

Government Arts College for Women, Salem-8

Department of Physics

Skill Based Elective Course-Programming in C-II.B.Sc., Physics 2020-2021

UNIT-I

1. Definition of computer
2. Earliest computer
3. Computer History
4. Computer Generations

Definition of Computer

- Computer is a programmable machine.
- Computer is a machine that manipulates data according to a list of instructions.
- Computer is any device which aids humans in performing various kinds of computations or calculations.

Three principles characteristic of computer:

- It responds to a specific set of instructions in a welldefined manner.
- It can execute a pre-recorded list of instructions.
- It can quickly store and retrieve large amounts of data

Earliest Computer

- Originally calculations were computed by humans, whose job title was computers.
- These human computers were typically engaged in the calculation of a mathematical expression.
- The calculations of this period were specialized and expensive, requiring years of training in mathematics.
- The first use of the word "computer" was recorded in 1613, referring to a person who carried out calculations, or computations, and the word continued to be used in that sense until the middle of the 20th century.

History of Computers

Tally Sticks

A tally stick was an ancient memory aid device to record and document numbers, quantities, or even messages.

Abacus

- An abacus is a mechanical device used to aid an individual in performing mathematical calculations.
- The abacus was invented in Babylonia in 2400 B.C.

- The abacus in the form we are most familiar with was first used in China in around 500 B.C.
- It used to perform basic arithmetic operations.

Napier's Bones

- Invented by John Napier in 1614.
- Allowed the operator to multiply, divide and calculate square and cube roots by moving the rods around and placing them in specially constructed boards.

Slide Rule

- Invented by William Oughtred in 1622.
- Is based on Napier's ideas about logarithms.
- Used primarily for – multiplication – division – roots – logarithms – Trigonometry • Not normally used for addition or subtraction.

Pascaline

- Invented by Blaise Pascal in 1642.
- It was its limitation to addition and subtraction.
- It is too expensive.

Stepped Reckoner

- Invented by Gottfried Wilhelm Leibniz in 1672.
- The machine that can add, subtract, multiply and divide automatically.

Jacquard Loom

- The Jacquard loom is a mechanical loom, invented by Joseph-Marie Jacquard in 1801.
- It an automatic loom controlled by punched cards.

Arithmometer

- A mechanical calculator invented by Thomas de Colmar in 1820,
- The first reliable, useful and commercially successful calculating machine.
- The machine could perform the four basic mathematic functions.
- The first mass-produced calculating machine.

Difference Engine and Analytical Engine

- It an automatic, mechanical calculator designed to tabulate polynomial functions.
- Invented by Charles Babbage in 1822 and 1834
- It is the first mechanical computer.

First Computer Programmer

- In 1840, Augusta Ada Byron suggests to Babbage that he use the binary system.
- She writes programs for the Analytical Engine.

Scheutzian Calculation Engine

- Invented by Per Georg Scheutz in 1843.
- Based on Charles Babbage's difference engine.
- The first printing calculator.

Tabulating Machine

- Invented by Herman Hollerith in 1890.
- To assist in summarizing information and accounting.

Havard Mark 1

- Also known as IBM Automatic Sequence Controlled Calculator (ASCC).
- Invented by Howard H. Aiken in 1943
- The first electro-mechanical computer.

Z1

- The first programmable computer.
- Created by Konrad Zuse in Germany from 1936 to 1938. • To program the Z1 required that the user insert punch tape into a punch tape reader and all output was also generated through punch tape

Atanasoff-Berry Computer (ABC)

- It was the first electronic digital computing device.
- Invented by Professor John Atanasoff and graduate student Clifford Berry at Iowa State University between 1939 and 1942.

ENIAC

- ENIAC stands for Electronic Numerical Integrator and Computer.
- It was the first electronic generalpurpose computer.
- Completed in 1946.
- Developed by John Presper Eckert and John W. Mauchl.

UNIVAC 1

- The UNIVAC I (UNIVersal Automatic Computer 1) was the first commercial computer. • Designed by J. Presper Eckert and John Mauchly.

EDVAC

- EDVAC stands for Electronic Discrete Variable Automatic Computer
- The First Stored Program Computer
- Designed by Von Neumann in 1952.
- It has a memory to hold both a stored program as well as data.

The First Portable Computer

- Osborne 1 – the first portable computer.

- Released in 1981 by the Osborne Computer Corporation.

The First Computer Company

- The first computer company was the Electronic Controls Company. • Founded in 1949 by J. Presper Eckert and John Mauchly.

Computer Generations

There are five generations of computer:

- First generation – 1937- 1946
- Second generation – 1947 – 1962
- Third generation – 1963 - 1975
- Fourth generation – PC 1975 – Current
- Fifth generation – Today to future

First Generation of Computer (1937 – 1946):

In 1937 the first electronic digital computer was built by Dr. John V. Atanasoff and Clifford Berry. It was called the Atanasoff-Berry Computer 12 (ABC). In 1943 an electronic computer name the Colossus was built for the military. Other developments continued until in 1946 the first general– purpose digital computer, the Electronic Numerical Integrator and Calculator (ENIAC) was built. It is said that this computer weighed 30 tons, and had 18,000 vacuum tubes which was used for processing. When this computer was turned on for the first time lights dim in sections of Philadelphia. Computers of this generation could only perform single task, and they had no operating system.

Characteristics:

- i. Sizes of these computers were as large as the size of a room.
- ii. Possession of Vacuum Tubes to perform calculation.
- iii. They used an internally stored instruction called program.
- iv. Use capacitors to store binary data and information.
- v. They use punched card for communication of input and output data and information
- vi. They generated a lot of heat.
- vii. They have about One Thousand 1000 circuits per cubic foot.

Examples:

- i. Mark I developed by Aiken in 1944.
- ii. Electronic Numerical Integrator and Calculator (ENIAC) built at the Moore School for Engineering of the University of Pennsylvania in 1946 by J. Presper Eckert and William Mauchly.

iii. Electronic Discrete Variable Automatic Computer (EDVAC) also developed in 1947 by Eckert and Mauchley.

Second Generation of Computer (1947 – 1962):

Second generation of computers used transistors instead of vacuum tubes which were more reliable. In 1951 the first computer for commercial use was introduced to the public; the Universal Automatic Computer (UNIVAC 1). In 1953 the International Business Machine (IBM) 650 and 700 series computers made their mark in the computer world. During this generation of computers over 100 computer programming languages were developed, computers had memory and operating systems. Storage media such as tape and disk were in use also were printers for output.

Characteristics:

- i. The computers were still large, but smaller than the first generation of computers.
- ii. They use transistor in place of Vacuum Tubes to perform calculation.
- iii. They were produced at a reduced cost compared to the first generation of computers.
- iv. Possession of magnetic tapes as for data storage.
- v. They were using punch cards as input and output of data and information. The use of keyboard as an input device was also introduced.
- vi. These computers were still generating a lot of heat in which an air conditioner is needed to maintain a cold temperature.
- vii. They have about one thousand circuits per cubic foot.

Example:

- i. Leprechaun, IBM built by Bell Laboratories in 1947
- ii. Transis produced by philco, GE and RCA.
- iii. UNIVAC 1107, UNIVAC
- iv. IBM 7030 stretch.

Third Generation of Computer (1963 – 1975):

The invention of integrated circuit brought us the third generation of computers. With this invention computers became smaller, more powerful more reliable and they are able to run many different programs at the same time.

Characteristics:

- i. They used large-scale integrated circuits, which were used for both data processing and storage.
- ii. Computers were miniaturized, that is, they were reduced in size compared to previous generation.
- iii. Keyboard and mouse were used for input while the monitor was used as output device.

- iv. Use of programming language like COBOL and FORTRAN were developed.
- v. They have hundred thousand circuits per cubic foot.

Examples:

- i. Burroughs 6700, Mini computers
- ii. Honeywell 200
- iii. IBM system 360
- iv. UNIVAC 9000 series.

Fourth Generation of Computer (PC 1975 – Current)

At this time of technological development, the size of computer was redivided to what we called Personal Computers, PC. This was the time the first Microprocessor was created by Intel. The microprocessor was a very largescale, that is, VLS integrated circuit which contained thousands of transistors. 15 Transistors on one chip were capable performing all the functions of a computer's central processing unit.

Characteristics:

- i. Possession of microprocessor which performs all the task of a computer system use today.
- ii. The size of computers and cost was reduced.
- iii. Increase in speed of computers.
- iv. Very large scale (VLS) integrated circuits were used.
- v. They have millions of circuits per cubic foot.

Examples:

- i. IBM system 3090, IBM RISC6000, IBM RT.
- ii. ILLIAC IV
- . iii. Cray 2 XMP.
- iv. HP 9000.
- v. Apple Computers.

Fifth Generation of Computers (Present and Beyond)

Fifth generations computing devices, based on artificial intelligence (AI) are still in development, although there are some application such as voice recognition, facial face detector and thumb print that are used today.

Characteristics:

- i. Consist of extremely large scale integration.
- ii. Parallel processing
- iii. Possession of high speed logic and memory chip.
- iv. High performance, micro-miniaturization.

v. Ability of computers to mimic human intelligence, e.g. voice recognition, facial face detector, thumb print.

vi. Satellite links, virtual reality.

vii. They have billions of circuits per cubic.

Examples:

i. Super computers

ii. Robots

iii. Facial face detector

iv. Thumb print.