



Software and More about Hardware

Lecture 3

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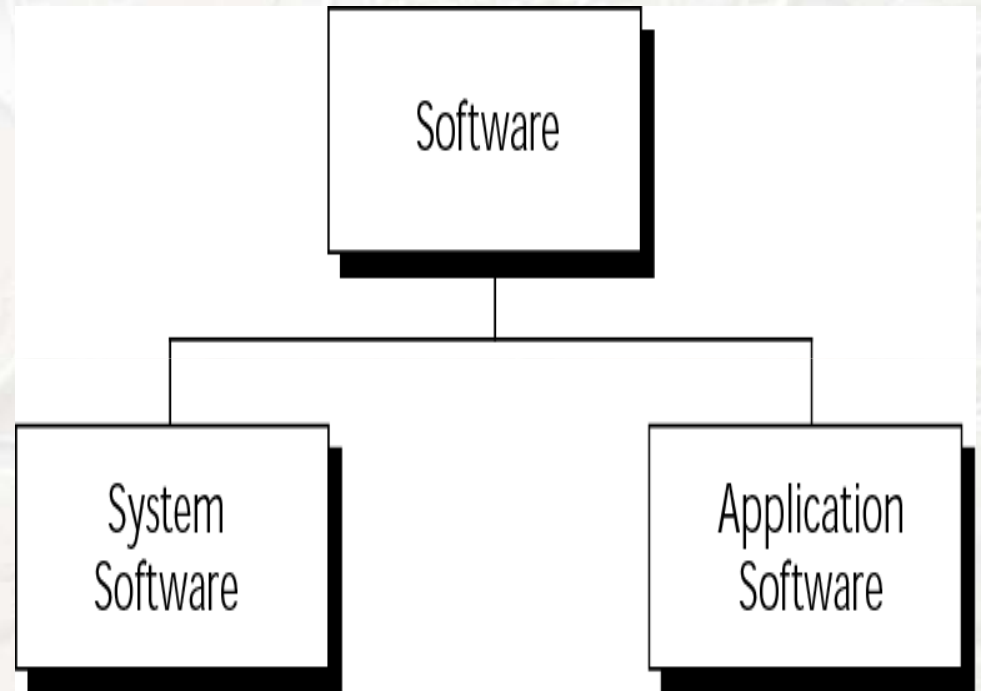
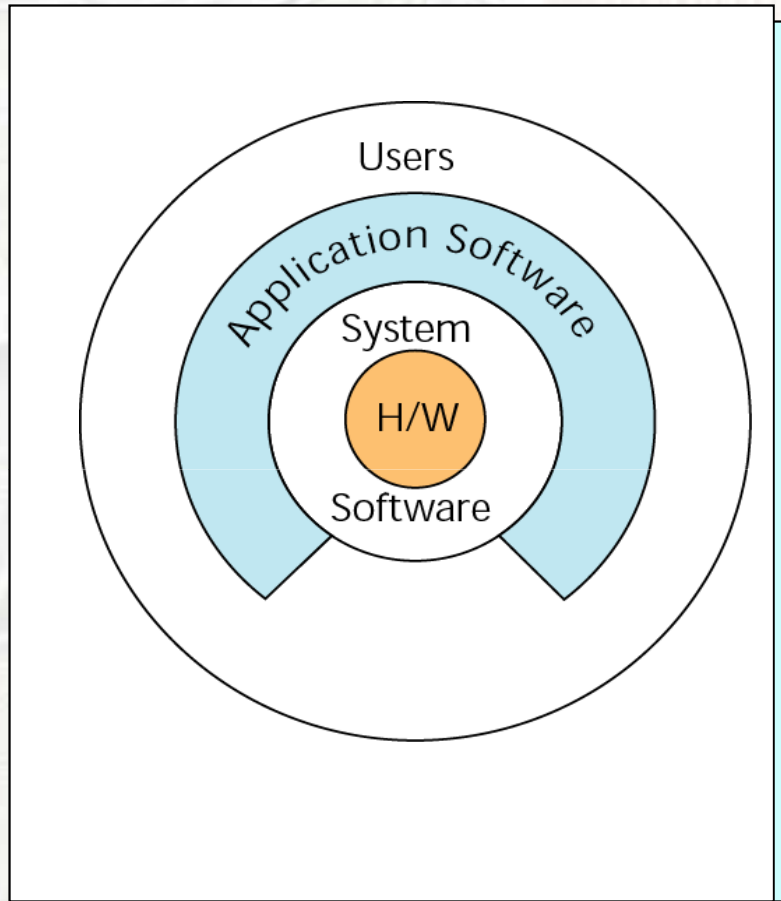
Software

- **Software** is the programs and data that a computer uses.
 - Programs are lists of instructions for the processor
 - Data can be any information that a program needs: character data, numerical data, image data, audio data, etc.
 - Both programs and data are saved in computer memory in the same way.
 - Instructions and associated data, stored in electronic format, that direct the computer to accomplish a task.

Software

- Computer software is divided into two main categories:
 - 1. Systems software**
 - 2. Applications software**
- *System software* manages computer resources and makes computers easy to use and helps the computer carry out its basic operating tasks.
- An *applications software* enables a computer to be used to do a particular task.

Computer Software



Types of software

Software

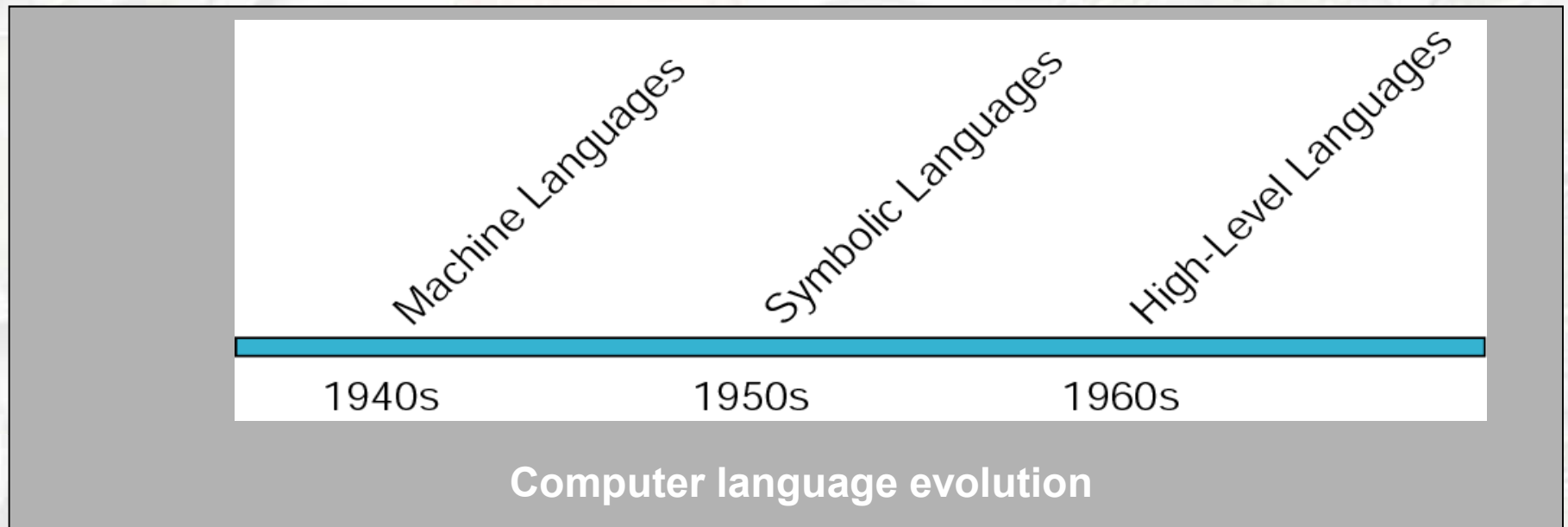
Software

Application Programs	Systems Programs
<p>Word processors</p> <p>Game programs</p> <p>Spreadsheets</p> <p>Graphics programs</p> <p>Web browsers</p>	<p>Operating system.</p> <p>Networking system.</p> <p>language software.</p> <p>Data backup.</p>

Operating Systems

- The most important systems program is the operating system.
 - It is a group of programs that coordinates the operation of all the hardware and software components of the computer system.
 - It is responsible for starting application programs running and finding the resources that they need.
- **Examples of operating systems** are: Unix, Windows NT, Windows XP, MS-DOS, Linux, Solaris, VMS, OS/2 and System 7.

Computer Languages

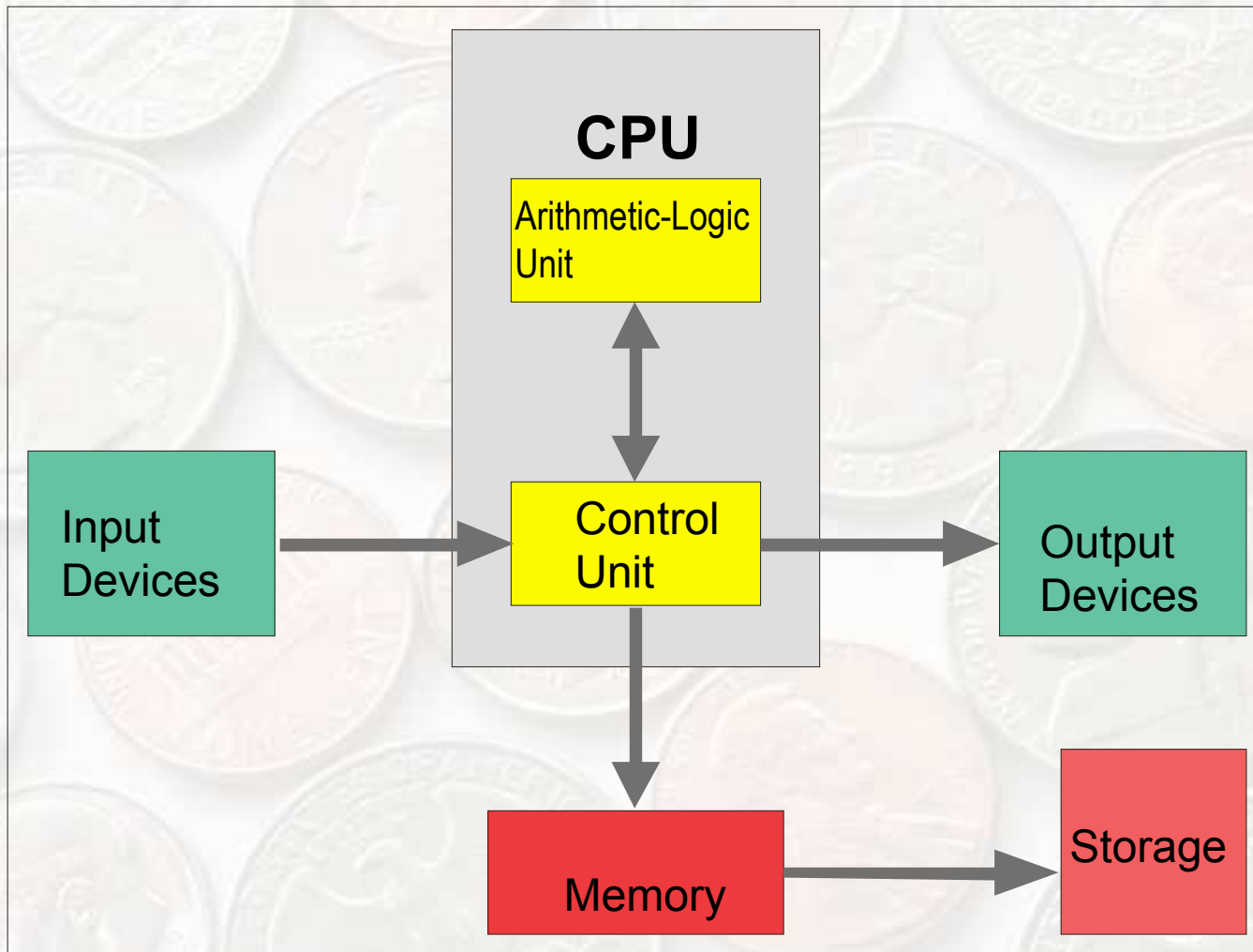


Note:

The only language understood by a computer is machine language.

More About CPU

- CPU consists of two basic parts – *Arithmetic-Logic Unit (ALU)* and *Control Unit*



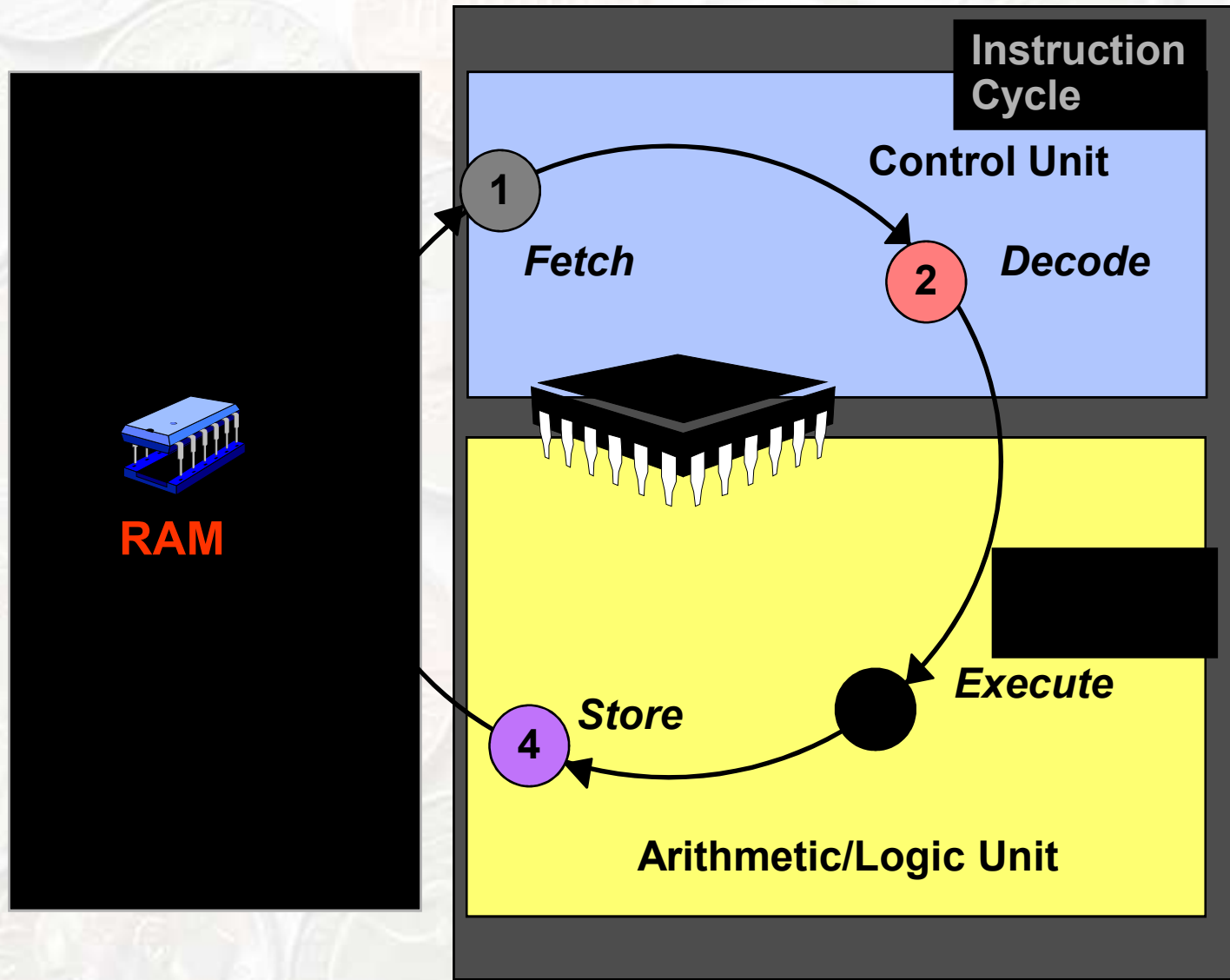
Computer Hardware and Software

- Control unit manages all the computer's resources according to the instruction set
- ALU performs two types of operations – arithmetic operations (+, -, x, ÷, ^) and logical operations (=, ≠, >, not >, <, not <, ≥, not ≥, ≤, not ≤)
 - ALU includes a group of **registers** – high-speed memory location in the CPU
 - 32-bit processor or 64-bit processor usually refers to the size of registers – sometimes called the word size
- The four steps taken by the CPU are – fetching, decoding, executing, and storing – machine cycle
 - In pipeline processing, the control unit begins a new machine cycle before the current cycle is completed

Fetch Decode Execute Cycle

- The CPU continuously transfers data to and from the primary memory
- Data transfer is done in units called *instructions* or *words*
- When a computer is switched on, the CPU continuously goes through a process called ***fetch-decode-execute cycle***:
 - **The Control Unit fetches** the current instruction from memory, decodes it and instructs the **ALU** (Arithmetic Logic Unit) to execute the instruction.
 - The execution of an instruction may generate further data fetches from memory
 - The result of executing an instruction is stored in either a **register** or **RAM**

Fetch-Decode-Execute Cycle (cont'd)



What is the difference between Register and Cache?

- Cache memory is random access memory (RAM) that a computer microprocessor can access more quickly than it can access regular RAM. As the microprocessor processes data, it looks first in the cache memory and if it finds the data there (from a previous reading of data), it does not have to do the more time-consuming reading of data from larger memory.
- The register is a small set of data holding places that are part of a computer processor . A register may hold a computer instruction , a storage address, or any kind of data (such as a bit ..."

What is the difference between RAM and Cache?

- RAM is Random Access Memory - this usually refers to the main memory on your motherboard, that the OS uses for it's 'working' memory space
- Cache is a small amount of very fast memory on the processor chip that buffers between the processor and the main RAM memory. Because the processor runs so much faster than RAM, the cache helps keep the processor fed with data and instructions while the RAM is off getting more.

Pointing devices

This type of input device used in various form as

1. Mouse

- A mouse is a hand-movable device that controls the position of cursor on the screen.
- Generally of two types

1. Mechanical mouse

- Consists of a box with buttons on the top and a ball on the bottom.
- The mouse is placed on a flat surface.
- Ball's movement on the surface causes the cursor movement on screen.

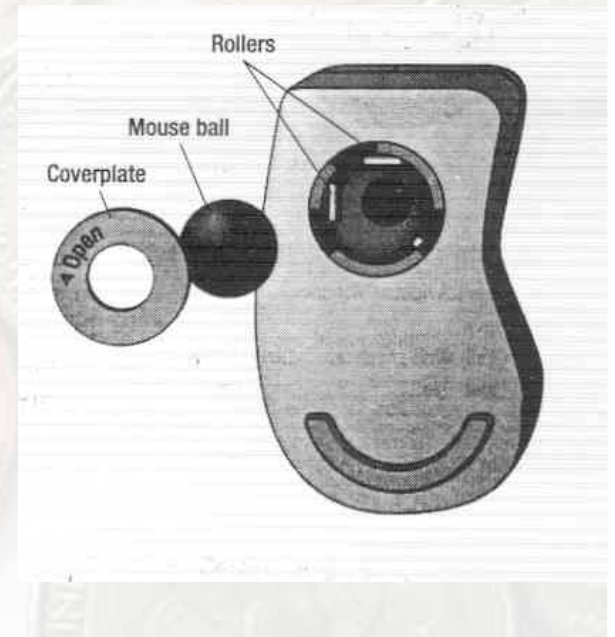


Fig : A mouse

2. Optical mouse

- Non-mechanical.
- This type of mouse emits a beam of light whose reflection is used as a signal.



2. Track ball

- A track ball is a pointing device that works like an upside mouse.
- In order to move the pointer the ball is rolled.

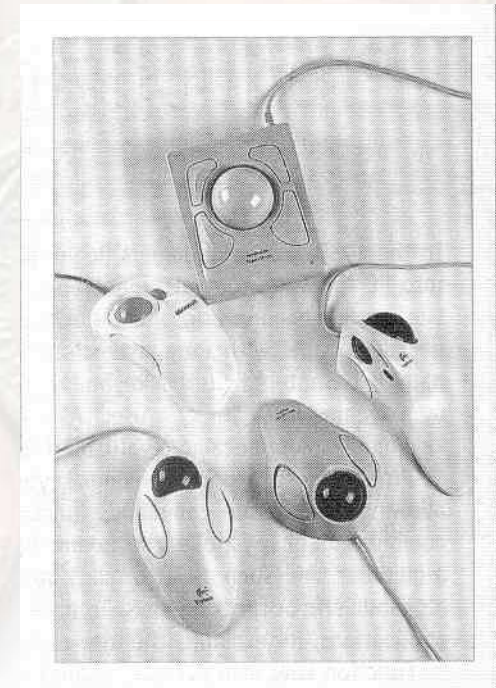


Fig: Track ball

3. Track pad

- Also called touch pad.
- Stationary pointing device.
- Less tiring to use than mouse or track ball.
- Movement of finger is translated to the movement of pointer.



Fig : Track pad/Touch pad



4. Joy stick

- These are used with video games for user input.
- These devices may also be used to move the cursor around the screen to facilitate input to a graphical display.

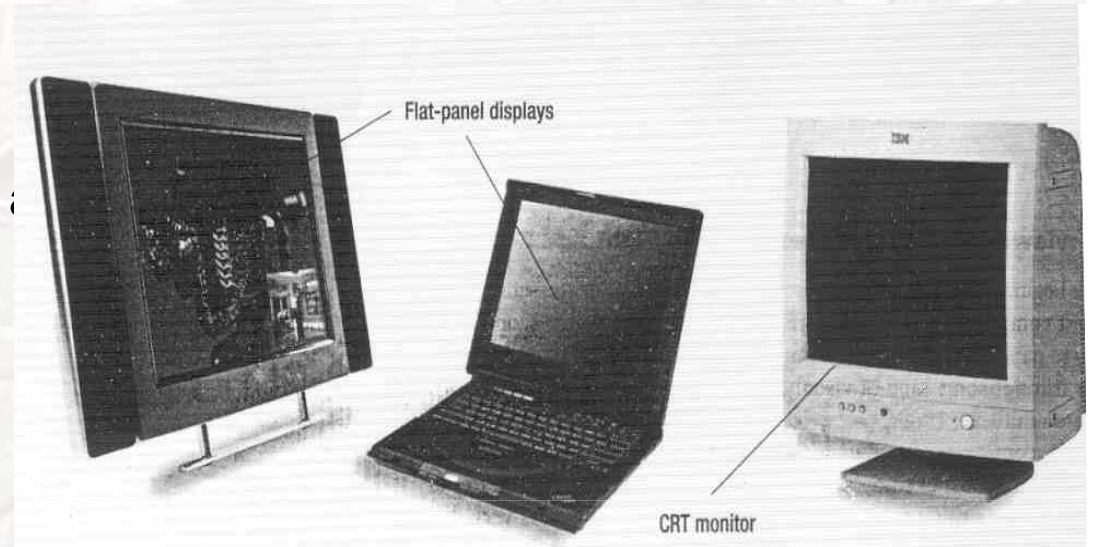
5. Touch screen

- Touch screen accepts input by allowing the user to place a fingertip directly on the computer screen.
- This technique is useful when dirt or weather would render keyboards and pointing devices useless.

Monitors

Generally two types of monitors are used with PCs. These are

1. CRT monitor.
2. Flat-panel displays



CRT monitor

- Looks like a television.
- The main component is a large vacuum tube called cathode ray tube (CRT)

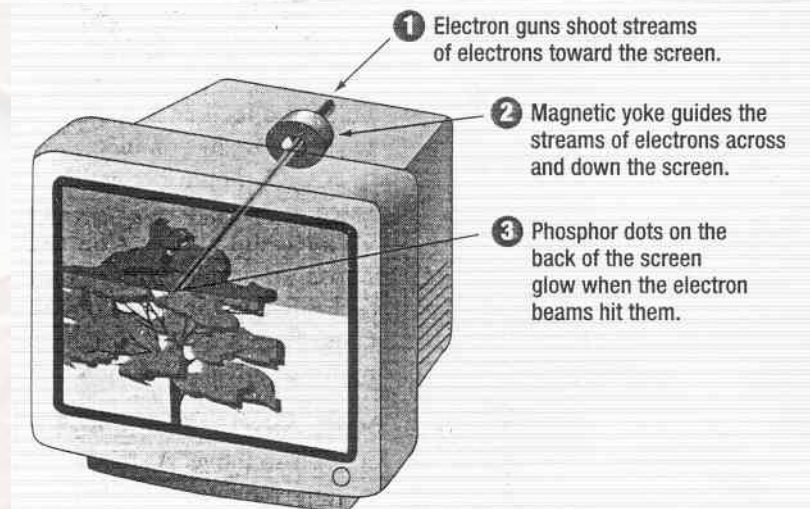


Fig: How image is produced in CRT monitor.

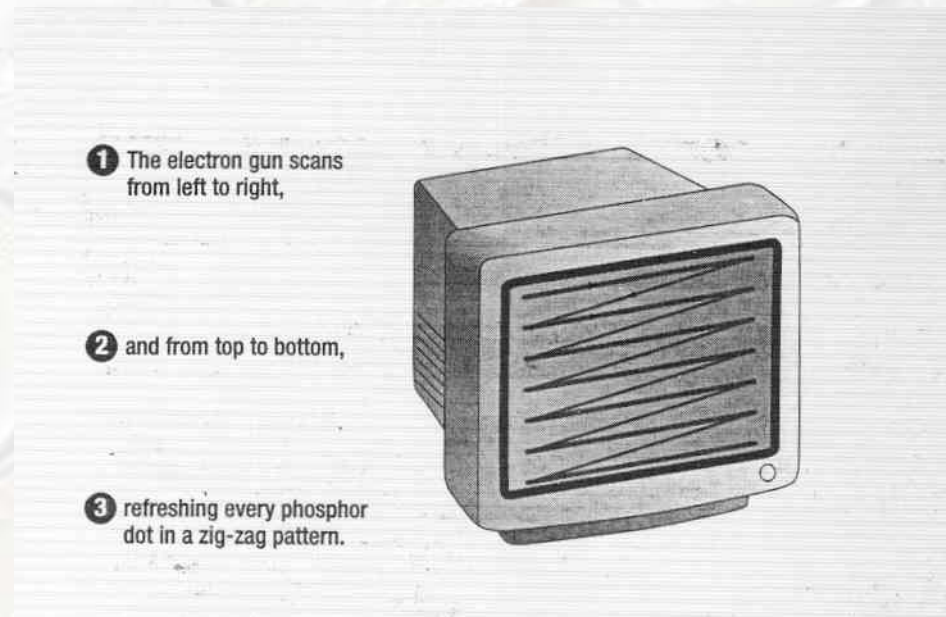


Fig: Scanning pattern of CRT monitor

- The smallest numbers of dots that a a electron gun can focus is called pixel in other words the minimum unit of screen.
- In case of a monochromatic monitor there is one electron gun.
- In case of a color monitor there are three electron guns for three basic colors
- Two main drawbacks of CRT monitors are
 1. Bulky
 2. Requires lot of power

Flat panel monitors

- A flat panel monitor occupy less space than CRT monitor.
- It runs cooler than CRT motor.
- There are several types of flat panel monitor. The most common is the LCD (Liquid crystal display) monitor.

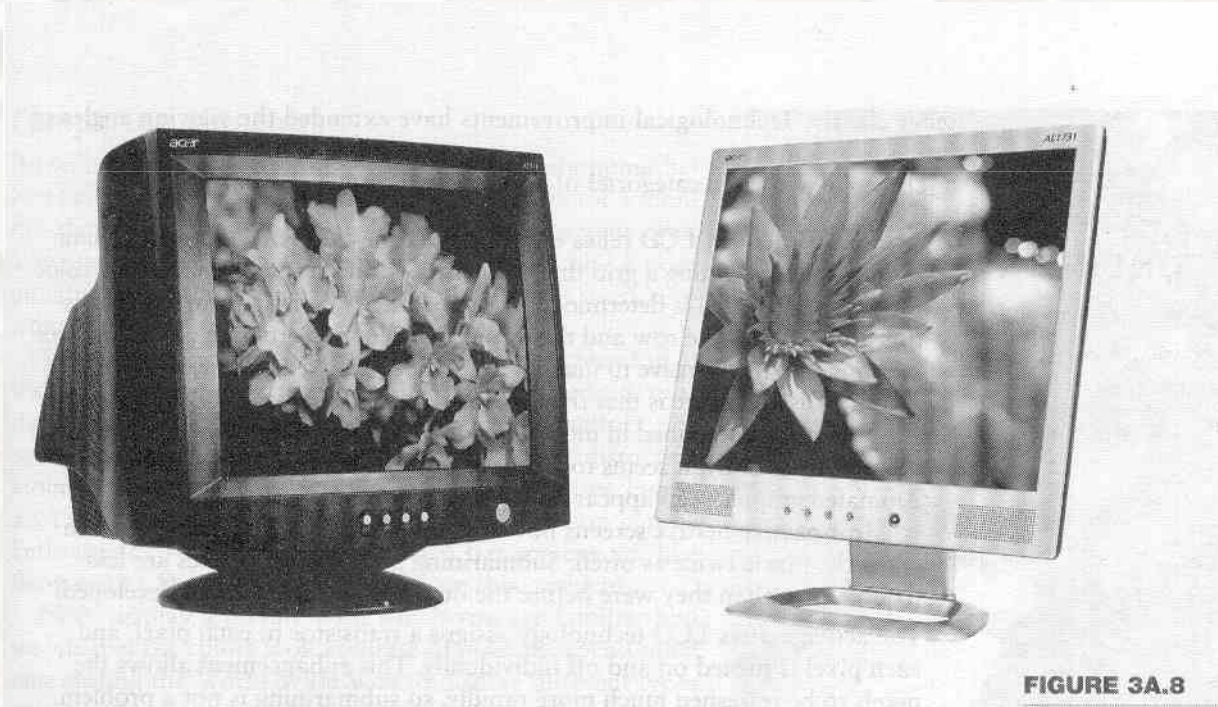


Fig : Comparing size between a standard CRT monitor and Flat panel monitor.



Fig : A flat panel monitor

LCD (Liquid Crystal Display) monitor

- Uses a clear liquid chemical trapped in tiny pockets between two pieces of glass.
- Each pocket of liquid is covered both front and back by very thin wires.
- When a small amount of current is applied to both wires, a chemical reaction turns the liquid dark thereby blocking light.
- Principle advantages of LCD monitors are
 - low power consumption
 - Low cost
 - Small size.
- Major disadvantages includes
 - Image has very little contrast
 - Optimum view angle is narrow.
 - Resolution is not as good as

Factors to be considered in case of a monitor

1. Size

- Monitors are measured diagonally in inches across the front of screen.
- Actual viewing area is smaller than it's overall size.
- Actual viewing area of LCD monitor is larger than CRT monitor of same size.

2. Resolution

- The term resolution refers to the sharpness of images.
- The monitors resolution is determined by the number of pixels on the screen.
- The more pixels a monitor can display the higher the resolution and thus the clearer images.
- A resolution of 640x480 means, 640 pixels in horizontally and 480 pixels vertically down the screen.

3. Refresh rate

- The monitor's refresh rate is the number of times per second that the electron gun scans every pixel on the screen.
- It is important because phosphor dots fade quickly after the electron gun charges them with electrons.
- Refresh rate is measured in Hz
- Refresh rate over 72 Hz is favorable.

4. Dot pitch

- Important parameter for color monitor.
- Briefly, the **dot pitch** is the measure of how much space there is between a display's pixels.
- When considering dot pitch, remember that smaller is better.
- Usually it is measured as a fraction of mm.
- Should be 0.22 mm or even less is better.

5. Color depth

- color bit depth refers to the number of bits used to describe the color of a single pixel. The bit depth determines the number of colors that can be displayed at one time.

Glossary of Terms

DDR SDRAM – Double Data Rate Synchronous Dynamic Random Access Memory

DXF – Data eXchange Format

DTP – Desk Top Publishing

DIMM – Dual In-line Memory Module

DLL – Dynamic Link Library – a partial executable file

DNS – Domain Name System – a method of naming computers on the internet

Dpi – Dots Per Inch

EIDE – Enhanced Integrated Drive Electronics

EXE – Executable (file)

FAT – File Allocation Table

FTP – File Transfer Protocol

Firewall – An anti-piracy method for protecting networks

GUI – Graphical User Interface

HTML – HyperText Markup Language

HTTP – HyperText Transfer Protocol

ISA – Industry Standard Architecture

Glossary of Terms

I/O – Input/Output
IP – Internet Protocol (address)
ISP – Internet Service Provider
IRQ – Interrupt ReQuest
JPEG – Joint Photographic Experts Group (format)
LAN – Local Area Network
LCD – Liquid Crystal Display (monitor)
MPEG – Moving Pictures Experts Group (format)
MIDI – Musical Instrument Digital Interface
ns – nanosecond (10^{-9} seconds)
OLE – Object Linking and Embedding
OCR – Optical Character Recognition
PCI – Peripheral Component Interconnect (bus)
RAM – Random Access Memory
ROM – Read-Only Memory
SCSI – Small Computer System Interface
SIMM – Single In-line Memory Module

Glossary of Terms

SRAM – Static RAM

SVGA – Super VGA – capable of displaying resolutions up to 1024 x 768 pixels

TCP/IP – Transmission Control Protocol/Internet Protocol

TFT – Thin Film Transistor (monitor)

TIFF – Tagged Image File Format

URL – Uniform Resource Locator

USB – Universal Serial Bus

VGA – Video Graphics Array

VRAM – Video RAM

WAN – Wide Area Network

WWW – World Wide Web

WYSIWYG – What You See Is What You Get

A background of various US coins including pennies, nickels, dimes, and quarters. The coins are scattered across the frame, with some showing the obverse and others the reverse. The word "THANKS" is centered in the middle of the image in a bold, black, sans-serif font.

THANKS