# First Generation of Computer (1942-1955)

## Introduction

- 1942-1955 is the period of first generation computer.
- The 1st generation of computers used thousands of electronic gadgets called Vacuum tubes or thermionic valves to store & process information.

## Main Characteristics

- **Main electronic component** – vacuum tube
- **Main memory** – magnetic drums and magnetic tapes
- **Programming language** – machine language
- **Power** – consume a lot of electricity and generate a lot of heat.
- **Speed and size** – very slow and very large in size (often taking up entire room).
- **Input/output devices** – punched cards and paper tape.

## Advantages

- It made use of vacuum tubes which are the only electronic component available during those days.
- These computers could calculate in milliseconds.

## Disadvantages

- These were very big in size, weight was about 30 tones.
- These computers were very costly.
- It could store only a small amount of information due to the presence of magnetic drums.
- As the invention of first generation computers involves vacuum tubes, so another disadvantage of these computers was, vacuum tubes require a large cooling system.
- Very less work efficiency.
- Limited programming capabilities and punch cards were used to take inputs.
- Large amount of energy consumption.
- Not reliable and constant maintenance is required.

## Few Examples are;

- ENIAC
- EDVAC
- EDSAC
- UNIVAC
- IBM-701

# Second Generation of Computer (1955-1964)

## Introduction

- 1955-1964 is the period of second-generation computer.
- The 2nd generation computers used tiny, solid-state electronic devices called Transistors. The transistors were relatively smaller, more stable & reliable than vacuum tubes.

## Main Characteristics

- **Main electronic component** – transistor
- **Memory** – magnetic core and magnetic tape / disk
- **Programming language** – assembly language
- **Power and size** – low power consumption, generated less heat, and smaller in size (in comparison with the first generation computers).
- **Speed** – improvement of speed and reliability (in comparison with the first generation computers).
- **Input/output devices** – punched cards and magnetic tape.

## Advantages

- Due to the presence of transistors instead of vacuum tubes, the size of electron component decreased. This resulted in reducing the size of a computer as compared to first generation computers.
- Less energy and not produce as much heat as the first generation.

- Assembly language and punch cards were used for input.
- Low cost than first generation computers.
- Better speed, calculate data in microseconds.
- Better portability as compared to first generation

## Disadvantages

- A cooling system was required.
- Constant maintenance was required.
- Only used for specific purposes.

## Few Examples are;

- Honeywell 400
- IBM 7030
- CDC 1604
- UNIVAC LARC

# Third Generation of Computer (1964-1975)

## Introduction

- 1964-1975 is the period of third generation computer.
- These computers were based on Integrated circuits.
- IC was invented by Robert Noyce and Jack Kilby In 1958-1959.
- IC was a single component containing number of transistors.

## Main Characteristics

- **Main electronic component** – integrated circuits (ICs)
- **Memory** – large magnetic core, magnetic tape / disk
- **Programming language** – high level language (FORTRAN, BASIC, Pascal, COBOL, C, etc.)
- **Size** – smaller, cheaper, and more efficient than second generation computers (they were called minicomputers).

- **Speed** – improvement of speed and reliability (in comparison with the second generation computers).
- **Input / output devices** – magnetic tape, keyboard, monitor, printer, etc.

## Advantages

- These computers were cheaper as compared to second-generation computers.
- They were fast and reliable.
- Use of IC in the computer provides the small size of the computer.
- IC not only reduce the size of the computer but it also improves the performance of the computer as compared to previous computers.
- This generation of computers has big storage capacity.
- Instead of punch cards, mouse and keyboard are used for input.
- They used an operating system for better resource management and used the concept of time-sharing and multiple programming.
- These computers reduce the computational time from microseconds to nanoseconds.

## Disadvantages

- IC chips are difficult to maintain.
- The highly sophisticated technology required for the manufacturing of IC chips.
- Air conditioning is required.

## Few Examples are;

- PDP-8
- PDP-11
- CDC 6600
- IBM 360
- IBM 370

# Fourth Generation of Computers (1975-1989)

## Introduction

- 1975-1989 is the period of fourth generation computer.
- This technology is based on Microprocessor.
- A microprocessor is used in a computer for any logical and arithmetic function to be performed in any program.
- Graphics User Interface (GUI) technology was exploited to offer more comfort to users.

## Main Characteristics

- **Main electronic component** – very large-scale integration (VLSI) and microprocessor. VLSI means thousands of transistors on a single microchip.
- **Memory** – semiconductor memory (such as RAM, ROM, etc.)
- **Programming language** – high level language (Python, C#, Java, JavaScript, Rust, Kotlin, etc.). A mix of both third- and fourth-generation languages
- **Size** – smaller, cheaper and more efficient than third generation computers.
- **Speed** – improvement of speed, accuracy, and reliability (in comparison with the third generation computers).
- **Input / output devices** – keyboard, pointing devices, optical scanning, monitor, printer, etc.

## Advantages

- Fastest in computation and size get reduced as compared to the previous generation of computer.
- Heat generated is negligible.
- Small in size as compared to previous generation computers.
- Less maintenance is required.
- All types of high-level language can be used in this type of computers.

## Disadvantages

- The Microprocessor design and fabrication are very complex.
- Air conditioning is required in many cases due to the presence of ICs.
- Advance technology is required to make the ICs.

## Few Examples are;

- IBM PC and its clones.
- VAX 9000
- STAR 1000
- TRS-80
- CRAY-1/ CRAY-2
- APPLE II
- Apple Macintosh

# Fifth Generation of Computers (1989-Onwards)

## Introduction

- The period of the fifth generation in 1989-onwards.
- This generation is based on artificial intelligence.
- The aim of the fifth generation is to make a device which could respond to natural language input and are capable of learning and self-organization.

## Main Characteristics

- **Main electronic component:** based on artificial intelligence, uses the Ultra Large-Scale Integration (ULSI) technology and parallel processing method. ULSI means millions of transistors on a single microchip and Parallel processing method means use two or more microprocessors to run tasks simultaneously.
- **Language** – understand natural language (human language).
- **Power** – consume less power and generate less heat.
- **Speed** – remarkable improvement of speed, accuracy and reliability (in comparison with the fourth generation computers).

- **Size** – portable and small in size, and have a huge storage capacity.
- **Input / output device** – keyboard, monitor, mouse, trackpad (or touchpad), touchscreen, pen, speech input (recognize voice / speech), light scanner, printer, etc.

## Advantages

- It is more reliable and works faster.
- It is available in different sizes and unique features.
- It provides computers with more user-friendly interfaces with multimedia features.

## Disadvantages

- They need very low-level languages.
- They may make the human brains dull and doomed.

## Few Examples are;

- IBM Notebooks
- Pentium PCs
- Sun Workstations
- PARAM 10000
- SGI Origin 2000