

COMPUTER THEIR ORIGIN AND APPLICATIONS

The word computer comes from the word "compute" which means to calculate.

Computer is also meant for calculation but it is much more than just a calculating machine. Computer is an electronic device which performs three basic tasks i.e., inputting, processing and outputting.

▼ ORIGIN OF COMPUTERS

Origin of computer could be rigorous efforts of men to count large numbers.

- **Abacus**

Nearly 5,000 years ago, the "abacus" was developed in China in 3000 B.C. The word abacus means calculating board. The "abacus" may be considered the first computer and it has been used since ancient times by a number of civilizations for basic arithmetical calculations

- **Napier's Bones**

John Napier was a mathematician who became famous for his invention of logarithms. The use of "logs" enabled him to reduce any multiplication problem. John Napier built a mechanical device for the purpose of multiplication in 1617 A.D.

- **Slide Rule**

English mathematician E. Gunter developed the slide rule. This machine could perform operations like addition, subtraction, multiplication, and division.

- **Pascal's Calculator**

- **Leibniz's Multiplication and Dividing Machine**

- **Difference Engine**

The first step towards the creation of computers was made by an English mathematics professor, Charles Babbage. Early on, he realized that all mathematical calculations can be broken up into simple operations which are then constantly repeated, and that these operations could be carried out by an automatic machine.

- **The Analytical Engine**

The Engine had a 'Store' (memory) where numbers and intermediate results could be held, and a separate 'Mill' (processor) where the arithmetic processing was performed. It

had an internal stock of the four arithmetical functions and could perform direct multiplication and division. It was also capable of functions like: conditional branching, looping (iteration), microprogramming, parallel processing, latching, and polling etc. The logical structure of the Analytical Engine was essentially the same as that which has dominated computer design in the electronic era.

▼ **COMPUTER GENERATIONS**

- **First Generation Computers (1940-1956)**

First generation computers are characterized by the use of vacuum tube

The first general purpose programmable electronic computer was the Electronic Numerical Integrator and Computer (ENIAC)

length = 30-50 feet

weight = 30 tons

vacuum tubes = 70000

registers = 10,000

electricity = 150,000 watts

- **Second Generation Computers (1956-1963)**

Solid-State components (transistors and diodes) and magnetic core storage formed the basis for the second generation of computers.

It is in the second generation that the concept of Central Processing Unit (CPU), memory, programming language and input and output units were developed.

During the second generation many high level programming languages were introduced, including FORTRAN (1956), ALGOL (1958) and COBOL (1959).

Examples: PDP-8, IBM1400 series, IBM 1620, IBM 7090, CDC 3600

- **Third Generation Computers (1964-1971)**

The third generation computers were introduced in 1964. Transistors were miniaturized and placed on silicon chips.

They used Integrated Circuits (ICs).

Computers consist of many chips placed on electronic boards called printed circuit boards. There are different types of chips. For example, CPU chips (also called microprocessors) contain an entire processing unit, whereas memory chips contain blank memory.

Computers of this generation were small in size, low cost, large memory and processing speed is very high. Higher level language such as BASIC (Beginners All purpose Symbolic Instruction Code) was developed during this period.

- **Fourth Generation Computers (1971-Present)**

Fourth generation computers started around 1971 by using large scale of integration (LSI) in the construction of computing elements. LSI circuits built on a single silicon chip called microprocessors. A microprocessor contains all the circuits required to perform arithmetic, logic and control functions on a single chip.

Due to the development of microprocessor it is possible to place computer's central processing unit (CPU) on single chip. These computers are called microcomputers.

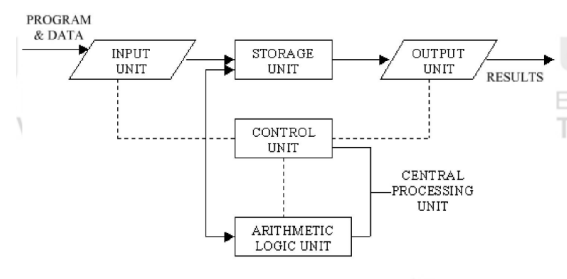
The major innovations in this generation were the development of microelectronics and the different areas in computer technology such as multiprocessing, multiprogramming, time-sharing, operating speed, and virtual storage.

- **Fifth Generation Computers (Present and Beyond)**

Fifth generation computers, based on artificial intelligence, are still in development, though there are some applications, such as voice recognition, that are being used today

▼ **COMPUTER SYSTEM**

- **How Computers Work ?**



- ▼ **Operational Unit**

- Arithmetic Logical Unit (ALU)

The Arithmetic Logical Unit is an important component of the CPU, which carry the actual execution of the instructions.

The major operations performed by the ALU are addition, subtraction, multiplication, division, logic and comparison

- Control Unit (CU)

The control unit determines the sequence in which computer programs and instructions are executed. Things like processing of programs stored in the main memory, interpretation of the instructions and issuing of signals for other units of the computer to execute them.

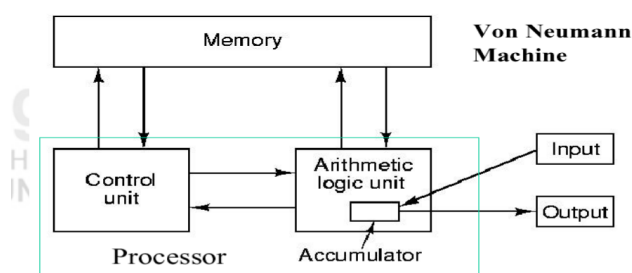
- Central Processing Unit (CPU)

The ALU and the CU of a computer system are jointly known as the central processing unit. The term CPU relates to a specific chip or the processor. CPU may be considered as the brain of any computer system.

- ▼ System Unit

- Ports and Connectors
- Power Supply
- Motherboard

- Von Neumann Architecture



It is a design model for the modern computers which has central processing unit (CPU) and the concept of memory used for storing both data and instructions. This model implements the stored program concept in which the data and the instructions both are stored in the memory.

- ▼ Classification of Computers

- Microcomputers
- Minicomputers
- Mainframe Computers

- **Supercomputers**

They are used for highly calculation-intensive tasks such as molecular modeling, climate research, weather forecasting, quantum physics, physical simulations etc.

- ▼ **Classification by Technology**

- Analog Computers
- Digital Computers
- Hybrid Computers

- ▼ **Integrated Circuit**

It is an electronic circuit which involves thousands or millions of interconnected components like transistors, diodes and resistors.

The first integrated circuits (ICs) were based on small scale integration (SSI) circuits, which had around 10 devices per circuit (or „chip“), and evolved to the use of medium-scale integrated (MSI) circuits, which had up to 100 devices per chip. Integrated circuits are also found in almost every modern electrical device such as cars, television sets, CD players, cellular phones, etc. The main benefits of ICs are lower costs, high reliability and smaller space requirements.

- ▼ **Electronic Circuits**

- **Transistor**

The transistor acts like a switch. It can turn electricity on or off, or it can amplify current. It is used for example in computers to store information.

- **Resistor**

The resistor limits the flow of electricity and gives us the possibility to control the amount of current that is allowed to pass. For example resistors are used, among other things, to control the volume in television sets or radios.

- **Capacitor**

The capacitor collects electricity and releases it all in one quick burst.

- **Diode**

The diode stops electricity under some conditions and allows it to pass only when these conditions change. This is used in, for example, photocells where a light beam that is broken triggers the diode to stop electricity from flowing through it.