding directories are marked by an icon with a red X.

File restoration selection procedures are similar to those for file back up. It is important to note, however, that when a tape is loaded, only the first backup set on the tape is displayed until the tape's catalog is loaded. Therefore, the tape's catalog must be loaded first to get the complete list of backup sets prior to multiple file restoration.

Partial Tape and Backup Set Catalog Construction

Some large file system back ups will require several tapes. If a single backup set must be restored from a multitape backup set, you will be prompted to insert the last tape to load the tape catalog information and obtain the complete file backup set list and their corresponding locations. If, for some reason, the last tape in such a group of backup sets is missing or damaged, build a partial tape catalog by inserting the available tapes and loading each tape's catalog of backup sets. If a specific directory is needed from a multivolume (tape) backup set, first load each backup set's catalog of directories and files. Then, select the desired directory from the displayed list.

Emergency System and File System Recovery

Sometimes, although rarely, Windows NT does not start properly. Before taking drastic measures, do everything possible to determine what is wrong. Often, the problem is simple and easily solved.

All backup tapes and critical disks must be stored in a location safe from fire. This could be a fire-proof safe, off-site storage or a bank vault. For small shops or at home, a lesser known but rather ingenious place is in the freezer.
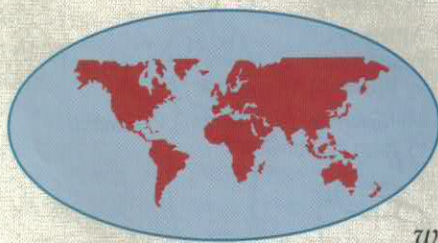
If all other possibilities are exhausted and Windows NT still won't boot, it is time to use the emergency repair disk to recover the system. Use only the emergency repair disk created for your specific computer; otherwise, even bigger problems could occur.

To use the emergency repair disk, run setup as you did when Windows NT was first installed. At the Welcome screen, press R to attempt repairs on a damaged Windows NT system. Setup will ask for insertion of the emergency repair disk. Follow the instructions as they appear on the screen. If it does not recover the system, reinstall Windows NT.

All is not lost, however. Revive the Windows NT environment after reinstallation by restoring the last system backup from your file backup sets. Make sure to restore the files correctly (based upon your chosen backup algorithm), otherwise the restored file system will not be right.

Backing Up Networked Windows NT and/or WFW From a Single Windows NT System

Backing up data from other networked Windows NT and/or WFW systems is just as easy as backing up local data. To back up this data from networked systems:

■ Have authorization access to the file systems to be backed up. This authorization is given by the owning data administrator on the networked source system.

■ "Mount" these disk drives on the target Windows NT backup system.

Once these steps are performed, back up and restore these networked file systems just as if they were local. The command syntax and windows layout are the same as local devices. Remember, however, the network load will be heavily increased. This could impact LAN/WAN performance.

Keep Tapes and Emergency Diskettes in a Safe Place

All backup tapes and critical disks must be stored in a location safe from fire. This could be a fire-proof safe, off-site storage or a bank vault.

For small shops or at home, a lesser known but rather ingenious place is in the freezer. It sounds amazing, but consider this: Household freezers have an Underwriter's Laboratory one-hour fire-proof rating.

Summary

Anyone familiar with Microsoft Windows 3.1 will find Windows NT similar. No substantial retraining is needed to go to the power of Windows NT. Implementing established data availability procedures in the Windows NT environment is straightforward.

No operating system is perfect. Windows NT has, in my mind, one major limitation. The currently available release of Windows NT backup includes no data compression. However, this will most probably be included with future releases.

Microsoft provides adequate documentation with Windows NT. This documentation can be found both in written format (*Windows NT System Guide* provided with the shipped product) and online. Since Windows NT is available on CD-ROM, one can save disk space by leaving this information on CD-ROM and referring to it as needed.

This article introduced the Windows NT backup process. For further information, see the *Windows NT System Guide*. Anyone seriously interested in mastering Windows NT should purchase the three-volume *Microsoft Windows NT Resource Kit*.

Was this article of value to you? If so, please let us know by circling Reader Response Card No. 17.

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