

Computers Are Your Future



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Chapter 4

System Software



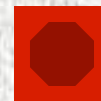
What You Will Learn . . .

- ✓ The two major components of operating system software
- ✓ Why a computer isn't useful without an operating system
- ✓ The five basic functions of an operating system
- ✓ What happens when you turn on a computer
- ✓ The three major types of user interfaces

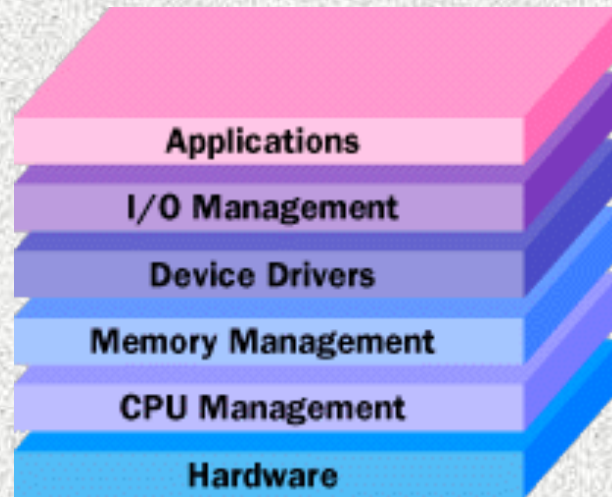


What You Will Learn . . .

- ✓ The strengths and weaknesses of the most popular operating systems
- ✓ The seven essential system utilities
- ✓ Data backup procedures
- ✓ Troubleshooting techniques



System Software



- ✓ **System software** includes all of the programs needed to keep a computer and its peripheral devices running smoothly
- ✓ Two major categories of system software are:
 - Operating systems (OS)
 - System utilities



The Operating System (OS): The Computer's Traffic Cop

- ✓ The **operating system** is a set of programs that perform certain basic functions with a specific type of hardware
- ✓ The functions of the operating system are:
 - Starting the computer
 - Managing programs
 - Managing memory
 - Handling messages from input and output devices
 - Enabling user interaction with the computer



Starting the Computer

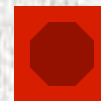


- ✓ **Booting** – The process of loading or reloading the operating system into the computer's memory
- ✓ The booting processes are:
 - **Cold boot** – Loads the OS when the power is turned on
 - **Warm boot** – Reloads the OS when the computer is already on



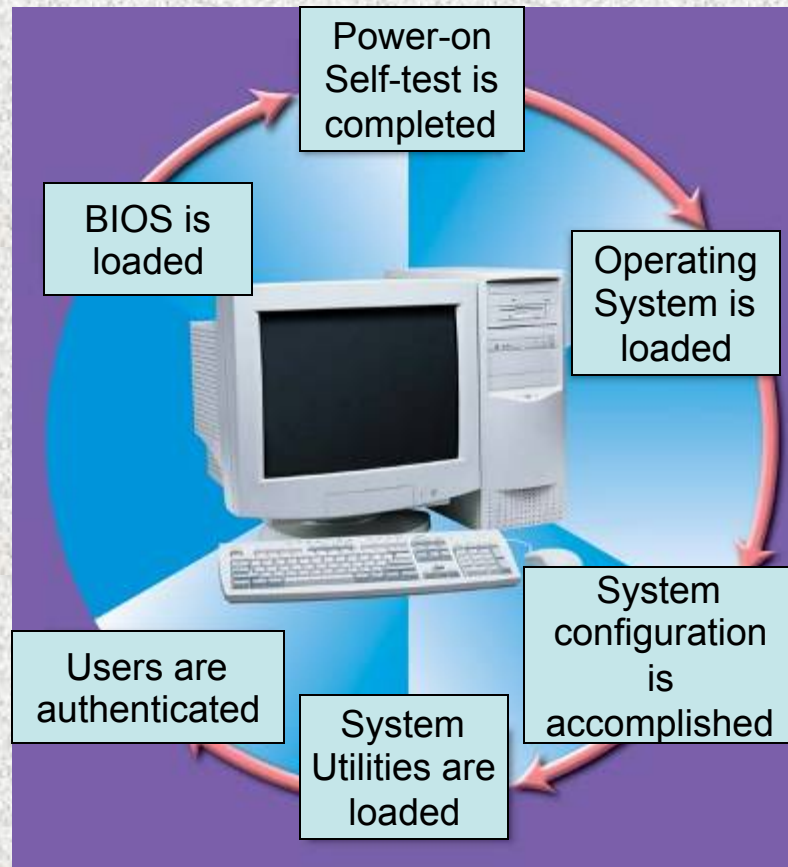
Starting the Computer

- ✓ The computer copies the **kernel** from the hard drive into the computer's memory
 - The kernel:
 - Is the central part of the operating system
 - Starts all applications
 - Manages devices and memory
 - Resides in memory at all times
 - Performs other essential functions



Starting the Computer

The step-by-step booting process (click for each step):



Step 1: The BIOS and Setup Program

- ✓ **ROM** (read only memory) – Permanent and unchanging memory
- ✓ **BIOS** (basic input/output system) – The part of the system software that includes the instructions that the computer uses to accept input and output
- ✓ **Load** – To transfer from a storage device to memory
- ✓ ROM loads BIOS into the computer's memory
- ✓ **Setup program** – A special program containing settings that control the computer's hardware
 - The program can be accessed while the BIOS information is visible



Step 2: The Power-On-Self-Test (POST)

- ✓ **POST** (power-on-self-test) – A series of tests conducted on the computer's main memory (random access memory or **RAM**), input/output devices, disk drives, and the hard disk
 - BIOS conducts a Power-On-Self-Test (POST) to check the input/output system for operability
- ✓ The computer will produce a beeping sound and an error message will appear on the monitor if any problems are encountered



Step 3: The Operating System (OS) Loads

- ✓ BIOS searches for the OS
- ✓ Settings in the **CMOS**—complementary metal-oxide semiconductor—determine where to look for the OS
- ✓ The operating system's kernel is loaded into the computer's memory
- ✓ The OS takes control of the computer and begins loading system configuration information



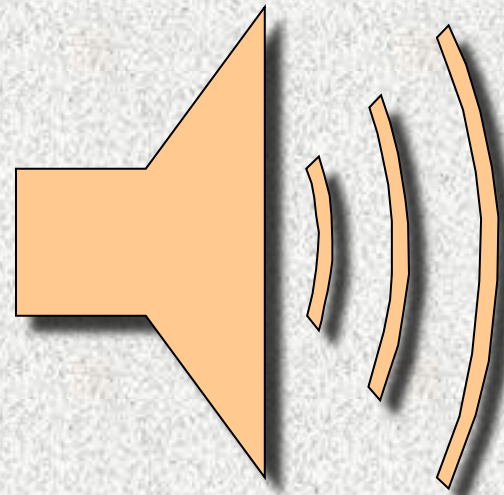
Step 4: System Configuration

- ✓ **Registry** – A database that stores information about peripherals and software
- ✓ **Peripheral** – Device connected to a computer
- ✓ **Driver** – A utility program that makes peripheral devices function properly
- ✓ The system is configured from the operating system's registry
- ✓ Drivers are loaded into memory



Step 5: System Utilities Loads

- ✓ System utilities are loaded into memory
 - Volume control
 - Antivirus software
 - PC card unplugging utility



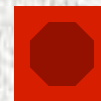
Step 6: Users Authentication

- ✓ Authentication or user login occurs
 - User name
 - Password
- ✓ The user interface starts, enabling user interaction with computer programs

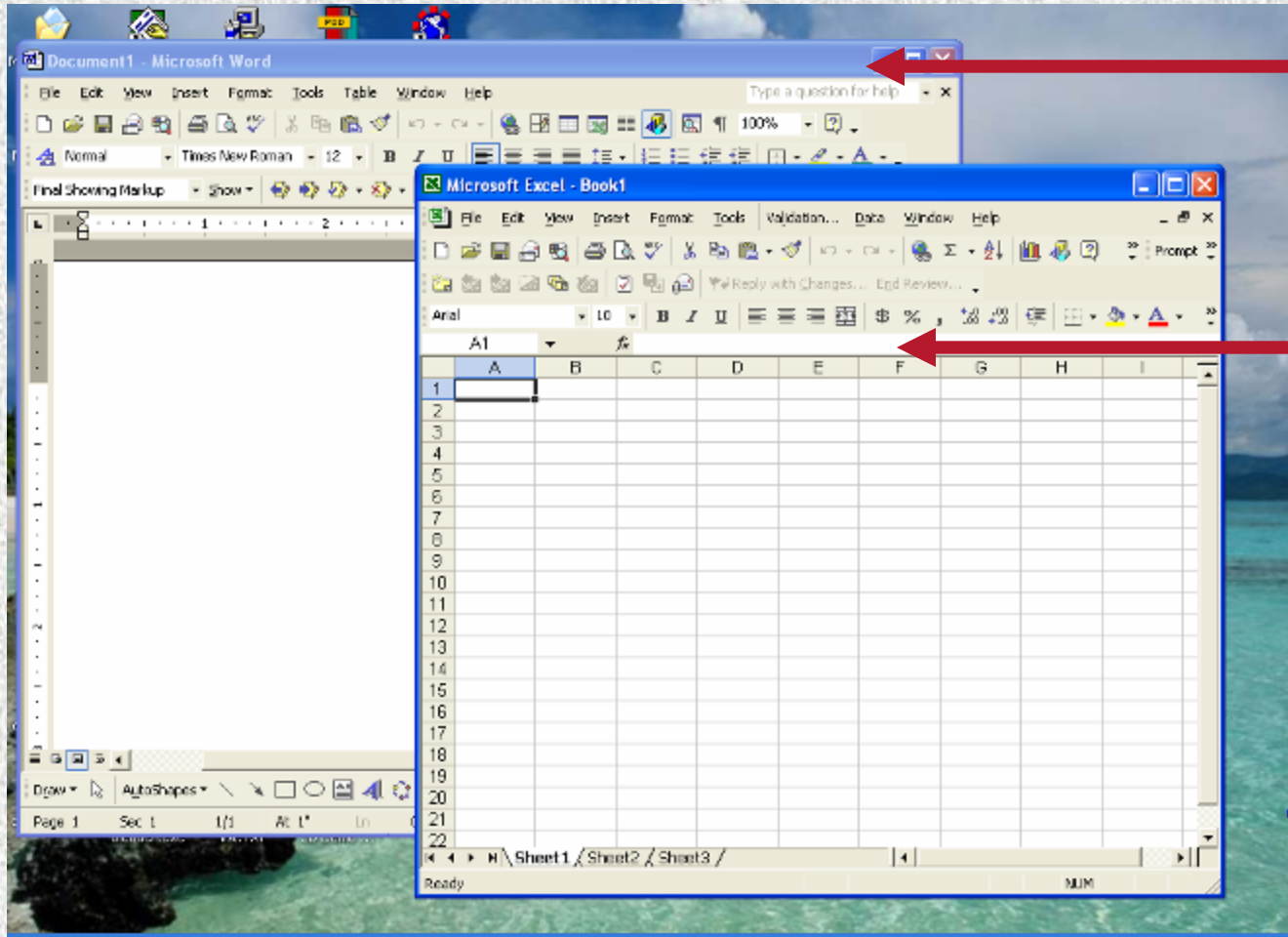


Managing Applications

- ✓ **Single-tasking** operating systems run one application program at a time
- ✓ **Multitasking** operating systems have the ability to run more than one application program at a time
- ✓ Multitasking is accomplished by:
 - **A foreground application** – The active program or program in use
 - **One or more background applications** – Inactive program(s) or program(s) not in use



Example of Multitasking



Background application

Foreground application



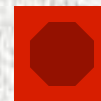
Managing Programs

- ✓ **Preemptive multitasking** – Enables the operating system to regain control if an application stops working

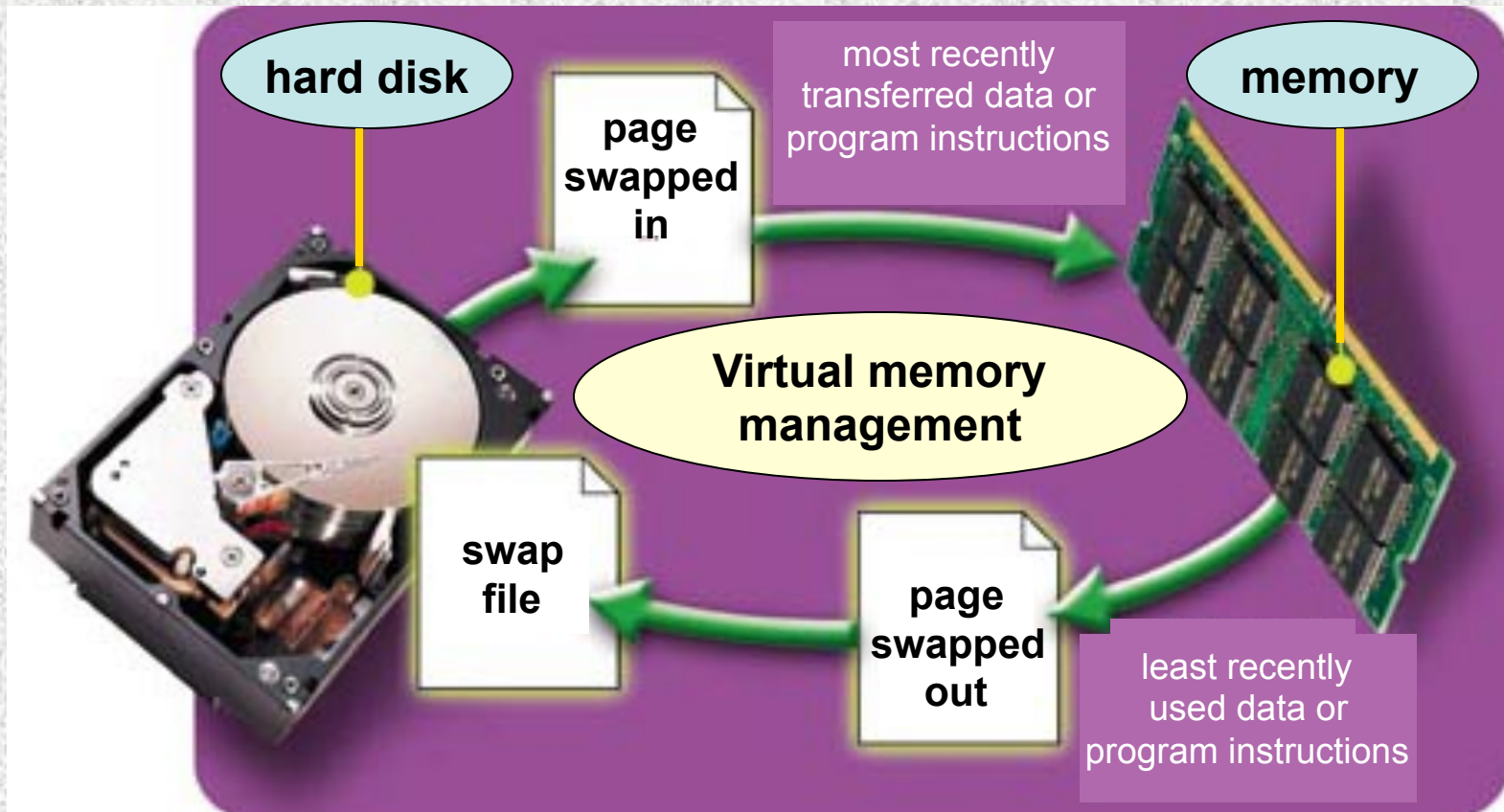


Managing Memory

- ✓ Computers use **memory** to make processing more fluid
- ✓ The operating system allocates memory areas for each running program; it keeps programs from interfering with each other
- ✓ The operating system uses **virtual memory** as an extension of random access memory (RAM)



Managing Virtual Memory



Handling Input and Output

- ✓ Input and output devices generate **interrupts**, or signals, that tell the operating system that something has happened
- ✓ The OS provides **interrupt handlers** or mini-programs that begin when an interrupt occurs
- ✓ **Interrupt request (IRQ)** lines handle the communications between input/output devices and the CPU
- ✓ An **IRQ conflict** causes system instability when two devices try to use the same IRQ line



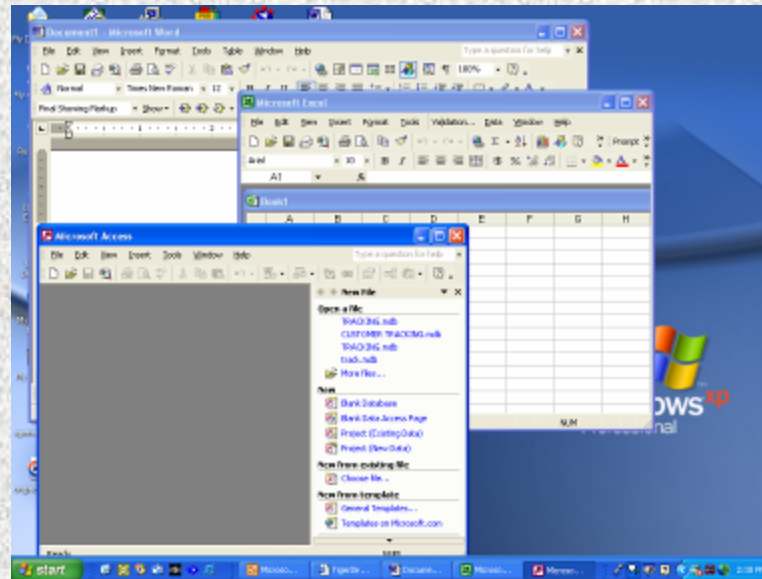
Providing the User Interface

- ✓ The **user interface** is that part of the operating system with which the user interacts with a computer
- ✓ User interface functions:
 - Start application programs
 - Manage disks and files
 - Shut down the computer safely



Graphical User Interface (GUI)

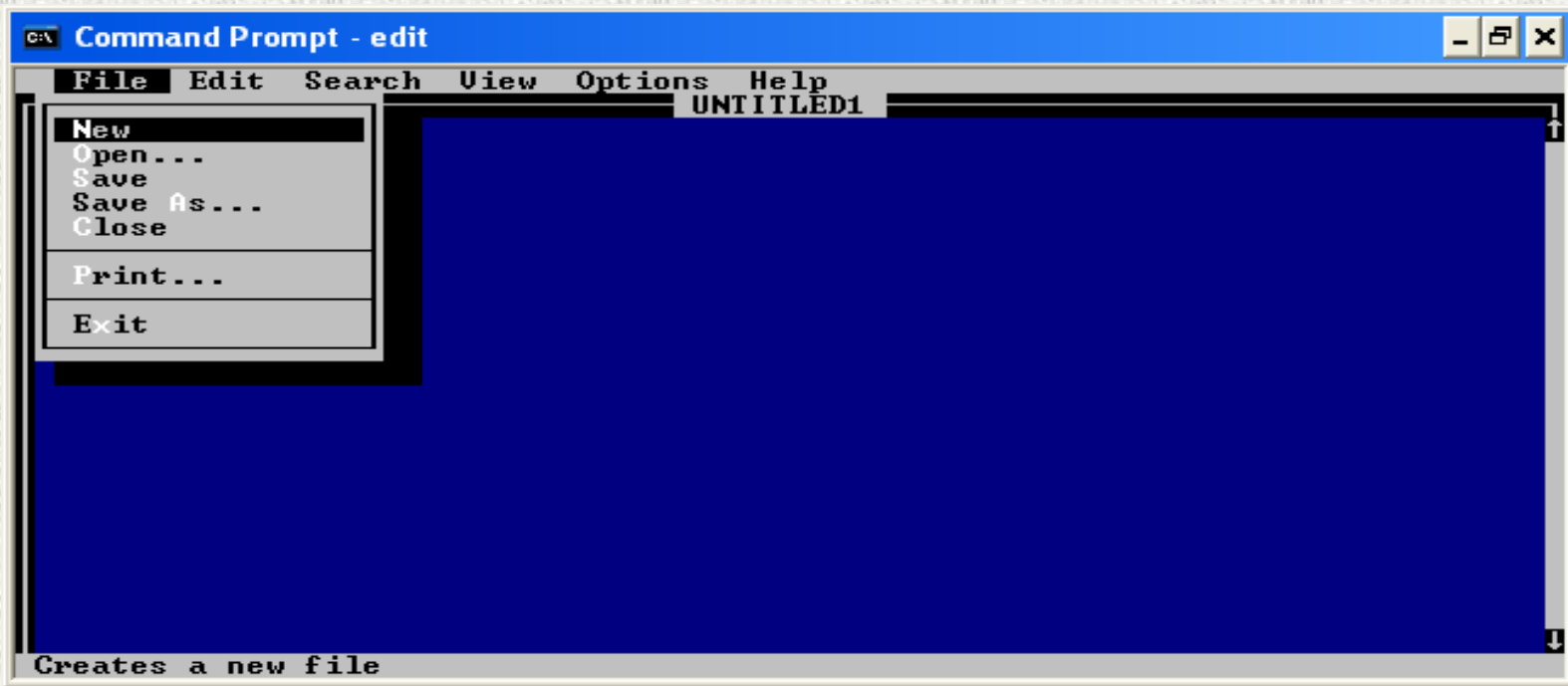
- ✓ Graphical user interface (GUI):
 - Uses graphics to create a desktop environment
 - Icons (small pictures) represent computer resources
 - Programs run within on-screen windows



Menu-driven User Interface

✓ Menu-driven:

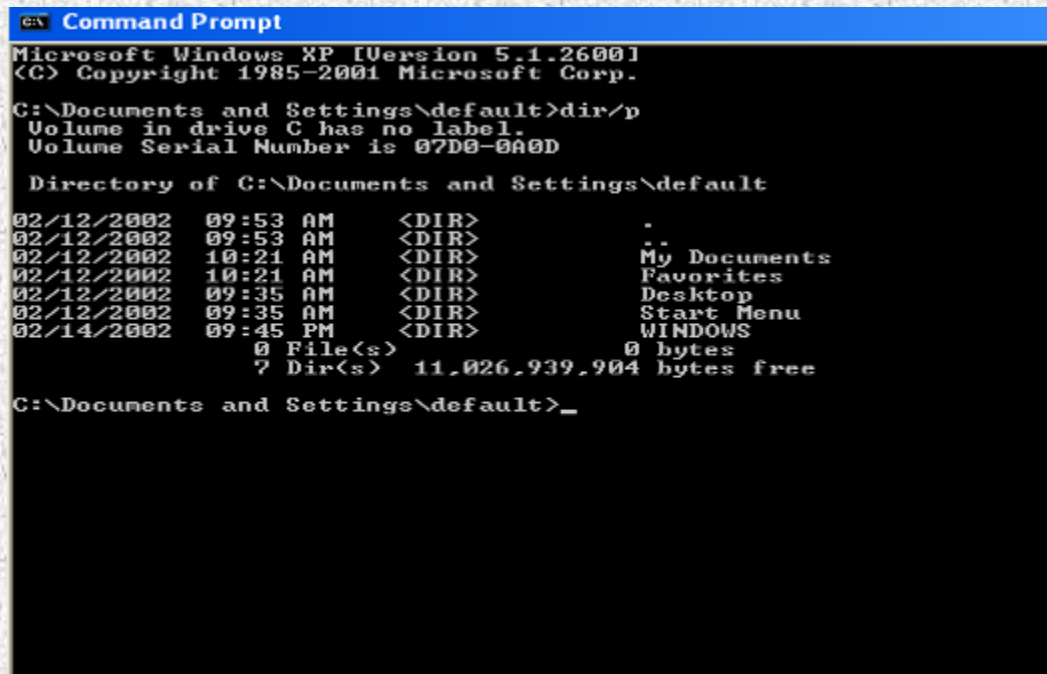
- Text-based menus are used to show all of the options available to the user



Command-Line Interface

✓ Command-line:

- The user is required to type keywords or commands in order to enter data or give instructions



```
Command Prompt
Microsoft Windows XP [Version 5.1.2600]
(C) Copyright 1985-2001 Microsoft Corp.

C:\Documents and Settings\default>dir/p
Volume in drive C has no label.
Volume Serial Number is 07D0-0A0D

Directory of C:\Documents and Settings\default

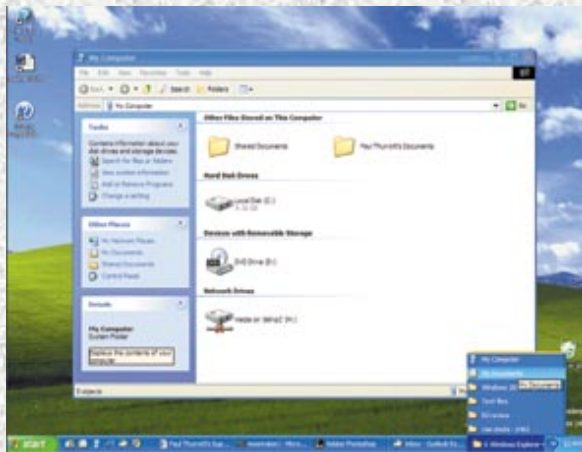
02/12/2002  09:53 AM    <DIR>          .
02/12/2002  09:53 AM    <DIR>          ..
02/12/2002  10:21 AM    <DIR>          My Documents
02/12/2002  10:21 AM    <DIR>          Favorites
02/12/2002  09:35 AM    <DIR>          Desktop
02/12/2002  09:35 AM    <DIR>          Start Menu
02/14/2002  09:45 PM    <DIR>          WINDOWS
           0 File(s)          0 bytes
           7 Dir(s)    11,026,939,904 bytes free

C:\Documents and Settings\default>_
```



Exploring Popular Operating Systems

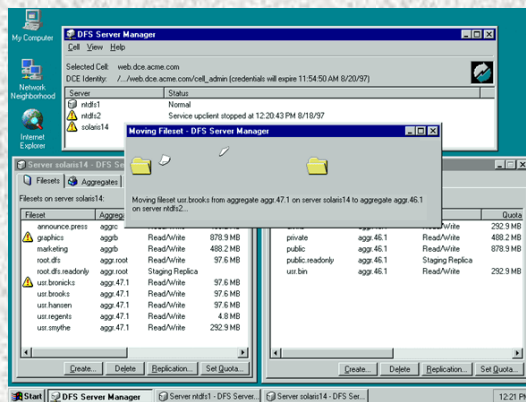
WINDOWS XP



WINDOWS CE



WINDOWS NT



MAC OS X



Exploring Popular Operating Systems

LINUX



MS-DOS



UNIX



Microsoft Windows

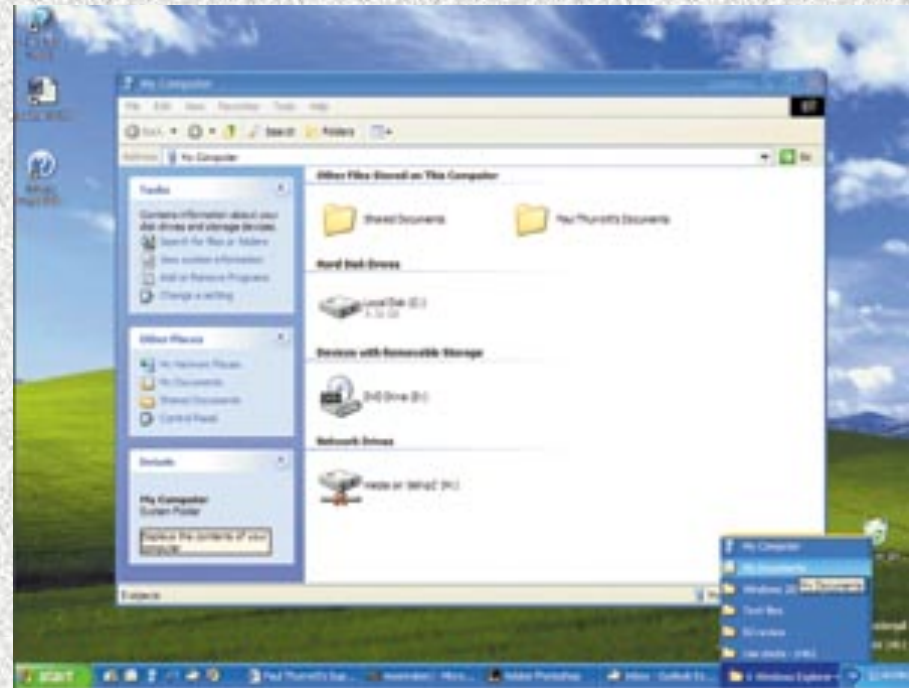
Click to view each Windows version (1985-2001)

Windows XP (2001)



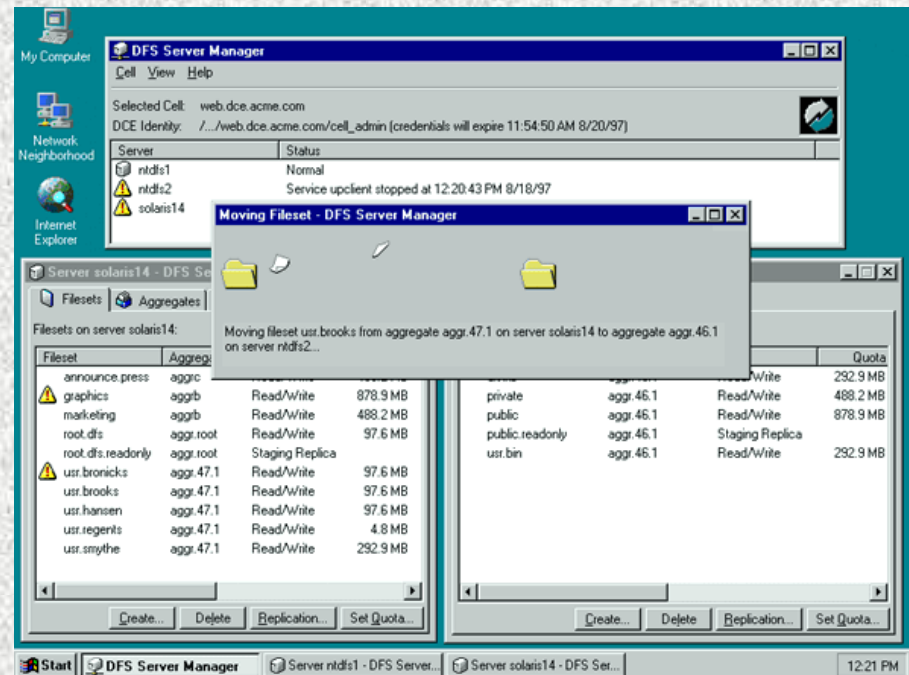
Windows XP

- ✓ Released in 2001 by Microsoft
- ✓ XP is short for “experience”
- ✓ Uses the same underlying code for all versions
- ✓ Replaces all previous versions of Windows
- ✓ Three versions:
 - Windows XP Home Edition
 - Windows XP Professional
 - Windows XP Server



Windows NT

- ✓ Released in 1993 by Microsoft
- ✓ Designed for client/server systems
- ✓ Two components:
 - Windows NT Workstation
 - Windows NT Server
- ✓ Oriented to business needs
- ✓ Offers security, remote administration, directory services, and a Web server



Windows CE



- ✓ Released in 1996 by Microsoft
- ✓ System used in PDAs or palmtops
- ✓ Runs simplified versions of Windows programs
- ✓ Data can be transferred to PCs
- ✓ Includes handwriting and voice recognition



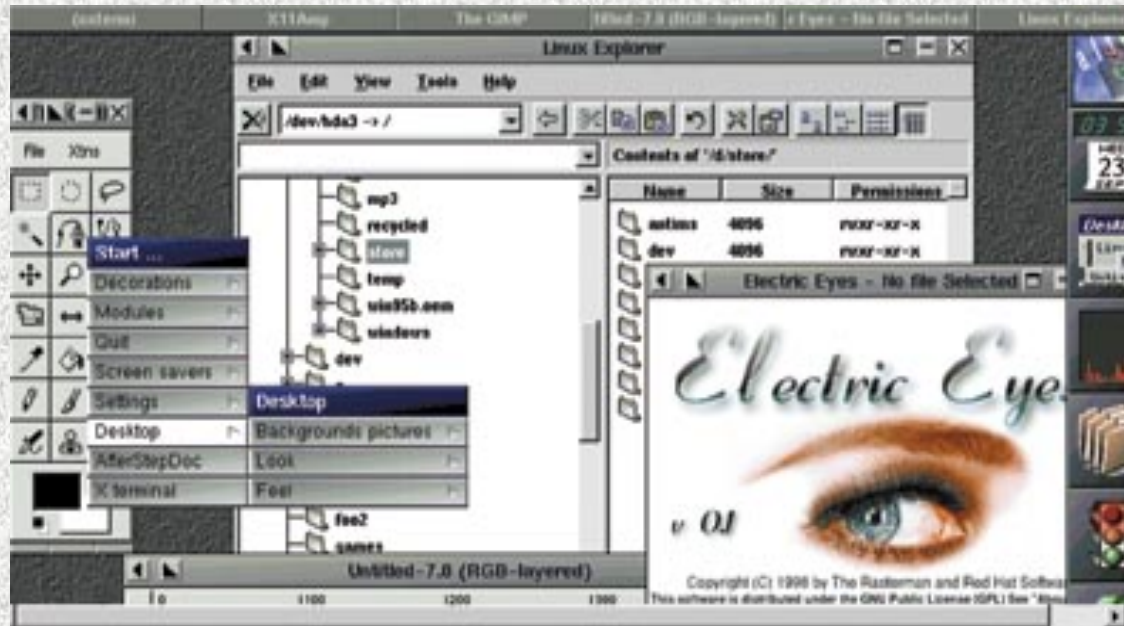
MAC OS

- ✓ Created in 1984
- ✓ First OS to use graphical user interface
- ✓ Easiest operating system for beginners
- ✓ A new version, Mac OS X, was released in 2000



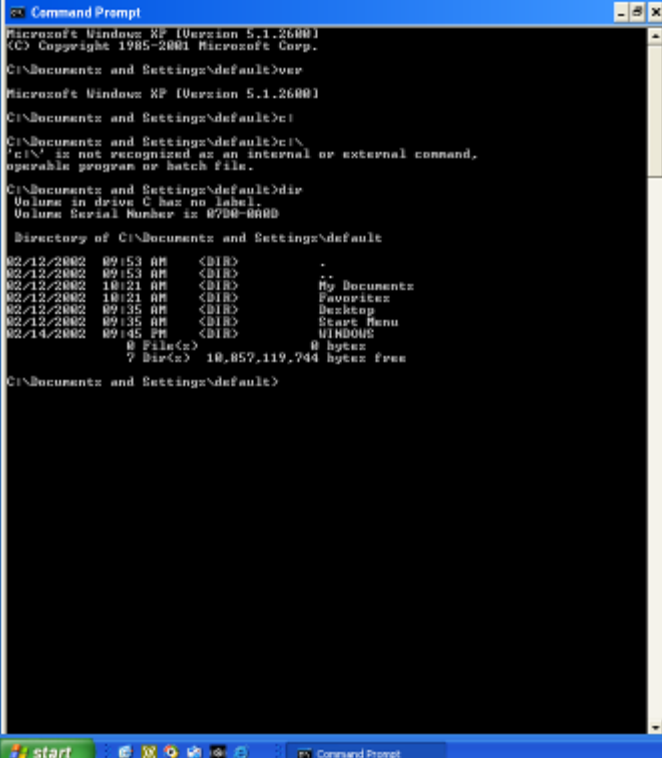
Linux

- ✓ Developed in 1991 by UNIX
- ✓ Open-source code – Available for all to see and use
- ✓ Competes with Windows and MAC-OS
- ✓ Powerful and free
- ✓ Growing acceptance



MS-DOS

- ✓ Developed for IBM PCs in 1981
- ✓ Uses command-line interface
- ✓ Use is diminishing



```
Command Prompt
Microsoft Windows XP [Version 5.1.2600]
(C) Copyright 1985-2001 Microsoft Corp.

C:\Documents and Settings\default>over

Microsoft Windows XP [Version 5.1.2600]

C:\Documents and Settings\default>c:\

C:\Documents and Settings\default>c:\

C:\Documents and Settings\default>dir
Volume in drive C has no label.
Volume Serial Number is: 07D0-0000

Directory of C:\Documents and Settings\default

02/12/2002  09:53 AM  <DIR>          .
02/12/2002  09:53 AM  <DIR>          ..
02/12/2002  10:21 AM  <DIR>          My Documents
02/12/2002  10:21 AM  <DIR>          Favorites
02/12/2002  09:35 AM  <DIR>          Desktop
02/12/2002  09:35 AM  <DIR>          Start Menu
02/14/2002  09:45 PM  <DIR>          WINDOWS
           N File(s)            0 bytes
           V Dir(s)          10,857,119,744 bytes free

C:\Documents and Settings\default>
```



UNIX

- ✓ Developed by AT&T in 1970s
- ✓ Included first preemptive multitasking system
- ✓ Developed concepts of file management and path names
- ✓ Facilitates client/server networking
- ✓ Widely used by corporations



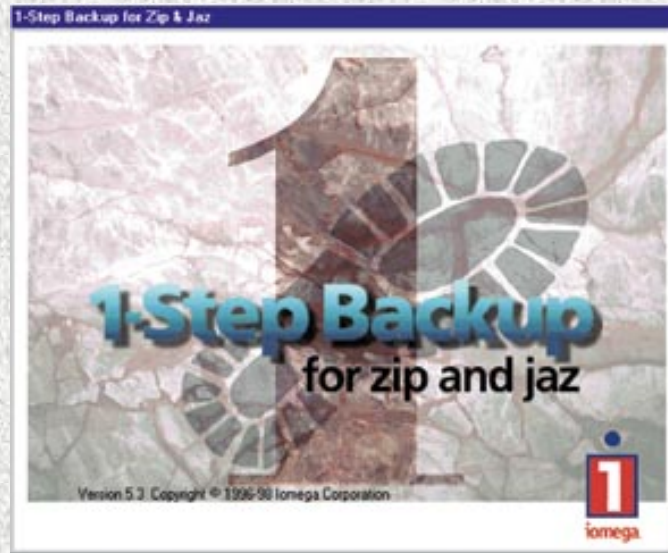
System Utilities: Tools for Housekeeping

- ✓ System utilities are programs that help the operating system manage the computer system's resources
- ✓ Types of utilities:
 - Backup software
 - Antivirus software
 - Disk scanning
 - Disk defragmentation
 - File management
 - File-searching software
 - File compression



Computers Are Your Future Chapter 4

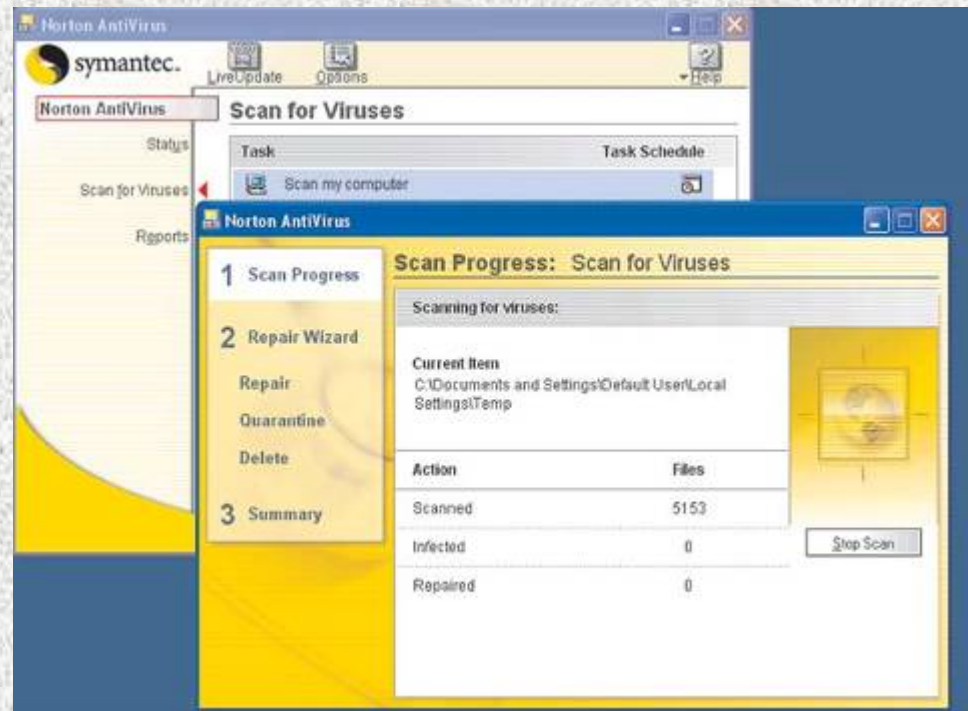
Backup Software



- ✓ **Backup software** includes programs that enable the user to copy data from the hard disk to another storage medium
- ✓ **Types of backups:**
 - **Full backup**
 - **Incremental backup**



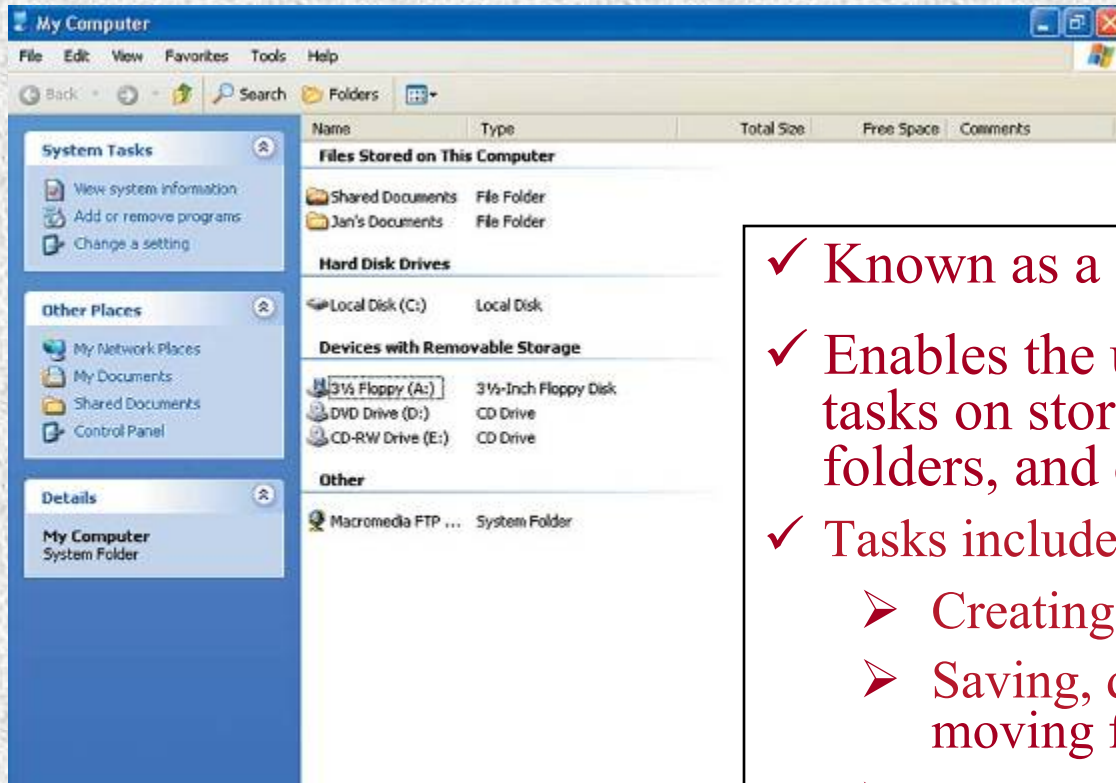
Antivirus Software



✓ Antivirus software protects the computer from computer viruses



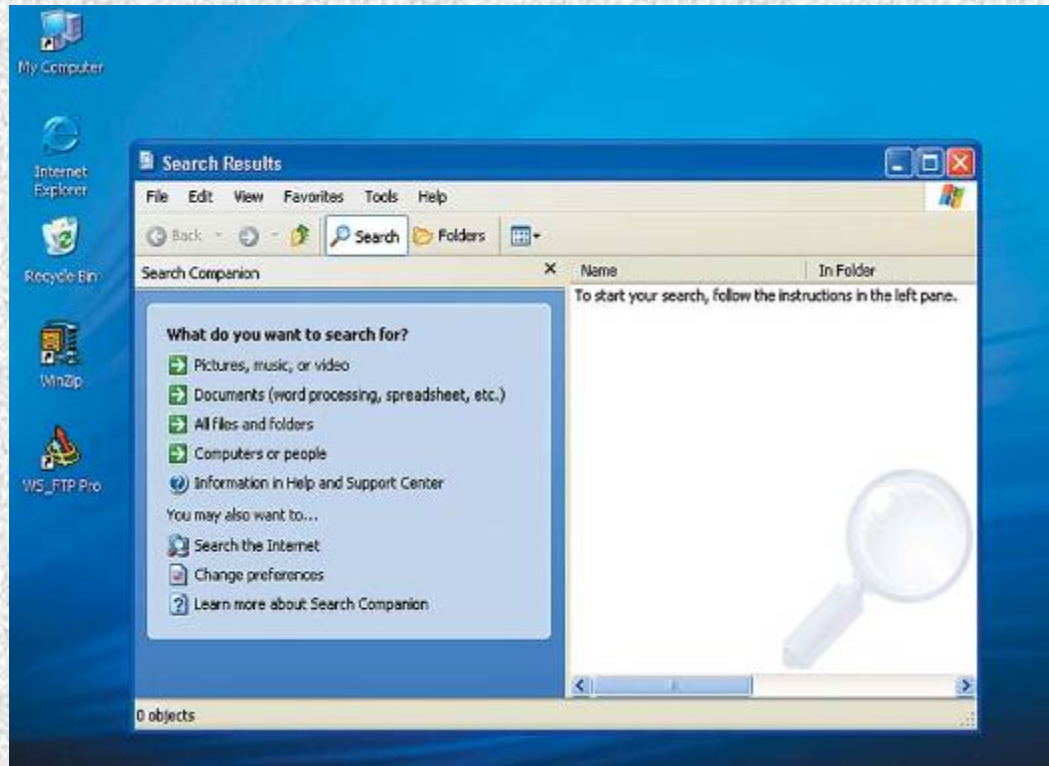
File Management Utilities



- ✓ Known as a **file manager**
- ✓ Enables the user to perform various tasks on storage devices using files, folders, and directories
- ✓ Tasks include:
 - Creating folders
 - Saving, deleting, copying, and moving files and folders
 - Examining the contents of files
 - Launching application programs



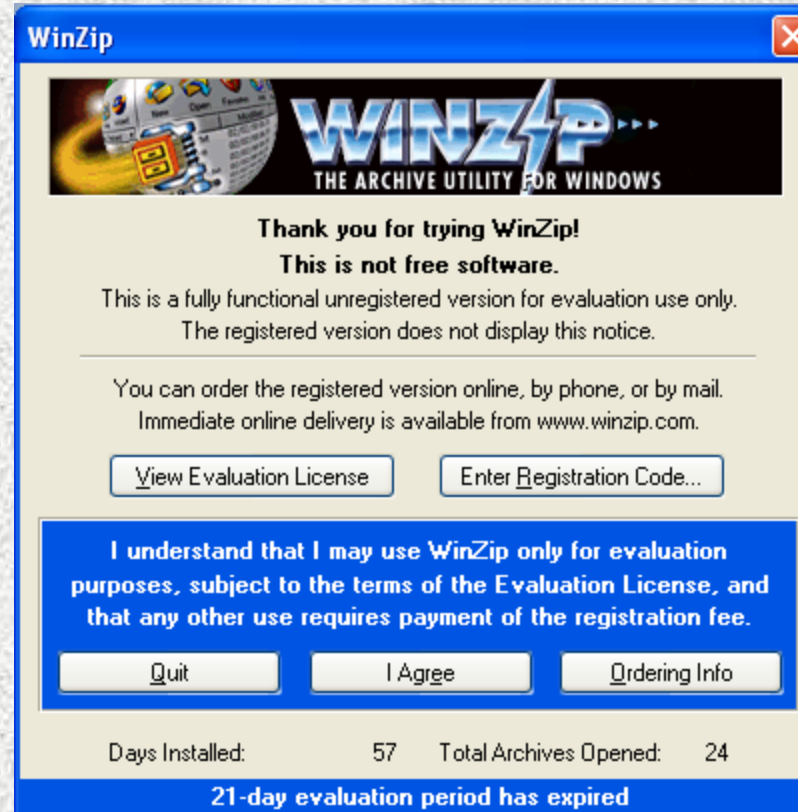
Search



✓ **Search programs** enable users to find files on storage devices



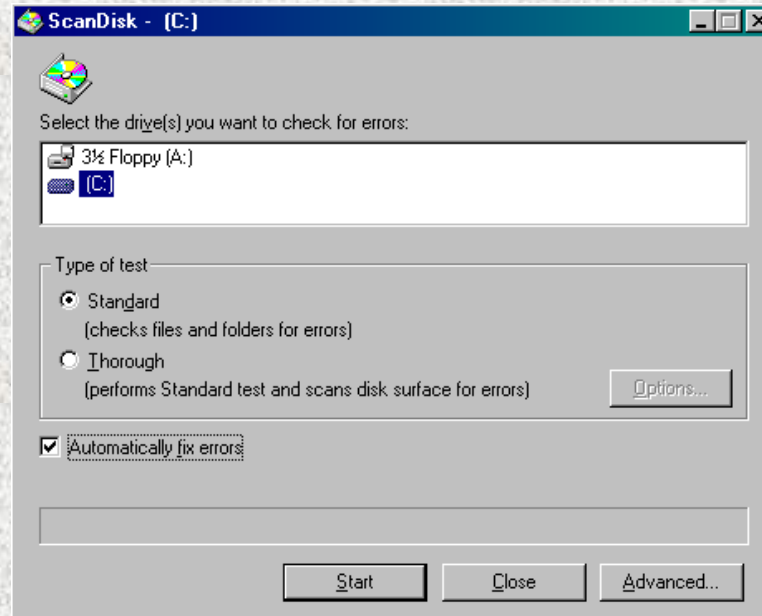
File Compression Utility



✓ A file compression utility reduces the size of a file



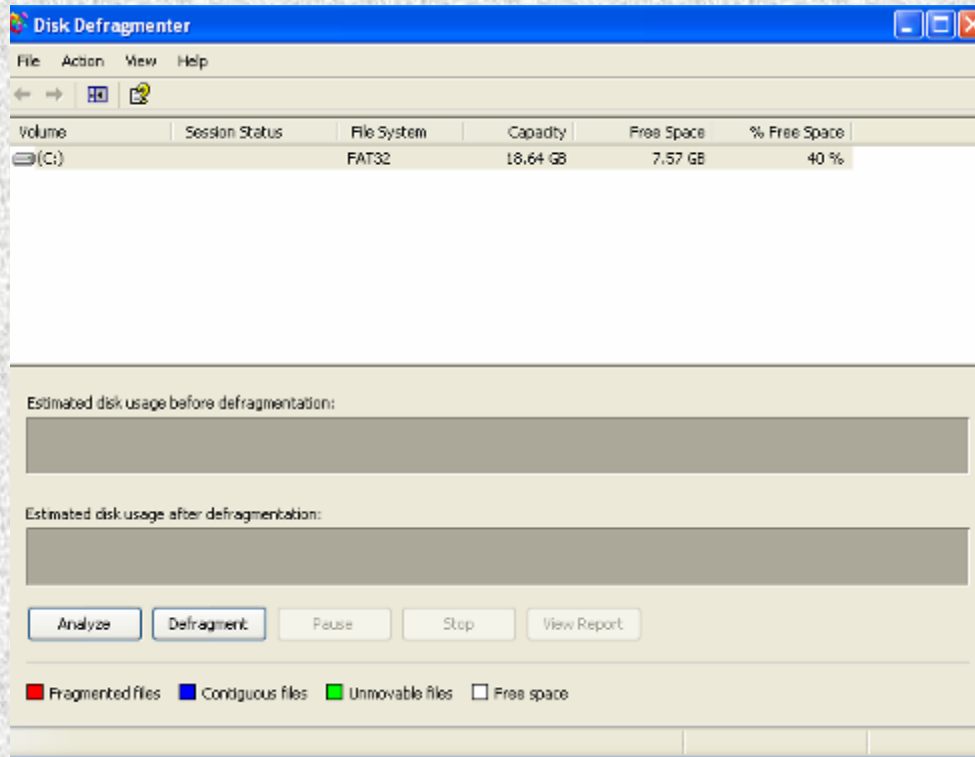
Disk Scanning Programs



- ✓ **Disk-scanning utilities** are programs that detect and fix physical and logical problems on storage devices
- ✓ **Disk cleanup utilities** are programs that remove files that are no longer needed



Disk Defragmentation Programs



- ✓ A disk defragmentation program moves data on a storage device to improve performance



System Update



✓ Windows Update keeps the operating system up to date

➤ windowsupdate.microsoft.com



Troubleshooting

- ✓ Computer startup failure:
 - Use a boot disk (emergency disk) in the floppy drive
- ✓ Configuration problems after adding new peripherals:
 - Start the computer in Windows' safe mode
 - Access safe mode by pressing the F8 key during the startup process



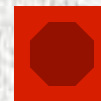
Troubleshooting

- ✓ System slowdown:
 - Scan for viruses
 - Check the CPU fan
 - Check BIOS options
 - Defragment the hard disk



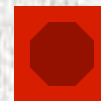
Shutting Down Your System

- ✓ Click Start, then Turn Off Computer
 - Standby - low power state
 - Shut Down – turns computer off
 - Restart – reboots computer



Chapter 4 Summary

- Two of the system software components are the operating system and system utilities
- The operating system coordinates the functions of a computer's hardware and provides support for application programs
- An operating system manages programs, memory, and input/output devices, and it also provides a means of communicating with the user
- The six steps to start a computer are loading the BIOS, power-on self-test, load operating system, configure system, load utilities, authenticate users



Chapter 4 Summary (continued)

- Two major operating systems for the personal computer are Microsoft Windows and the Mac OS X
- The basic types of user interface are command-line, menu-driven, and graphical
- System utilities keep the computer running efficiently
- Backup procedures keep data safe
- Troubleshooting is helpful for discovering errors

