

Unit 2

Evolution of the computer and the modern Computers

History of Computing

The history of Information and Communication Technology can be divided into four main areas.

1. Pre mechanical era (before 1450)
2. Mechanical era (1450-1840)
3. Electromechanical era (1840-1940)
4. Electronic era (1940 to date)

Early calculating aids

- Abacus - In 3000BC, the Chinese invented the Abacus.
- Pascaline - In 1642 Blaise Pascal developed the pascaline which could do additions and subtractions.
- Leibnitz Calculator - in 1673 Leibnitz improved the pascaline so that it could do multiplications and divisions.
- Difference Engine - In 1820 Charles Babbage designed the Difference Engine.
- Analytical Engine - In 1834 Charles Babbage designed the Analytical Engine.

Electronic Age of Computing

The invention of the Electronic valve by Forrest in 1906 laid the foundation for to the modern computer technology.

In 1944, Howard Aiken, an American mathematician, designed the Automatic Sequence Controlled Calculator (ASCC) which was better known as the Mark 1. It was funded by IBM and was used in the Harvard University and was used in the war effort. A Navy officer called Grace Hopper was one of the team members who worked with Howard Aiken was the first to introduce the word "bug" for a computer error as a real bug was stuck on a circuit board.

First Generation Computers (1940 - 1956)

- ENIAC (Electronic Numerical Integrator and Calculator) invented in 1946 is considered the first electronic digital computer.
- EDVAC (Electronic Discrete Variable Automatic Computer) invented in 1948, is considered the first digital computer that could store programs (used the Von Neumann Architecture).
- UNIVAC (Universal Automatic Computer) in 1956 is the first commercial and mass produced computer.

Second Generation Computers (1956 - 1964)

- The Transistor was invented by William Shockley, Wolter Brattain and John Bardeen in 1947.
- Many drawbacks of vacuum tubes were overcome by Transistors.

Third Generation Computers (1964 - 1971)

- In 1964, the Integrated Circuit was invented by Jack Kilby and Robert Noyce separately.
- With the invention of the IC, computers became small in size, low in price and had more speed.
 - ❖ Small Scale Integration (SSI)
 - ❖ Medium Scale Integration (MSI)

Fourth Generation Computers (1971 -)

- Gilbert Hyatt is regarded as the inventor of the Microprocessor in 1968.
- Computers built using these had increased efficiency and speed, and a drop in size and cost.
 - ❖ Very Large Scale Integration (VLSI)
 - ❖ Ultra Large Scale Integration (ULSI)
- MIT built the ALTAIR 8800 in 1975.
- IBM built the IBM-PC in 1981 which was the first personal computer.
- Apple built the Macintosh in 1984 as a response to that, which revolutionized the PC industry.

Future directions of computer technology.

The anticipation of present day scientists is to build a computer that perform functions of an intelligent human. In computer science this particular field is called Artificial Intelligence. Man has the ability to involve himself in complex activities like concentrating on different traits of thought at the same time, and to distinguish between different voices. Robot technology and the construction of automatic vehicles based on artificial intelligence, are technologies already in place.

While the concept of the molecular computer / DNA computers and biological computers are already in process they will be a reality in the future. Further, the development of a quantum computer by 2015 is one aim of the scientists. These are considered objectives of the fifth generation computers.

Evolution of the processors

Model (Intel)	Model (Motorola)	Year	Speed (MHz)
8088			8
8086	68000		4-8
80186	68010		16
80286	68020	1982	20
80386	68030	1986	40
80486	68040	1990	66-75
Pentium MMX	Power PC	1997	166/200
Pentium II	Power PC G3/G4	2000	1200
Pentium III		2001	1800-3800
Pentium IV		2004	1600-2500
	Power PC G5	2007	4200-

The Transistor

Before the invention of transistors, electronic valves were used in the construction of computers.

Since a lot of heat was emitted problems arose due to burning out of valves. A circuit built by assembling several transistors was called a chip. By using chips it was possible to overcome the above problems. In this chip there are a large number of circuits built by using semiconductor technology.

Specification of a Processor

Bus

The physical path along which data travels as signals within the components of a computer or within the components between computers is called a Bus.

There are three main varieties of bus on the motherboard.

1. Data Bus

The bus carrying Data from one place to another is called a data bus.

2. Address Bus

A particular location is selected in order to read the data in the memory or write data into memory. The address of this location is known as the address bus.

3. Control Bus

Control signals are carried to various locations in the computer by the control bus.

Registers

The location where signals of the Arithmetic and logic unit are stored temporarily is called registers.

Clock speed of a CPU

The speed at which instructions provided to a processor is implemented, is called the clock speed of the CPU. The CPU of a modern computer is measured in MHz or GHz

Word Size

The number of bits in a machine language word used in a computer is called its size or its word length.

Classification of computers

There are several ways of classifying computers

1. According to size
2. According to technology used
3. According to purpose of use

1. Classification of computers According to size

- Super Computers
- Mainframe Computers
- Mini Computers
- Micro Computers

2. Classification of computers According to technology used

- Digital Computers
- Analog Computers
- Hybrid Computers

3. Classification of computers According to purpose of use

- General Purpose
- Special Purpose

Personal Computers that fall into the category of Micro Computers are as follows.

- Desktop Computers
- Workstations
- Laptop Computers
- Palmtop Computers
- Notebook Computers
- Personal Digital Assistant (PDA) or Digital Diary
- Pocket Computers