UNIT I

Computer: Definition, Classification, Organization i.e. CPU, register, Bus architecture, Instruction set, Memory & Storage Systems, I/O Devices, and System & Application Software. Computer Application in eBusiness, Bio-Informatics, health Care, Remote Sensing & GIS, Meteorology and Climatology, Computer Gaming, Multimedia and Animation etc.
Operating System: Definition, Function, Types, Management of File, Process & Memory.
Introduction to MS word, MS PowerPoint, MS Excel

Computer: to compute

Compute is an electronic device which performs arithmetic and logical operations, depending on input it gives desired output.

Arithmetic: + - * / sin, cos,

Logical: true (yes), no (false)

Block diagram of computer

Input device: To input the data to the computer.

Keyboard, Mouse, Scanner

Output device: To display output to the screen.

Monitor, Printer

CPU: Central Processing Unit.

CPU=ALU + CU + Memory

It performs all the processing

ALU: Arithmetic Logic Unit: It performs all arithmetic and logical operations.

CU: Control Unit: It controls all the operations of computer.

Memory: is used to store data during operations

Characteristics of computer

Speed

Accuracy

Diligence

Versatility

Reliability

Automation

Storage

Generation of Computers

First generation (1942- 1955)

The first generation of computers uses vacuum tube as electronic device. Examples of first generation of computers are ENIAC (Electronic Numerical Integrator And Computer) and UNIVAC (Universal Automatic Computers).

Disadvantages

- The computers were very large in size.
- They consumed a large amount of energy.
- They heated very soon due to thousands of vacuum tubes.
- They were not very reliable.
- Constant maintenance was required.
- Non-portable.
- Costly commercial production.
- Limited commercial use.
- Very slow speed.
- Limited programming capabilities.
- Used machine language only.
- Used magnetic drums which provide very less data storage.
- Used punch cards for input.
- Not versatile and very faulty.

Second generation (1955- 1964)

The second generation of computer used transistor as a main device in computer. Vacuum tubes were replaced with transistors. Examples of second generation computers are **IBM 7094 series**, **IBM 1400 series** and **CDC 164** etc. Size of computer decreases as transistors are small in size.

Third generation (1964- 1975)

The third generation of computer used IC (Integrated Circuit). The transistors were replaced with IC. An IC may contain hundreds of transistors so size of a computer decreases. The examples of third generation computers are **IBM 370**, **IBM System/360**,**UNIVAC 1108** and **UNIVAC AC 9000** etc.

Fourth generation (1975- 2000): The fourth generation of computer used VLSI (Very Large System Integration). It uses microprocessors, chipsets. A VLSI may consists of millions of transistors in a single device. So size of computer decreases. The speed is also increses. The transistors were replaced with IC. An IC may contain hundreds of transistors so size of a computer decreases.

The examples of fourth generation computers are **Apple Macintosh & IBM PC.**

Fifth generation (Present)

Example **IBM Watson.**

Classification of computers or types of computers

Supercomputers

Is the most powerful computer. The speed of the supercomputer is fastest among all types of computers. The performance and processing is very high in supercomputers. These are specialized and task specific computers used by large organizations. These computers are used for research and exploration purposes, like NASA uses supercomputers for launching space shuttles, controlling them and for space exploration purpose.

The supercomputers are very expensive and very large in size. It can be accommodated in large air-conditioned rooms; some super computers can span an entire building. Supercomputer processing speeds are measured in floating point operations per second.

Seymour Cray designed the first Supercomputer **"CDC 6600"** in 1964. CDC 6600 is known as the first ever Supercomputer.

Presently, China's **"Tianhe – 2"** is the world's faster Supercomputer.

Uses of Supercomputers

Space Exploration

Earthquake studies

Weather Forecasting

Nuclear weapons testing

Mainframe computers

Mainframe computers are less powerful than Supercomputers. Mainframes can also process & store large amount of data. Mainframe computers are used in large organization for high speed data processing and data storage. Banks educational institutions & insurance companies use mainframe computers to store data about their customers, students & insurance policy holders. They are also large in size and expensive. Mainframe computer processing speeds are measured in millions of instruction per second MIPS.

Examples of mainframe computers are Fujitsu's ICL VME, Hitachi's Z800

Minicomputers

Minicomputers are used by small businesses & firms. Minicomputers are also called as "Midrange Computers". These are small machines and can be accommodated on a disk with not as processing and data storage capabilities as super-computers & Mainframes**.** These computers are not designed for a single user. Individual departments of a large company or organizations use Mini-computers for specific purposes. For example, a production department can use Mini-computers for monitoring certain production process.

Popular Minicomputers are K-202, Texas Instrument TI-990, SDS-92, IBM Midrange computers

Microcomputers

Microcomputers are also called personal computers. Desktop computers, laptops, personal digital assistant (PDA), tablets & smartphones are all types of microcomputers. The micro-computers are widely used & the fastest growing computers. These computers are the cheapest among the other

three types of computers. The Micro-computers are specially designed for general usage like entertainment, education and work purposes. Well known manufacturers of Micro-computer are Dell, Apple, Samsung, Sony & Toshiba.

Desktop computers, Gaming consoles, Sound & Navigation system of a car, Netbooks, Notebooks, PDA's, Tablet PC's, Smartphones, Calculators are all type of Microcomputers.

Organization of computer i.e. CPU, register

Registers

Registers are quickly accessible location available to computer's processor. Registers usually consists of small amount of fast storage.

Registers are used to store and transfer data and instructions that are being used immediately by the CPU.

A processor register may hold an instruction, a storage address, or any data.

Data register: holds memory operand

Accumulator: processor register

Address register: holds address for the memory

Memory address registers

Memory data registers or Memory buffer registers

Stack pointer

Status registers

General purpose registers

Instruction register: holds instruction code

Program counter: holds address of the instruction

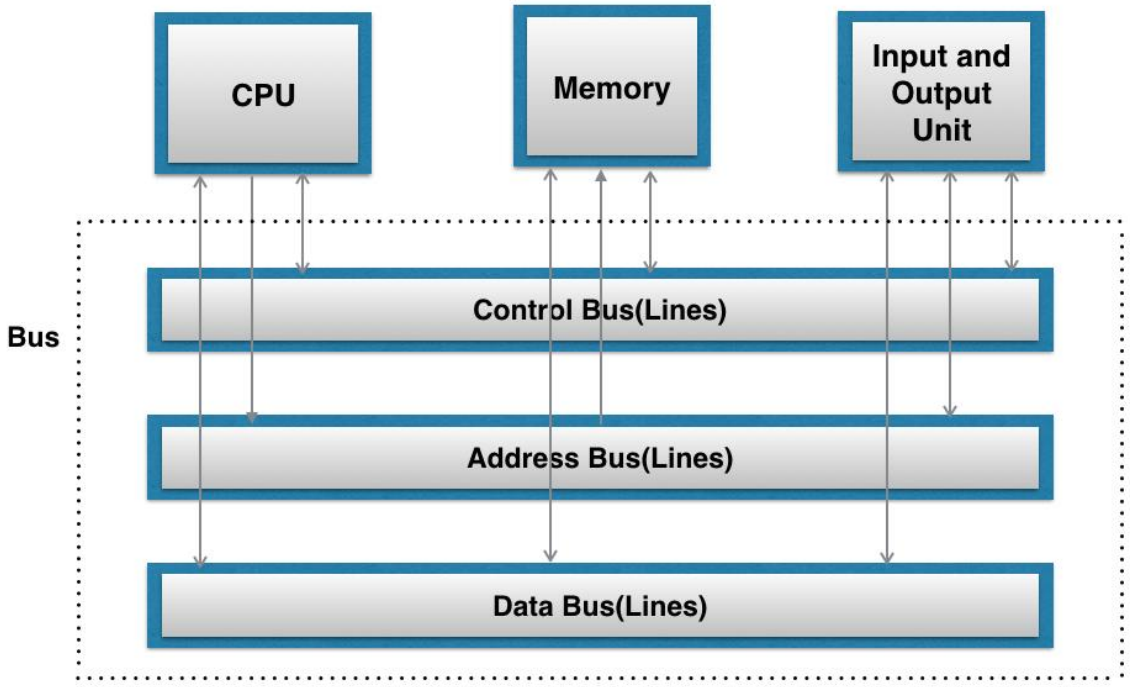
Bus architecture

Bus is a subsystem that is used to transfer data and other information between devices. The devices CPU, memory and input output devices are communicate with each other through buses. A bus is a communication pathway connecting two or more devices.

Control bus

Data bus

Address bus



Instruction set

An instruction set is a group of commands for a CPU in machine language.

Memory & Storage Systems

Memory: is used to store data or information.

Memory hierarchy

Level 0	CPU registers	processors registers, very fast, very expensive, small size, small capacity,
Level 1	Cache memory	processor cache, very fast, very expensive, small size, small capacity
Level 2	Main memory	RAM, fast, affordable, medium size, medium capacity
Level 3	Magnetic disk	hard drives, slow, very cheap, large size, and very large capacity
Level 4	Magnetic tape	tape backup, very slow, affordable, large size, very large capacity

RAM

Types of memory

(1) Primary

RAM: Random Access Memory: It can be used for read and write.

In RAM data storage is not permanent.

Volatile: If power supply is off then data is lost.

ROM: Read Only Memory: We can only read information.

(2) Secondary: memory is used to store data permanently.

Non volatile: If power supply is off then data will not lost.

Hard disk or drive:

Floppy disk or drive

CD: Compact Disk

Pan drive

Memory unit:

Bit: Binary digit: It can store either 0 or 1.

Nibble: Group of 4 bits.

Byte: group of 8 bits.

Kilo bytes: KB= 1024 bytes = 1024*8 1K

Mega Bytes: MB= 1KB * 1KB = 1024 bytes * 1024 Bytes = 1MB

Giga Bytes: GB = IKB* 1KB * 1KB

Tera Bytes: TB = 1KB * 1KB * 1KB * 1KB = 1TB

I/O Devices

An **input** is data that a computer receives. An **output** is data that a computer sends.

I/O **devices** are the pieces of hardware used by a human (or other system) to communicate with a computer.

Devices for communication between computers, such as modems and network cards, typically perform both input and output operations.

Input devices

Input devices are used to take input data from outside and give to the CPU.

Examples: Keyboard, Mouse, Scanner, Mic etc.

Output devices

Output devices are used to take result after CPU processing and display to the output device.

Examples: Monitors, Printers, Speakers etc.

Input device

1. **Keyboard**

- A simple device comprising keys and each key denotes either an alphabet, number or number commands which can be given to a computer for various actions to be performed
- It has a modified version of typewriter keys
- The keyboard is an essential input device and computer and laptops both use keyboards to give commands to the computer

2. **Mouse**

- It is also known as a pointing device
- Using mouse we can directly click on the various icons present on the system and open up various files and programs
- A mouse comprises 3 buttons on the top and one trackball at the bottom which helps in selecting and moving the mouse around, respectively
- In case of laptops, the touchpad is given as a replacement of mouse which helps in the movement of the mouse pointer

3. **Joy Stick**

- It is a device which comprises a stick which is attached at an angle to the base so that it can be moved and controlled
- Mostly used to control the movement in video games
- Apart from a computer system, a joystick is also used in the cockpit of an aeroplane, wheelchairs, cranes, trucks, etc. to operate them well

4. **Light Pen**

- It is a wand-like looking device which can directly be moved over the device's screen
- It is light-sensitive
- Used in conjunction with computer's cathode ray tube

5. **Microphone**

- Using a microphone, sound can be stored in a device in its digital form
- It converts sound into an electrical signal
- To record or reproduce a sound created using a microphone, it needs to be connected with an amplifier

6. **Scanner**

- This device can scan images or text and convert it into a digital signal

- When we place any piece of a document on a scanner, it converts it into a digital signal and displays it on the computer screen

7. **Barcode Reader**

- It is a kind of an optical scanner
- It can read bar codes
- A source of light is passed through a bard code, and its aspects and details are displayed on the screen

Output device

1. **Monitor**

- The device which displays all the icons, text, images, etc. over a screen is called the Monitor
- When we ask the computer to perform an action, the result of that action is displayed on the monitor
- Various types of monitors have also been developed over the years

2. **Printer**

- A device which makes a copy of the pictorial or textual content, usually over a paper is called a printer
- For example, an author types the entire book on his/her computer and later gets a print out of it which is in the form of paper and is later published
- Multiple types of printers are also available in the market, which can serve different purposes

3. **Speakers**

- A device through which we can listen to a sound as an outcome of what we command a computer to do is called a speaker
- Speakers are attached with a computer system and also are a hardware device which can be attached separately
- With the advancement in technology, speakers are now available which are wireless and can be connected using BlueTooth or other applications

4. **Projector**

- An optical device which presents an image or moving images onto a projection screen is called a projector

- Most commonly these projectors are used in auditoriums and movie theatres for the display of the videos or lightening
- If a projector is connected to a computer, then the image/video displayed on the screen is the same as the one displayed on the computer screen

5. **Headphones**

- They perform the same function as a speaker, the only difference is the frequency of sound
- Using speakers, the sound can be heard over a larger area and using headphones, the sound is only audible to the person using them
- Also known as earphones or headset

Peripheral devices

Input or output devices that are connected to computer are called **peripheral devices**. These devices are designed to read information into or out of the memory unit upon command from the CPU and are considered to be the part of computer system. These devices are also called **peripherals**.

System & Application Software.

Instruction: Tells the computer to do some action

Program: is group of instructions.

Software: is a group of programs.

MS Word is a software and Cut , copy, print, save are programs.

Software Types:

(a) Application software: is for user.

Notepad, MS word, Power point, excel, MP3 player,

ATM, Railway reservation

(b) System software: is for computer system

Operating systems: Windows 10,

Device driver: Keyboard driver, mouse driver, printer's driver, pan drive driver

Compiler: C/C++ convert binary language

Interpreter: convert C/C++ into binary

(i) E-business – E-business is about using internet technologies to transform the way business processes are performed. Its most visible form is purchasing using PC and Internet. Every day. More companies and people gain access to the Internet, more purchases are executed electronically.

(ii)Bio-informatics – Bio-informatics is the application of computer technology to the management of biological information. Computers are used to gather, store, analyze and integrate biological and genetic information which can then be applied to gene-based drug discovery and development. The need for bio-Informatics capabilities has been precipitated by the explosion of publicly available genomic information resulting from the Human Genome Project. The science of Bio-

informatics, which is the melding of molecular biology with computer science, is essential to the use of genomic information of new molecular target for drug discovery.

(iii)Health Care – Computers are also being used for planning and control purposes by health-care professional. Computer equipment is used to monitor pulse rate, blood pressure and other vital signs. This leads to correct and fast diagnosis. Medical researchers are using computers as a tool in their search for cures of deadly diseases like cancer and AIDS.

(iv)Remote Sensing and GIS – Remote sensing is the science of deriving information about the earth's land water areas form images acquired by using sensing devices operated from a remote location. It relies upon measurement of electromagnetic energy reflected or emitted form the features of interest.

The field of GIS and remote sensing has been referred to as the technology of today. The largest primary source of digital data for use in GIS is undoubtedly that created by Remote sensing technology on board of satellites and other aircrafts. Different schools of thought have had different and varies definitions for geographic information system (GIS) . Tomlin defines a GIS as a configuration of computer hardware and software specially designed for the acquisition, maintenance and use of cartographic data. Burrough defines a GIS as a powerful set of tools for collecting storing and retrieving at will, transforming and displaying spatial data from the real world.

Thus, a GIS is a computer-assisted system for the acquisition, storage, analysis and display of geographically are spatially referenced data.

(v)Meteorology and Climatology – Meteorology, as a science, is relatively new and, with computer assistance, it has become more of an exact science. The problem in meteorology has always been to obtain sufficient data, and to analyse that data quickly enough so that predictions can be made. Satellites, linked directly with computer systems, now provide the meteorologist with information, in addition to the data obtained from weather stations on land and at sea. Armed with more information, the relationship between the variable factors which constitute weather can be analyzed in greater depth, and a more accurate forecast can then be made. The computer system is also able a analyze vast quantities of past measurements to test for weather patterns and, based on these results, long-range forecasts can be made.

(vi) Computer Gaming – Computer are also being used for playing video games. With the advent of multimedia, there has been a boom in the different types of video games available on computer systems. Sound and animation have been particularly important in these applications to make the games thrilling and exciting for the user. Because the sequence of events in such games depends on the actions of the player, these programs are very interactive in nature.

(vii)Multimedia and Animation – Computers can be used to integrate two or more types of media, such as text, graphics, image, audio, and video, for the purpose of generation, storage, representation, manipulation and access of multimedia information. Multimedia is one of the most commonly used terms in entertainment industry, which produces various entertainment products such as movies and video games.

Computer animation deals with the generation, sequencing, and display of a set of images to create an effect of visual change or motion, similar to a movie films (video). Animation is an important component of multimedia, because just as a picture is a powerful way to illustrate, information, a small animation clip even more powerful and useful for illustrating concepts, which involve movement. For example, in the multimedia application meant for educating small children, an animation clip will be very effective in illustrating the difference in the movement of a horse during a gallop versus a walk. Several movies and advertisements now contain many visual tricks, which could never be accomplished without aid of computers. For example, if you carefully watch the advertisements for detergent soaps/powders, toothpastes, insecticides for mosquitoes and cockroaches, etc., you will notice scenes in them, which cannot be video graphed. These scenes are produced by using computer animation.