

Computers: Tools for an Information Age

System Software



Objectives

 **System Software**

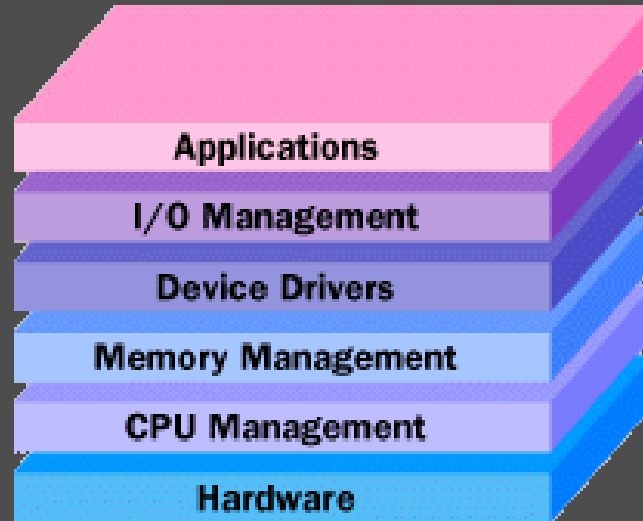
 **Operating system (OS)**

- **Popular Operating Systems**

 **System Utilities**

System Software

System Software



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



Operating system (OS)



The Operating System (OS)

- The operating system is a set of programs that perform certain basic functions.
- The functions of the operating system are:
 - ❖ Starting the computer
 - ❖ Managing programs
 - ❖ Distributing memory
 - ❖ Coordinating the processor and peripheral devices
 - ❖ Enabling user interaction with the computer



Starting the Computer

- The **cold booting** process begins when the power is turned on.
- There are several steps to a cold boot:
 1. ROM loads **BIOS (basic input/output system)** into the computer's memory.
 2. BIOS conducts a **Power-on self-test (POST)** to check the input/output system for operability.
 3. BIOS searches for the OS. Settings in the **CMOS (complementary metal-oxide semiconductor)** determine where to look for the OS.
 4. The **kernel** (the essential OS components) is loaded into memory from storage.
 5. OS takes control of the computer.



Configuring the System

1. The system is configured from the OS's **registry**.
2. **Drivers** and **utility programs** are loaded into memory.
3. **System utilities** (volume control, antivirus software, etc.) are loaded into memory.
4. **Authentication** or **user login** occurs.
5. **User interface** begins, enabling user interaction with computer programs.

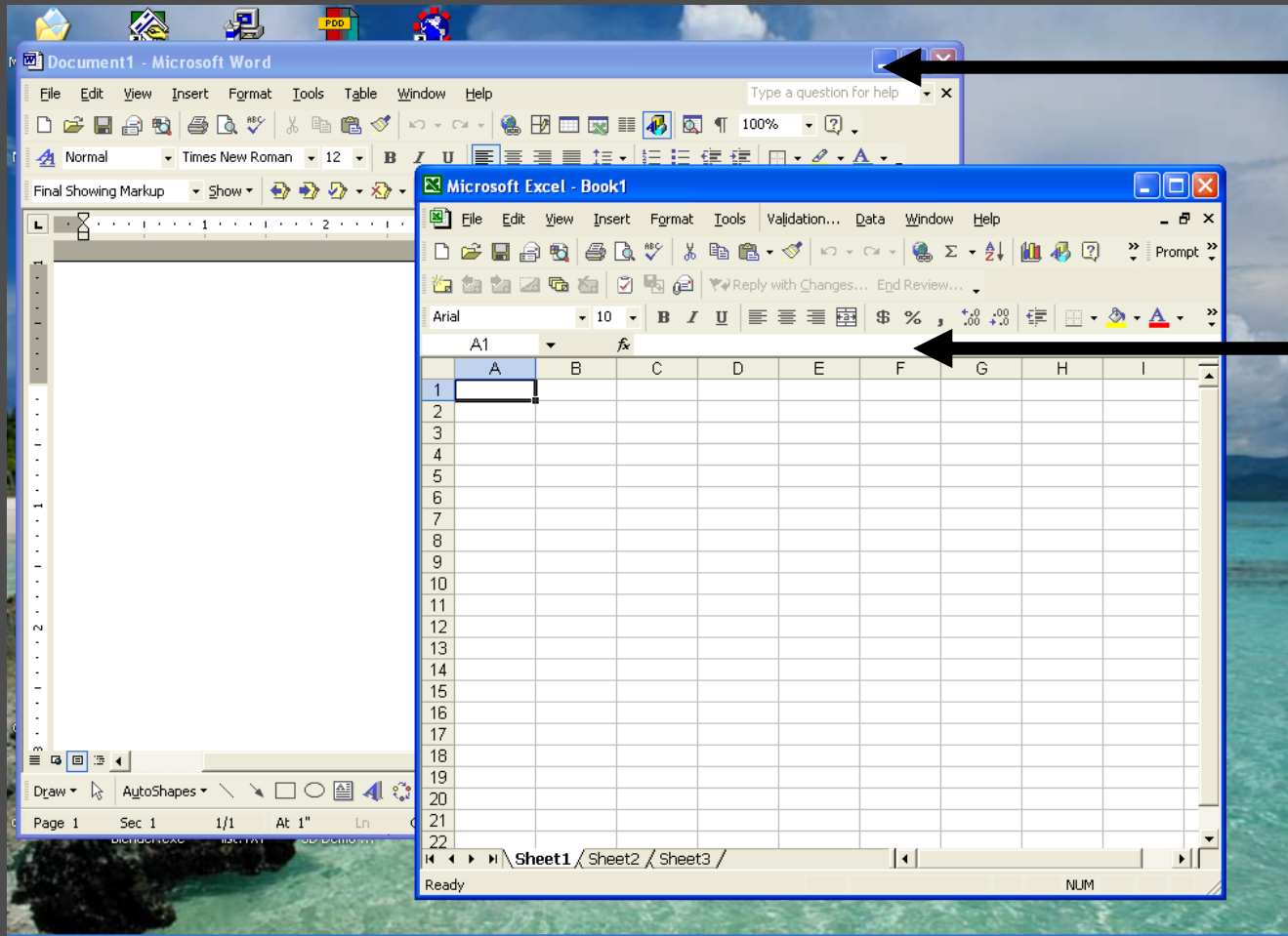


Managing Programs

- **Single-tasking** 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:
 - ❖ **Foreground application**– Active program or program in use
 - ❖ **Background application**– Inactive program or program **not** in use



Example of Multitasking



Background Application

Foreground Application

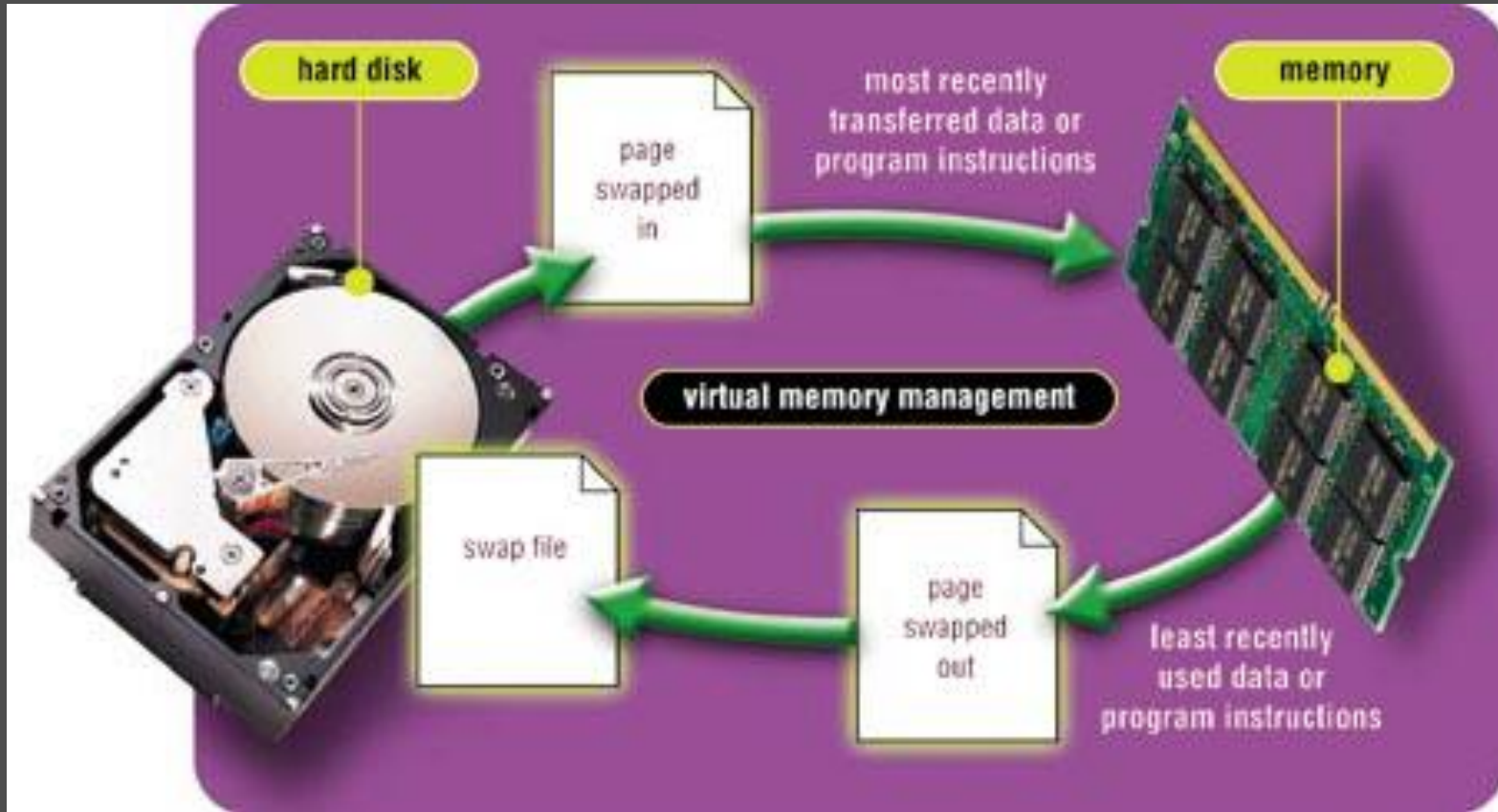


Managing Memory

- The operating system allocates memory area for each running program. It keeps programs from interfering with each other.
- The OS uses **virtual memory** as an extension of RAM. **Pages** of data and instructions are **swapped** between RAM and the hard drive if RAM is full.
- The OS works with the **direct memory access (DMA) controller** to permit peripherals access to RAM.



Managing Virtual Memory



Providing the User Interface

- The **user interface** is that part of the operating system that enables the user to interact with it.
- Two types of user interfaces:
 - ❖ **Command-line**– Requires the user to type keywords or commands to enter data or give instructions.
 - ❖ **Graphical user interface (GUI)**– Uses a graphics environment made up of objects, icons, buttons and menus. The user is able to use a pointing device (mouse, joystick, etc.) or keyboard to enter data and issue commands.



Command-Line Interface

```
C:\ 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

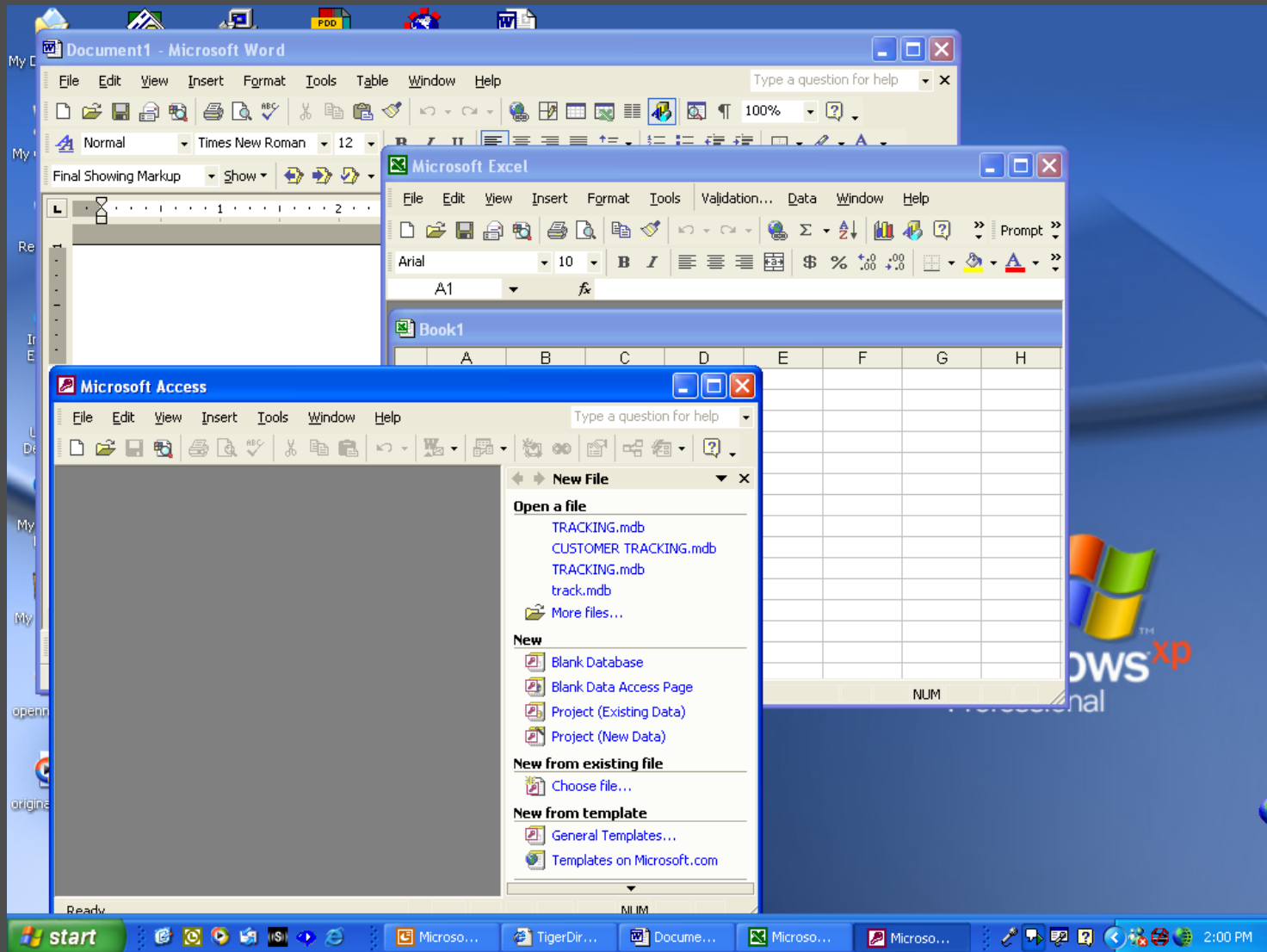
Directory of C:\Documents and Settings\default

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>_
```



Graphical User Interface (GUI)



Popular Operating Systems

Popular Operating Systems

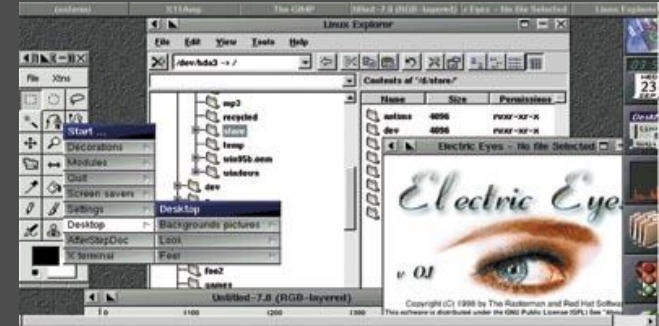
MS-DOS



UNIX



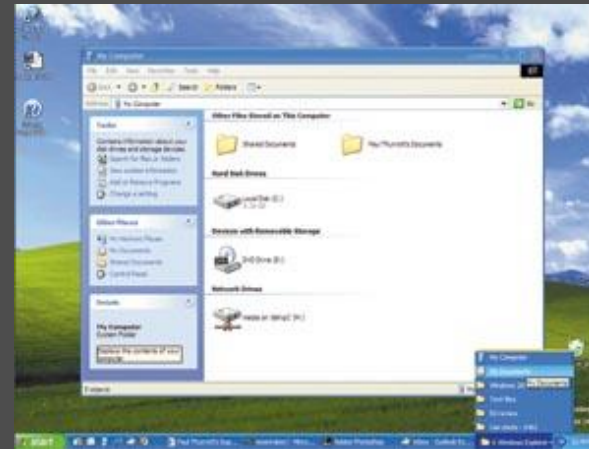
LINUX



MAC OS



WINDOWS XP



UNIX

- Developed by AT&T in 1970s
- First preemptive multitasking system
- Developed concepts of file management and path names
- **Client/server** networking system
- Widely used by corporations



MS-DOS

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



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

C:\Documents and Settings\default>ver
Microsoft Windows XP [Version 5.1.2600]

C:\Documents and Settings\default>c:
C:\Documents and Settings\default>c:\
'c:\' is not recognized as an internal or external command,
operable program or batch file.

C:\Documents and Settings\default>dir
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
02/12/2002  09:45 PM  <DIR>          WINDOWS
               0 File(s)              0 bytes
               7 Dir(s)  10,857,119,744 bytes free

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



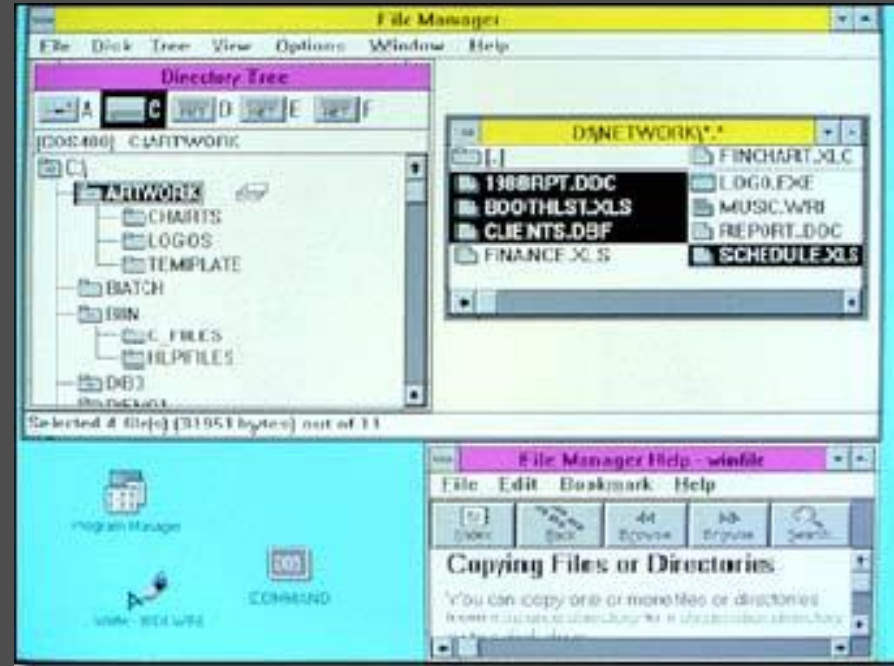
MAC OS

- First to use graphical user interface in 1984
- Easiest operating system for beginners



Windows 3.X

- Includes Windows 3.0, 3.1, 3.11, and Windows for Workgroups 3.1
- Not a true operating system
- Uses cooperative multitasking



Windows 95 and 98



■ Windows 95

- ❖ True operating system
- ❖ Uses preemptive multitasking
- ❖ Downward compatible with DOS
- ❖ Considered a transitional system



■ Windows 98

- ❖ Improved version of Windows 95
- ❖ More stable than Windows 95



Windows CE (consumable electronics)

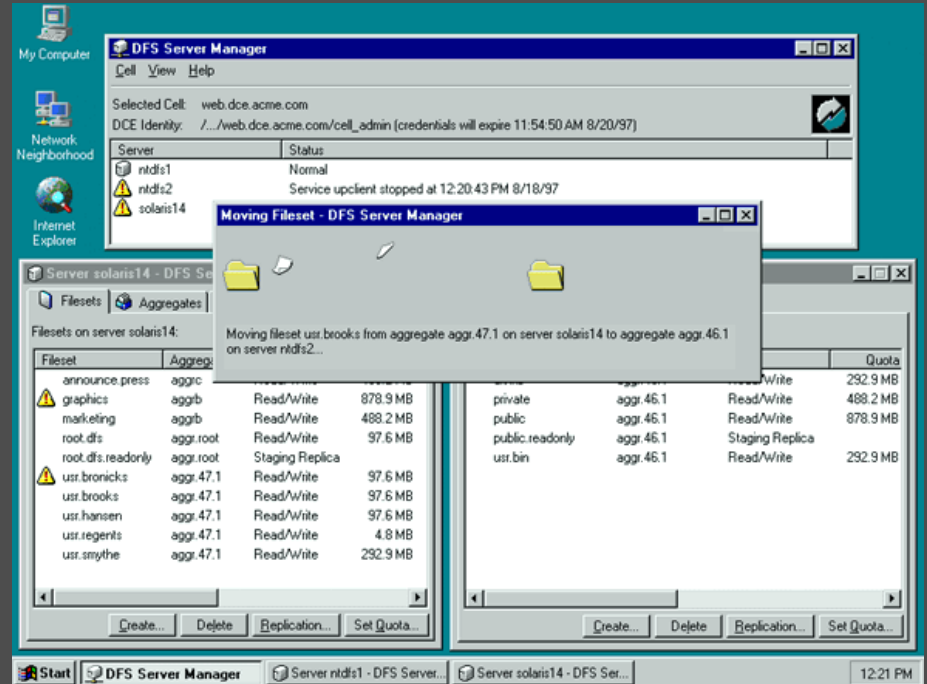


- System used in PDAs or palmtops
- Runs simplified versions of Windows programs
- Data can be transferred to PCs
- Includes handwriting and speech recognition



Windows NT

- Designed for client/server systems
- Two components:
 - ❖ Windows NT Workstation
 - ❖ Windows NT Server
- Oriented to business needs
- Offers security, remote administration, directory services, and server



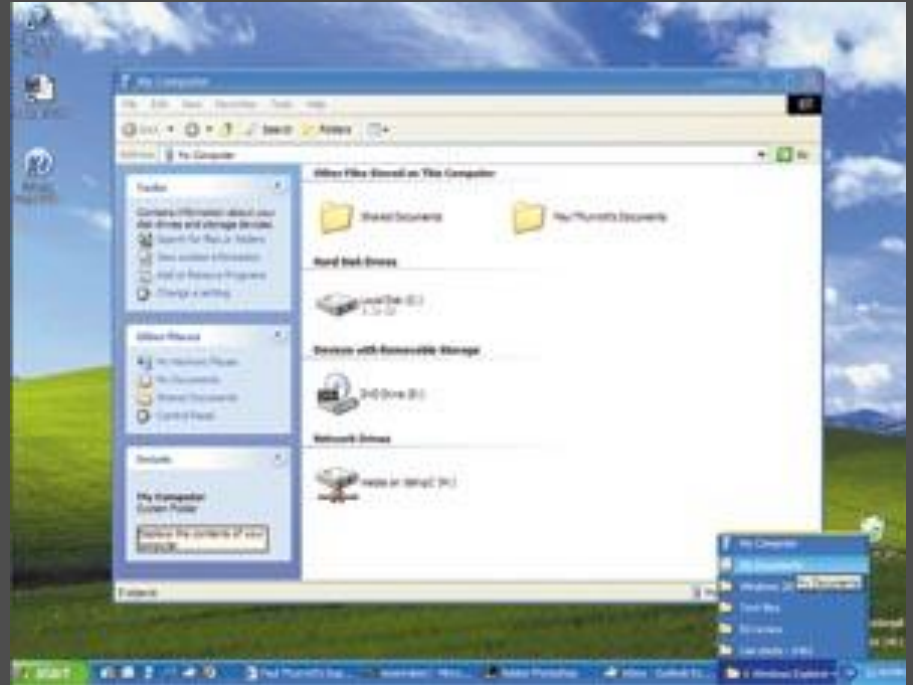
Windows 2000

- Two versions:
 - ❖ Microsoft Windows 2000 Professional
 - ❖ Microsoft Windows 2000 Server
- Better stability and more features than Windows NT



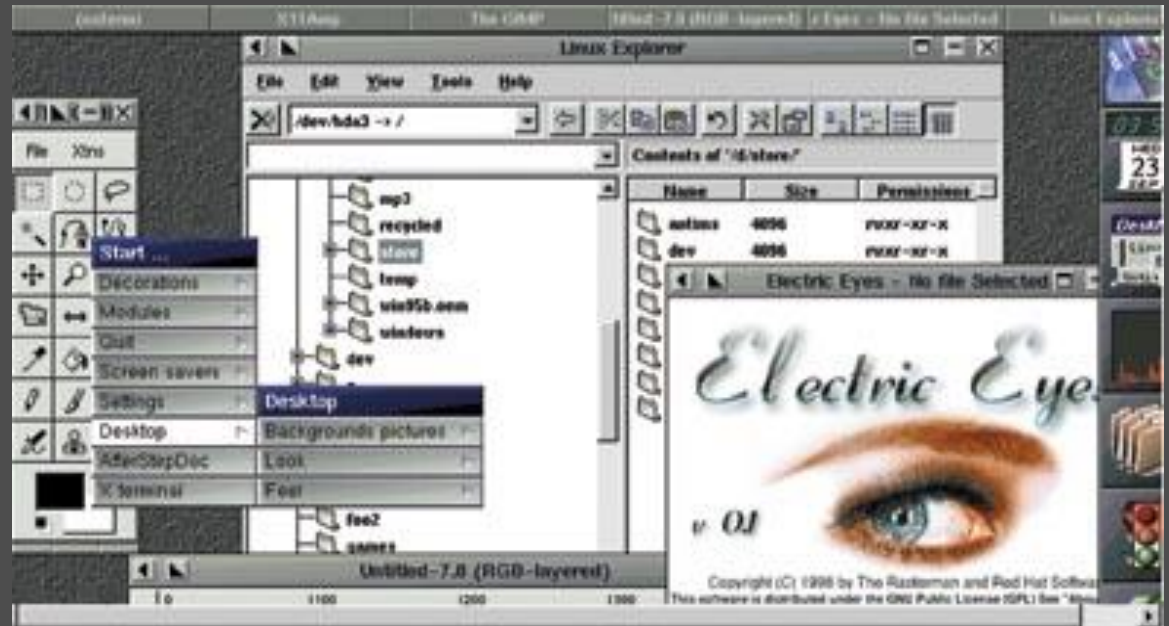
Windows XP

- Replaces all previous versions of Windows
- Three versions:
 - ❖ Windows XP Home Edition
 - ❖ Windows XP Professional
 - ❖ Windows XP Server



Linux

- Developed in 1991 by UNIX
- Competes with Windows and MAC
- Powerful and free
- Growing fast in acceptance
- Uses **Apache** web server



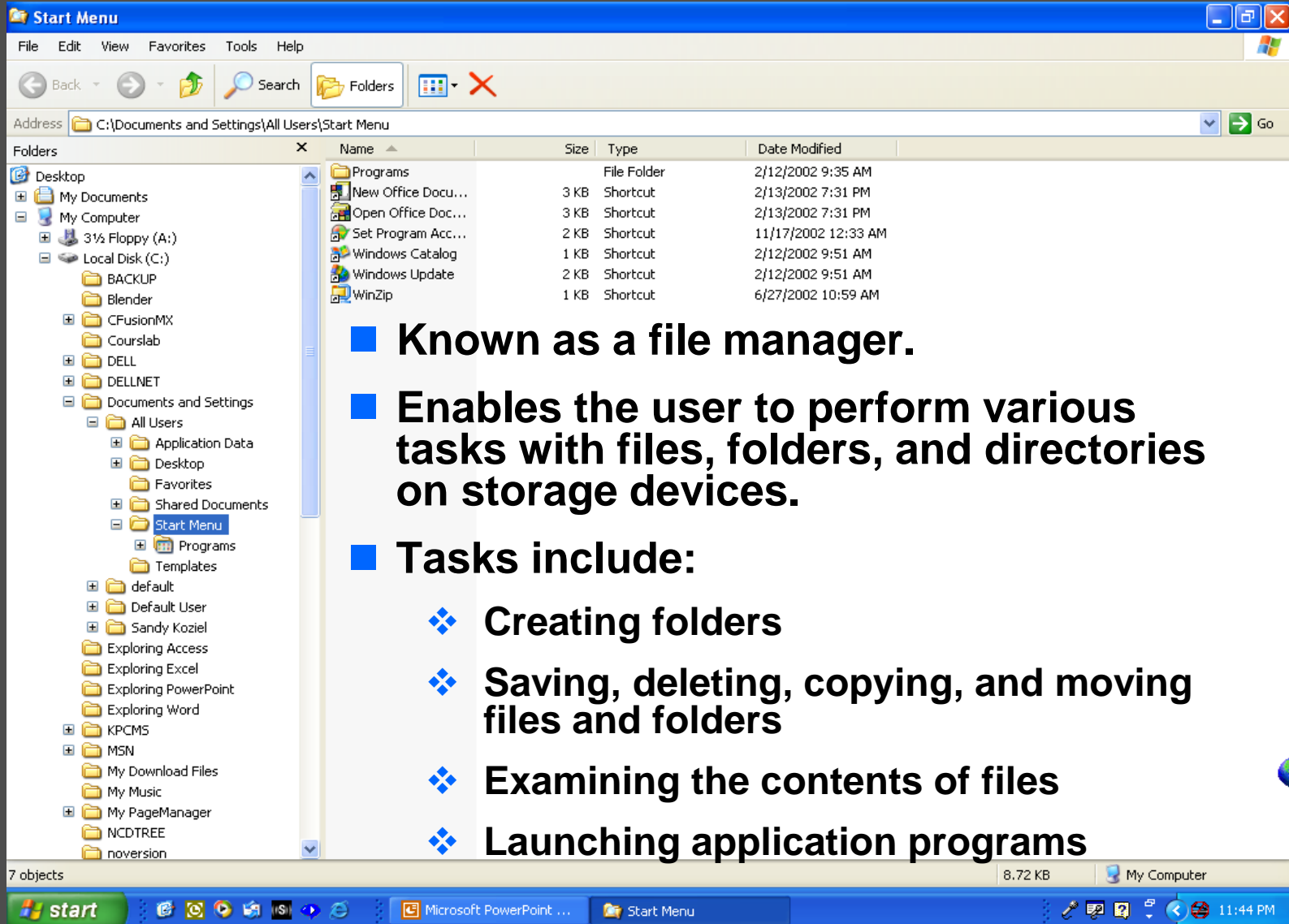
System Utilities

System Utilities

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



File Management Utilities



The screenshot shows a Windows Explorer window titled "Start Menu" with the address bar set to "C:\Documents and Settings\All Users\Start Menu". The left pane shows a tree view of folders, with "Start Menu" selected. The right pane displays a list of files and folders:

Name	Size	Type	Date Modified
Programs		File Folder	2/12/2002 9:35 AM
New Office Docu...	3 KB	Shortcut	2/13/2002 7:31 PM
Open Office Doc...	3 KB	Shortcut	2/13/2002 7:31 PM
Set Program Acc...	2 KB	Shortcut	11/17/2002 12:33 AM
Windows Catalog	1 KB	Shortcut	2/12/2002 9:51 AM
Windows Update	2 KB	Shortcut	2/12/2002 9:51 AM
WinZip	1 KB	Shortcut	6/27/2002 10:59 AM

7 objects

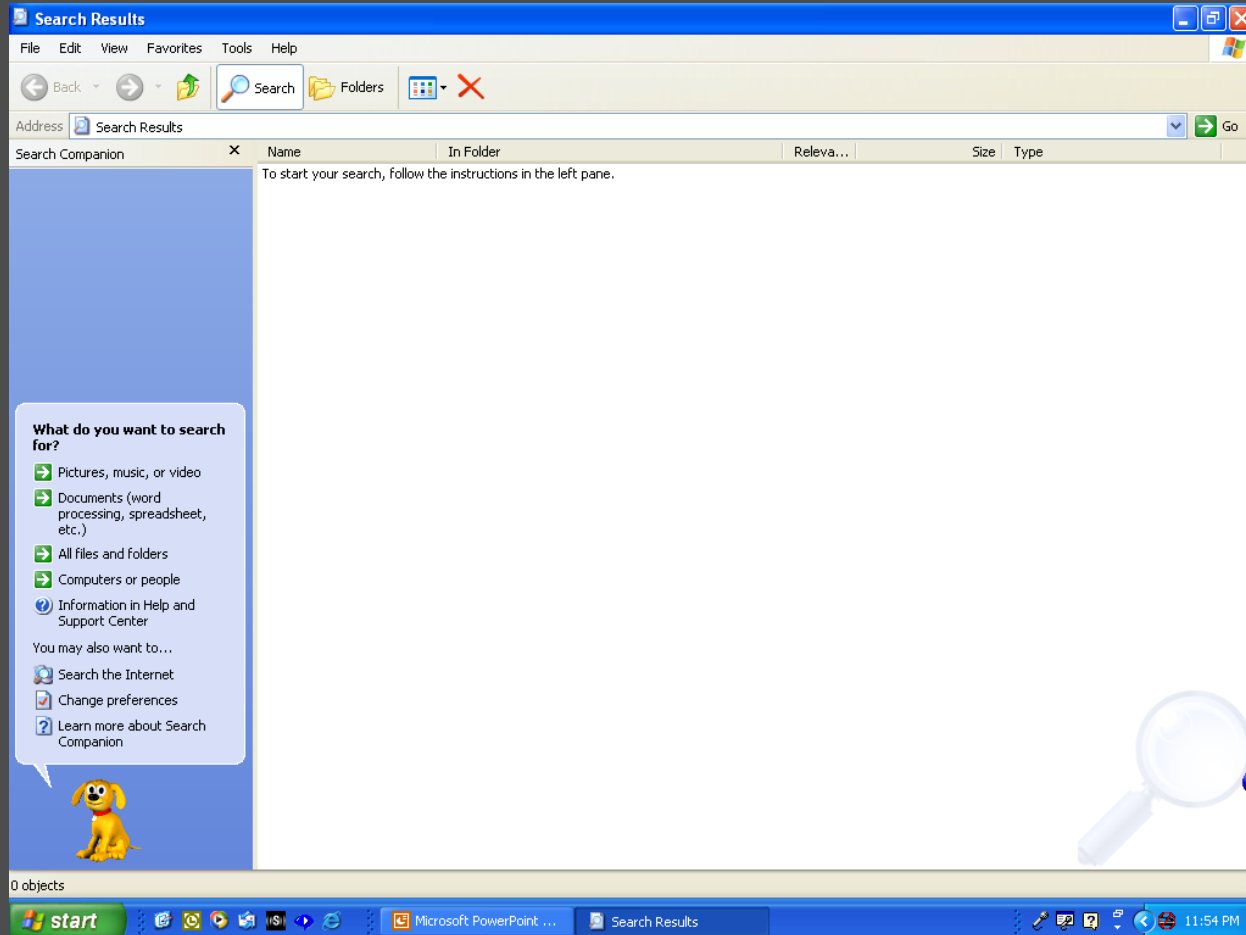
8.72 KB My Computer

Taskbar: Microsoft PowerPoint ... Start Menu 11:44 PM

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



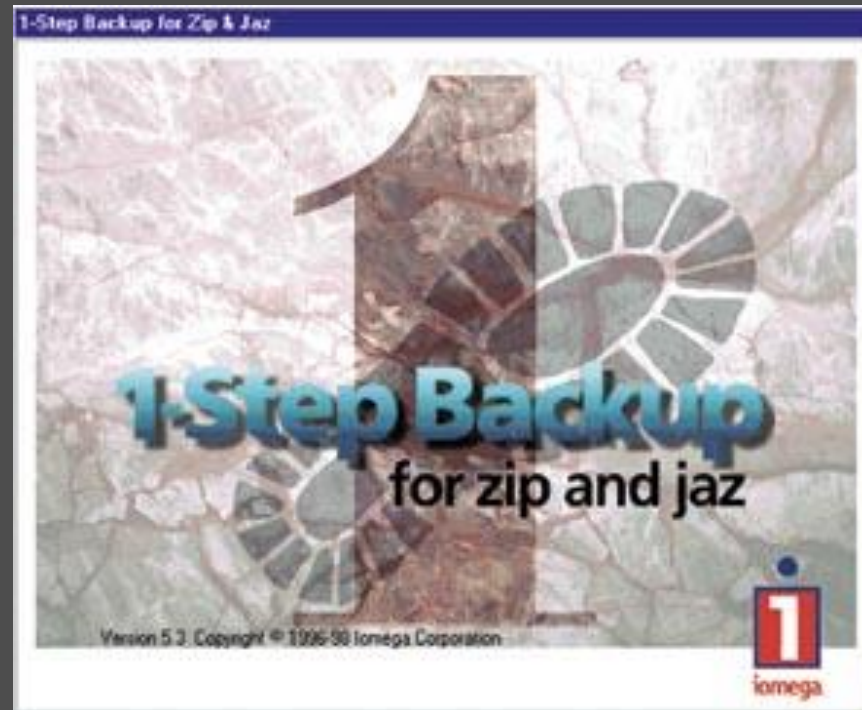
File Finders



- **File finders** are programs that enable the user to find files on a storage device.



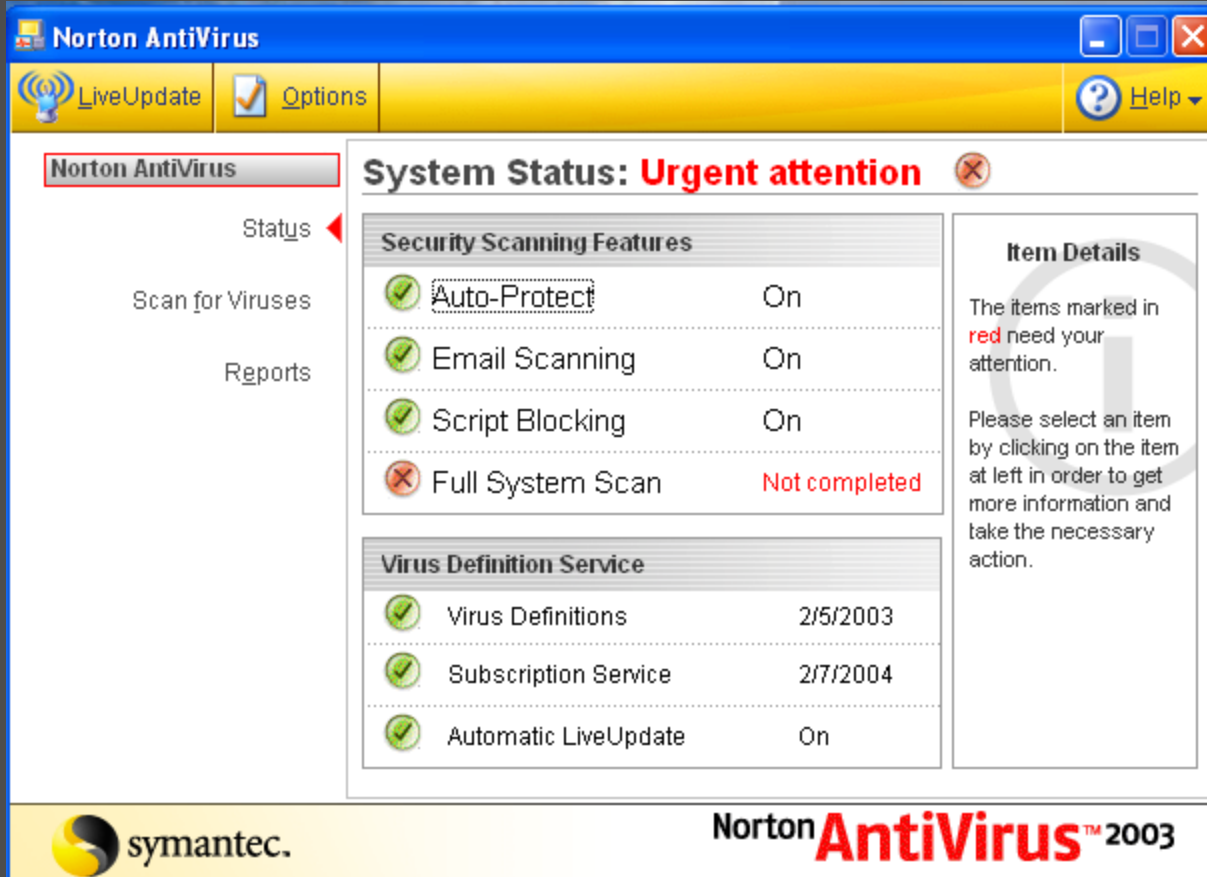
Backup Utilities



- **Backup utilities** are programs that enable the user to copy data from the hard disk to another storage medium.



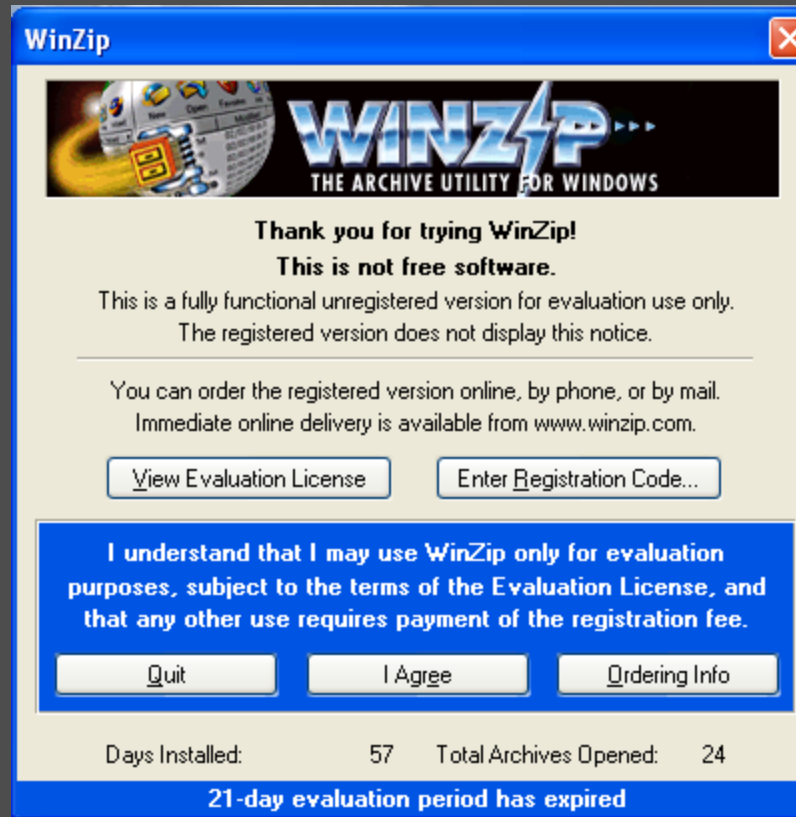
Antivirus Software



- Antivirus software protects the computer from computer viruses.



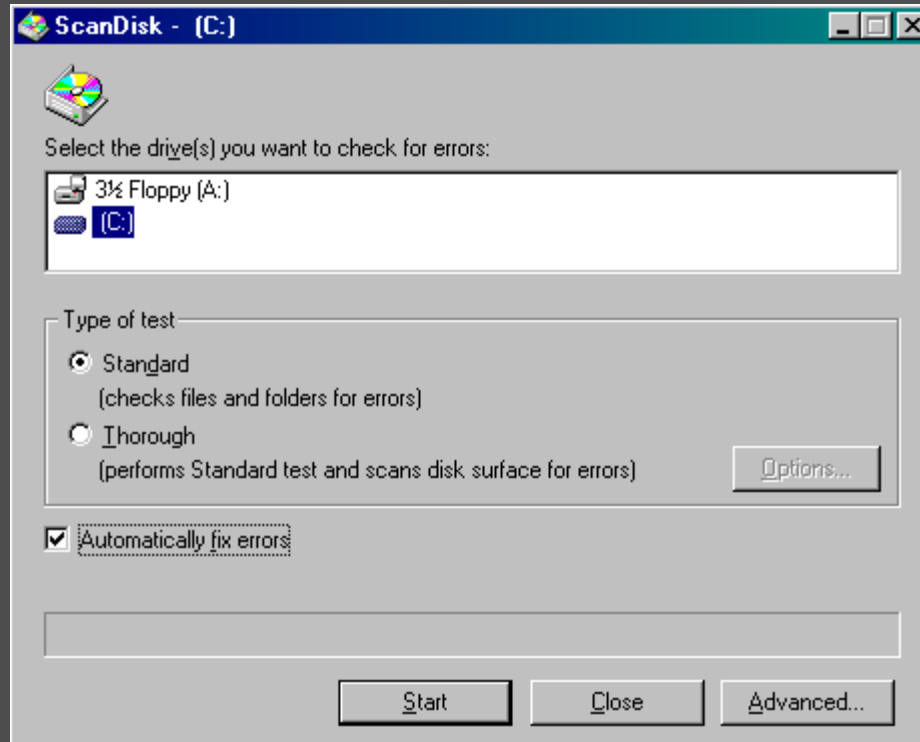
File Compression Utility



- A file compression utility reduces the size of a file.



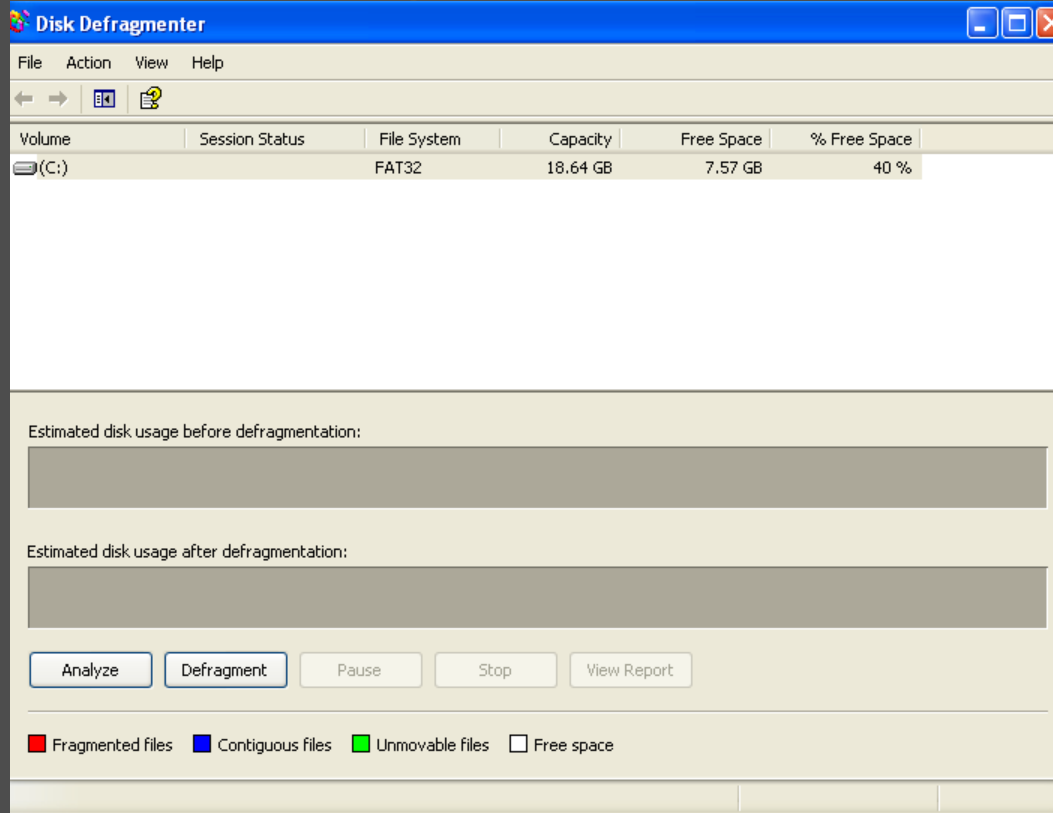
Disk Scanning Utility



- A disk scanning utility is a program that detects and fixes **physical** and **logical** problems on storage devices.



File Defragmentation Utility



- A **file defragmentation utility** is a program that moves data on a storage device to improve performance.

