

## Class XI – General Computer

### Chapter - 1

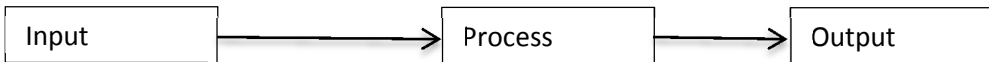
#### Computer Overview

##### What is Computer?

Computer is an advanced electronic device that takes raw data as input from the user and processes these data under the control of set of instructions (called program) and gives the result (output) and saves output for the future use. It can process both numerical and non-numerical (arithmetic and logical) calculations

##### Functioning of a computer.

It works the principle of I-P-O Cycle



A computer has four functions:

- a. accepts data **Input**
- b. processes data **Processing**
- c. produces output **Output**
- d. stores results **Storage**

(While designing the Difference Engine and Analytical Engine **Charles Babage** has given the concept of these four units, Hence he is known as “**Father of Computer**”.)

##### **Input (Data):**

Input is the raw information or facts entered into a computer from the input devices. It is the collection of letters, numbers, images etc.

##### **Process:**

Process is the operation of data as per given instruction. It is totally internal process of the computer system.

##### **Output:**

Output is the processed data given by computer after data processing. Output is also called Result or information . We can save these results in the storage devices for the future use.

#### Evolution of Computers

The growth of computer industry started with the need for performing fast calculations. The manual method of computing was slow and prone to errors. So attempts were made to develop faster calculating devices. The journey that started from the first calculating device i.e. Abacus has led us today to extremely high speed calculating devices. Let us first have a look at some early calculating devices and then we will explore various generations of computer.

##### **Abacus**

Abacus was discovered by the Mesopotamians in around 3000 BC. An abacus consisted of beads on movable rods divided into two parts. Addition and multiplication of numbers was done by using the place value of digits of the numbers and position of beads in an abacus.

##### **Napier's Logs and Bones**

The idea of logarithm was developed by John Napier in 1617. He devised a set of numbering rods known as Napier's Bones through which both multiplication and division could be performed.

##### **Pascaline**

Blaise Pascal, a French mathematician invented an adding machine in 1642 that was made up of gears and was used for adding numbers quickly.

### **Jacquard's Loom**

In order to make the cotton weaving process automatic, Joseph Jacquard devised punch cards and used them to control looms in 1801. The entire operation was under a program's control. Through this historic invention, the concept of storing and retrieving information started.

### **Difference engine and Analytical Engine**

Charles Babbage, an English mathematician developed a machine called Difference Engine in 1822 which could calculate various mathematical functions, do polynomial evaluation by finite difference and theoretically could also solve differential equations.

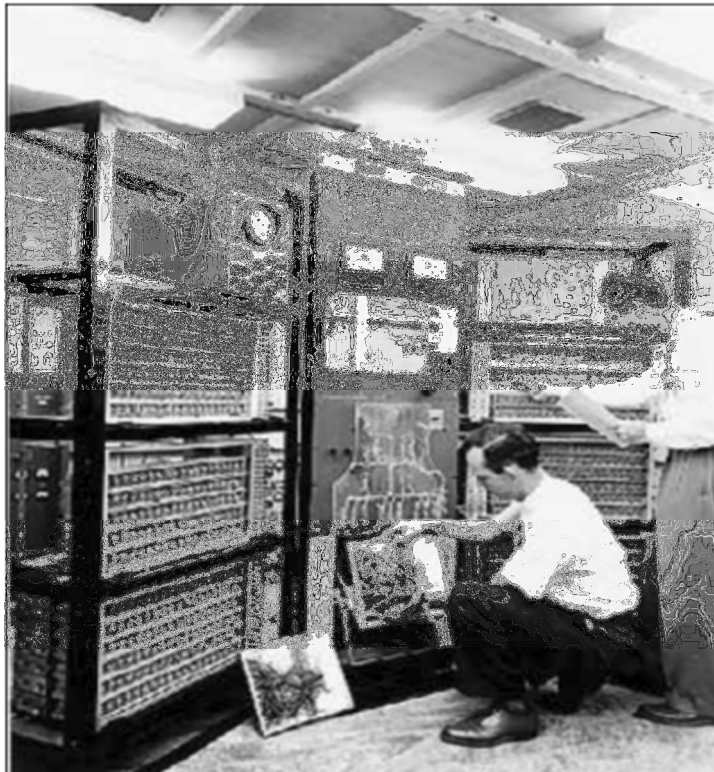
### **Mark 1**

In 1944 Prof Howard Aiken in collaboration with IBM constructed an electromechanical computer named Mark 1 which could multiply two 10 digit numbers in 5 seconds. This machine was based on the concept of Babbage's Analytical engine and was the first operational general purpose computer which could execute preprogrammed instructions automatically without any human intervention.

### **Generations of computer:**

#### **First Generation (1940-56):**

The first generation computers used **Vacuum tubes & Machine language** was used for giving the instructions. These computer were large in size & their programming was difficult task. The electricity consumption was very high. Some computers of this generation are ENIAC, EDVAC, EDSAC & UNIVAC-1.



### **Second Generation(1956-63):**

In 2nd generation computers, **Vacuum tubes were replaced by Transistors**. They required only 1/10 of power required by **Vacuum** tubes. This generation computers generated less heat & were reliable. The first operating system developed in this generation.

Some computers of this generation were: •

IBM 1620 • IBM 7094 • CDC 1604 • CDC 3600 • UNIVAC 1108



### **The Third Generation(1964-71):**

The 3rd generation computers replaced transistors with Integrated circuit known as chip. From Small scale integrated circuits which had 10 transistors per chip, technology developed to MSI circuits with 100 transistors per chip. These computers were smaller, faster & more reliable. High level languages invented in this generation.

Some computers of this generation were:

• IBM-360 series • Honeywell-6000 series • PDP (Personal Data Processor) • IBM-370/168 • TDC-316



### **The fourth Generation(1972- 1980):**

LSI & VLSI were used in this generation. As a result microprocessors came into existence. The computers using this technology known to be Micro Computers. High capacity hard disk were invented. There is great development in data communication.

Some computers of this generation were:

- DEC 10 • STAR 1000 • PDP 11 • CRAY-1(Super Computer) • CRAY-X-MP(Super Computer)



### **The Fifth Generation (Present & Beyond):**

Fifth generation computing devices, based on artificial intelligence, are still in development, though there are some applications, such as voice recognition, that are being used today. The use of parallel processing and superconductors is helping to make artificial intelligence a reality. Quantum computation and molecular and nanotechnology will radically change the face of computers in years to come.

The main features of fifth generation are:

- ULSI technology • Development of true artificial intelligence • Development of Natural language processing • Advancement in Parallel Processing • Advancement in Superconductor technology • More user-friendly interfaces with multimedia features • Availability of very powerful and compact computers at cheaper rates

Some computer types of this generation are:

- Desktop • Laptop • Notebook • Ultrabook • Chromebook



## Types of Computer

On the basis of working principle

### a) Analog Computer

An analog computer is a form of computer that uses continuous physical phenomena such as electrical, mechanical, or hydraulic quantities to model the problem being solved.

Eg: Thermometer, Speedometer, Petrol pump indicator, Multimeter

### b) Digital Computer

A computer that performs calculations and logical operations with quantities represented as digits, usually in the binary number system.

### c) Hybrid Computer (Analog + Digital)

A combination of computers those are capable of inputting and outputting in both digital and analog signals. A hybrid computer system setup offers a cost effective method of performing complex simulations. The instruments used in medical science lies in this category.

Digital Computer

### a) Super Computer

The fastest type of computer. Supercomputers are very expensive and are employed for specialized applications that require immense amounts of mathematical calculations. For example, weather forecasting requires a supercomputer. Other uses of supercomputers include animated graphics, fluid dynamic calculations, nuclear energy research, and petroleum exploration. PARAM, Pace & Flosolver are the supercomputer made in India.

### b) Mainframe Computer

A very large and expensive computer capable of supporting hundreds, or even thousands, of users simultaneously. In the hierarchy that starts with a simple microprocessor (in watches, for example) at the bottom and moves to supercomputers at the top, mainframes are just below supercomputers. In some ways, mainframes are more powerful than supercomputers because they support more simultaneous programs. But supercomputers can execute a single program faster than a mainframe.

### c) Mini Computer

A mid-sized computer. In size and power, minicomputers lie between *workstations* and *mainframes*. In the past decade, the distinction between large minicomputers and small mainframes has blurred, however, as has the distinction between small minicomputers and workstations. But in general, a minicomputer is a multiprocessing system capable of supporting from 4 to about 200 users simultaneously. Generally, servers are comes in this category.

### d) Micro Computer

i. **Desktop Computer:** a personal or micro-mini computer sufficient to fit on a desk.

ii. **Laptop Computer:** a portable computer complete with an integrated screen and keyboard. It is generally smaller in size than a desktop computer and larger than a notebook computer.

iii. **Palmtop Computer/Digital Diary /Notebook /PDAs/ Smart Phone:** a hand-sized computer. Palmtops have no keyboard but the screen serves both as an input and output device.

### **e) Workstations**

A terminal or desktop computer in a network. In this context, workstation is just a generic term for a user's machine (client machine) in contrast to a "server" or "mainframe."

#### **Strength**

- **Speed**
- High Storage Capacity
- Accuracy
- Reliability
- Versatility

#### **Weakness**

- Lack of decision making power
- IQ Zero

## **Chapter 2**

### **Working With O.S.**

#### **Software**

As specified earlier Software, simply are the computer programs. The instructions given to the computer in the form of a program is called Software. Software is the set of programs, which are used for different purposes. All the programs used in computer to perform specific task is called Software.

#### **Types of software**

##### **1. System software:**

###### **a) Operating System Software**

DOS, Windows XP, Windows Vista, Unix/Linux, MAC/OS X etc.

###### **b) Utility Software**

Windows Explorer (File/Folder Management), Compression Tool, Anti-Virus Utilities, Disk Defragmentation, Disk Clean, BackUp, WinZip, WinRAR etc...

###### **c) Language Processors**

Compiler, Interpreter and Assembler

##### **2. Application software:**

###### **a) General Application Software**

Ms. Office 2003, Ms. Office 2007, office 2010, Macromedia (Dreamweaver, Flash, Freehand), Adobe (PageMaker, PhotoShop)

###### **b) Tailored or Customized Software**

School Management system, Inventory Management System, Payroll system, financial system etc.

#### **Operating system**

Operating system is an interface between hardware and user which is responsible for the management and coordination of activities and the sharing of the resources of a computer. It hosts the several applications that run on a computer and handles the operations of computer hardware. The operating system is a special type of program that loads automatically when you start your computer. The operating system allows you to use the advanced features of a modern computer without having to learn all the details of how the hardware works. The link between the hardware and you, the user. Makes the computer easy to use without having to understand bits and bytes!

#### **Need for an Operating System**

Operating system provides a platform, on top of which, other programs, called application programs can run. As discussed before, it acts as an interface between the computer and the user. It is designed in such a manner that it operates, controls and executes various applications on the computer. It also allows the computer to manage its own resources such as memory, monitor, keyboard, printer etc.

#### **Types of Services**

- User interface
- Program Execution
- File System Manipulation
- I/O Operations



- Communication
- Resource Allocation
- Error Detection & Accounting
- Security and protection.

### **Functions of operating System:**

- □ Processor Management
- □ Memory Management
- □ File Management
- □ Device Management

### **Types of Operating System:**

□ □ **Real-time Operating System:** It is a multitasking operating system that aims at executing real-time applications. Example of Use: e.g. control of nuclear power plants, oil refining, chemical processing and traffic control systems, air traffic control

□ □ **Single User Systems:** Provides a platform for only one user at a time. They are popularly associated with Desk Top operating system which run on standalone systems where no user accounts are required. Example: DOS.

□ □ **Multi User Systems:** Provides regulated access for a number of users by maintaining a database of known users. Refers to computer systems that support two or more simultaneous users. Another term for multi-user is time sharing. Ex: All mainframes are multi-user systems. Example: Unix

□ □ **Multi-tasking and Single-tasking Operating Systems:** When a single program is allowed to run at a time, the system is grouped under the single-tasking system category, while in case the operating system allows for execution of multiple tasks at a time, it is classified as a multitasking operating system.

□ □ **Distributed Operating System:** An operating system that manages a group of independent computers and makes them appear to be a single computer is known as a distributed operating system. Distributed computations are carried out on more than one machine. When computers in a group work in cooperation, they make a distributed system.

**Time sharing Operating System:** It allows execution of more than one tasks or processes concurrently. For this, the processor time is divided amongst different tasks. This division of time is also called **time sharing**.

### **Commonly used operating system**

**UNIX:** Pronounced *yoo-niks*, a popular *multi-user, multitasking* operating system developed at Bell Labs in the early 1970s. UNIX was one of the first operating systems to be written in a high-level programming language, namely C. This meant that it could be installed on virtually any computer for which a C compiler existed.

**LINUX:** Pronounced *lee-nucks* or *lih-nucks*. A freely-distributable open source operating system that runs on a number of hardware platforms. The Linux kernel was developed mainly by Linus Torvalds and it is based on Unix. Because it's free, and because it runs on many platforms, including PCs and Macintoshes, Linux has become an extremely popular alternative to proprietary operating systems.



**Windows:** **Microsoft Windows** is a series of graphical interface operating systems developed, marketed, and sold by Microsoft. Microsoft introduced an operating environment named *Windows* on November 20, 1985 as an add-on to MS-DOS in response to the growing interest in graphical user interfaces (GUIs).[2] Microsoft Windows came to dominate the world's personal computer market with over 90% market share, overtaking Mac OS, which had been introduced in 1984. The most recent client version of Windows is Windows 7; the most recent server version is Windows Server 2008 R2; the most recent mobile version is Windows Phone 7.5. Ex. Win 98, Win 2K, XP, NT, Win 7,8,10

**SOLARIS:** **Solaris** is a Unix operating system originally developed by Sun Microsystems. It superseded their earlier SunOS in 1993. **Oracle Solaris**, as it is now known, has been owned by Oracle Corporation since Oracle's acquisition of Sun in January 2010.

**BOSS:** BOSS (Bharat Operating System Solutions) GNU/Linux distribution developed by C-DAC (Centre for Development of Advanced Computing) derived from Debian for enhancing the use of Free/Open Source Software throughout India. This release aims more at the security part and comes with an easy to use application to harden your Desktop.

**Mobile OS:** A mobile operating system, also called a mobile OS, is an operating system that is specifically designed to run on mobile devices such as mobile phones, smartphones, PDAs, tablet computers and other handheld devices. The mobile operating system is the software platform on top of which other programs, called application programs, can run on mobile devices.

□ □ **Android:** Android is a Linux-based mobile phone operating system developed by Google. Android is unique because Google is actively developing the platform but giving it away for free to hardware manufacturers and phone carriers who want to use Android on their devices.

□ □ **Symbian:** Symbian is a mobile operating system (OS) targeted at mobile phones that offers a high-level of integration with communication and personal information management (PIM) functionality. Symbian OS combines middleware with wireless communications through an integrated mailbox and the integration of Java and PIM functionality (agenda and contacts). The Symbian OS is open for third-party development by independent software vendors, enterprise IT departments, network operators and Symbian OS licensees.

**LANGUAGE PROCESSORS:** Since a computer hardware is capable of understanding only machine level instructions, So it is necessary to convert the HLL into Machine Level Language. There are three Language processors:

A. **Compiler:** It is translator which converts the HLL language into machine language in one go. A Source program in High Level Language get converted into Object Program in Machine Level Language.

B. **Interpreter:** It is a translator which converts the HLL language into machine language line by line. It takes one statement of HLL and converts it into machine code which is immediately executed. It eliminate the need of separate compilation/run. However, It is slow in processing as compare to compiler.

C. **Assembler:** It translate the assembly language into machine code.

## Utilities

A utility software is one which provides certain tasks that help in proper maintenance of the computer. The job of utility programs is to keep the computer system running smoothly.

### Antivirus

An antivirus is utility software which detects and removes computer viruses. If the software is not able to remove the virus, it is neutralized.

Some of the common types of viruses are:

□ □ **Boot Sector Virus:** A boot sector virus displaces the boot record and copies itself to the boot sector i.e. where the program to boot the machine is stored. So first the virus is loaded on to the main memory and then the operating system.

**File Virus:** A file virus generally attacks executable files. They can attach to various locations of the original file, replace code, fill in open spaces in the code, or create companion files to work with an executable file.

**Trojan Horse:** It is a code generally hidden in games or spreadsheets. Since they are hidden, the program seems to function as the user wants but actually it is destroying the program.

**Worm:** Worm is a program capable of replicating itself on a computer network. A worm also does not require a host as it is a self-contained program.

## Advantages of utility software

Utility software has been designed specifically to help in management and tuning of operating system, computer hardware and application software of a system.

- It performs a specific and useful function to maintain and increase the efficiency of a computer system
- Aids in keeping the computer free from unwanted software threats such as viruses or spyware
- Adds functionality that allow the user to customize your desktop and user interface
- Manages computer memory and enhances performance

In general, these programs assist the user to make and run their computer better. They are also used for password protection, memory management, virus protection, and file compression in order to manage all the computer functions, resources and files efficiently.

## **Chapter 3 Data Representation – Number System & Conversions**

### **NUMBER SYSTEM:**

#### **A. Decimal Number System:**

Decimal Number system composed of 10 numerals or symbols. These numerals are 0 to 9. Using these symbols as digits we can express any quantity. It is also called base-10 system. It is a positional value system in which the value of a digit depends on its position. These digits can represent any value, for example: **754**.

#### **B. Binary Number System:**

**In Binary Number system there are only two digits i.e. 0 or 1. It is base-2 system. It can be used to represent any quantity that can be represented in decimal or other number system. It is a positional value system, where each binary digit has its own value or weight expressed as power of 2.**

The following are some examples of binary numbers:

1011012 112 101102

#### **C. Octal Number System:**

It has eight unique symbols i.e. 0 to 7. It has base of 8. Each octal digit has its own value or weight expressed as a power of 8.

#### **D. Hexadecimal Number System:**

The hexadecimal system uses base 16. It has 16 possible digit symbols. It uses the digits 0 through 9 plus the letters A,B,C,D,E,F as 16 digit symbols. Each hexadecimal digit has its own value or weight expressed as a power of 16.

For example: Convert the binary number 10110101 to a hexadecimal number

Divide into groups for 4 digits      1011    0101

Convert each group to hex digit    B      5      (B5)<sub>16</sub>

Another example: Convert the binary number 0110101110001100 to hexadecimal

Divide into groups of 4 digits      0110 1011 1000 1100

Convert each group to hex digit    6    B      8      C    (6B8C)<sub>16</sub>

To convert a hexadecimal number to a binary number, convert each hexadecimal digit into a group of 4 binary digits. Example: Convert the hex number 374F into binary

3      7      4      F

Convert the hex digits to binary      0011 0111 0100 1111    (0011011101001111)<sub>2</sub>

Conversion of Binary to Decimal and Decimal to binary uses a binary table method

1

2

4

8

16

32

64

128

256

512

1024 and so on....