FUNDAMENTALS OF COMPUTER

By Probir Sir

TOPICS COVERED

- ✓ Evolution of Computers
- ✓ Categories of Computers
- ✓ Other Types of Computers
- ✓ Devices of a Computer

1930

1940

1950

1960

EVOLUTION OF COMPUTERS

1970

1980

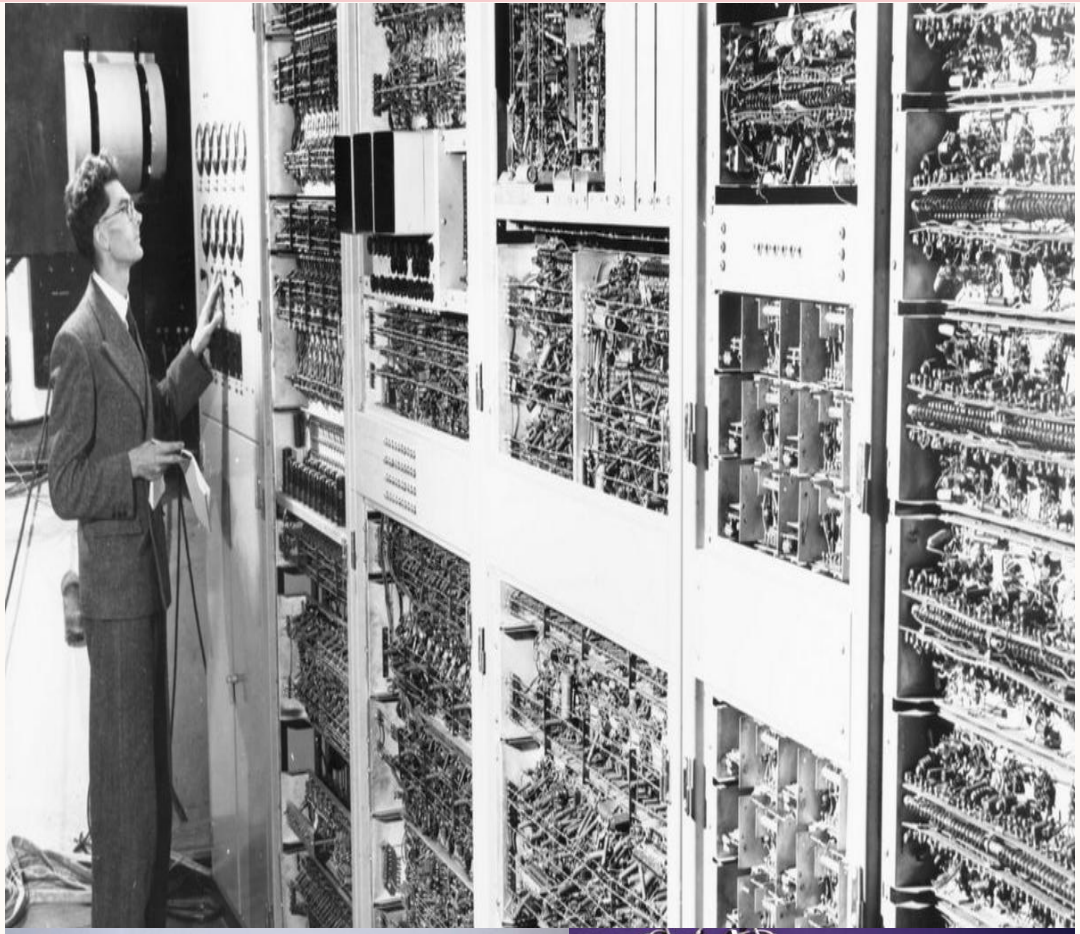
1990

2000

EVOLUTION OF COMPUTERS

First Generation (Vacuum Tube Based) Computers

- Vacuum tubes were used for logic circuitry.
- Magnetic Drums were used for Memory.
- Large size and weight: Occupied entire rooms.
- Slow speed.
- Unreliable operation: Vacuum tubes were prone to failure.
- High power consumption.
- Machine language: Programming was done using low-level machine code.
- Examples: ENIAC, EDVAC, UNIVAC I, IBM 650.



EVOLUTION OF COMPUTERS

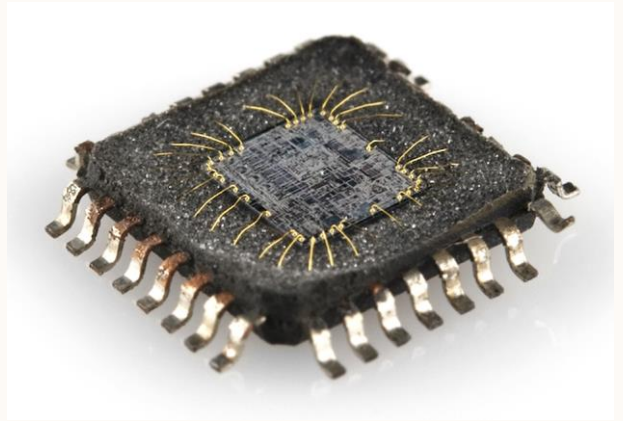
Second Generation (Transistor Based) Computers

- Transistor based computers.
- Transistors: These smaller, more reliable components replaced bulky and heat-generating vacuum tubes, leading to smaller and more energy-efficient computers.
- Smaller in size.
- Faster in speed.
- Reliable operation.
- Low power consumption.
- Assembly level language was used for Programming.
- Examples: The IBM 1401 and UNIVAC 1107.

EVOLUTION OF COMPUTERS

Third Generation (Integrated Circuits Based) Computers

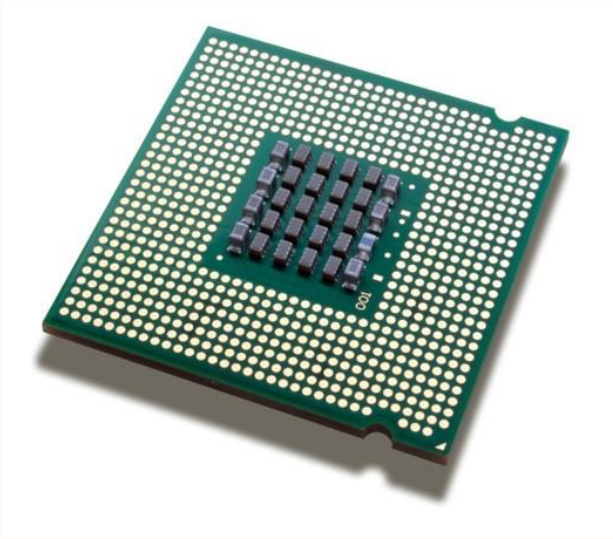
- Integrated circuits (ICs), also known as microchips were introduced.
- ICs allowed for the placement of multiple transistors on a single chip.
- Much smaller in size.
- Faster processing.
- Reliable operation.
- Operating System were introduced.
- High level languages like FORTRAN, COBOL, and Pascal were used for Programming.
- Examples: IBM System/360, PDP-11, and Honeywell 6000.



EVOLUTION OF COMPUTERS

Fourth Generation (Microprocessors Based) Computers

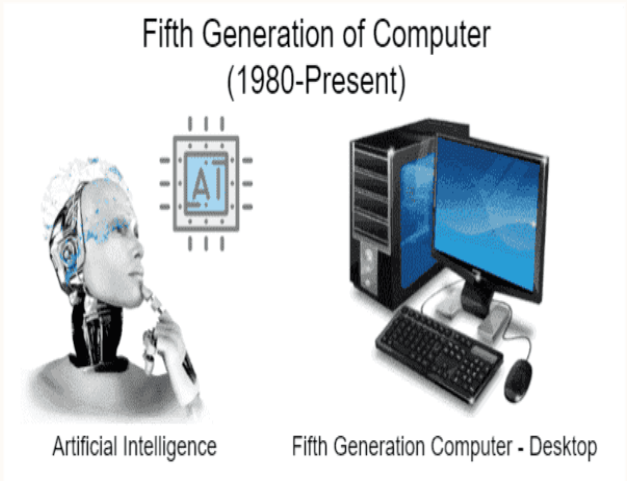
- Very Large-Scale Integration (VLSI) microprocessors were introduced.
- Personal Computers (PCs).
- Graphical User Interfaces (GUIs).
- Faster processing.
- Reliable operation.
- Semiconductor memories (like RAM) replaced the older magnetic core memories.
- Early forms of networking, including local area networks (LANs).
- Languages like C, C++, and Ada were developed.
- Examples: IBM PC, Intel 8008, Apple Macintosh PCs.



EVOLUTION OF COMPUTERS

Fifth Generation (Artificial Intelligence Based) Computers

- Characterized by the use of Ultra-Large-Scale Integration (ULSI) technology, artificial intelligence (AI), and parallel processing.
- ULSI chips can contain millions of transistors on a single chip.
- Artificial Intelligence (AI).
- Parallel Processing.
- Natural Language Understanding.
- IBM Deep Blue, Watson, Google Translate, Amazon Alexa.



CATEGORIES OF COMPUTERS

Types: - Three types of Computers

1. Analog Computers 2. Digital Computers 3. Hybrid Computers

1. Analog Computers: -

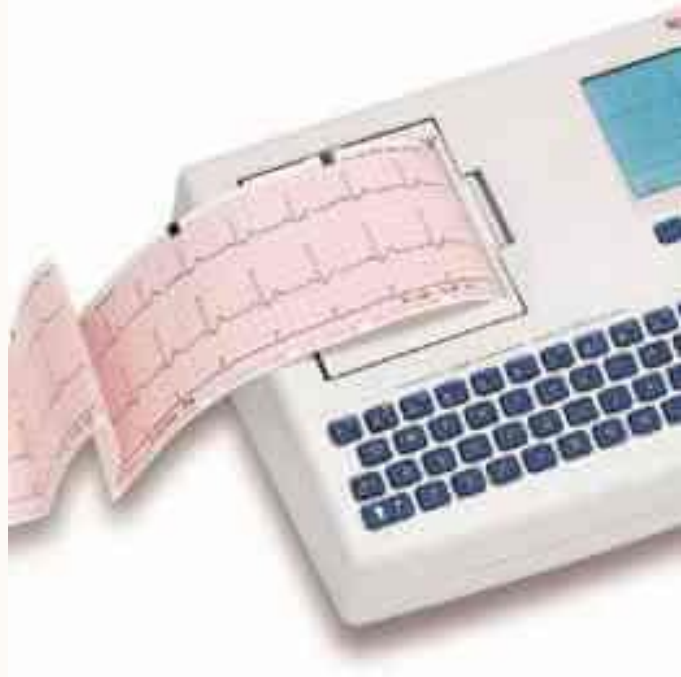
- Use continuous signals to represent and process information.
- Works on voltage, pressure, water flow etc.
- Examples: - Thermometers (mercury), Amplifiers, and speedometers.

2. Digital Computers: -

- Electronic devices that process information by manipulating numbers and other data using discrete values, binary code (0s and 1s).
- Uses electronic circuits and software to process information.
- Examples: - PCs, Smart Phone, Digital Gadgets.

3. Hybrid Computers: -

- Computers that exhibit features of analog computers and digital computers.
- Used for scientific research and specialized applications.
- Examples: - Electrocardiogram machine.



CATEGORIES OF COMPUTERS

On the basis of **Size, Speed, Processing** and **Cost** computers can be categorized as (**i**) **Micro Computers**, (**ii**) **Mini Computers**, (**iii**) **Mainframe Computers** and (**iv**) **Super Computers**.

(i) Micro Computers: -

- Personal Computer.
- Consists CPU, Primary and Secondary Memory.
- Input/Output.
- Desktop, Laptop, Tablet, Smartphone.

- **Desktop**: -Fits on the desk and used in the offices, home and schools.
- **Laptop**: -Portable and can be placed on the lap. Works can be done anywhere using it. More compact than a desktop with similar feature.
- **Tablet**: -Consists of touch screen, virtual keyboard, useful for IT savvy.
- **Smartphone**: -A mobile phone with mobile operating system. Helpful in many ways – can access email and internet easily, video conferencing is possible.

(ii) Mini Computers: -

- Powerful Computer.
- Bigger, faster in processing.
- Multi user support.
- Ex. HCL Magnum, VAX 7500.

(iii) Mainframe Computers: -

- Large Computers occupy a room.
- Store enormous amount of data.
- Multiple terminal are attached.
- Large scale computing.

(iv) Super Computers: -

- Consists large number of processors.
- Powerful to perform scientific calculations.
- El Capitan, Frontier, and LUMI .

OTHER TYPES OF COMPUTERS

Embedded Computers: - Specialized computer system—a combination of a computer processor, computer memory, and input/output peripheral devices that has a dedicated function within a larger mechanical or electronic system.

(i) **Digital Camera**: - Commonly used embedded computer with memory, smart, feature rich camera.
(ii) **ATM(Automated Teller Machine)**:- Embedded computer that allows us to withdraw money.
(iii) **Microwave Oven**: - Embedded computer to cook and warm food.

Handheld Computers: - A portable mostly touchscreen-based device designed to fit in your hand, allowing you to carry it around easily, browsing internet, run Apps etc.

(i) **Smart Phone**: - A mobile phone that performs many of the functions of a computer, typically having a touchscreen interface, internet access, and an operating system capable of running downloaded apps.
(ii) **PDA (Personal Digital System)**:- A handheld computer used for managing personal information, like contacts, calendars, and notes.
(iii) **Smart Watch**: - A wearable computing device that resembles a wristwatch and often connects to a smartphone. Can make phone calls, access internet.
(iv) **Gaming Consoles**: - A specialized computer designed to play video games, typically connected to a display device like a TV.

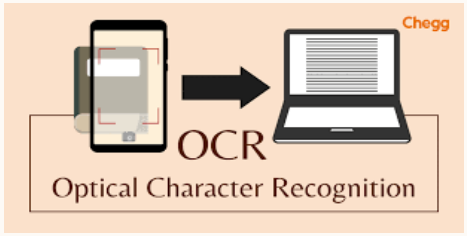
DEVICES OF A COMPUTER

A Computer performs an IPO cycle- Input → Process → Output.

- **Input**: - Data or Instructions entered into a computer. Input devices help us to input data or instructions.
- **Process**: - Processes the basic instructions that drive a computer.
- **Output**: - The information displayed, printed, or transmitted by a computer after processing.

Input Devices: -

1. **Gesture Recognition Camera**: -Motion Input Devices, uses Air Gestures which involves using sensors and algorithms to track and analyze the movements of the human body, particularly the hands, arms, and fingers, and then translating those movements into actions or commands.
2. **Barcode Reader**: - A device that uses light to read and decode information encoded in barcodes.
3. **OMR(Optical Mark Reader)**: - A technology that allows a machine to read marks made on paper forms.
4. **OCR(Optical Character Reader)**:- Is the process that converts an image of text into a machine-readable text format.
5. **MICR(Magnetic Ink Character Reader)**: -A technology that involves the use of magnetic ink and special characters to process and verify the legitimacy of cheques.

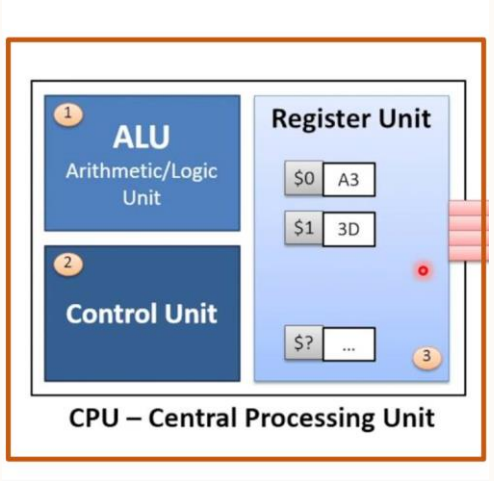


DEVICES OF A COMPUTER

Processing Devices: -

- A hardware components that help to handle the processing of the information, storage and retrieval process of the information.
- Central processing unit is the brain of the computer.

1. **ALU(Arithmetic Logic Unit)**: -A computer component that performs arithmetic and logical operations. It's a fundamental part of a computer's central processing unit (CPU). .
2. **Control Unit (CU)**: - It instructs the memory, logic unit, and both output and input devices of the computer on how to respond to the program's instructions.
3. **Memory Unit**: - A fundamental component of a computer that stores data and instructions.



DEVICES OF A COMPUTER

Output Devices: -

A Printer is an output device that gives output to a paper.

(i) **Impact**: - Creates immediate contact between the ink ribbons and paper. They can be noisy yet are very popular.

(ii) **Non Impact**: - Print without physically striking a ribbon or paper. Instead, they use methods like laser, inkjet, or thermal transfer to deposit ink or toner. Examples include laser printers, inkjet printers, and thermal printers.

1. **Laser Printer**: -A popular type of computer printer that uses a non-impact photocopier technology where there are no keys striking the paper, expensive yet best quality printout, speed measured in pages per minute or PPM .
2. **Inkjet Printer**: - A computer peripheral that produces hard copies of a text document or photo by spraying droplets of ink onto paper. Speed measured in lines per minute or LPM, lesser quality.
3. **Dot Matrix Printer**: - A computer printer that uses pins to strike an ink ribbon to create characters and images. Speed measured character per second or CPS, noisy, slow, cheaper.

DEVICES OF A COMPUTER

Plotter: -
A computer output device, similar to a printer, that uses a pen, marker, or other drawing tool to create lines and shapes on paper or other media, often producing large-format, high-quality graphics.

(**i**) **Inkjet Plotter**: - These use inkjet technology to deliver ink droplets to the drawing surface, creating a wider range of colors and finer detail.

(**ii**) **Flatbed Plotter**: - A large-format printing device that uses a stationary paper bed and a moving pen or print head to create drawings or graphics, typically for technical or architectural applications.

(**iii**) **Drum Plotter**: -Draw on paper wrapped around a drum that turns to produce one direction of the plot while the pens move to provide the other direction.

THANK YOU