

# THE COMPUTER GENERATIONS

# FIRST GENERATION, 1942 – 1955: The Vacuum Tube

- The first generation of computers, characterized by vacuum tubes, started in 1951 with the creation of -

**UNIVAC (Universal Automatic Computer)** – a tabulating machine which won the contest for the fastest machine which could count the US 1890 census.



**VACUUM TUBES** – electronic tubes about the size of light bulbs.

## **MAIN FEATURES:**

- Vacuum Tube technology
- Magnetic core memories
- Fastest computing areas were scientific computation, payroll processing, record keeping etc.
- Computation time: milliseconds.

## **DISADVANTAGES:**

- They generate more heat causing many problems in temperature regulation and climate control.
- Tubes were subject to frequent burn-out.
- Bulky in size and occupies lot of space.
- Unreliable and prone to frequent hardware failures.

**EXAMPLES:** EDVAC, ENIAC, EDSAC, UNIVAC-I

# SECOND GENERATION, 1955 – 1964: The Transistor

The year 1955 marked the invention of transistors, which characterized the second generation of computers.

**TRANSISTOR** – was a three-legged component which shrunk the size of the first generation computers. Occupied only  $1/100^{\text{th}}$  of the space occupied by a vacuum tube

More reliable, had greater computational speed, required no warm-up time and consumed far less electricity.



## MAIN FEATURES:

Transistor based technology therefore they are 10 times faster than the first generation computer.

Smaller in size & required lesser space than first generation computer.

Consumes less power & dissipated less heat .

More reliable & less prone to hardware failures.

Faster and larger primary & secondary storage as compared to first generation computer. This improved I/O devices.

Easier to program & use, therefore widely used for commercial purpose.

Computation time in microseconds.

## DISADVANTAGES:

Frequent maintenance needed.

Commercial production was difficult.

Air conditioning required.

EXAMPLE: IBM 700, 1401, ATLAS, ICL 1902.

# **THIRD GENERATION, 1964 – 1975: The Integrated Circuit**

Third generation computers arose in 1965 with the invention of smaller electronic circuits called integrated circuits (IC'S)

**INTEGRATED CIRCUITS** – are square silicon chips containing circuitry that can perform the functions of hundreds of transistors.



## **MAIN FEATURES:**

- More powerful than second generation computers as they were capable of performing about 1 million instructions per second.
- Smaller in size requiring lesser space.
- Sophisticated operating systems became available with time sharing & multi-programming concepts.
- Consumed less power & dissipated less heat.
- General purpose machine suitable for both scientific & commercial applications.
- Commercial production of these systems was easier & cheaper.
- These computers were portable.
- Computational time reduced from micro to nano-seconds.

## **DISADVANTAGES:**

- Complex & Sophisticated technology required to the manufacture the CPU & other components.

**EXAMPLE:** IBM 360/370

# **FOURTH GENERATION, 1975 – 1989: The Large Scale integration**

## **MAIN FEATURES:**

- By early 1970's large scale integration (LSI) of electronic circuits became possible, therefore, much faster in computation as compared to previous generations.
- Semiconductor memories replaced magnetic core memories resulting in large random access memories with very fast access time.
- More reliable & less prone to hardware failures, requiring negligible maintenance cost.
- Use of standard high level programming languages allowed programs written for one computer to be easily ported to & executed on another computer.



## **MAIN FEATURES (cont.):**

- Graphical user interface(GUI) enabled new users to quickly learn how to use computers.
- Commercial production of these systems was easier & cheaper.
- Network of computers enabled sharing of resources like disks, printers etc among multiple computers & their users.

## **DISADVANTAGES:**

Complex & sophisticated technology required for manufacturing the CPU & other components.

**EXAMPLE:** HCL Workhorse, Magnum, Ille etc.

# FIFTH GENERATION, 1989 – Present: The Microprocessor

- Marked by the use of microprocessor
- **MICROPROCESSOR** – is a silicon chip that contains the CPU – part of the computer where all processing takes place.
- **4004 chip** – was the first microprocessor introduced by Intel Corporation.



## MAIN FEATURES:

- Faster, more powerful, tremendous data storage and processing capacity
- Become even more powerful and a lot cheaper.
- Communication technologies became faster & more & more computers were networked together because of emergence of internet.
- These are used for wide range of multimedia applications that deal with information containing text, graphics, animation, audio & video data.
- Portable PCs, are much smaller & handy than PCs of 4<sup>th</sup> generation allowing users to use computing facility even while travelling.

GENERATION	ELECTRONIC COMPONENT	ADVANTAGE	DISADVANTAGE	COMMENTS
1. 1942-1955	VACUUM TUBES.	ONLY VACUUM TUBES ARE AVAILABLE.	LARGE SIZE, HEAT, A/C, UNRELIABLE, HIGH MAINTENANCE.	MANUAL ASSEMBLY, INDS. COMPONENT INTO A UNIT.
2. 1955-1964	TRANSISTORS.	SMALL SIZE, LESS HEAT, RELIABLE FASTER.	A/C, HIGH MAINTENANCE.	AS ABOVE
3. 1964-1975	INTEGRATED CIRCUITS.	SMALLER SIZE, LOWER HEAT, LESS POWER REQUIRED, MORE RELIABLE, FASTER.	PROBLEMS WITH MANUFACTURER.	LESS HUMAN LABOUR AT ASSEMBLY STAGE
4. 1975 -1989	LARGE SCALE INTEGRATED CIRCUITS.	NO A/C REQUIRED, MINIMUM MAINTENANCE, CHEAPEST.		AS ABOVE
5. (1989- present)	MICRO PROCESSOR, HIGHER STORAGE CAPACITY, MULTI MEDIA.	HIGH SPEED, NO A/C REQUIRED, CHEAPEST.		AS ABOVE