

INTRODUCTION TO INFORMATION & COMMUNICATION TECHNOLOGIES.

(Computer Hardware: In Put and Output Devices)

Lecture # 03

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WHAT ARE HARDWARE AND SOFTWARE?

Hardware

The electric, electronic, and mechanical equipment that makes up a computer

Software

The series of instructions that tells the hardware how to perform tasks

COMPUTER HARDWARE PARTS:

Computer System can be divided into main Three Parts/types:

- 1- In Put Devices
- 2- System Unit
- 3- Out Put Devices.

THE COMPONENTS OF A COMPUTER

What are common computer hardware components?



THE COMPONENTS OF A COMPUTER

What is an input device?

- Any hardware component that allows a user to enter data and instructions into a computer



THE COMPONENTS OF A COMPUTER

What is an output device?

- Any hardware component that can convey information to a user



Click to view Web Link
then click Output Devices
p. 1.6 Fig. 1-3

Keyboard

A keyboard is a set of typewriter like keys that enables you to enter data into a computer

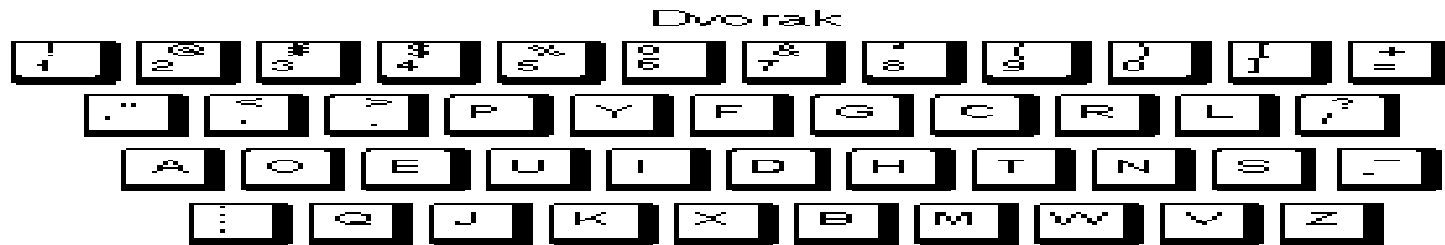
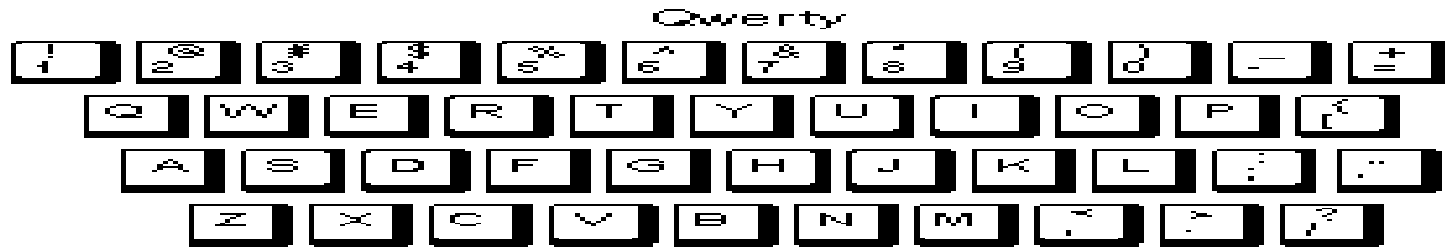
The keys on a computer keyboard are classified as follow:

1. Alphanumeric keys (letters & numbers)
2. Punctuation keys (comma, semi colon etc...)
3. Special keys (function keys, control keys, arrow keys etc..)
4. Toggle keys (keys that switches b/w two different states like Num Lock, Caps Lock)

Keyboard

- The standard layout of letters, numbers & punctuations is known as **QWERTY keyboard** because the first six keys on the top row of letters is spelled as QWERTY.
- Another type is **Dvorak Keyboard**. It is designed so that the middle row of the keys include the most common letters. It was designed for speed typing.

Keyboard



QWERT vs Dvorak

- ▶ A desktop computer typically have 101 to 105 keys containing alphanumeric, function & punctuation keys.
- ▶ Wireless keyboards battery powered device use radio waves or infrared technology to transmit data.

Pointing Devices

A pointing device is an *input device* which is used to control a pointer on a screen. Pointer is a small symbol on a screen.

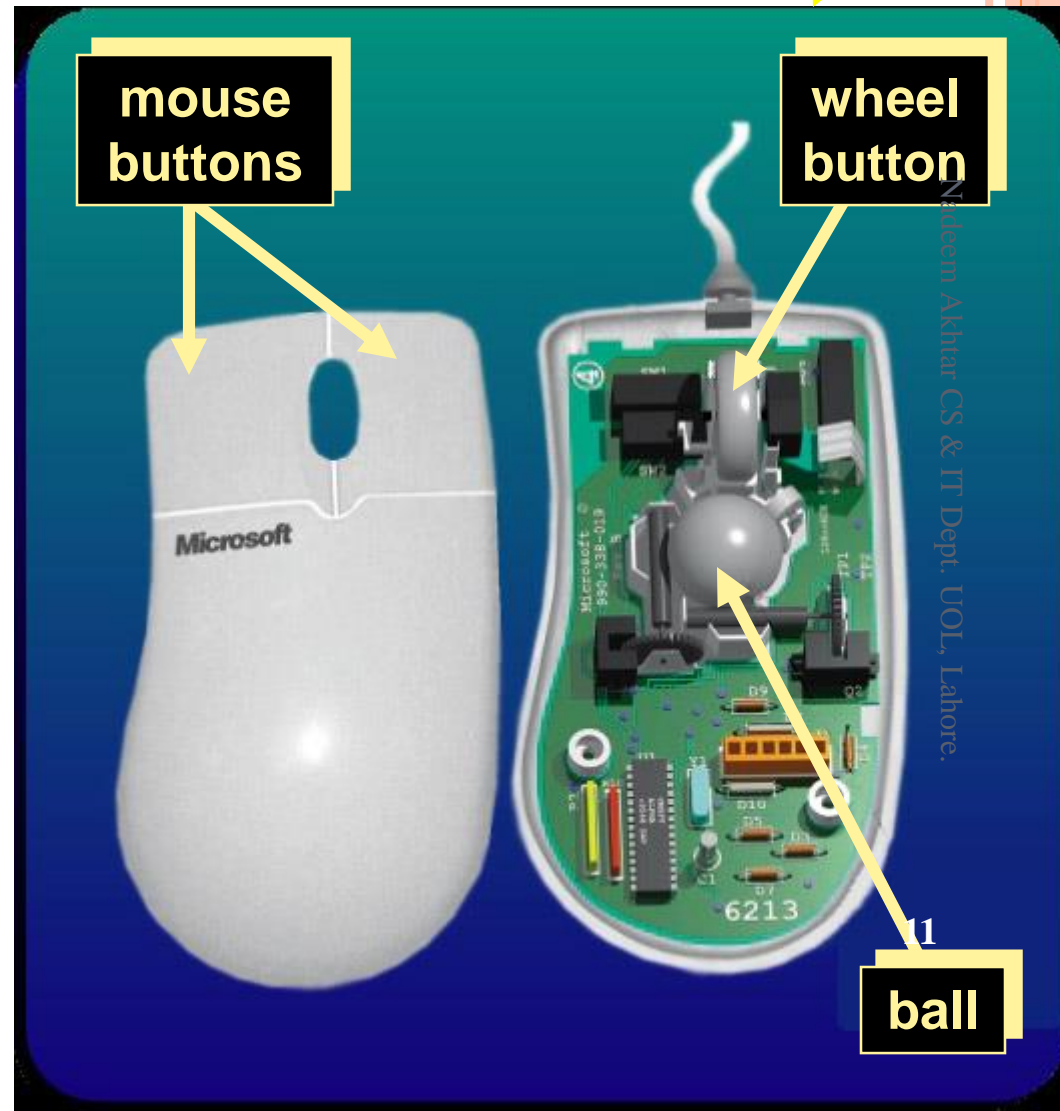
- Mouse
- Trackball
- Joy Stick
- Touchpad
- And many more

MOUSE

How does a mechanical mouse work?

- A rubber or metal ball is on its underside
- When the ball rolls in a certain direction, electronic circuits in the mouse translate the movement of the mouse into signals the compute understands

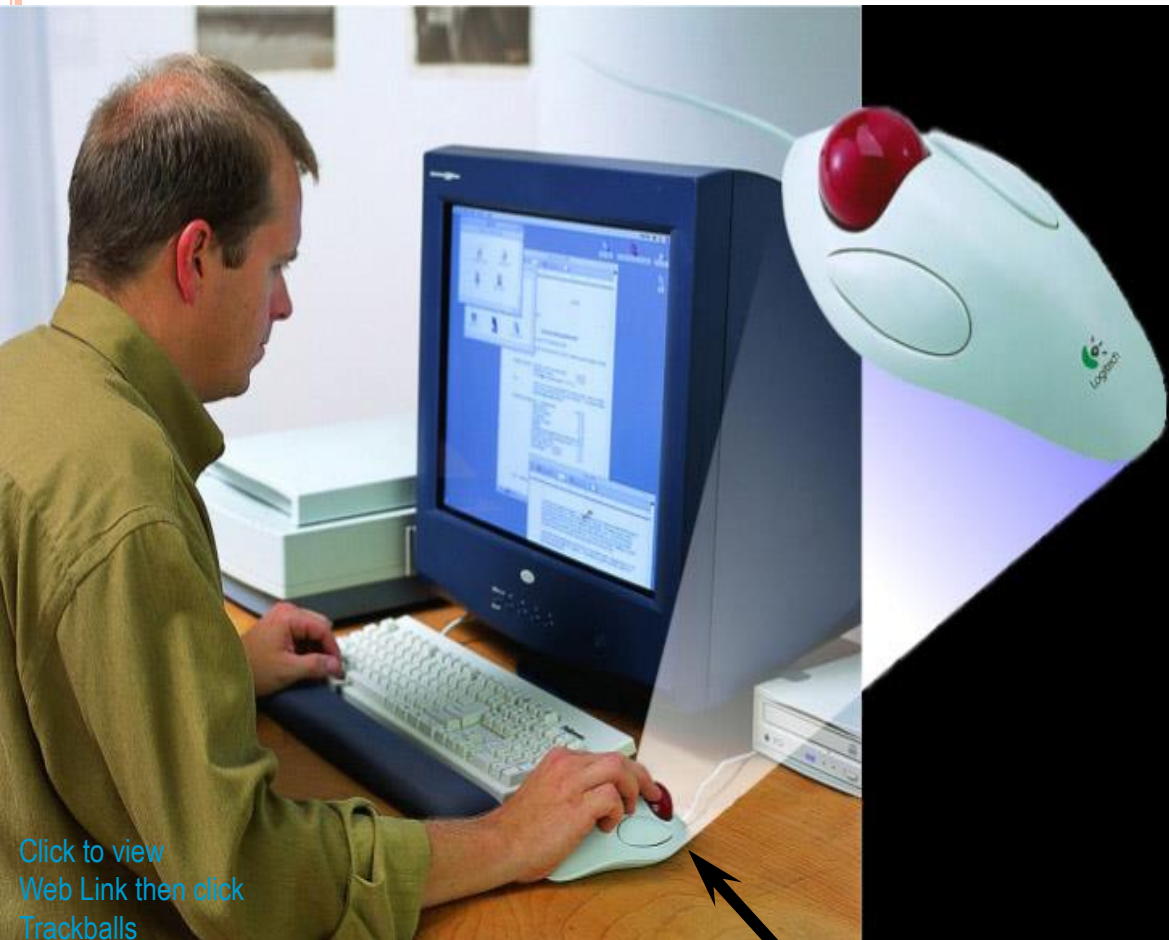
❧ **A mouse pad provides better traction and protects the ball from a build up of dust and dirt**



OTHER POINTING DEVICES?

What is a trackball?

- A stationary pointing device with a ball on its top



trackball

OTHER POINTING DEVICES

What is a touchpad?

- Also called a track pad

- ⌚ **A small flat, rectangular pointing device that is sensitive to pressure and motion**

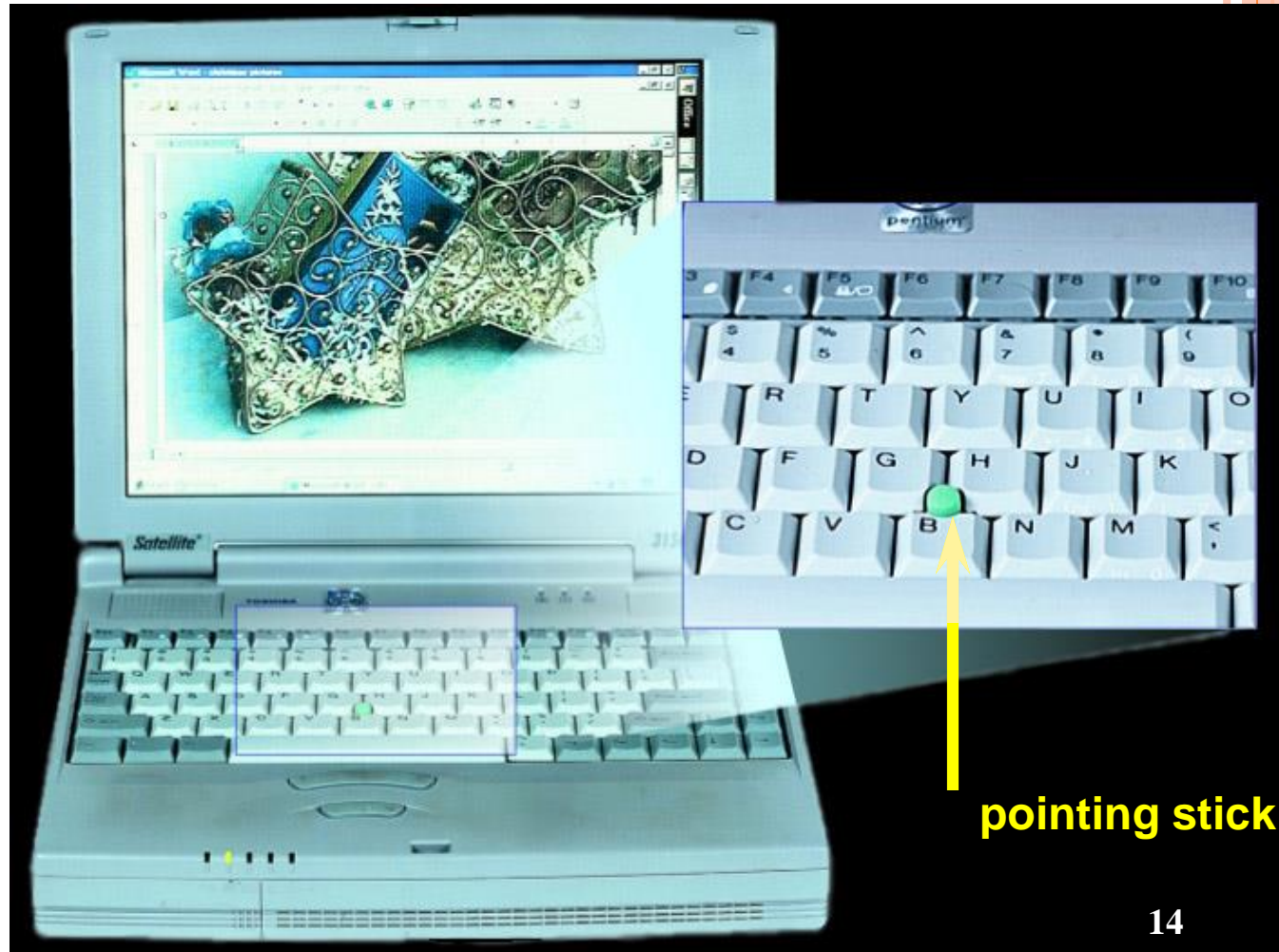
- ⌚ **Typically built onto keyboards of laptop or notebook computers**



OTHER POINTING DEVICES

What is a pointing stick?

- A pressure-sensitive pointing device shaped like a pencil eraser that is positioned between keys on the keyboard



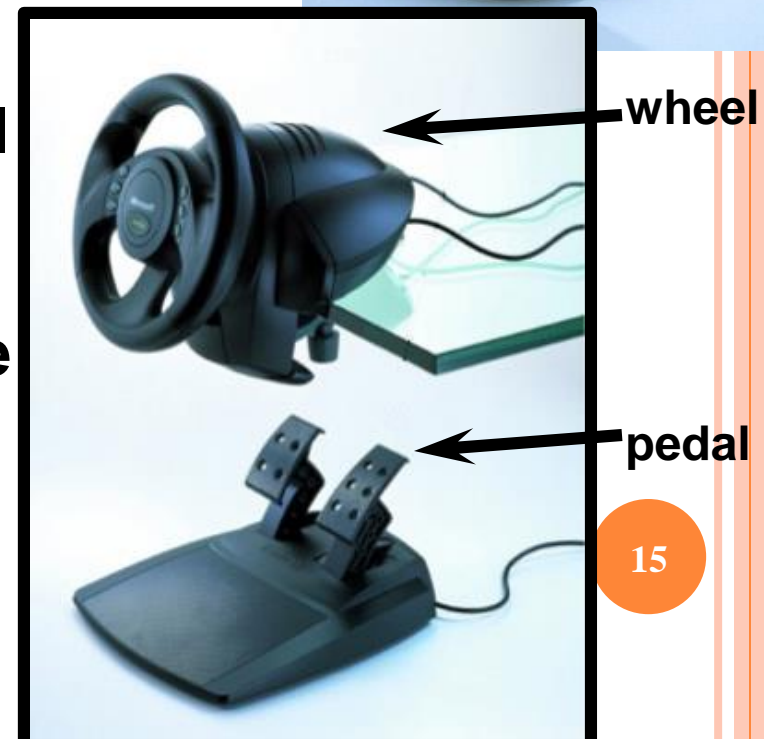
pointing stick



OTHER POINTING DEVICES

What are a joystick and a wheel?

- Help the user control the actions of players and vehicles in game and simulation software
- A joystick is a vertical lever mounted on a base
 - **You move the lever in different directions to control the actions of a vehicle or player**
- A wheel is a steering-wheel type of input device
 - **You turn the wheel to drive a car, truck, or other vehicle**
 - **Most include foot pedals**



OTHER POINTING DEVICES

What is a light pen?

- A handheld input device that contains a light source or can detect light
- ⌚ **Some require a specially designed monitor**
- ⌚ **To select objects on the screen, you press the light pen against the surface of the screen and then press a button on the pen**



OTHER POINTING DEVICES

What is a touch screen?

- A touch-sensitive display

⌚ You interact with the device by touching areas of the screen with your finger

⌚ Often found in kiosks located in stores, hotels, airports and museums

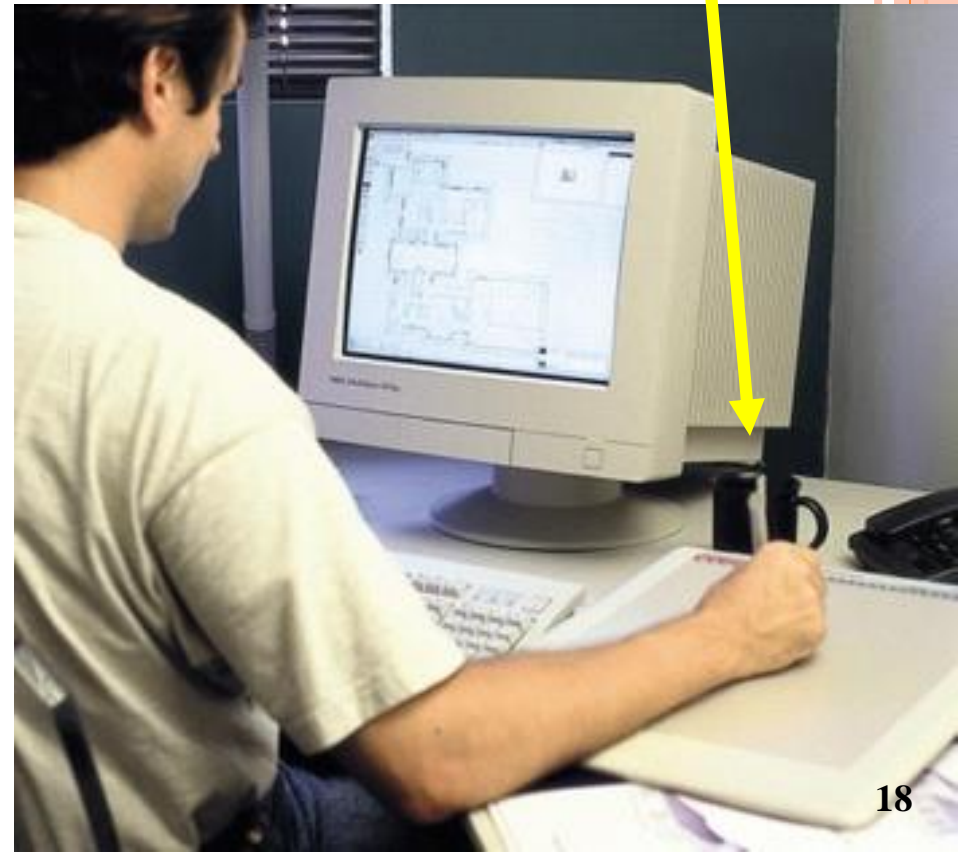


OTHER POINTING DEVICES

What is a stylus?

- ⌚ **Looks like a ballpoint pen, but uses pressure to write text and draw lines**
- ⌚ **Originally called a pen or electronic pen**
- Used in professional graphical applications
- A graphics tablet, also called a digitizer or digitizing tablet, is a flat rectangular, electronic plastic board used with a stylus

stylus or pen



OTHER POINTING DEVICES

What is an electronic signature?

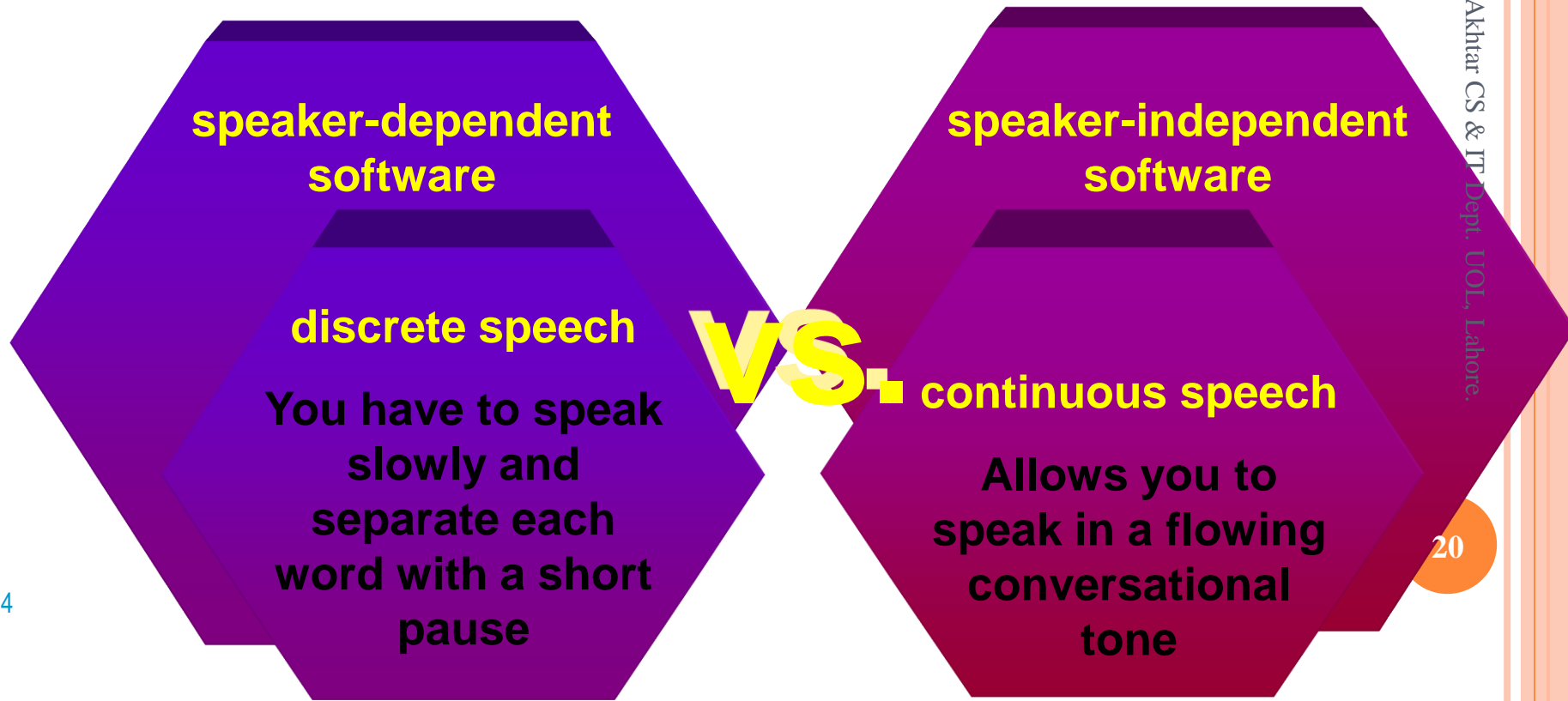
- Also called an e-signature
- ⌚ **Pen and graphics tablet used with special software for handwriting recognition**
- ⌚ **An electronic signature is just as legal as an ink signature**



VOICE INPUT

What is voice input?

- The process of entering data by speaking into a microphone that is attached to the sound card on the computer
- Voice recognition, also called speech recognition, is the computer's capability of distinguishing spoken words



VOICE INPUT

How does voice recognition work?



You're right!



Natural Language Engine

...Your write
...**You're right**
...Your right



Step 4: To narrow a list down, the software presents the user with a list of choices or uses a natural language component to predict the most likely match. The user may correct any and selections made by the software units such as aw and guh.

Matches

your, you're
right, write

VIDEO INPUT

What is video input?

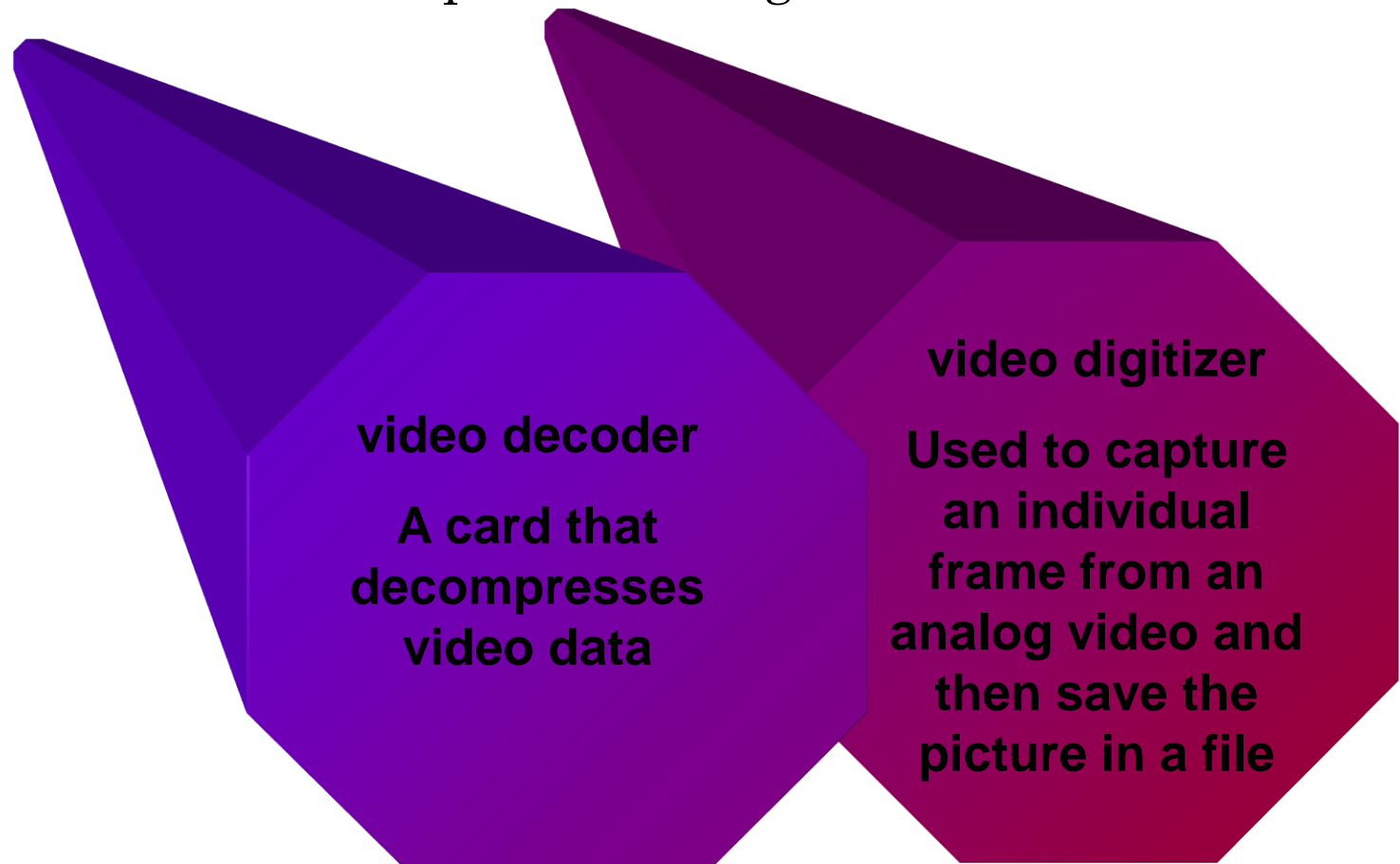
- The process of entering a full-motion recording into a computer and storing it on a storage medium



VIDEO INPUT

What are some factors related to video input?

- Video files can require huge amounts of storage space
- Video compression is used to decrease the size of the files
- Files can be compressed using software or hardware



SCANNERS AND READING DEVICES

What is a scanner?

- A device that captures data directly from source documents
- A source document is the original form of the data



SCANNERS AND READING DEVICES

What are various types of scanners?

Pen or
handheld



Flatbed



Drum



Sheet-fed



SCANNERS AND READING DEVICES

What is an optical reader?

- A device that uses a light source to read characters, marks and codes and then converts them into digital data that a computer can process

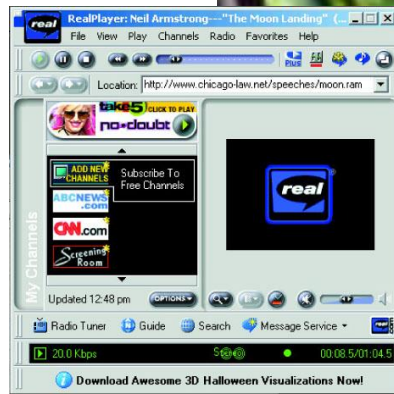


Optical character
recognition (OCR)

Optical mark
recognition

Bar code
scanner

OUTPUT DEVICES



2. OUTPUT DEVICES

- Any *hardware component* used to show results after processing to any user. Output can be text, Audio, Video & graphics.
- **Examples**
 - ✓ Display device
 - Monitor
 - Printer
 - Plotter
 - Projectors
 - Speakers
 - Headphone etc

Display Devices

A display device is simply an output device that visually conveys text, graphics & video information.

Information on a display device, sometimes called soft copy exists for a temporary period only.

Display devices include:

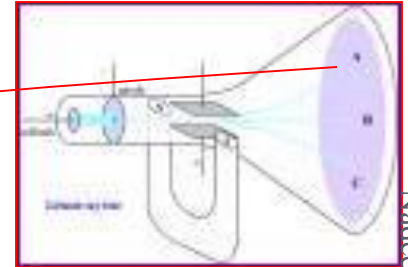
- ✓ CRT Monitors
- ✓ LCD Monitors
- ✓ Gas Plasma Monitors
- ✓ Televisions

Monitors



CRT Monitors

- ✓ Similar to standard Television because it contains the CRT (Cathode Ray Tube)
- ✓ CRT is a large, sealed, glass tube
- ✓ The front of the tube is screen
- ✓ Tiny dots of phosphorus material coat the screen
- ✓ Each dot consists of red, green & blue phosphorus.
- ✓ Inside CRT, an electronic beam moves back & forth across the back site of the screen which causes the dots on the front of the screen to glow Three dots combine to make up one pixel
- ✓ The size of CRT monitors can be 14, 15, 17, 19, 21 and 22 plus more inches which is measured diagonally.
- ✓ The actual viewable area is however, less than the diagonal size. For example, a 21 inches monitor will have 19.8 inches viewable area



LCD Monitors

- ✓ LCD Monitors use Liquid Crystal
 - ✓ LCD contains liquid crystals between two sheets of material
 - ✓ When an electric current passes through the crystals, they twist which causes the image to be displayed on the screen
 - ✓ LCD Monitors are the type of the **flat-panel displays**
- ✓ Flat Panel displays have less weight, compact screen & consume less than one third the power consumed by CRT monitors
 - ✓ The size ranges from 15, 17, 18, 20 and 21 plus more inches
 - ✓ LCD Monitors typically are more expensive than CRT Monitors
 - ✓ Desktop, Notebook & Handheld computers often use LCD displays



LCD or TFT:

Active Matrix or Thin Film Transistor (TFT) Display: Higher refresh rate & contrast



Gas Plasma Monitors

- ✓ Gas Plasma Monitors are Flat-Panel screens instead only they use gas plasma technology, which substitutes a layer of gas for the liquid crystal material in an LCD monitor
- ✓ When voltage is applied, the gas released UV light.
- ✓ The UV light causes the pixels on the screen to glow
- ✓ The Gas Plasma Monitors can be more than 42" wide.



- ✓ **Refresh Rate:** Phosphorus on the CRT Monitors must be refreshed 50 to 100 times after every second (Hz).
- ✓ Faster refresh rate causes fewer flickers on screen
- ✓ **Monitor Resolution:** Depends upon the number of bits to be used to display each pixel:
 - ❑ 2^8 bits = 256 colors
 - ❑ 2^{16} bits = 65536 colors
 - ❑ 2^{24} to 2^{32} bits = 16 million to 4 billion colors

Printers

A printer is an output device that produces text and graphics on a physical medium such as paper or transparency film.

Printed information is called hard copy. And is more permanent than a soft copy.

There are two types of printers:

1. Impact Printers
2. Non-Impact Printers

Impact Printers

- An impact printer forms characters and graphics on a piece of paper by striking a mechanism against an inked ribbon that physically contacts the paper.
- Impact printers are noisy because of this striking activity.
- Impact printers normally do not provide Letter Quality (LQ) printing. They are ideal to print multipart forms because they easily can print through many layers of papers.



Printers

Two commonly used types of impact printers
are:

- a. Dot Matrix Printers
- b. Line Printers

Dot Matrix Printers

Dot Matrix Printer produces the printed images when tiny wire pins on a print Head mechanism strike an inked ribbon.

When ribbon passes against the paper, it creates dots that form characters and graphics.

The print head can contain 9 to 24 pins. A high number of pins means the printer prints more dots per character, which results in higher print quality.



Printers (a-Dot Matrix Printers)

Most dot matrix printers use continuous-form paper, in which each sheet of paper is connected together. The pages have holes along the sides to help feed the paper.

The speed is measured by number of characters per second (CPS). It ranges from 300 to 1100 CPS

Factories & retail counters use impact printers because these printers can withstand dusty environment, vibrations & extreme temperatures.

9-pin dot matrix printer in action

Printers

B-Line Printers

- A line printer is a high speed impact printer that prints an entire line a time.
- The speed is measured by number of lines it can print. (LPM). These printers are capable to print 3000 LPM.
- A line printer is often connected with a midrange mainframe, server or network.



- Line printers are bigger in size & are more expensive than dot matrix printers.

2–Non–impact Printer

- A non-impact printer forms characters & graphics on a piece of paper without actually striking the paper.
- Some spray ink, while others use heat & pressure to create images. Because, these printers do not strike the paper, they are much quieter than impact printers.

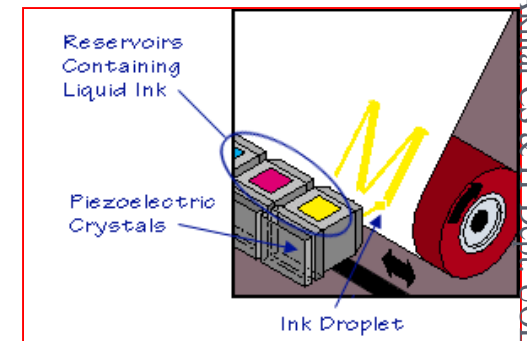
The commonly used types of the non-impact printers are:

- ✓ Ink-jet printers
- ✓ Laser Printers

Ink-Jet Printers

Ink Jet Printers create characters & graphics by spraying tiny drops of liquid ink onto a piece of paper.

- Ink Jet Printers usually use individual sheets of paper stored in removable or stationary tray.
- These printers can print both black & white & color prints on a variety of paper types. e.g., plain papers, photo paper, glossy paper and banner paper.
- Most Ink Jet Printers have the resolution ranges from 300 to 2400 dpi & speed 3 to 20 p p m.



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Higher the dpi, better the quality of the image

Ink Jet Printers have become most popular type of the color printers especially in homes because of their lower cost & better quality printing

Laser Printers

Laser Printers use a laser to mark the parts of the page where the text & image is to be formed. The paper is passed through a toner solution where the marked areas pick up the toner & the text becomes visible.

Laser Printers usually use individual sheets of paper stored in removable or stationary tray. Some laser printers have trays that can accommodate different sizes of papers.

These Printers can print both black, white & gray and color prints. However, color laser printers are expensive.

Most Laser Printers have the resolution ranges from 600 to 2400 dpi & speed 6 to 40 ppm.



HP Laser Jet 2100



HP Color Laser Jet 4550

DISPLAY DEVICES

What is an electronic book (e-book)?

- A small, book-sized computer that uses an LCD screen
- Allows users to read, save, highlight, bookmark, and add notes to online text
- Download new book content from the Web

Clear Type, a new technology developed

by Microsoft, used to improve the quality of reading material on LCD screens



DISPLAY DEVICES

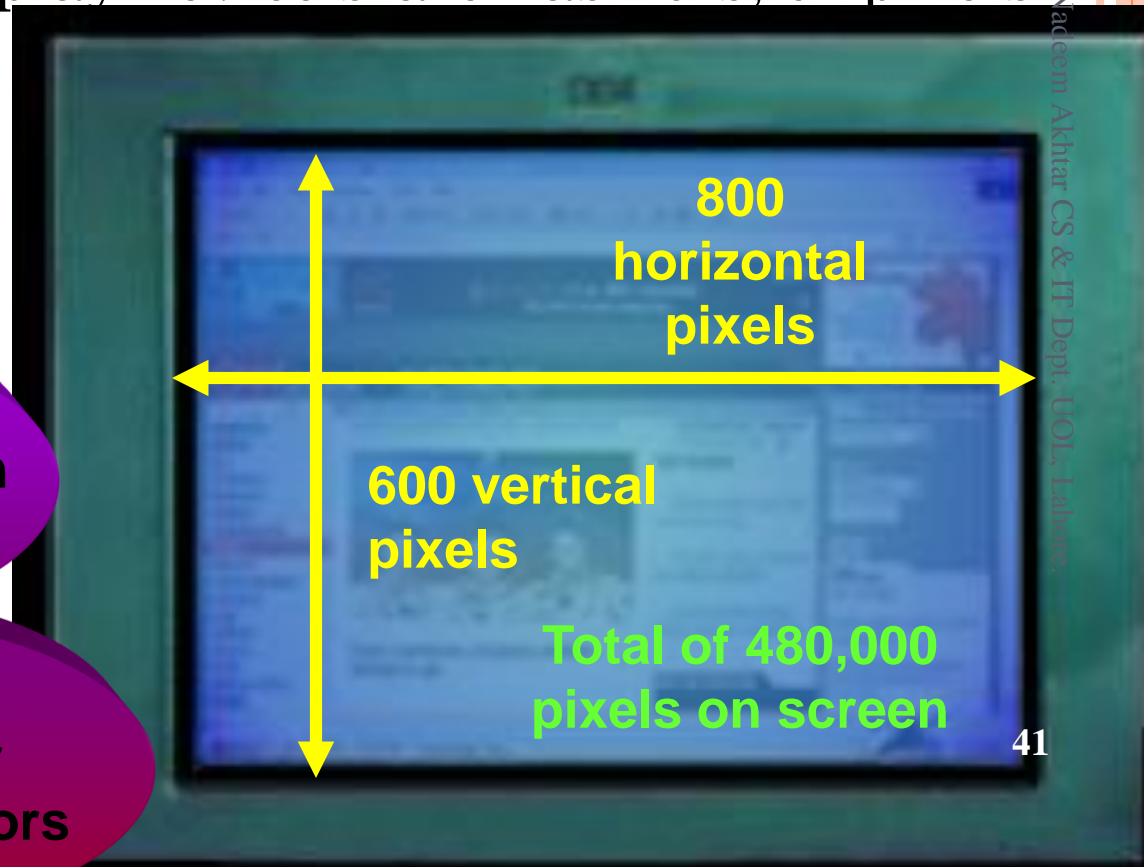
What is display resolution?

- Describes the sharpness and clearness of an image
- Resolution of a display device stated as dots, or pixels

800 x 600
typically the
standard

1280 x 1024
maximum resolution
of most monitors

2048 x 1536
maximum for
high-end monitors



OTHER OUTPUT DEVICES

What is a data projector?

- A device that takes the image from a computer screen and projects it onto a larger screen so an audience of people can see the image clearly



TERMINALS

What is a terminal?

- A device that performs both input and output because it consists of a monitor (output), a keyboard (input), and a video card
- Three basic categories



**dumb
terminals**

**intelligent
terminals**

**special-
purpose
terminals**

TERMINALS

What is a dumb terminal?

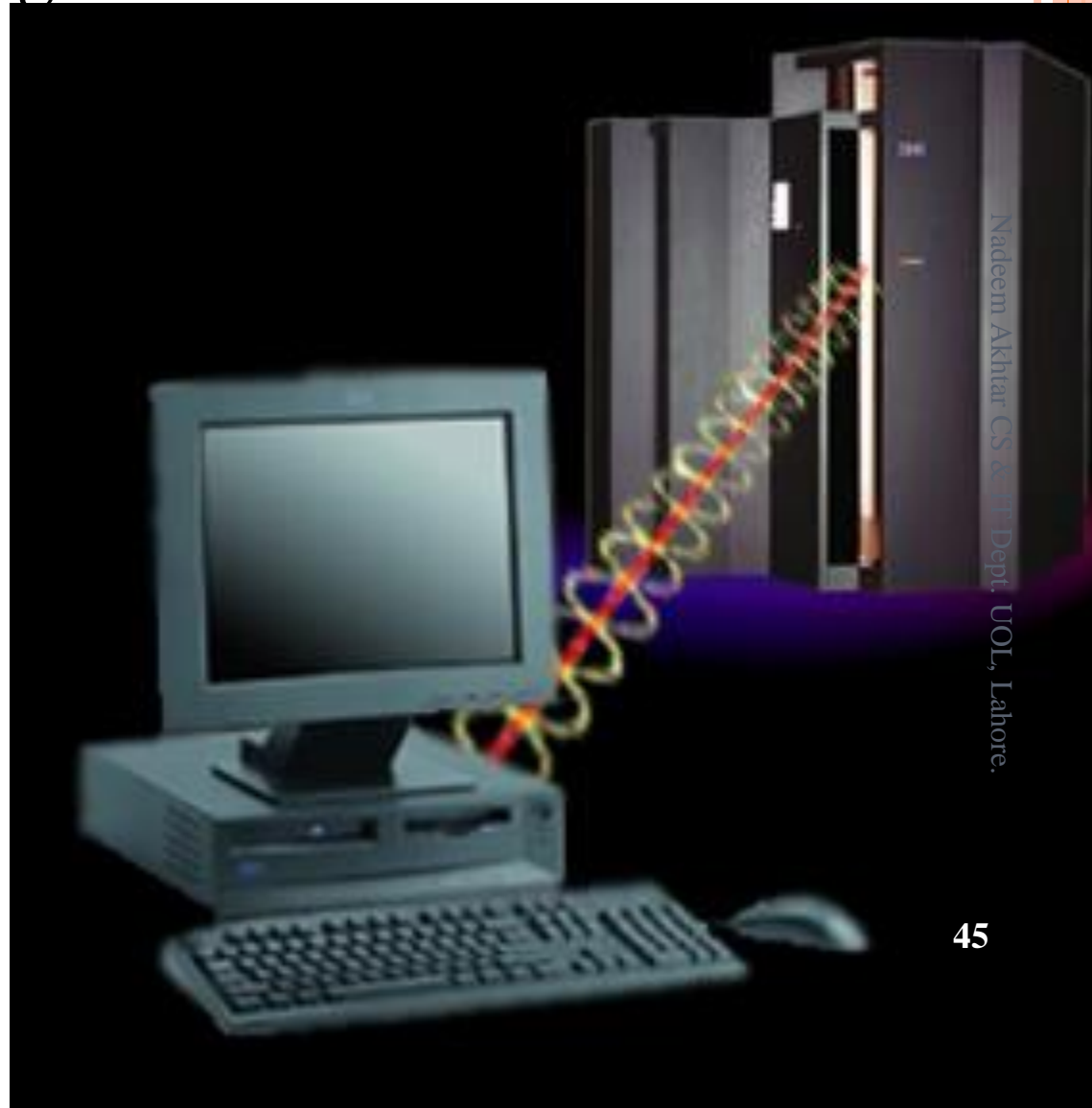
- Has no processing power so it cannot function as an independent device
- # **Can enter and transmit data to, or receive and display information from, a computer to which it is connected**
- # **Connect to a host computer that performs the processing and then sends the output back to the dumb terminal**



TERMINALS

What is an intelligent terminal?

- ◉ Has memory and a processor that has the capability of performing some functions independent of the host computer
- ◉ Sometimes called programmable terminals because they can be programmed by the software developer to perform basic tasks



TERMINALS

What is a point-of-sale (POS) terminal?

POS
terminal

- Records purchases at the point where the consumer purchases a product or a service
- Output from POS terminals serve as input to other computers to maintain sales records, update inventory, verify credit, and perform other activities associated with the sales transactions that are critical to running the business



Click to view
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then click
POS Terminals

Next

p. 6.28 Fig. 6-37



TERMINALS

What is an automated teller machine (ATM)?

- A self-service banking machine that connects to a host computer through a telephone network
- Insert a plastic bankcard with a magnetic strip into the ATM
- Enter your password, called a personal identification number (PIN), to access your bank account



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