COURSE TECHNOLOGY
CENGAGE Learning

A+ Guide to Software: Managing, Maintaining, and Troubleshooting, 5e

Chapter 4
Maintaining Windows

Objectives

- Learn how to set up and perform scheduled preventive maintenance tasks to keep Windows healthy
- Learn how to prepare for disaster by keeping good backups of use data and Windows system files
- Learn about the directory structures used by Windows and how to manage files and folders
- Learn how to use Windows utilities to manage hard drives

Scheduled Preventive Maintenance

- Preventive maintenance
  - Alleviates slow computer performance
- Tasks
  - Verifying Windows settings
  - Defragmenting the hard drive
  - Checking drive for errors
  - Reducing startup processes to essentials
  - Doing whatever it takes to free up hard drive space

Verify Critical Windows Settings

- Help user by explaining:
  - Automatic Windows updates importance
  - How to manually check for and install updates
- Verify updates and service packs installed
  - Verify Windows Updates is configured correctly
- Reasons automatic updates sometimes not set
  - Slow Internet connection
  - Lack of trust
    - Verify updates before installation
    - Know if update applies to the system

Verify Critical Windows Settings (cont'd.)

- Vista verification steps
  - 1. Verify all service packs installed
  - 2. View updates waiting to be installed
  - 3. Select updates to install
  - 4. Verify Windows installs updates

Figure 4-2 Important Windows updates are not installed. Courtesy: Course Technology/Cengage Learning

Verify Critical Windows Settings (cont'd.)

- Windows XP verification steps
  - 1. View service packs installed
  - 2. View and manually install updates
  - 3. View how Windows XP installs updates
- Windows 2000 verification steps
  - 1. Install updates
    - Click Start and Click Windows Updates
- Verify antivirus software

Clean Up the Hard Drive

- Delete unneeded files occasionally
  - Windows requires some hard drive free space
    - Normal operation, defragmenting drives, burning CDs and DVDs, and other tasks
- Determining hard drive free space
  - Open Windows Explorer
  - Right-click the drive and select Properties
- Using Disk Cleanup utility (Vista and XP)
  - Deletes temporary files
    - Run cleanmgr.exe in Start Search box
    - Use Windows Explorer, Properties box, General tab

Clean Up the Hard Drive (cont'd.)

- Windows.old folder
  - Delete if user no longer needs the data
- Freeing up more Windows Vista disk space
  - Uninstall software
    - Click More Options tab on the Disk Cleanup box
    - Click Clean up in Programs and Features area
  - Delete all but the most recent restore points

Defrag the Hard Drive

- Fragmentation
  - Files fragmented in segments all over the drive
- Reasons to defragment
  - Read-write head moves all over to retrieve a file
  - Data-recovery utilities may not work
- Defragment when user not using the PC
- Vista default
  - Automatic defrag every Wednesday at 1:00 AM
- Defrag a healthy drive with 15% free space

Defrag the Hard Drive (cont'd.)

- Verify Vista default defrag setting or manually defrag

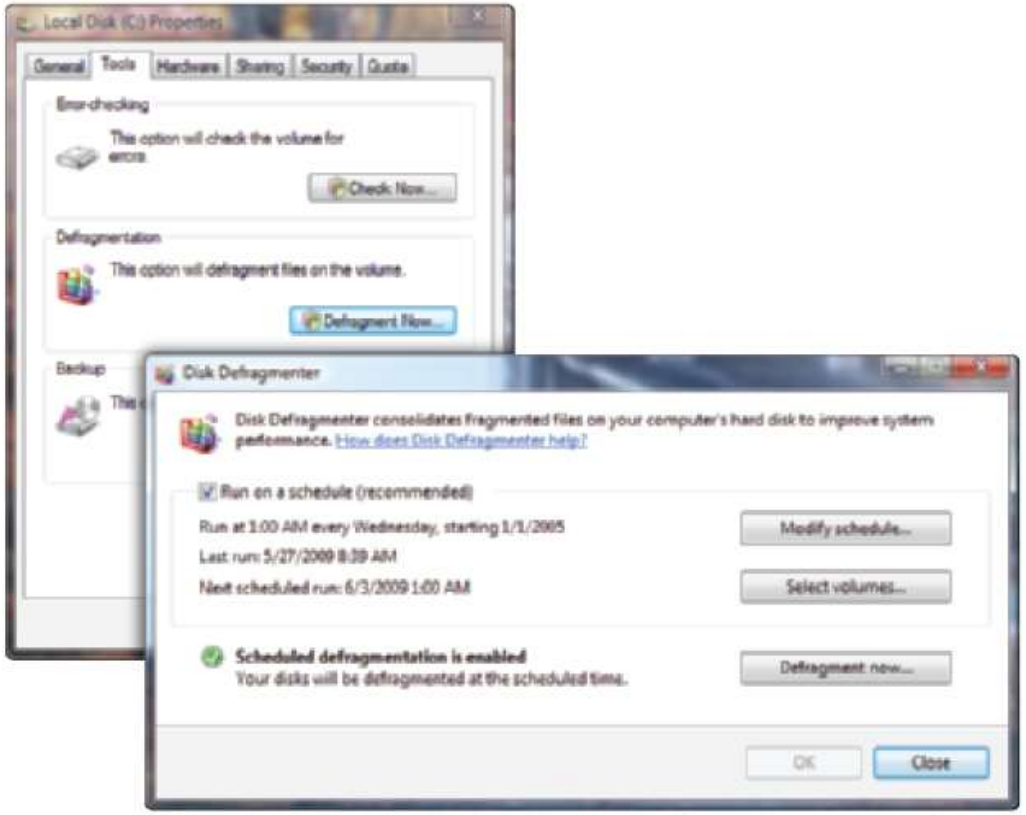

Figure 4-9 The Properties box for a drive allows you to manage the Disk Defragmenter
Courtesy: Course Technology/Cengage Learning

Defrag the Hard Drive (cont'd.)

- Verify XP default defrag setting or manually defrag

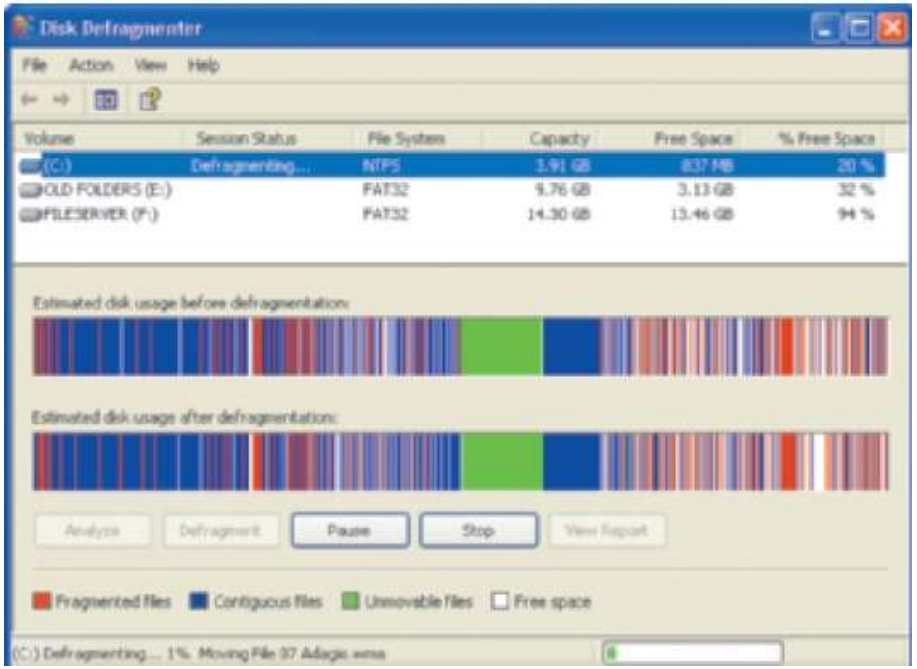

Figure 4-10 Windows XP defragmenting a volume
Courtesy: Course Technology/Cengage Learning

Check the Hard Drive for Errors

- Chkdsk utility
  - Searches for bad sectors on a volume
  - Recovers data if possible
- Error checking and repair time
  - Potentially long depending on drive size and files
- Methods to launch Chkdsk utility in Vista or XP
  - Windows Explorer drive Properties box
  - Chkdsk command in a command prompt window

```
chkdsk c:/r
```

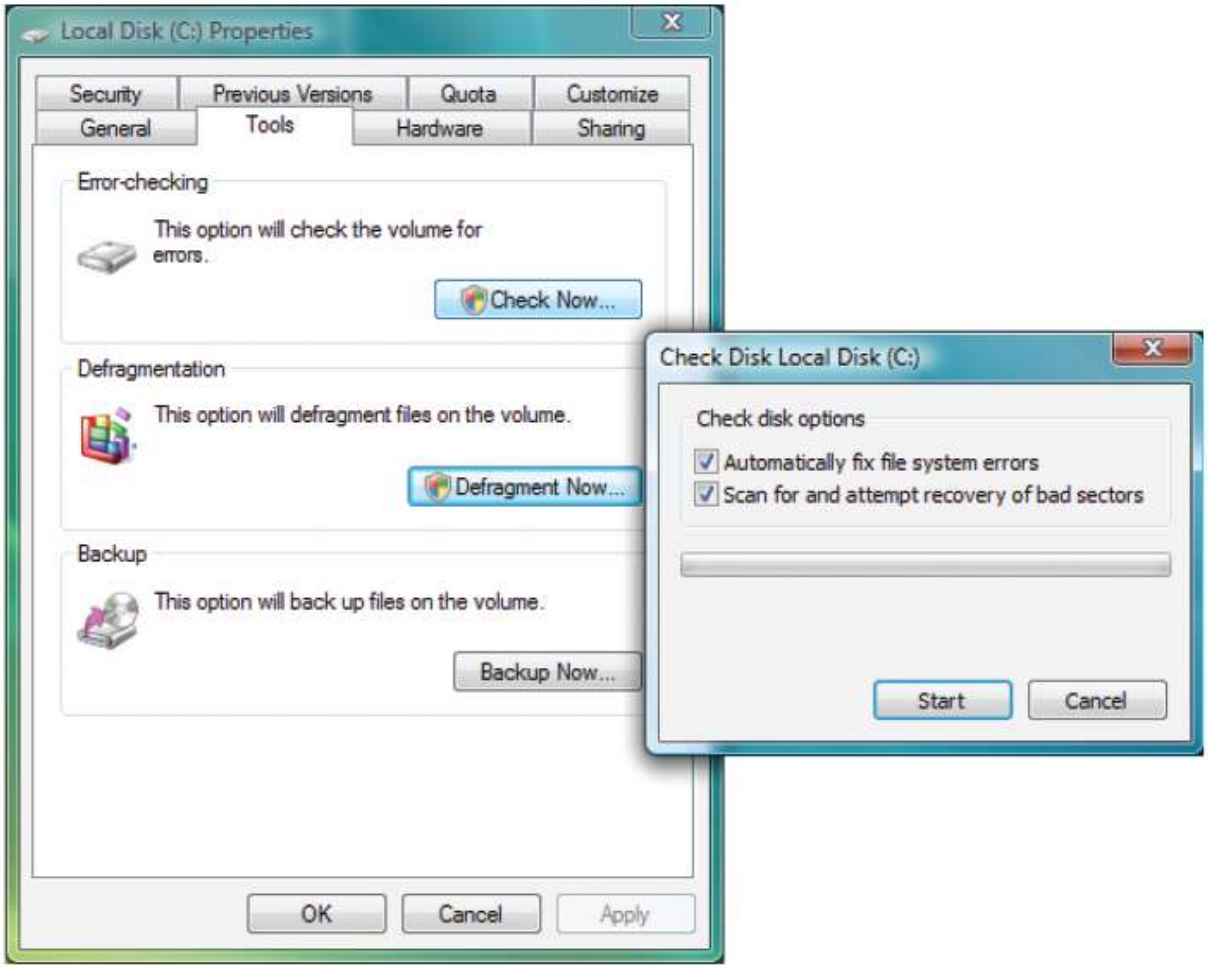

Figure 4-11 Windows repairs hard drive errors under the drive's Properties box using Windows Explorer. Courtesy: Course Technology/Cengage Learning

Verify Startup Programs

- Software programs
  - Add themselves to automatic startup list
    - Shortcut or program file in a startup folder
    - Registry entry
    - Scheduled Task list entry
- Problem with too may startup programs
  - Slow system startup, sluggish system, startup errors
- Problem solution
  - Remove unnecessary programs

Verify Startup Programs (cont'd.)

- Startup programs in Vista
- Windows Vista startup folders
  - For individual users:
    - C:\Users\username\AppData\Roaming\Microsoft\Windows\Start Menu\Programs\Startup
  - For all users:
    - C:\ProgramData\Microsoft\Windows\Start Menu\Program\Startup
- Software Explorer
  - View and stop Vista startup programs

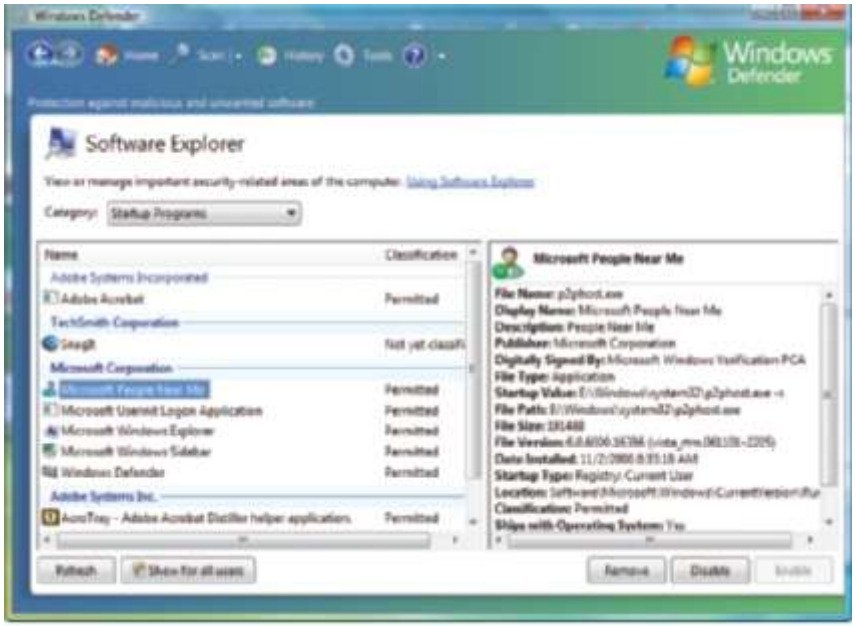

Figure 4-12 Use Software Explorer in Vista to find out what programs are launched at startup
Courtesy: Course Technology/Cengage Learning

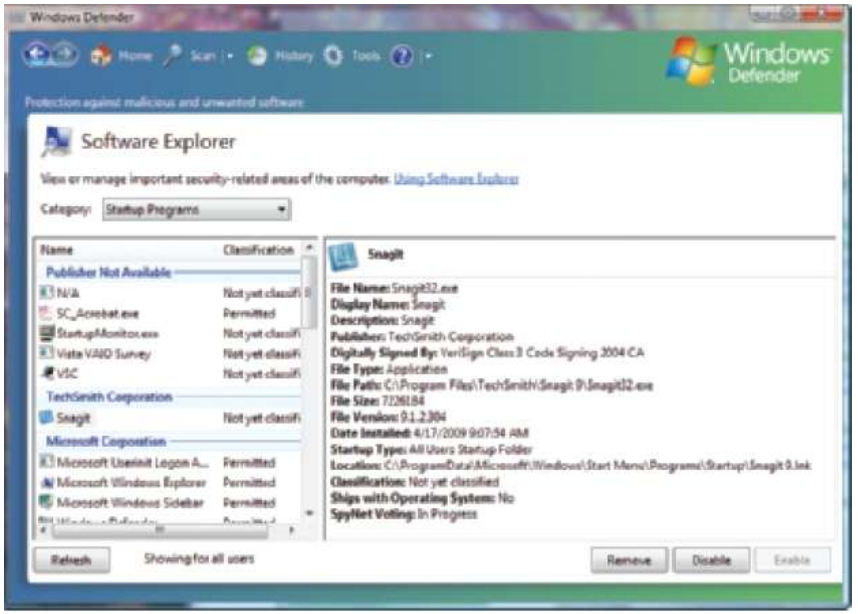

Figure 4-13 A startup program is launched by using a startup folder
Courtesy: Course Technology/Cengage Learning

Program	Description	Startup Programs	Currently Running Programs*
userinit.exe	Userinit Logon Application	X	
explorer.exe	Windows Explorer	X	X
MSASCui.exe	Windows Defender	X	X
Dwm.exe	Desktop Window Manager		X
taskeng.exe	Task Scheduler Engine		X

*Programs that continue to run after startup is completed or are launched by other startup programs

Table 4-1 Programs launched at startup on a barebones Vista system

Verify Startup Programs (cont'd.)

- Startup programs in XP
- Windows XP startup folders
  - For individual users:
    - C:\Documents and Settings\username\StartMenu\Programs\Startup
  - For all users:
    - C:\Documents and Settings\All Users\Start Menu\Program\Startup
- Manually look for unnecessary software
  - Uninstall with Control Panel, Add or Remove Programs applet

Free Up Additional Hard Drive Space

- Windows Explorer
  - Displays drive free space
- No set minimum free space for Vista
- Rule of thumb
  - Shoot for 15 percent of drive free
- Move data to other drives or devices
- Use NTFS drive or folder compressions

Free Up Additional Hard Drive Space (cont'd.)

- Reorganize folders and volumes
  - Move applications
    - Most require reinstall
- Move virtual memory paging file
  - Windows Pagefile.sys
    - Virtual memory enhancing amount of system RAM
    - Hidden file stored in C drive root directory
  - Move to another partition on the same or different drive
    - New drive speed should be equal to or greater than existing drive

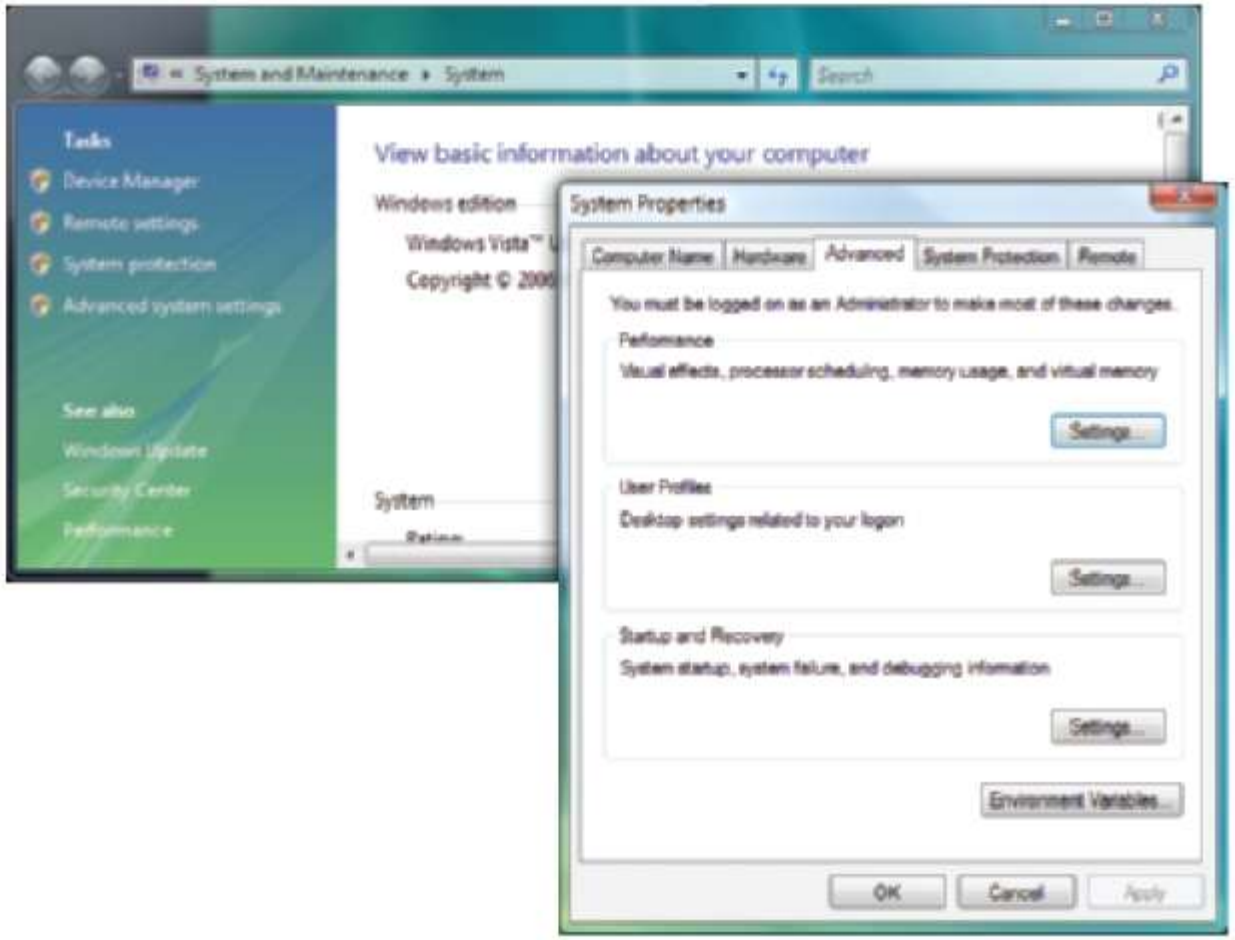

Figure 4-15 Manage virtual memory using the System Properties box
Courtesy: Course Technology/Cengage Learning

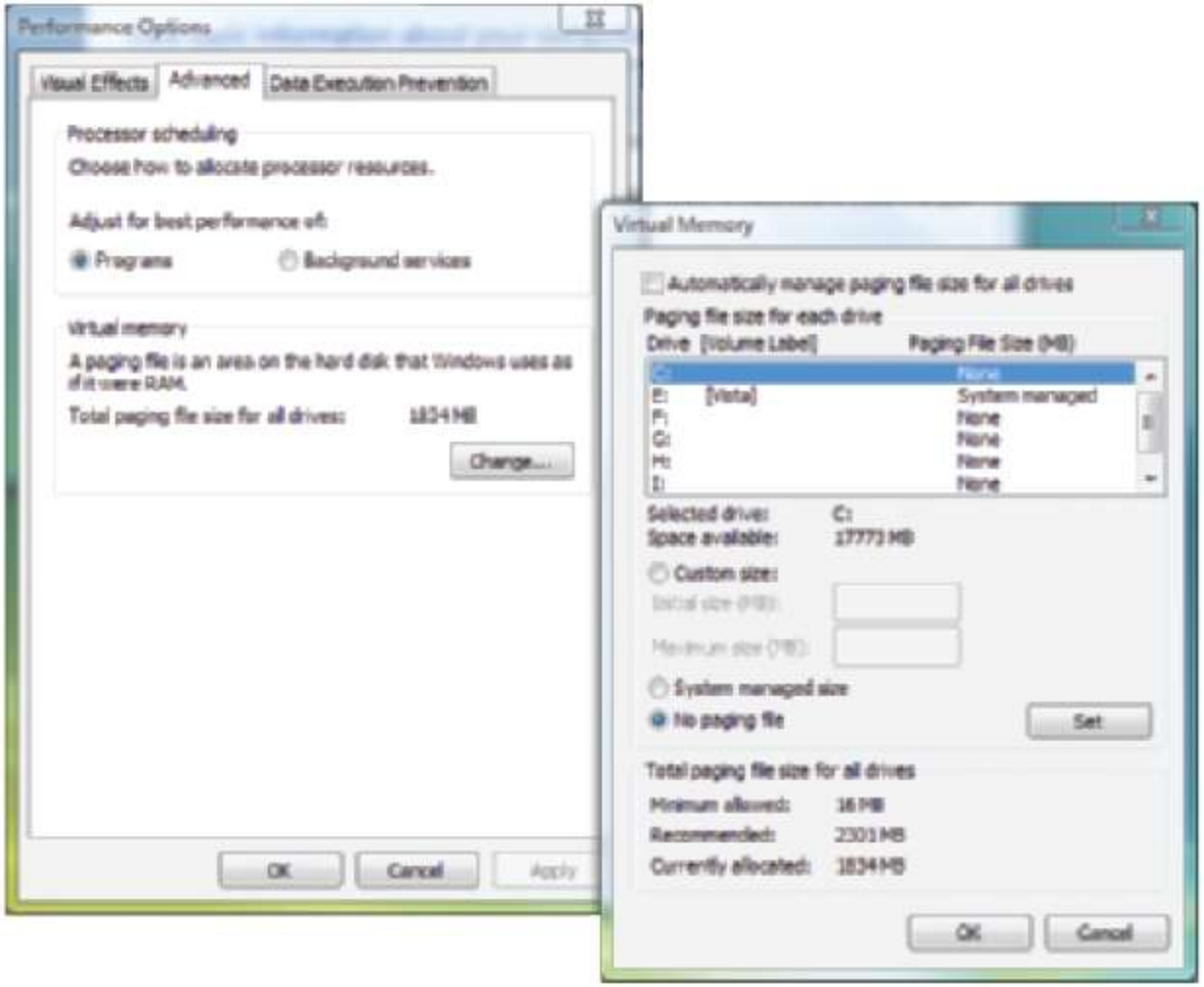

Figure 4-16 Move Pagefile.sys to a different drive
Courtesy: Course Technology/Cengage Learning

Free Up Additional Hard Drive Space (cont'd.)

- Limit space used by Internet Explorer (IE)
  - Reduce IE cache file space
  - Move cache folder to a second volume (if available)
  - Set IE to empty cache folder when browser closes
- If more space is still needed, add another hard drive

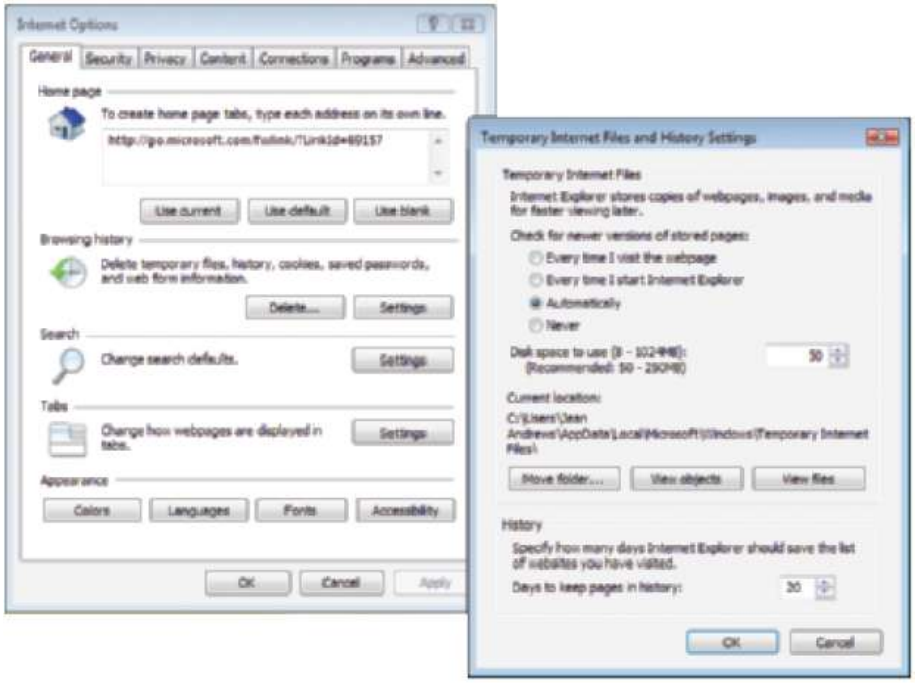

Figure 4-17 Allocate hard drive space to be used for temporary Internet files
Courtesy: Course Technology/Cengage Learning

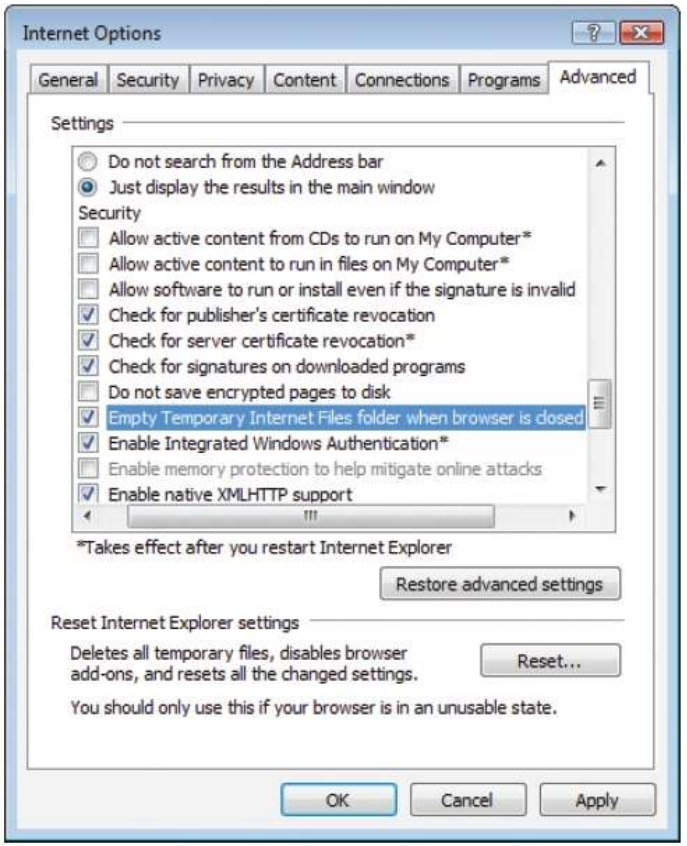

Figure 4-18 Set Internet Explorer not to keep a cache after the browser is closed
Courtesy: Course Technology/Cengage Learning

Backup Procedures

- Backup
  - Extra copy of a data or software file
    - Use if original file becomes damaged or destroyed
- Ways to lose data
  - System failure, virus, file corruption, or some other problem
- Never trust important data to only one media

Planning For Disaster Recovery

- Points for a backup and recovery plan
  - Decide on backup media
  - Consider purchasing third-party backup software
    - Easier to use
    - Offers more features than Microsoft utility
  - Use a selective backup plan
    - Only back up data that changes often to save time
  - Back up after every four to ten hours of data entry

Planning For Disaster Recovery (cont'd.)

- Points for a backup and recovery plan (cont'd.)
  - Record regular backups in a log
    - Folders or drives backed up
    - Date of the backup
    - Type of backup
    - Label identifying tape, disk, or other media
  - First time backup
    - Verify backup tape disks
    - Verify successful recovery of data
  - Keep backups in a safe place
    - Routinely test

Back Up User Data

- Windows Vista backup utility
  - 1. Connect backup device to PC
  - 2. Backup and Restore Center window
  - 3. Click Back up files and respond to the UAC box
    - Select where to save backup and click Next
  - 4. Select volumes containing folders or files to back up
  - 5. Select type of files to back up
  - 6. Select back up frequency

Back Up User Data (cont'd.)

- Windows Vista file restore
  - 1. Open Backup Status and Configuration window
  - 2. Click Restore Files and follow directions
- Windows Vista backup issues
  - Provides little control over the folders
  - Many turn to third-party backup utilities
    - Back up e-mail messages and address book
    - Back up Internet Explorer favorites list

Back Up User Data (cont'd.)

- Windows 2000/XP Ntbackup.exe utility
  - 1. Open Backup Wizard and click Advanced Mode
  - 2. Within the Backup utility, click Backup tab
    - To perform immediate backup check the drive and subfolders
  - 3. Change backup destination location (if desired)
  - 4. Click Start Backup button in the lower-right corner

Figure 4-25 Backup or Restore Wizard
Courtesy: Course Technology/Cengage Learning

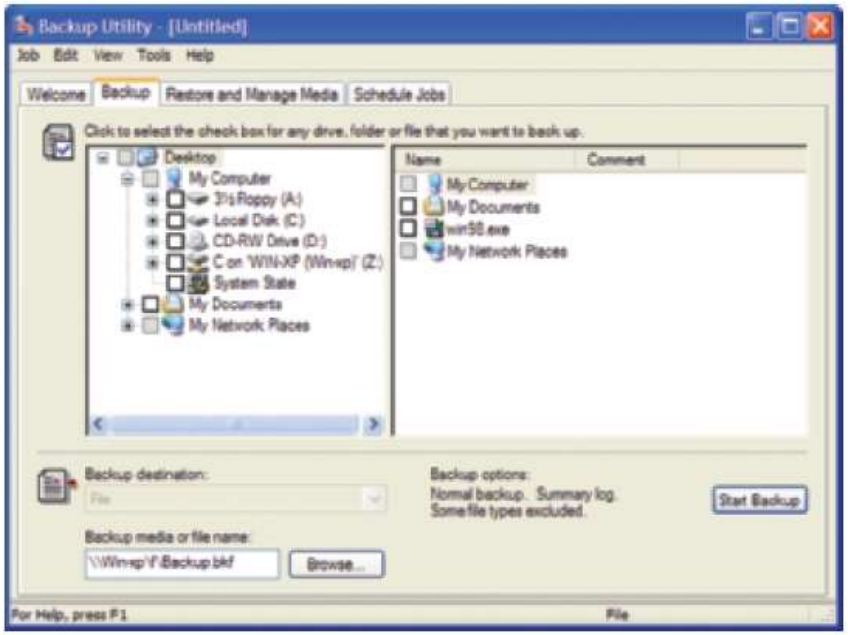

Figure 4-26 You can perform an immediate backup from the Backup tab
Courtesy: Course Technology/Cengage Learning

Back Up User Data (cont'd.)

- Windows 2000/XP scheduled backup options
  - Full backup (also called a normal backup)
  - Copy backup
  - Incremental backup
  - Differential backup
  - Daily backup
- Two best ways to schedule backups
  - Combination of full backups and incremental backups
  - Combination of full backups and differential backups

Back Up User Data (cont'd.)

- Windows 2000/XP backup schedule
  - 1. Open backup utility, click Schedule Jobs tab, select date to schedule a backup, click Add Job button
  - 2. Backup Wizard opens, click Next
    - Select Back up selected files, drives, or network data, click Next
  - 3. Select drives, folders, files to back up, click Next

Back Up User Data (cont'd.)

- Windows 2000/XP backup schedule (cont'd.)
  - 4. Choose where to save the backup, a back up name and type
  - 5. Make decisions on verifying data, compressing the data, and appending the data
  - 6. Select perform back up later
  - 7. Use Schedule Job window to select how often backup occurs
  - 8. Click Next in the wizard and follow remaining instructions

Back Up User Data (cont'd.)

- Windows 2000/XP additional items to back up:
  - E-mail messages and address book
  - Internet Explorer favorites list

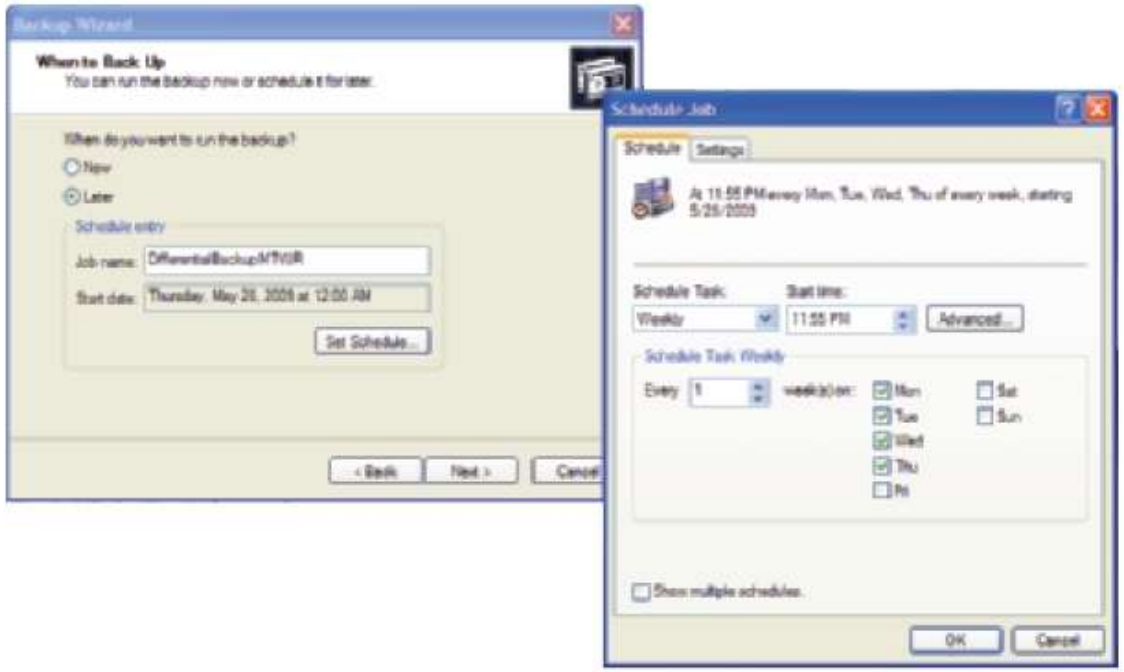

Figure 4-28 Schedule repeated backups
Courtesy: Course Technology/Cengage Learning

Back Up System Files

- System Restore
  - Restores system to a restore point
- Restore point
  - Condition at time a snapshot taken
- System Restore turned on
  - Windows automatically creates a restore point
    - Before new software or hardware installed or when changes are made to system
- Can manually create restore point at any time

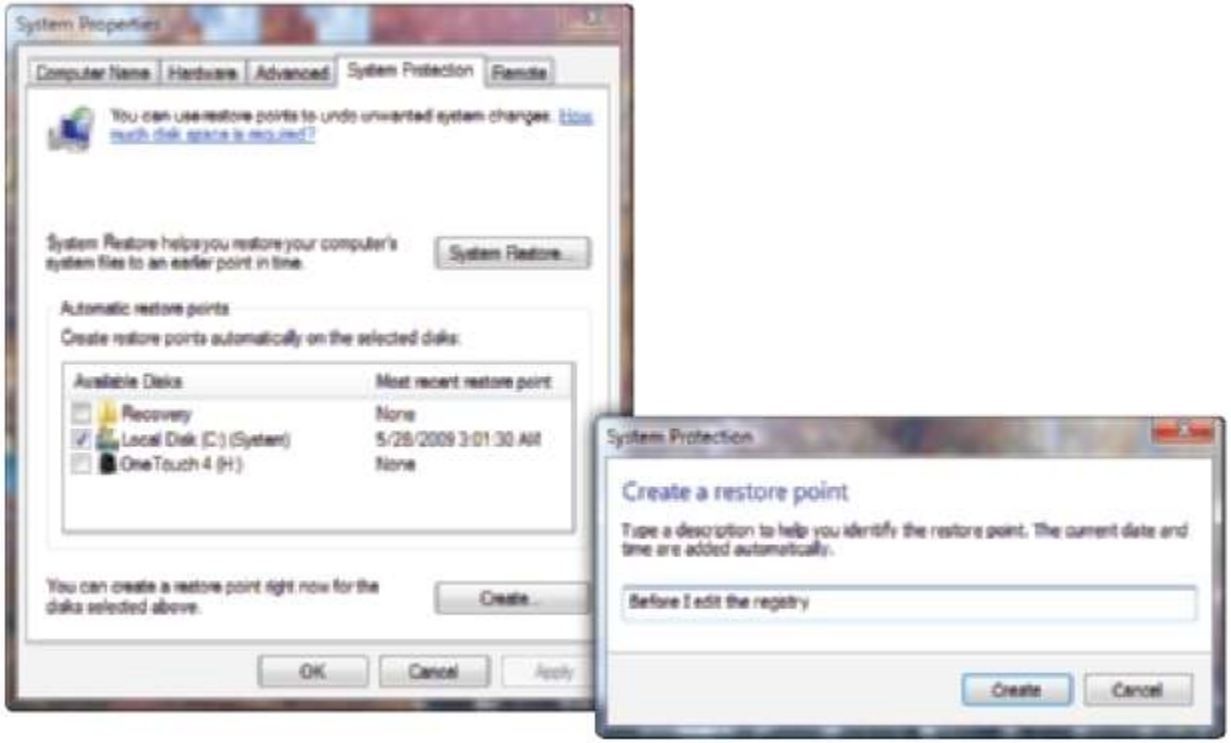

Figure 4-29 Manually create a restore point
Courtesy: Course Technology/Cengage Learning

Back Up System Files (cont'd.)

- Keep system protection turned on
  - Creates restore points
    - At regular intervals
    - Just before new software or hardware installed
- Restore point information:
  - Normally kept in folder C:\System Volume
    - Not accessible to the user
  - Taken at least every 24 hours
  - Can use up to 15 percent of disk space
    - When disk space is low, restore points are no longer made

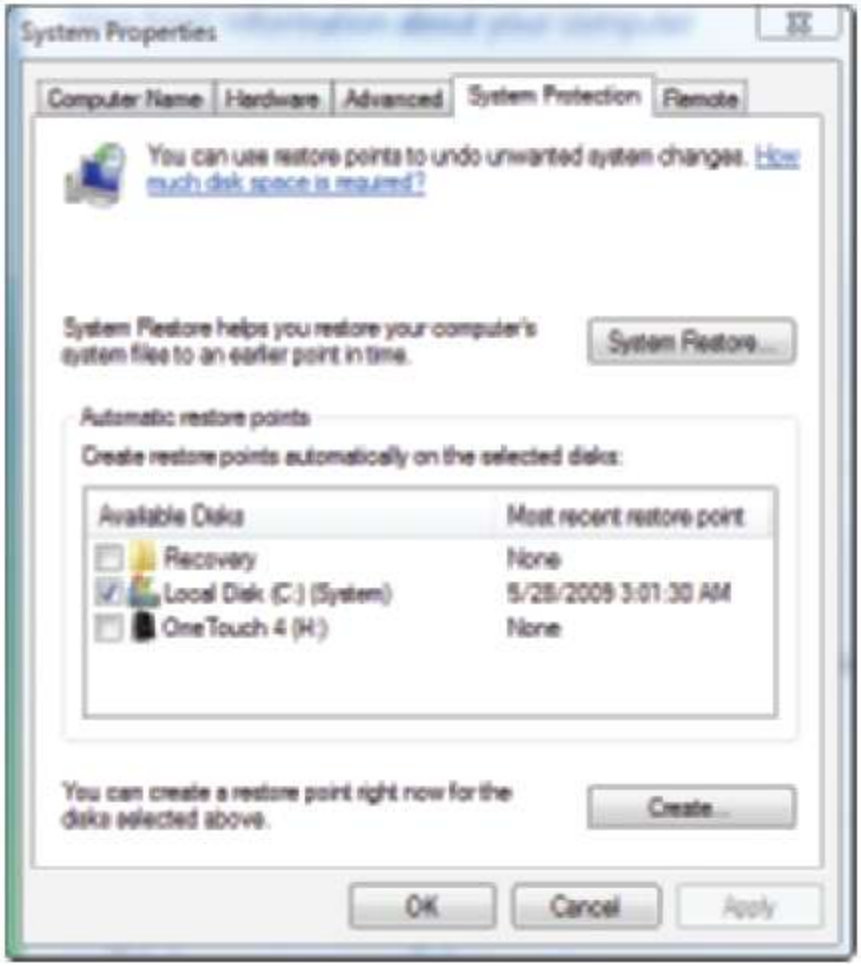

Figure 4-30 Make sure System Protection is turned on
Courtesy: Course Technology/Cengage Learning

Back Up System Files (cont'd.)

- Applying a restore point
  - User data not altered
  - Can affect installed software, hardware, user settings, and OS configuration settings
  - Changes made to settings are lost after restore point is created
  - Always use most recent restore point capable of fixing the problem
  - If Vista will not boot:
    - Launch System Restore from Vista Recovery Environment

Back Up System Files (cont'd.)

- Applying a restore point (cont'd.)
- Windows Vista or Windows XP desktop
  - 1. Open System Restore box
  - 2. If multiple restore points exist, two options display:
    - Use recommended restore point
    - Choose a different restore point
  - 3. System restarts and restore point is applied

Back Up System Files (cont'd.)

- Points about system restore
  - Great tool for fixing a device, restoring Windows settings, and solving application problems
  - Limitations
    - Recovers from errors only if registry somewhat intact
    - Process cannot remove virus or worm infection
    - Process might create a new problem
    - Process might make many changes to a system
    - Process requires restore points
    - Restore points kept in a hidden folder on the hard drive
    - Viruses and malware sometimes hide in restore points

Back Up System Files (cont'd.)

- Backing up system state using Windows XP/2000
  - All files are backed up
  - Use Backup, Advanced Mode

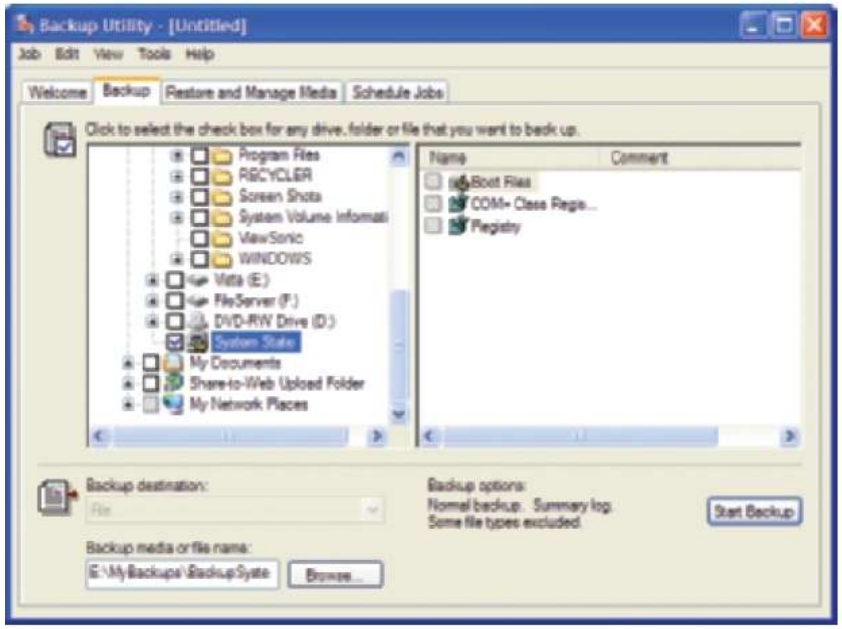

Figure 4-33 Back up the Windows XP/2000 system state
Courtesy: Course Technology/Cengage Learning

Back Up System Files (cont'd.)

- Restoring system state using Windows XP/2000
  - Open Backup Utility window
    - Click the Restore and Manage Media tab

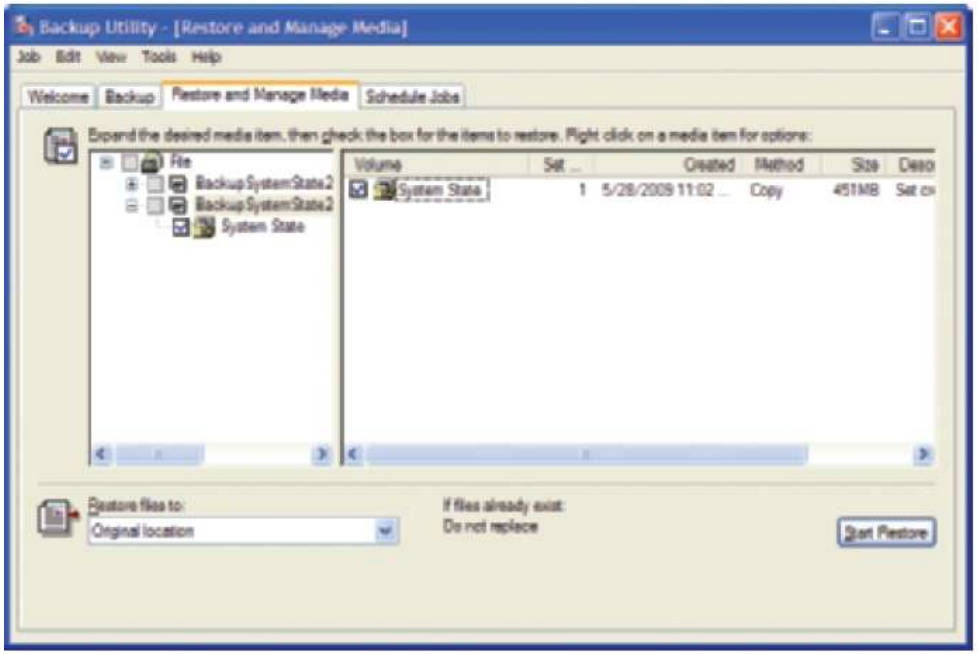

Figure 4-34 Restore the system state from the Restore and Manage Media tab of the Backup dialog box
Courtesy: Course Technology/Cengage Learning

Back Up the Entire Hard Drive

- Windows Vista Complete PC Backup
  - Backup of entire Vista volume
    - Can back up other volumes
  - Best practice
    - Complete PC backup after Vista, all hardware devices, and all applications are installed
  - Works similarly to recovery CDs or DVDs
  - Save complete PC backup to a local device
  - Vista uses incremental backup to keep initial backup current

Back Up the Entire Hard Drive (cont'd.)

- Windows XP Automated System Recovery (ASR)
  - Backup of entire XP volume
  - Recover XP system from last ASR backup
  - Lose everything on the volume since ASR backup created
    - Installed software and device drivers, user data, any changes to system configuration
  - ASR backup process creates two items
    - Full backup of the Windows drive
    - ASR floppy disk containing backup file location

Back Up the Entire Hard Drive (cont'd.)

- Windows XP ASR (cont'd.)
  - Restoring the system using an ASR backup
    - Restores Windows volume to its state when last ASR backup made
  - ASR recovery process
    - Erases everything on the volume being restored
    - Reformats the volume
  - After ASR recovery process finished
    - Restart the system
    - Restore user data from recent backups

Managing Files, Folders, and Hard Drives

- Understanding of how to manage folders and files
  - Manage data, configure Windows, set up network resources, and keep the PC in good working order
- Knowing where to look on the hard drive to find folders and files needed
  - Requires understanding of directory structures used by Windows Vista, XP, and 2000

Directory Structures

- Know user files, system files, fonts, temporary files, program files, and offline files and folders
- User profile contents
  - User folder together with subfolders is the user profile namespace
  - Ntuser.dat in the user's folder containing user settings
- Windows Vista user account folder
  - Stored in C:\Users\
- Windows XP user account folder
  - Stored in C:\Documents and Settings folder

Directory Structures (cont'd.)

- Other important folder locations
  - Windows registry: \Windows\system32\config folder
  - Registry backup: \Windows\system32\config\RegBack folder
  - Fonts: stored in the \Windows\Fonts folder
  - Program files (32-bit versions)
    - C:\Program Files
  - Program Files (Vista and XP 64-bit versions)
    - C:\Program Files (64-bit programs)
    - C:\Program Files (x86) (32-bit programs)

Directory Structures (cont'd.)

- Other important folder locations (cont'd.)
  - Temporary files: \Windows\Temp folder
  - Windows Vista temporary IE files:
    - C:\Users*username*\AppData\Local\Microsoft\Windows\Temporary Internet Files
  - Windows XP temporary IE files:
    - C:\Documents and Settings*username*\Local Settings\Temporary Internet Files
  - Client-side caching (CSC) folder: C:\Windows\CSC

Commands To Manage Files and Folders

- Command prompt window
  - Open by entering cmd.exe
    - Vista Start Search box or XP Run box
  - Provides a Command Line Interface (CLI)
    - Enter command lines to perform a variety of tasks

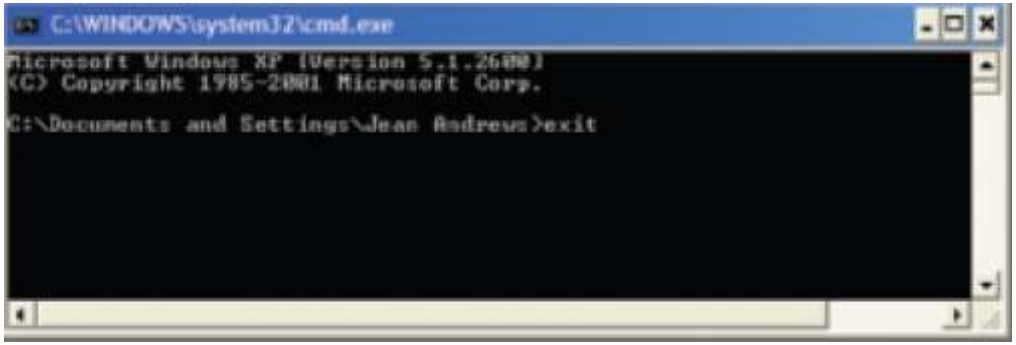

Figure 4-43 Use the exit command to close the command prompt window
Courtesy: Course Technology/Cengage Learning

Commands To Manage Files and Folders (cont'd.)

- File naming conventions
  - Filename and file extension characters
    - Letters a through z and numbers 0 through 9
    - Characters: _ ^ $! # % & – { } ( ) @ ' `
  - Filename with spaces:
    - Enclose filename in double quotation marks
- Wildcard characters in command lines
  - Question mark (?): wildcard for one character
  - Asterisk (*): wildcard for one or more characters

```
dir a*.???
```

Commands To Manage Files and Folders (cont'd.)

- Help or <command name> /?
- Dir [<filename>] [/p] [/s] [/w]
  - List files and directories

Command	Result
dir /p	Lists one screen at a time
dir /w	Presents information using wide format, where details are omitted and files and folders are listed in columns on the screen
dir *.txt	Lists all files with a .txt file extension in the default path
dir d:\data*.txt	Lists all files with a .txt file extension in the D:\data folder
dir myfile.txt	Checks that a single file, such as myfile.txt, is present
dir /s	Include subdirectory entries

Table 4-3 Sample dir commands

Commands To Manage Files and Folders (cont'd.)

- Del or Erase <filename>
  - Erases files or groups of files
- Copy <source> [<destination>] [/A] [/V] [/Y]
  - Three useful switches or parameters
    - /A: only copies only files with the archive attribute on
    - /V: size of each new file compared to the size of original file
    - /Y: confirmation message does not appear asking to confirm before overwriting a file
- Recover <filename>
  - Attempts to recover a file when parts corrupted

Commands To Manage Files and Folders (cont'd.)

- Xcopy <source> [<destination>] [/S] [/C] [/Y] [/D:date]
  - More powerful than Copy command

Command	Result
`xcopy C:\docs\*.* E:/S`	Use the /S switch to include subdirectories in the copy. This command copies all files in the directory C:\docs, as well as all subdirectories under \Docs and their files, to drive E.
`xcopy C:\docs\*.* E:/D:03/14/10`	The /D switch examines the date. This command copies all files from the directory C:\Docs created or modified on or after March 14, 2010.
`xcopy C:\docs\*.* E:/Y`	Use the /Y switch to overwrite existing files without prompting.
`xcopy C:\docs\*.* E:/C`	Use the /C switch to keep copying even when an error occurs.

Table 4-4 Xcopy commands and results

Commands To Manage Files and Folders (cont'd.)

- Robocopy <source> [<destination>] [/S] [/E] [/LOG:filename] [/LOG+:filename] [/move] [/purge]
  - Robust File Copy command
    - New with Windows Vista; similar to Xcopy command

Command	Result
`robocopy C:\docs\*.* E:/S`	The /S switch includes subdirectories in the copy, but does not include empty directories.
`robocopy C:\docs\*.* E:/E`	The /E switch includes subdirectories, even the empty ones.
`robocopy C:\docs\*.* E:/LOG:Mylog.txt`	Records activity to a log file.
`robocopy C:\docs\*.* E:/LOG+:Mylog.txt`	Appends a record of all activity to an existing log file.
`robocopy C:\docs\*.* E:/move`	Moves files and directories, deleting them from the source.
`robocopy C:\docs\*.* E:/purge`	Deletes files and directories at the destination that no longer exist at the source.

Table 4-5 Robocopy commands and results

Commands To Manage Files and Folders (cont'd.)

- MD [drive:]path
  - Creates a subdirectory under a directory
- CD [drive:]path or CD..
  - Changes current default directory
- RD [drive:]path
  - Removes a subdirectory
    - Directory must contain no files
    - Directory must contain no subdirectories
    - Directory must not be current directory

Commands To Manage Files and Folders (cont'd.)

- chkdsk [drive:] [/f] [/r]
  - Fixes file system errors
  - Recovers data from bad sectors

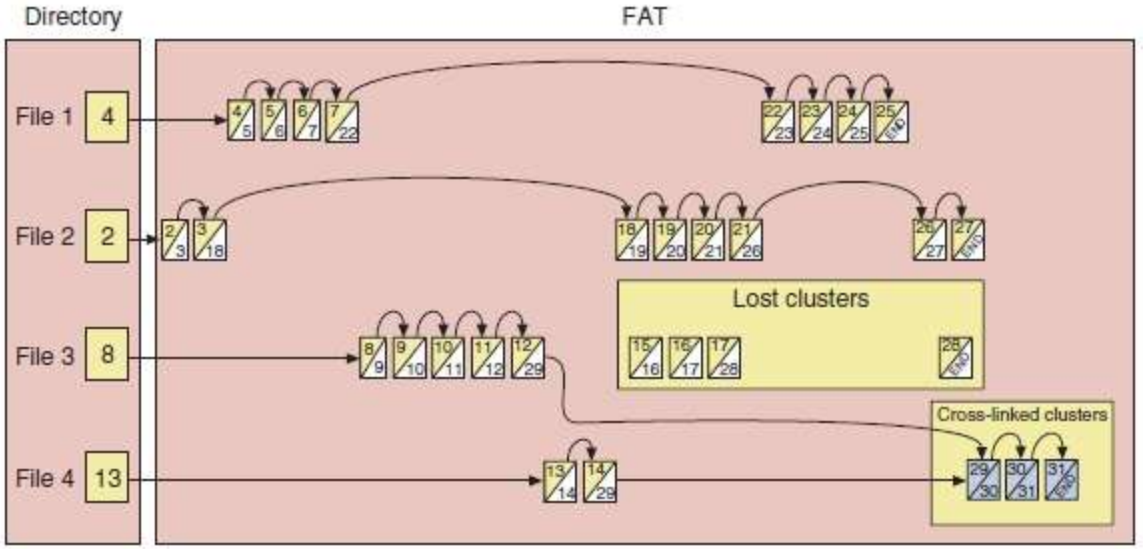

Figure 4-45 Lost and cross-linked clusters
Courtesy: Course Technology/Cengage Learning

Commands To Manage Files and Folders (cont'd.)

- Defrag [drive:] [-C]
  - Examines a drive for fragmented files
    - Rewrites fragmented files in contiguous clusters
- Edit [drive:path] <filename>
  - Edit program (Edit.com)

Command	Result
`defrag C:`	Defrag drive C
`defrag -c`	Defrag all volumes on the computer including drive C

Table 4-6 Defrag commands and results

Commands To Manage Files and Folders (cont'd.)

- Format <drive:> [/v:label] [/q] [fs:<filesystem>]
  - Format command

Command	Description
`Format A:/V:mylabel`	Allows you to enter a volume label only once when formatting several disks. The same volume label is used for all disks. A volume label appears at the top of the directory list to help you identify the disk.
`Format A:/Q`	Re-creates the root directory and FAT to quickly format a previously formatted disk that is in good condition. /Q does not read or write to any other part of the disk.
`Format D:/FS:NTFS`	Formats drive D using the NTFS file system.
`Format D:/FS:FAT32`	Formats drive D using the FAT32 file system.
`Format D:/FS:EXFAT`	Formats drive D using the extended FAT file system.

Table 4-7 Format commands and results

Use Disk Management To Manage Hard Drives

- Primary tool for managing hard drives
  - Manage partitions, mount a drive, or troubleshoot problems with the hard drive
- A partition is division of a hard drive
- Volumes are primary partitions
  - Active partition used by BIOS for OS load
  - Extended partition holds one or more logical drives
- File system manages files and folders
  - Custer: group of sectors used to hold a file
  - NTFS, FAT32, and exFAT

Use Disk Management To Manage Hard Drives (cont'd.)

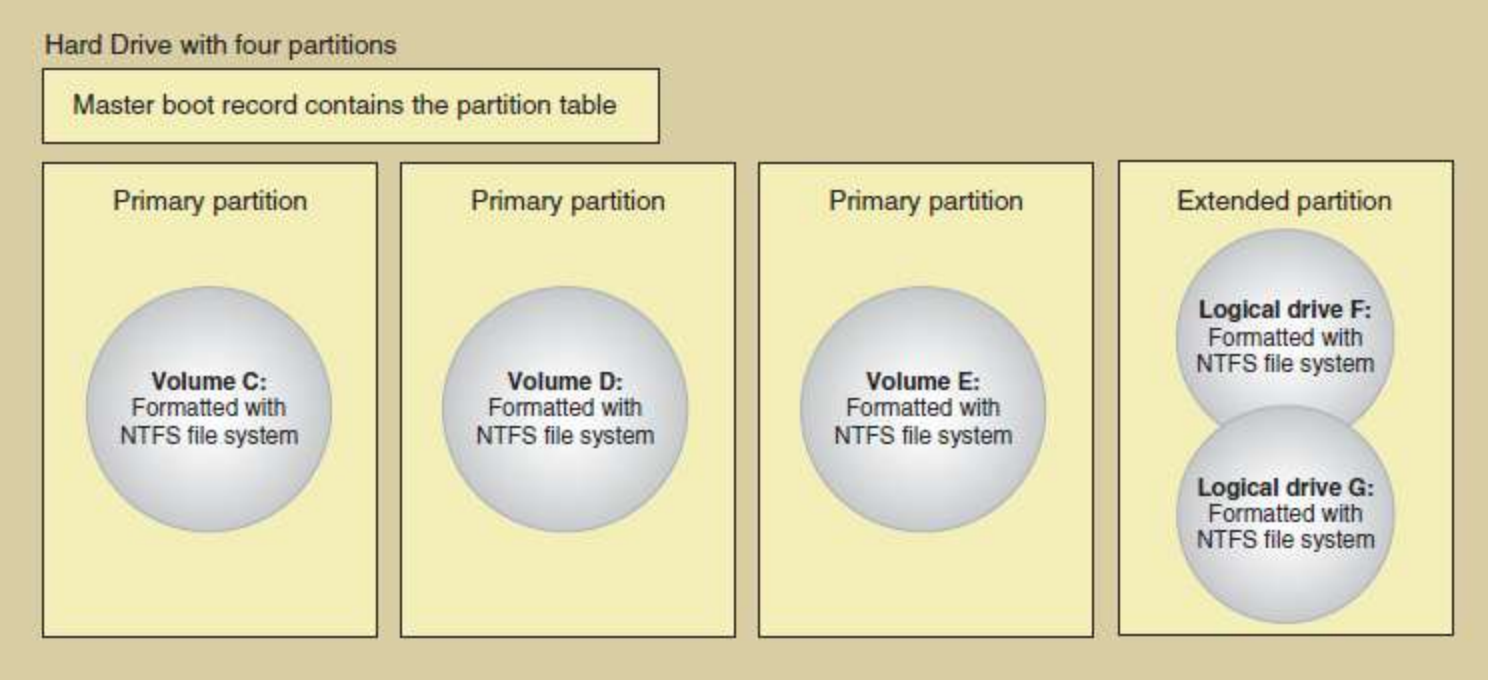

Figure 4-48 A hard drive with four partitions: the fourth partition is an extended partition
Courtesy: Course Technology/Cengage Learning

Use Disk Management To Manage Hard Drives (cont'd.)

- Mounted drive
  - Volume accessible by a folder on another volume
    - Folder has more available space
  - Mount point: C:\Data folder

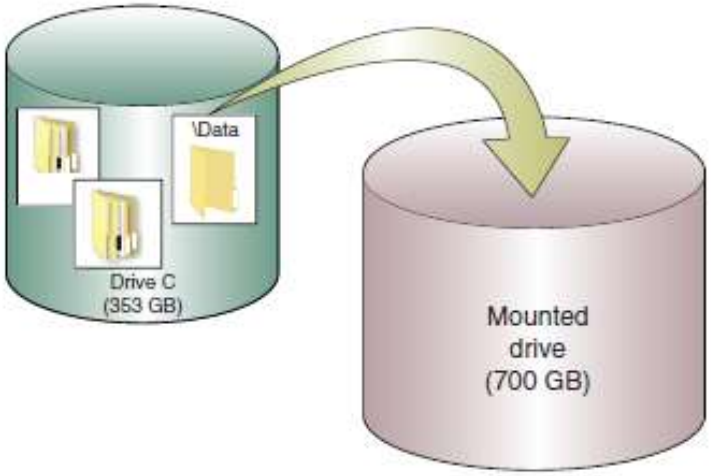

Figure 4-54 The C:\Data folder is the mount point for the mounted drive. Courtesy: Course Technology/Cengage Learning

Use Disk Management To Manage Hard Drives (cont'd.)

- Use of mounted drives
  - Need to expand drive space
    - Drive C too small
    - Want to enhance space using space on another volume
  - Want to put all user data on another volume or hard drive, other than the Windows volume
  - Ran out of drive letters A through Z

Use Disk Management To Manage Hard Drives (cont'd.)

- Windows dynamic disks
  - Better reliability, spanning, stripping (RAID 0) to improve performance, mirror two hard drives for fault tolerance (RAID 1) for XP

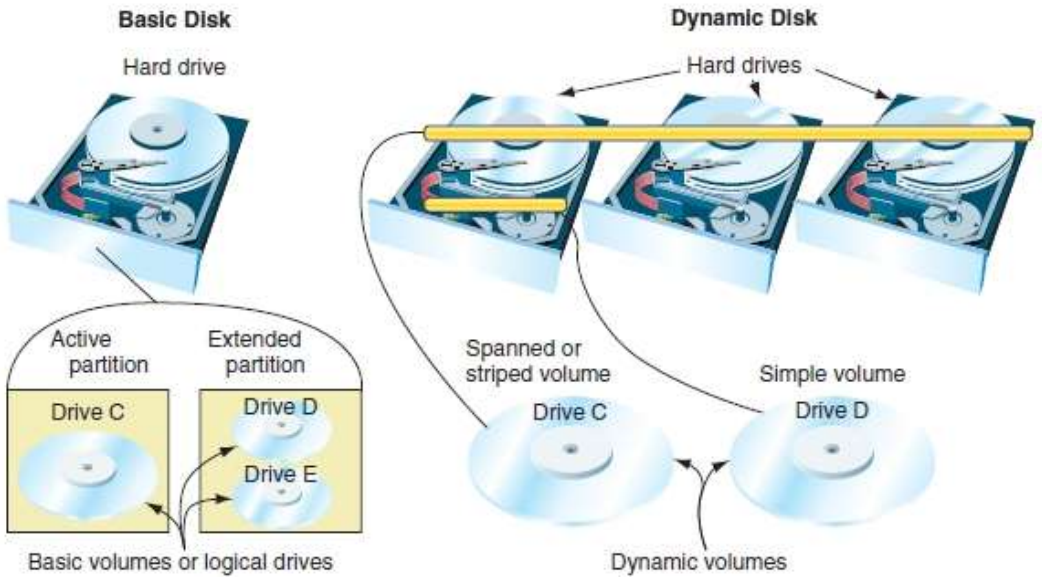

Figure 4-61 Basic disks use partitions to organize a hard drive, and dynamic disks use dynamic volumes to organize multiple hard drives
Courtesy: Course Technology/Cengage Learning

Use Disk Management To Manage Hard Drives (cont'd.)

- Windows dynamic disks (cont'd.)
  - Disk Management converts two or more basic disks to dynamic disks
    - Create spanned or stripped volume
    - Spanning and software RAID is not very safe

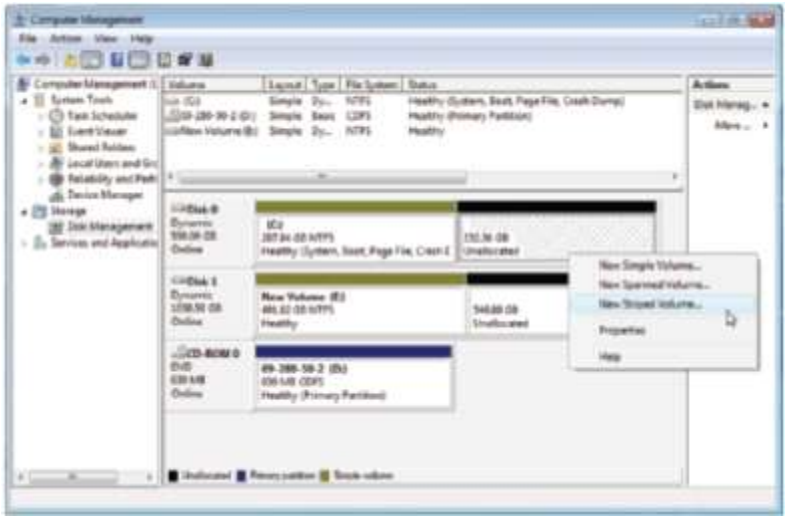

Figure 4-63 Create a spanned or striped volume. Courtesy: Course Technology/Cengage Learning

Use Disk Management To Manage Hard Drives (cont'd.)

- Drive and volume statuses:
  - Healthy
  - Failed
  - Online
  - Active
  - Unallocated
  - Formatting
  - Basic
  - Dynamic
    - Offline, foreign drive, and healthy (at risk)

Regional and Language Settings

- Configure computer to use a different language
  - Download and install the language pack
  - Change Windows display language
  - Chang how numbers are formatted
  - Change language used for keyboard input
- Windows Vista Ultimate
  - Download Language Interface Packs (LIP) through Windows Update
- Getting LIP for other Vista editions
  - Go to Microsoft Web site

Summary

- Regular preventive maintenance
  - Improves performance and troubleshooting
    - Verify Windows settings, defragment hard drives, check drive for errors, reduce startup process to essentials, and free up hard drive space
- Windows offers may preventative maintenance tools
- Preventative maintenance strategies
  - Maintain healthy Windows system and hardware resources
  - Keep good backups of data and system files