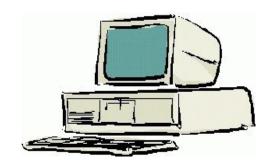# BASIC CONCEPT OF COMPUTING

What is a Computer?

A computer is an electronic device that accept data, processes data to perform various tasks and give the output of processed data as information and stores the information.
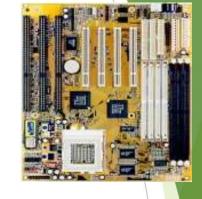
An electronic device that stores, retrieves, and processes data, and can be programmed with instructions. A computer is composed of hardware and software, and can exist in a variety of sizes and configurations.

- A computer's four major functions:
  - Accepts data
  - Processes data into information
  - Outputs data or information
  - Stores data and information
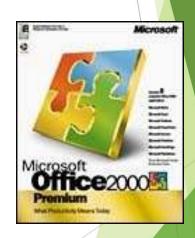
Thus data is the raw fact which computer uses. Data can be in form of diagram, numbers, alphabets, words, video etc.

Hardware & Software

The term hardware refers to the physical components of your computer such as the system unit, mouse, keyboard, monitor etc.

The software is the instructions that makes the computer work. Software is held either on your computers hard disk, CD-ROM, DVD or on a diskette (floppy disk) and is loaded (i.e. copied) from the disk into the computers RAM (Random Access Memory), as and when required.

Hardware Components

Input Devices -- *"How to tell it what to do"*

-        A keyboard and mouse are the standard way to interact with the computer. Other devices include joysticks and game pads used primarily for games.

Output Devices -- *"How it shows you what it is doing"*

-        The monitor (the screen) is how the computer sends information back to you. A printer is also an output device.

Hardware Components

INPUT DEVICES

- The Mouse
  - Used to 'drive' Microsoft Windows
- The Keyboard
  - The keyboard is still the commonest way of entering information into a computer
- Tracker Balls
  - an alternative to the traditional mouse and often used by graphic designers

Hardware Components

INPUT DEVICES

- Scanners
    - A scanner allows you to scan printed material and convert it into a file format that may be used within the PC
- Touch Pads
    - A device that lays on the desktop and responds to pressure
- Light Pens
    - Used to allow users to point to areas on a screen
- Joysticks
    - Many games require a joystick for the proper playing of the game

Hardware Components

OUTPUT DEVICES

- VDU
  - The computer screen is used for outputting information in an understandable format
- Printers
  - There are many different types of printers.
  - In large organizations laser printers are most commonly used due to the fact that they can print very fast and give a very high quality output.

Hardware Components

OUTPUT DEVICES

- Plotters
  - A plotter is an output device similar to a printer, but normally allows you to print larger images.

Computer Plotter

- Speakers
  - Enhances the value of educational and presentation products.

- Speech synthesisers
  - Gives you the ability to not only to display text on a monitor but also to read the text to you

Hardware Components

Storage Devices -- "How it saves data and programs"

-	Hard disk drives are an internal, higher capacity drive which also stores the operating system which runs when you power on the computer.

-	"Floppy" disk drives allow you to save work on small disks and take the data with you.

Hardware Components

Hard Disks

- Speed:
  - Very fast!
  - The speed of a hard disk is often quoted as "average access time" speed, measured in milliseconds. The smaller this number the faster the disk.
- Capacity:
  - Enormous! Often 40/80 Gigabytes. A Gigabyte is equivalent to 1024 Megabytes.
- Cost:
  - Hard disks costs are falling rapidly and normally represent the cheapest way of storing data.

Hardware Components

Diskettes (Floppy Disks)

- Speed:
  - Very slow!
- Capacity:
  - Normally 1.44 Mbytes.
- Cost:
  - Very cheap.

Hardware Components

CD-ROM Disks

- Speed:
  - Much slower than hard disks. The original CD-ROM speciation is given a value of 1x speed, and later, faster CD-ROMs are quoted as a multiple of this value.
- Capacity:
  - Around 650 Mbytes and more

Hardware Components

DVD Drives

- Speed:
  - Much faster than CD-ROM drives but not as fast as hard disks.
- Capacity:
  - Up to 17 Gbytes.
- Cost:
  - Slightly higher than CD-ROM drives.

Main Parts of Computer

Memory -- _"How the processor stores and uses immediate data"_

- RAM - Random Access Memory
  - The main 'working' memory used by the computer.

  - When the operating system loads from disk when you first switch on the computer, it is copied into RAM.

  - As a rough rule, a Microsoft Windows based computer will operate faster if you install more RAM. Data and programs stored in RAM are volatile (i.e. the information is lost when you switch off the computer).

Hardware Components

Read Only Memory
(ROM)

Memory

- ROM – Read Only Memory
  - Read Only Memory (ROM) as the name suggests is a special type of memory chip that holds software that can be read but not written to.

  - A good example is the ROM-BIOS chip, which contains read-only software.

  - Often network cards and video cards also contain ROM chips.

Hardware Components

How Computer Memory Is Measured

- Bit
  - All computers work on a binary numbering system, i.e. they process data in one's or zero's. This 1 or 0 level of storage is called a bit.
- Byte
  - A byte consists of eight bits.
- Kilobyte
  - A kilobyte (KB) consists of 1024 bytes.
- Megabyte
  - A megabyte (MB) consists of 1024 kilobytes.
- Gigabyte
  - A gigabyte (GB) consists of 1024 megabytes.

Hardware Components

Microprocessors -- "_The brain of the computer_"

-PCs primarily use microprocessors (sometimes called the chip). The older Intel versions include the 386, 486 and now the Pentium line.

The CPU (Central Processing Unit) is normally an Intel Pentium (or equivalent) and it is one of the most important components within your computer.

- It determines how fast your computer will run and is measured by its MHz speed.

- Thus a 600 MHz Pentium is much faster than say a 400 MHz Pentium CPU.

- It is the CPU that performs all the calculations within the computer.

Hardware Components

Some of the Factors that Impact Computer's Performance

- CPU speed
- RAM size
- Hard disk speed and capacity

Computer Software

▶ Computer software refers to a set of instructions that tell a computer how to perform specific tasks or functions.

▶ Here are the main categories of computer software:

▶ **1. System Software:** System software is a category of software that manages and controls the hardware components of a computer system. It provides a platform for running application software and acts as an intermediary between the computer hardware and the user. Examples are Operating system, device driver etc

▶ **2. Application software** refers to programs and software applications that perform specific tasks for the user, application software is designed to meet the needs of the user.

Software Component

Application Software

- Word processing applications
    - Microsoft Word
    - Lotus Word Pro
    - WordPerfect
- Spreadsheets
    - Microsoft Excel
    - Lotus 123
- Database
    - Microsoft Access
    - Lotus Approach

Software Component

Application Software

- Payroll
  - Sage software
  - Onpay
- Presentation tools
  - Microsoft PowerPoint
  - Google Slides
  - Lotus Freelance
- Desktop publishing
  - Adobe Photoshop / InDesign
  - Microsoft Publisher
- Multimedia applications
  - Microsoft's Encarta CD-ROM based encyclopaedias

Computer Network

A computer network is a set of interconnected computers and other devices that are capable of communicating with each other. The purpose of a computer network is to share resources, exchange information, and enable communication between the connected devices.

Uses of Network:
- Resource Sharing
- Communication
- Data Storage and Retrieval
- Collaboration and File Sharing

Computer Networking

Different programs in Computing Science

- **Computer Science**

- **Computer Science is about building abstract models of real-world objects or phenomena, with the aim of using the model to solve problems by automating the models through the use of algorithm, and implementing the algorithm in form of instructions which the computer can understand.**

- Thus Computer Science is about solving problem by abstraction
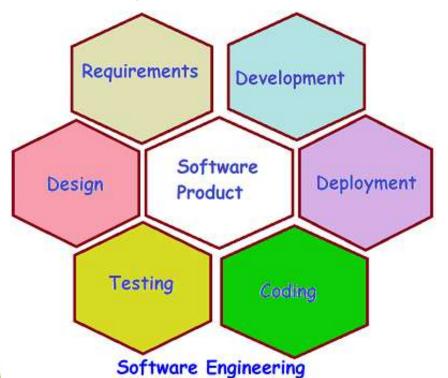
Artificial Intelligence (AI)

▶ Artificial Intelligence (AI) is a is the field of computer science that focuses on the development of intelligent machines capable of performing tasks that typically require human intelligence.

▶ Artificial intelligence is the simulation of human intelligence processes by machines, especially computer systems. Specific applications of AI include expert systems, natural language processing, speech recognition and machine vision.

Artificial Intelligence (AI)

Software Engineering

▶ Software Engineering is the branch of computer science that deals with the design, development, testing, and maintenance of software systems. It involves applying engineering principles to the entire software development process to ensure the production of high-quality software that meets user requirements, is reliable, and is delivered on time and within budget.

Software Engineering

Computer Information Systems (CIS)

- Computer Information Systems (CIS) is both a field in computing that focuses on the application of information technology to solve business problems and enhance organizational processes. It combines elements of computer science, business, and management to develop and manage information systems that support the goals and objectives of an organization.

Cybersecurity

- Cyber security is a specialized discipline within the broader field of information technology that focuses on protecting computer systems, networks, and data from unauthorized access, attacks, damage, or theft. As technology continues to advance, the importance of cybersecurity has grown significantly.

- Cybersecurity professionals play a crucial role in safeguarding digital assets and maintaining the integrity of systems and data in the face of evolving cyber threats. The field is dynamic, and ongoing education and training are essential for cybersecurity practitioners to stay abreast of the latest threats and security measures.

Information Technology (IT)

▶ Information Technology (IT) is a broad field that encompasses the use of technology to store, retrieve, transmit, and manipulate data for various purposes. It involves the utilization of computers, networks, software applications, and other technologies to manage and process information.

▶ Information Technology is a driving force behind innovation and digital transformation in various industries. IT professionals play crucial roles in businesses, government organizations, healthcare, education, and virtually every sector where technology is utilized

Computer Engineering

- Computer engineering is a branch of engineering that involves computer science and electronic processes. In this field, professionals design, test and refine computer hardware and programs. They may create new inventions, collaborate with programming teams and refine technological processes to increase efficiency.

- Computer engineering is a discipline that combines principles and practices from both electrical engineering and computer science. It focuses on the design, development, and maintenance of hardware and software components of computing systems. Professionals in computer engineering work on a broad range of technologies, from designing microprocessors and integrated circuits to developing software applications and systems

Cloud Computing

▶ Cloud computing is a paradigm that involves the delivery of computing services over the internet. Instead of owning and maintaining physical servers or data centers, users can access and use computing resources, such as servers, storage, databases, networking, software, and analytics, through cloud service providers. These services are delivered on a pay-as-you-go basis, allowing users to scale resources up or down based on their needs.

▶ Professionals in the cloud computing discipline may work in various roles, including cloud architect, cloud engineer, cloud administrator, or cloud security specialist, depending on their specific expertise and responsibilities. Continuous learning is crucial in this rapidly evolving field to stay abreast of new technologies and best practices.

Thank you