

Computer and Its Evolution

Introduction

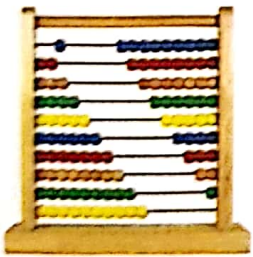
Computer has been the biggest human invention till date. The machine not only makes the calculations easy but is also helpful in various other functions such as storing data, mailing and others. However, prior to invention of computers, the calculations were done using different kinds of machines.

This chapter includes

- ▶ Early Calculating machines
- ▶ Evolution of computer

Early Calculating Machines

Abacus



It is the first known calculating device. It was used to perform simple arithmetic operations such as addition, subtraction, multiplication and division. Counting is done by moving the beads on the Abacus. It was invented around 5000 years ago and was primarily used in Asia. It was known as the first mechanical device used for calculation.



Napier Bones

John Napier, a Scottish mathematician in 1617 invented a system of calculation using strips of ivory bones known as Napier Bones.

Pascaline

It is the first mechanical calculating machine. It had a rectangular box with movable wheels. It was invented by

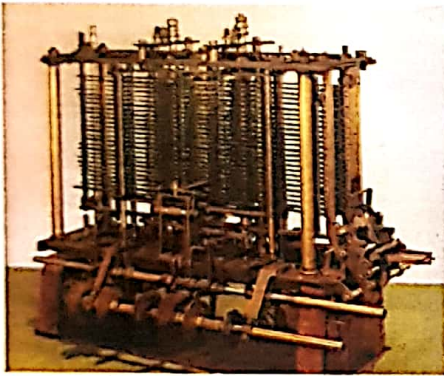
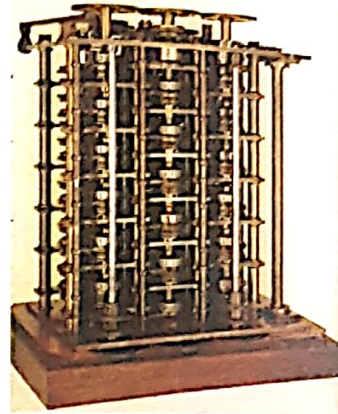


Blaise Pascal in 1641. The instrument was designed to perform arithmetic operations with numbers up to hundreds and thousands.

Difference Engine

Difference Engine was invented by Charles Babbage in 1822. It was an automatic mechanical calculator which was capable of preparing mathematical tables.

The machine was designed to create error free tables. Difference Engine had number of columns numbered from 1 to n and was capable of storing one decimal number in each column.



Analytical Engine

Analytical Engine is a better version of Difference Engine and was designed by Charles Babbage in 1837.

It was the first general-purpose computer. The calculating device had same basic elements as in modern computer. These elements were input, output and memory device.

Charles Babbage is known as the 'Father of Computer.'

Evolution of computers

The gradual development in the calculating devices led to the invention of computers. It took several years and stages for the computer to evolve as modern day computer. The various stages of computer evolution were:

First Generation Computers (1946-1959)

The first generation computers were typically large and needed a room for accommodation. They used high speed vacuum tubes as switching devices and had a very small memory.



Vacuum tubes

These computers used ENIAC. ENIAC stands for Electronic Numerical Integrator and Calculator. They were developed in 1946 by Eckert and Mauchly in USA.

The first generation computers were very big in size, slow in speed and gave very low level of accuracy. It consumed much of power and generate too much of heat due to which machine failure took place very often.

Second Generation Computers (1959-1965)

The second generation computers witnessed some major developments such as the vacuum tubes were replaced by transistors and diodes. The replacement helped in reducing the size of the computers as well.

They had advantages over the first generation computers as they were faster in speed, more reliable, larger storage capacity and required less power consumption. The machine failure rates were very low.

Third Generation Computers (1965-1970)

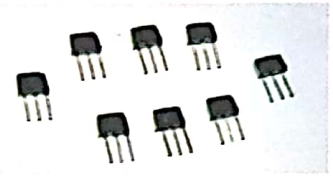
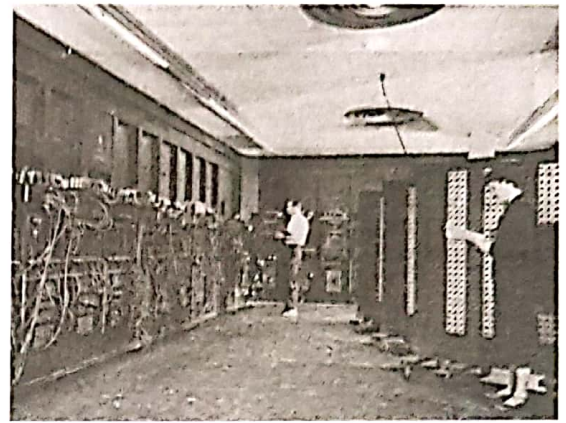
The third generation computers used integrated circuits known as chip, instead of transistors. They were smaller and had more storage capacity as compared to second generation computers.

These computers were designed to use an operating system that enabled different programs to run at the same time. These computers were 10,000 times faster than the first generation computers.

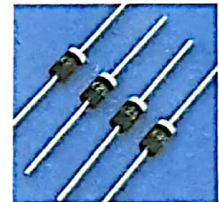
Examples of third generation computers are IBM 360 and 370 series.

Fourth generation computers (1970-1985)

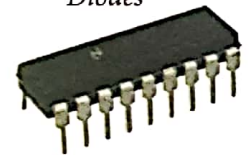
The fourth generation computers used microprocessors, which further reduced the size of the computer and increased their efficiency. These computers have greater computing power than the previous generations.



Transistor



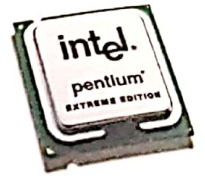
Diodes



Integrated Circuit (IC)



The use of microprocessor chip resulted in the development of microcomputer. The era of personal computer was developed during this period only.



Fifth generation computers (Since 1985)

Fifth generation computers are in developmental stage. The goal of the fifth generation is to develop a device which could respond to natural language input and is capable of learning and organising itself having a power of human intelligence. They will be able to recognise images and graphs.

Let's Summarise

- There were various calculating devices prior the inventions of computers.
- Abacus is considered as the first known calculating device.
- Abacus was soon replaced by Pascaline, which could calculate numbers up to hundreds and thousands.
- It was in 1822 when Charles Babbage designed the Difference Engine. It was designed to create error free table.
- It was soon replaced by Analytical Engine in 1837, again designed by Charles Babbage. This was the first general-purpose computer.
- The first generation computers were typically large and needed a room for accommodation. They used vacuum tubes for operations and had less internal storage.
- In second generation computers, the vacuum tubes were replaced by transistors. The replacement helped in reducing the size of the computers as well.
- The third generation computers used integrated circuits known as chip, instead of transistors.
- The fourth generation computers used microprocessors, which further reduced the size of the computer and increased their efficiency.
- The fifth generation computers have high storage capacity and are smaller in size.

Terms.....

General-purpose computer: ancient computers had similar basic elements like that of modern computers. The features are input devices, output devices and processing unit.

Vacuum tubes: huge electrically charged glass tubes are placed inside the computers to maintain the information flow in the computer.

Transistor: Building of computer system used to amplify a signal or open or close a circuit.

Diodes: Diodes were the first semi-conductor electronic devices.

Chip: small electronic circuit used to transmit data signals.

Microprocessor: a silicon chip that contains a CPU, i.e, it performs entire processing of a computer.

Exercise

1. Fill in the blanks:

Microprocessors Abacus transistors Electronic Numerical Integrator and Calculator

1. The full form of ENIAC is
2. is an early calculating device, primarily used in Asia.
3. Vacuum tubes were replaced by in the second generation of computers.
4. The fourth generation computers used which reduced the size of modern computer.

2. Write T for true and F for false for the following statements.

1. Abacus is the first known calculating device.
2. The third generation computers used transistors.
3. The first generation computers were typically large and needed a room for accommodation.
4. Analytical Engine replaced Pascaline.
5. Charles Babbage built Difference Engine in the year 1822.