

# Chapter 7A

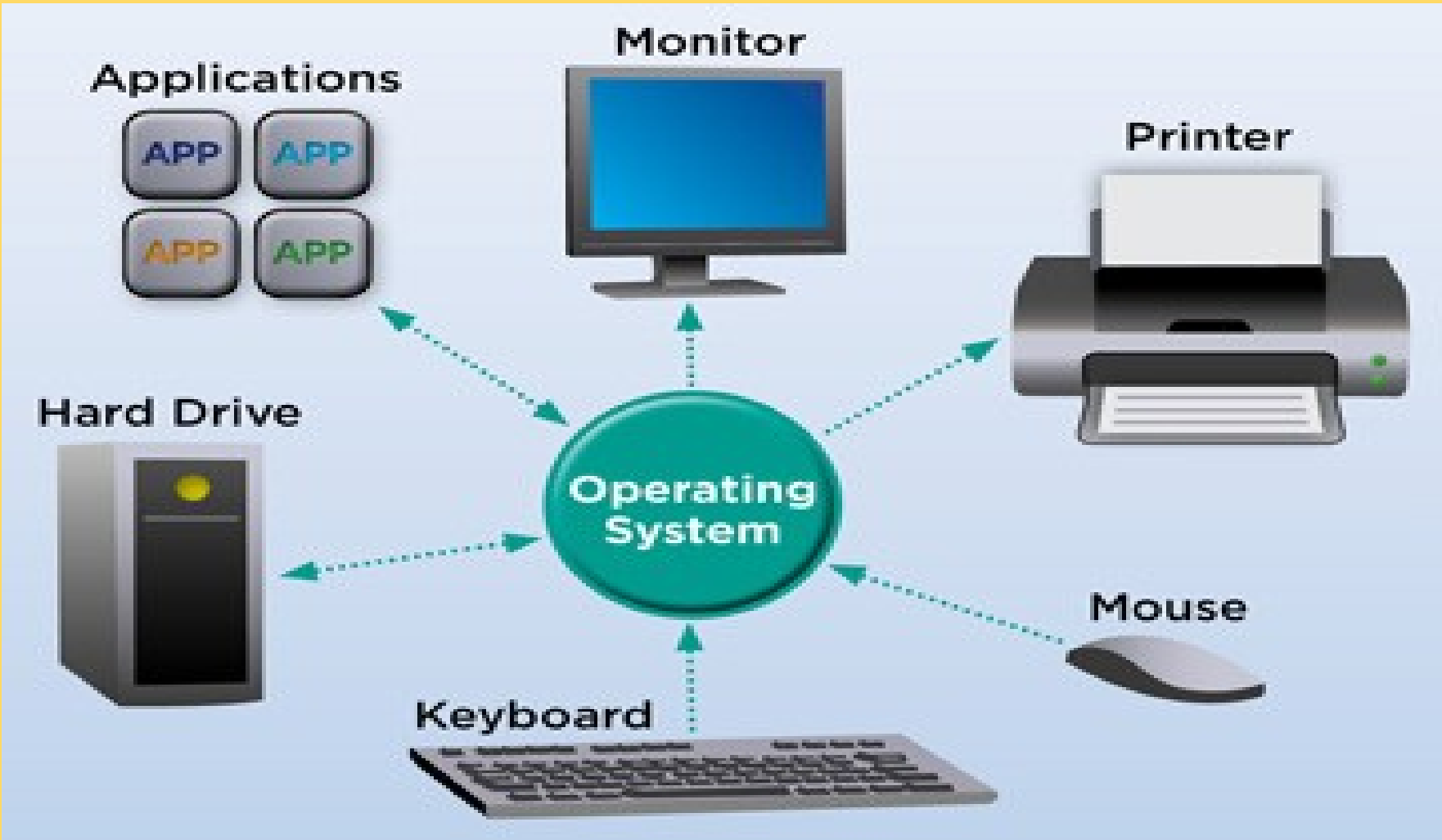
Operating System Basics

# Operating System

- The *operating system* (**OS**) is the most important program that runs on a computer. Every general-purpose computer must have an operating system to run other programs and applications.
- Computer operating systems perform basic tasks, such as recognizing input from the keyboard sending output to the display screen, keeping track of files and directories on the disk, and controlling peripheral devices such as printers.

- For large systems, the operating system has even greater responsibilities and powers. It is like a traffic cop — it makes sure that different programs and **users** running at the same time do not interfere with each other. The operating system is also responsible for *security*, ensuring that unauthorized users do not **access** the system.

# Operating system




# Functions of Operating Systems

- Provide a user interface
- Run programs
- Manage hardware devices
- Organized file storage

# Types of Operating Systems

- Real-time operating system
- Is an application that responds to certain inputs extremely quickly-thousandths or millionths of a second.
  - Very fast small OS
  - Built into a device
  - Respond quickly to user input
  - It can support multiple simultaneous tasks or it may only support single tasking.
  - MP3 players, Medical devices, machinery, life support system



# What is Real Time ?

- “ Real time in operating systems:

The ability of the operating system to provide a required level of service in a bounded response time.”

- POSIX Standard 1003.1

# Types of Operating Systems

- Single user/Single tasking OS
  - One user works on the system
  - Performs one task at a time
  - MS-DOS and Palm OS
  - Take up little space on disk
  - Run on inexpensive computers



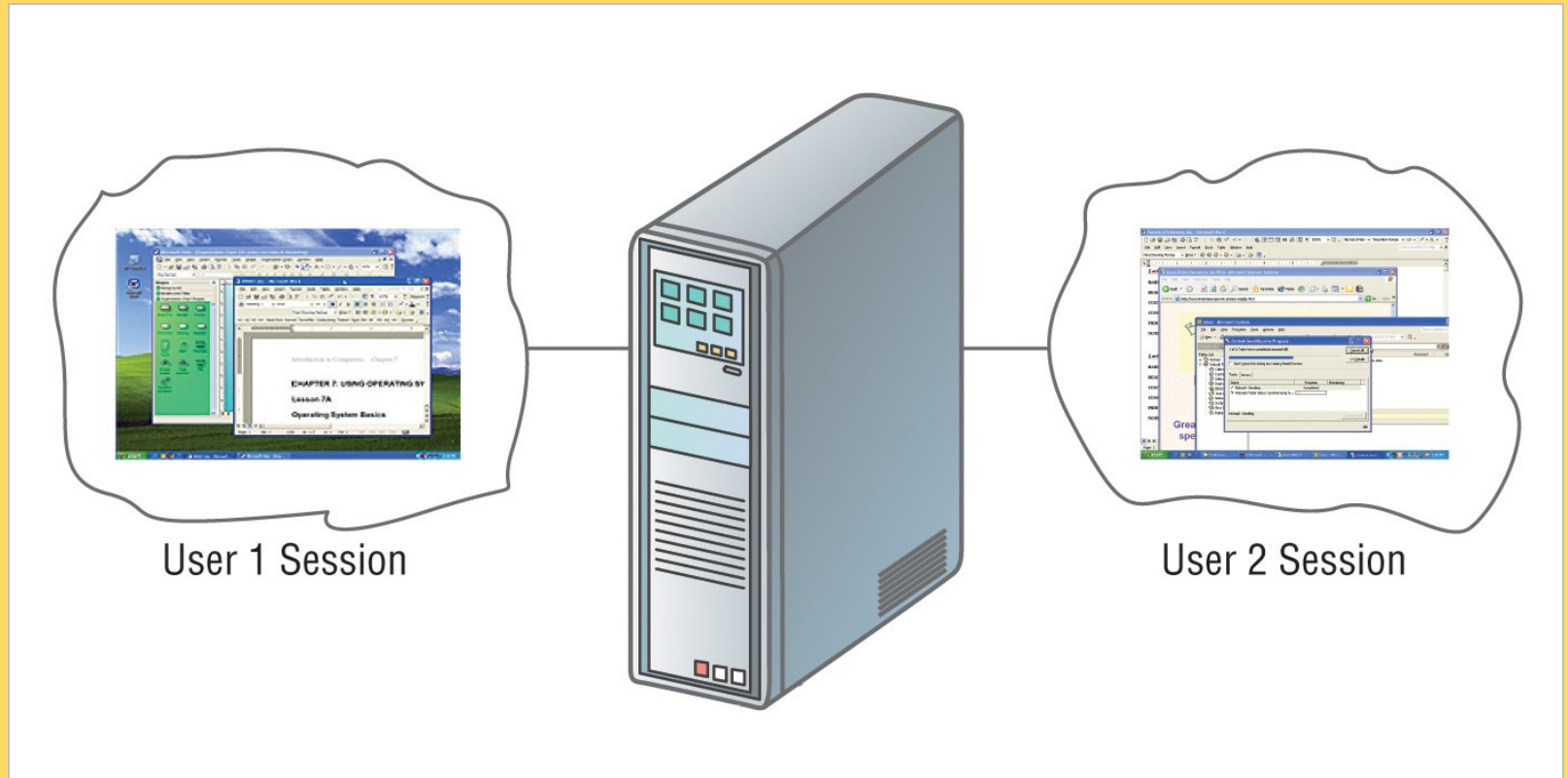
# Types of Operating Systems

- Single user/Multitasking OS
  - User performs many tasks at once
  - Most common form of OS
  - Windows XP and OS X
  - Require expensive computers
  - Tend to be complex

# Types of Operating Systems

- Multi user/Multitasking OS
  - Many users connect to one computer
  - Each user has a unique session
  - UNIX, Linux, and VMS
  - Maintenance can be easy
  - Requires a powerful computer

# Multi user/Multi tasking OS



# Providing a User Interface

- User interface
  - How a user interacts with a computer
  - Require different skill sets

# Providing a User Interface

- Graphical user interface (GUI)
  - Most common interface
    - Windows, OS X, Gnome, KDE
  - Uses a mouse to control objects
  - Uses a desktop metaphor
  - Shortcuts open programs or documents
  - Open documents have additional objects
  - Task switching
  - Dialog boxes allow directed input

# Graphical User Interface

## Windows 7 Desktop



Start button

Taskbar icons

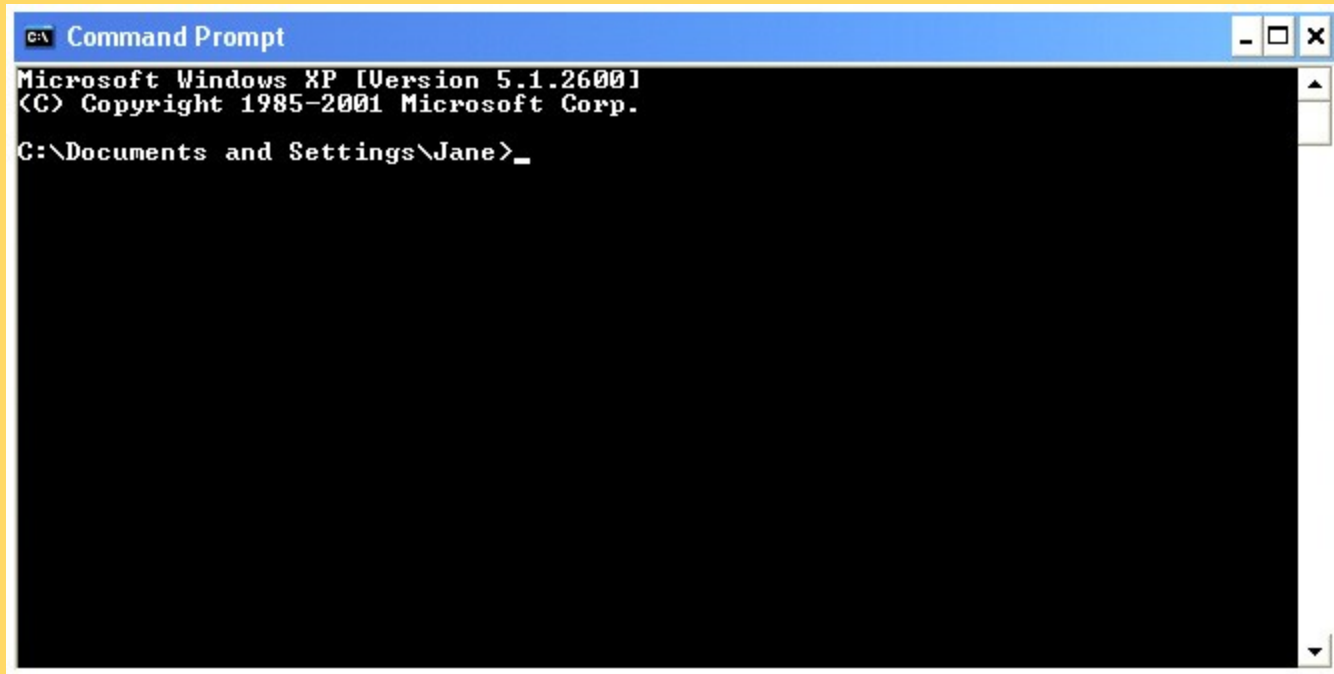
Windows Notification Area

Time and Date

# Providing a User Interface

- Command line interfaces
  - Older interface
    - DOS, Linux, UNIX
  - User types commands at a prompt
  - User must remember all commands
  - Included in all GUIs

# Command Line Interface

A screenshot of a Windows XP Command Prompt window. The title bar is blue and contains the text "c:\ Command Prompt" and standard window control buttons (minimize, maximize, close). The main area is black with white text. The text displayed is: "Microsoft Windows XP [Version 5.1.2600]  
(C) Copyright 1985-2001 Microsoft Corp.  
C:\Documents and Settings\Jane>\_".

```
c:\ Command Prompt
Microsoft Windows XP [Version 5.1.2600]
(C) Copyright 1985-2001 Microsoft Corp.
C:\Documents and Settings\Jane>_
```





# Running Programs

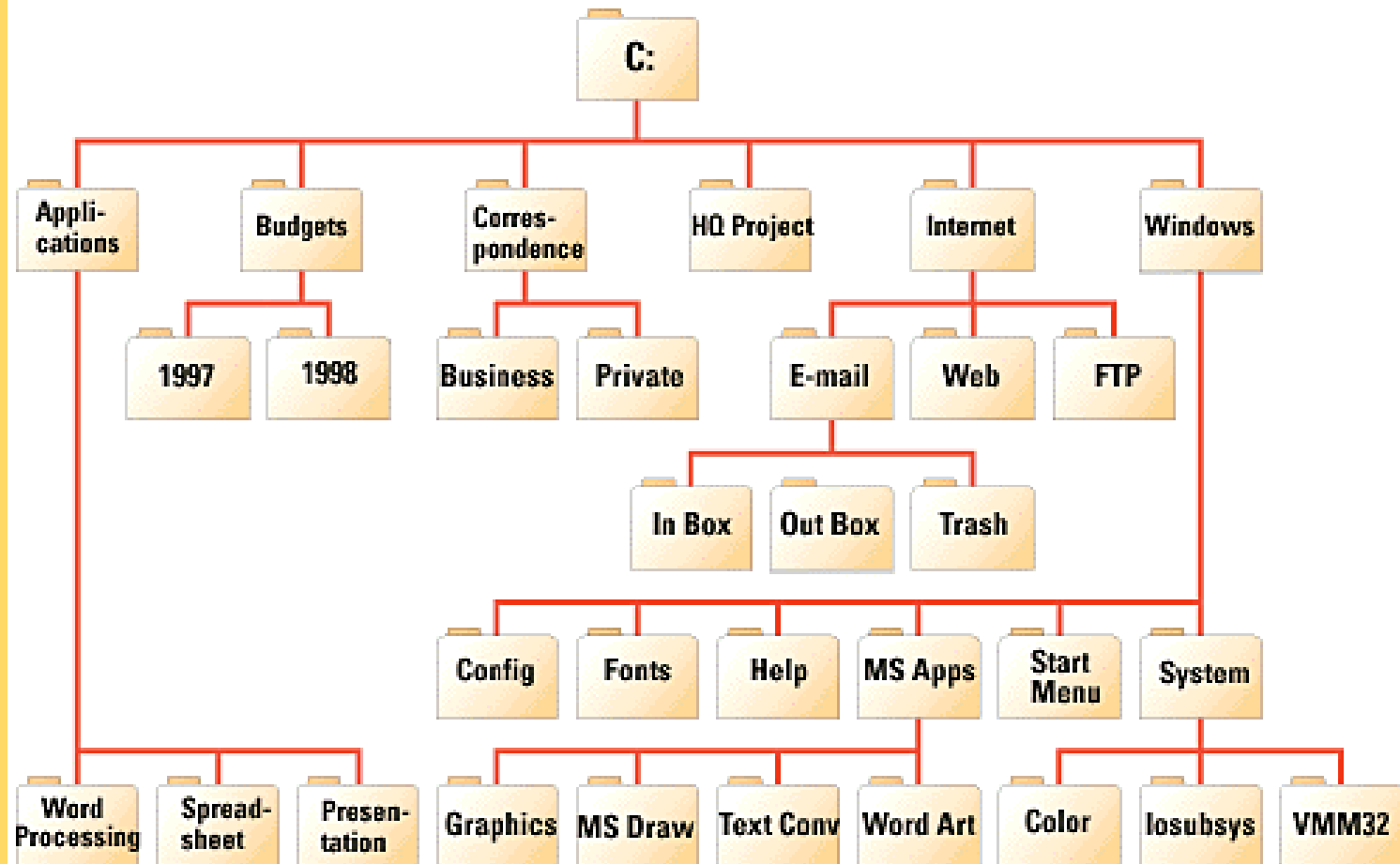
- Many different applications supported
- System call
  - Provides consistent access to OS features
- Share information between programs
  - Copy and paste
  - Object Linking and Embedding

- The operating system provides a consistent interface between application programs and the user.
- It is also the interface between those programs and other computer resources such as memory a printer or another program.
- Programmers write computer programs with built in instructions called system calls that request services from operating system.

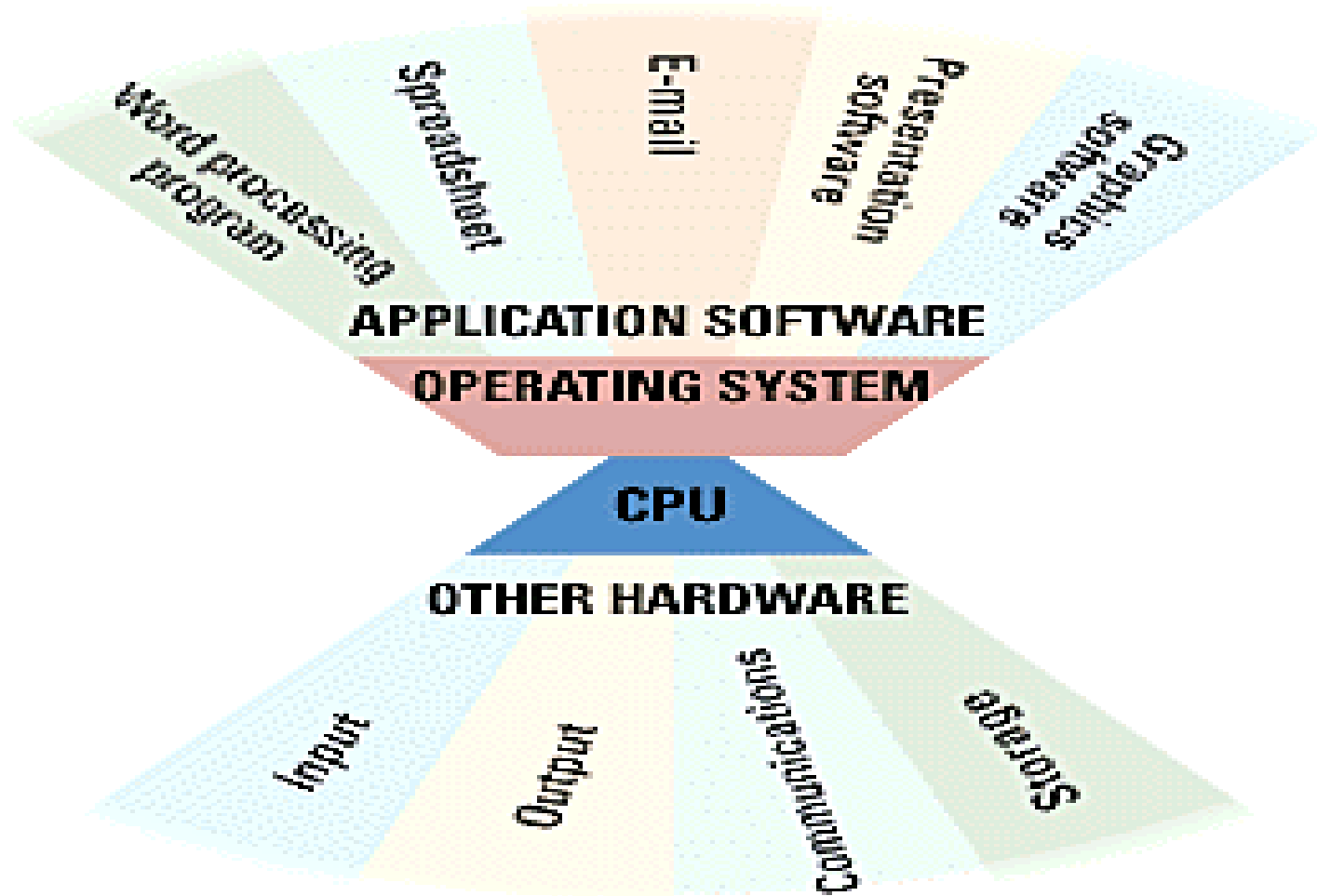
# Operating System Services:

- **Saves the contents of files to a disk for permanent storage.**
- Reads the contents of a file from disk into memory.
- Sends a document to the printer and activates the printer.
- Provides resources that let you copy or move data from one document to another, or from one program to another.
- Allocating RAM among the running programs
- Recognizing keystrokes or mouse clicks and displaying characters or graphics on the screen.

# A hierarchical file system



The operating system acts as an intermediary between the software and the hardware.







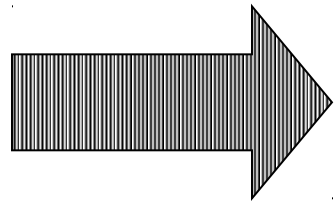


# Managing Hardware

- Programs need to access hardware
- Interrupts
  - CPU is stopped
  - Hardware device is accessed
  - Figure 6A.14
- Device drivers control the hardware

**When you click on a folder, the OS interprets the action as a command to list the files in that folder.**

**OPERATING SYSTEM**



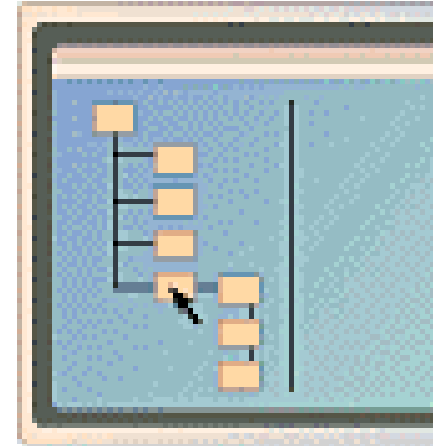
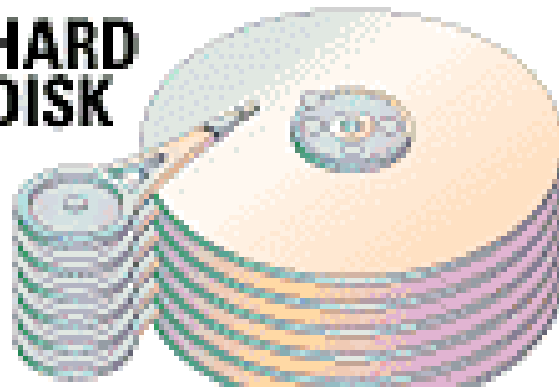
**The OS sends an interrupt request to the CPU.**

**CPU**



**When possible, the CPU pauses any other processing and checks with the OS to see what new processing job is being requested.**

**HARD DISK**





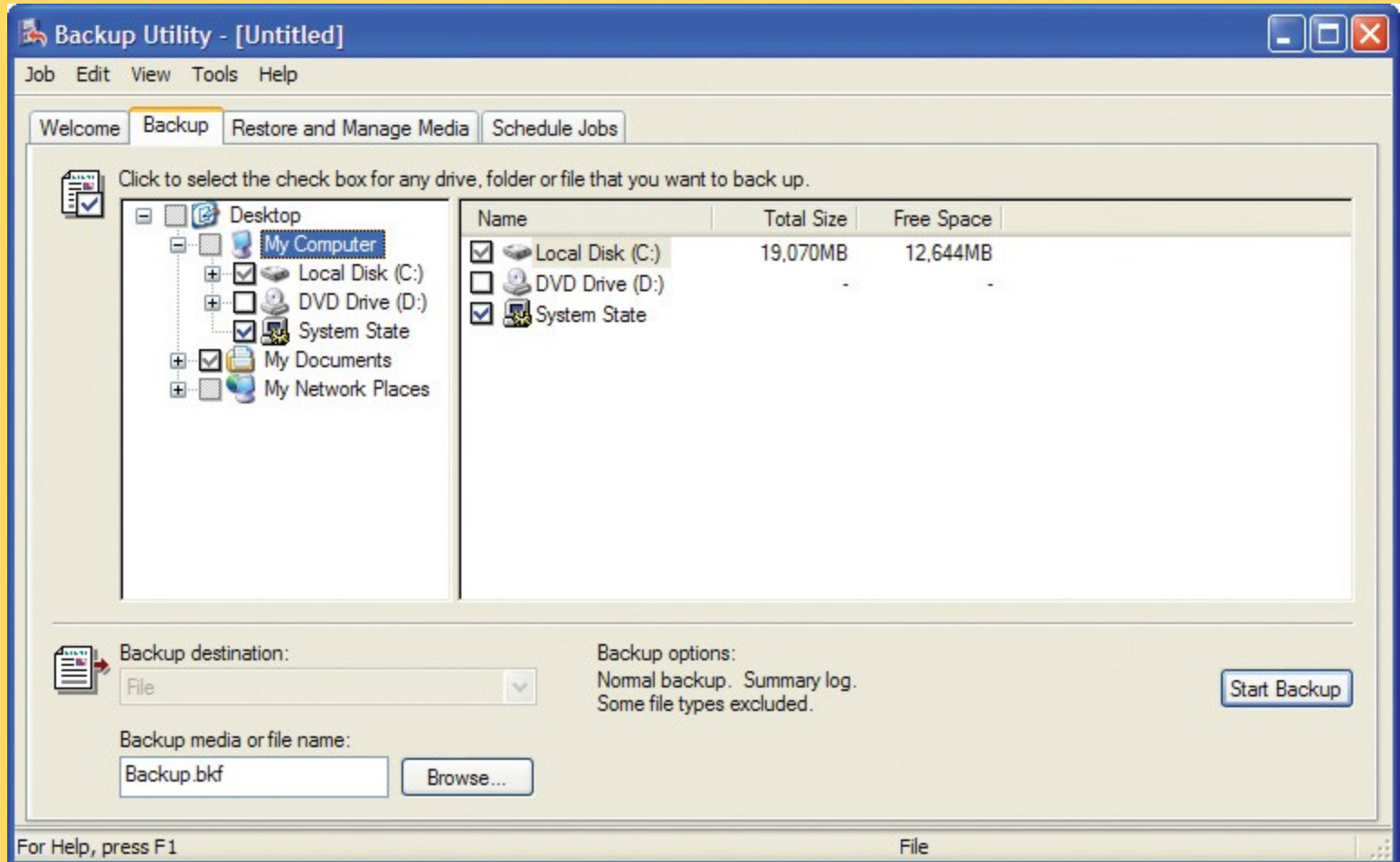
# Enhancing an OS

- Utilities
  - Enhance OS capabilities.
  - Provide services not included with OS
  - Goes beyond the four functions
  - Firewall, anti-virus and compression
  - Prices vary

# Enhancing an OS

- Backup software
  - Archives files onto removable media
  - Ensures data integrity
  - Most OS include a backup package
  - Many third party packages exist

# Backup Software



# Enhancing an OS

- Anti-virus software
  - Crucial utility
  - Finds, blocks and removes viruses
  - Must be updated regularly
  - McAfee and Norton Anti-Virus

# Enhancing an OS

- Firewall
  - Crucial utility
  - Protects your computer from intruders
  - Makes computer invisible to hackers
  - Zone Labs is a home firewall
  - Cisco sells hardware firewalls



# Enhancing an OS

- Intrusion detection
  - Often part of a firewall package
  - Announces attempts to breach security
  - Snort is a Linux based package

# Enhancing an OS

- Screen savers
  - Crucial utility for command line systems
    - Prevents burn in
  - Merely fun for GUI systems
  - Screen saver decorates idle screens



# Chapter 7A

End of Chapter