Basics of Information Technology

Let us Learn

- Definition of IT and ICT
- To understand concepts like data and information.
- Various concepts used under IT
- Different types of Operating Systems with its features and uses
- Architecture of Computer System
- Units of Memory
- Concepts related to Internet and Network with its types
- Recent trends, IT Enabled Services and careers in IT

1.1 An introduction to IT (Information Technology)

Information Technology has great influence on all aspects of life. Almost all work places and living environments are being computerized and the use of Information Technology is being enhanced.

Definition of Information Technology:

"IT (Information Technology) encompasses all of the technologies that we use in order to create, collect, process, protect and store information. It refers to hardware, software (computer programs), and computer networks".

ICT (Information and Communication Technology) concept involves transfer and use of all kinds of information. ICT is the foundation of economy and a driving force of social changes in the 21st century. Distance is no longer an issue when it comes to accessing information; for example, work-from-home, distance learning, e-banking, and e-governance are now possible from any place with an internet connection and a computing device. Lets first perceive two important concepts - Data and Information:

1.2 Data and Information

It is being said that the terms "data" and "information" are interchangeable and mean the same thing. However, they are not same and there is a difference between the two words. Data can be any character, text, word, number or raw facts. However, Information is data formatted in a manner that allows it to be utilized by human beings in some significant way. In

Example of Data:

Umbar, 1234, Xyz, MG Road, Calcutta, 9111111111, 84084

Example of Information:

Xyz, 1234, MG Road, Umbar 84084, Calcutta, 9111111111

the above example, the data appears to be a set of random words and numbers. However, when that data is interpreted, organized and formatted, one can tell that it is contact information of a person named as XYZ. Need of information: Information is required to take short term and long term decisions and also to make strategic decisions in an organization. Since we live in the "Information age", Information Technology has become a part of our everyday life.

1.3 Various concepts used under IT

Before getting started let us learn some of the important concepts used under Information Technology:

1.3.1 Computer: The word Computer is derived from a Latin word "computare" which means to "to calculate", "to count", "to sum up" or "to think together". An electronic device which accepts input from the user, processes it according to the instructions given to it and gives the required result in the form of output, is a computer.

Computer System:

A computer can process data, images, audio, video and graphics. A computer performs five major computer operations or functions irrespective of their size and make. These are -

- It accepts data or instructions by way of input.
- It stores data.
- It can process data as required by the user.
- 4) It gives results in the form of output.
- It controls all operations inside a computer.

1.3.2 Architecture of Computer :

Computer Architecture is a specification detailing of how a set of software and hardware technology standards interact to form a computer system. In short, computer architecture refers to how a computer system is designed and how it works.



Fig: 1 Computer System and Peripherals

Every computer system has the following three basic components:

- 1. Input Unit
- 2. Central Processing Unit
- 3. Output Unit
- I. Input Unit: This unit helps users to enter data and commands into a computer system. Data can be in the form of numbers, words, actions, commands, etc. The main function of input devices is to direct commands and data into computer. Computer then uses its CPU to process data and produce output.

For example, a keyboard is an input device that enters numbers and characters. Similarly, even a mouse can be an input device for entering directions and commands. Other examples include barcode reader, Magnetic Ink Character Recognition (MICR), Optical Character Recognition (OCR), etc.

Another example of input devices is touch-screens. Users can simply touch these screens without using any other device to enter commands. From smartphones to ATM machines, these input devices are becoming very popular now a days.

Central Processing Unit (CPU): After receiving data and commands from users, a computer system has to process

users, a computer system has to process it according to the instructions provided. Here, it has to rely on a component called the Central Processing Unit. The CPU further uses these three elements:

a) Arithmetic and Logic Unit:
This part of the CPU performs
arithmetic operations. It does basic
mathematical calculations like
addition, subtraction, division,
multiplication, etc. Further, it can

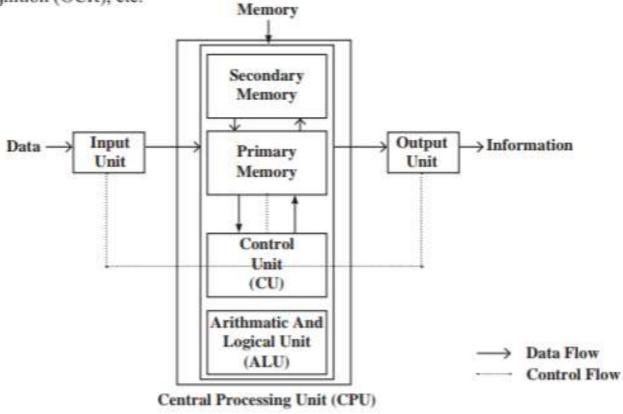


Fig: 2 Block Diagram of a Computer

even perform logical functions like the comparison of data.



Fig: 3 CPU Internal View

- b) Control Unit: This unit is the back bone of computers. It is responsible for coordinating tasks between all components of a computer system. The control unit collects data from input units and sends it to processing units depending on its nature. Finally, it further transmits processed data to output units to facilitate users.
- c) Memory Unit: Once a user enters data using input devices, the computer system stores this data in its memory unit. This data will now remain here until other components of CPU process it. The memory unit uses a set of pre-programmed instructions to further transmit this data to other parts of the CPU.

Types of Memory- There are two types of memory

- 1) Primary Memory 2) Secondary Memory
- Primary Memory: Primary memory is internal memory of the computer. It is also known as main memory.

Primary Memory holds the data and instruction on which computer is currently working.

Types of Primary Memory- Primary memory is generally of two types.

1. RAM 2. ROM

- RAM (Random Access Memory): It stands for Random Access Memory. RAM is known as read /write memory. It is generally referred to as main memory of the computer system. It is a temporary memory. The information stored in this memory is lost as the power supply to the computer is switched off. That's why RAM is also called as "Volatile Memory".
- 2. ROM (Read Only Memory): It stands for Read Only Memory. ROM is a Permanent Type memory. The content is not lost when power supply is switched off. Content of ROM is decided by the computer manufacturer and permanently stored at the time of manufacturing. ROM cannot be overwritten by the computer. It is also called "Non-Volatile Memory".
- Secondary Memory: It is an external memory of the computer. It is used to store the huge amount of different programs and information.

The secondary storage devices are:

- 1. Magnetic (Hard) Disk
- 2. Magnetic Tapes
- 3. Pen Drive
- 4. Flash memory
- 5. Optical Disk (CD,DVD)
- 6. SSD etc.

3. Output Unit: The third and final component of a computer system is the output unit. After processing of data, it is converted into a format which human can understand. After conversion, the output unit displays this data to users. Examples of output devices include monitors, screens, printers and speakers etc. Thus, output units basically reproduce the data formatted by the computer for user's benefit.

Do it yourself

 Try to find out names of the modern input devices used in shops/malls.

1.3.3 Units of Memory: Computer storage and memory is often measured in Megabytes (MB) and Gigabytes (GB). Let us understand the evolution of memory.

Bit: It is a binary digit that holds only one of two values: 0 or 1.

Nibble: A group of 4 bits is called a nibble (For example:1011, 1001, 1111).

Byte: A group of 8 bits is called a byte. A byte is the smallest unit, which can represent a data item or a character. (For example: 11101100, 10000001)

Different Units of Memory	
Data Measurement	Size
Bit	Single Binary Digit
	(1 or 0)
1 Byte	8 Bits
1 KiloByte (KB)	1,024 Bytes
1 MegaByte (MB)	1,024 KiloBytes
1 GigaByte (GB)	1,024 MegaBytes
1 TeraByte (TB)	1,024 GigaBytes
1 PetaByte (PB)	1,024 TeraBytes
1 ExaByte (EB)	1,024 PetaBytes

Table: 1 Different Units of Memory

1.3.4 Concept of Hardware and Software:

Hardware: Computer hardware comprises of the physical components that a computer system requires to function. In simple words hardware are the parts which we can see, we can touch them, feel them. It encompasses everything with a circuit board that operates within a Personal Computer or Laptop; including the motherboard, graphics card, CPU (Central Processing Unit), ventilation fans, webcam, power supply, and so on.

Software: A set of instructions given to the computer is known as a program. Program or set of programs are called as software. This helps us to interact with the computer in order to perform a particular task. Software is a generic term used to describe computer programs.

1.3.5 Categories of a software:

Open source software: It refers to the software which releases code in public domain for anyone to use. The source code can be copied, modified or distributed by other users and organizations. As the software is open to the public, the result is that it constantly updates, improves and expands as more people can work on its improvement. Many states are following FOSS policy i.e. Free Open Source Software Policy and it enabled them to save some million of rupees each year in licensing costs. The Kerala state is in news as they have adopted FOSS policy and saved rupees 300 crore as a license fee for proprietary or closed source software.

Closed source software: It is opposite to Open Source Software and means that the software is used by the proprietary and has a closely guarded code. Only the original authors of organization of a software can access, copy, and alter that software. In case of closed source software, user has to purchase the software before using it.

1.3.6 Computer software can be classified into two types based on its utility:

Application Software: Application software is a program or group of programs designed for end users. Applications software (also called end-user programs) include programs like database programs, word processors, web browsers, presentation software, spreadsheets etc.

System Software: System Software is a set of instructions required for a computer to work. For Example, Linux Operating system is a program that allows different applications and various components of hardware such as monitor, printer, mouse, keyboard etc. to communicate with each other.

Let's understand more about an operating system

- A computer would not be able to function correctly without an operating system.
- An operating system is a software program that empowers the computer hardware to communicate and operate with the computer software.

- The operating system boots up the computer and makes sure that everything is operational.
- The operating system is also what runs the cell phone and most of the electronic devices.
- The operating systems usually come preloaded on any computer, tablet, laptop or cell phone that you buy.
- Most people use the operating system that comes with their device as default.
- It is necessary to use licensed operating system and not a copied or a pirated one.
- There are many open source operating systems available on the web which are freely downloadable. It is advisable to use those OS instead of pirated ones.
 *Refer Page 61(Software Piracy)

∠ Do it yourself

 List out the open source and closed source software.

1.3.7 Operating Systems for Personal Computers:

DOS: DOS (Disk Operating System) was the dominant operating system for microcomputers in the 1980's and the early 1990's. For working with DOS the user needs to know how to input the commands using the Command Prompt Window.

Windows: Windows is a series of operating systems that are designed by Microsoft. The first two versions of the Windows operating system, introduced in 1985 and 1987 respectively, were primitive. Windows is the most commonly used operating system.

Mac OS: Apple Corporation's registered operating system is called Mac OS.

Chrome OS: Chrome OS is an open-source operating system created by Google to create a better computing experience for people who spend most of their time on the web.

UNIX: UNIX was trademarked in 1969 by a group of AT&T employees at Bell Labs as a multitasking, and multi-user computer operating system.

Linux: Linux is an open-source, portable, multi-user (multiple users can access system resources like memory/RAM/ application programs at the same time), multiprogramming, operating system. It is very similar to other operating systems, such as Windows and a source code is available to the public.

1.3.8 Operating Systems for Mobile Phones:

There are many different operating systems for mobile phones and devices. These are Android, Asha, Blackberry, iOS, Windows Phone etc.

Android : Android is a free and open source operating system provided by Google. It is most popular OS amongst all other OS.

Asha: Asha is used by Nokia phones. This is closed source OS.

Blackberry: This is a closed source operating system for smartphone and tablet devices. iOS: iOS is Apple's closed source operating system for Apple's iPhone, iPod Touch, iPad and second-generation Apple TVs.

Windows Phone: Windows Phone is developed by Microsoft as a closed source operating system for mobile phones.

1.4 Introduction to GNU/Linux (GNU Not Unix)

GNU/Linux is a family of operating systems that are created by various companies, organizations, and individuals. It is created by using Free Software Philosophies. This means that GNU/ Linux operating systems are usually free of charge, free to distribute, and they are open source. Open Source is when a person can view and modify the code for a piece of software. This is important because by having the ability to look and audit the code, user can be sure that the program does not perform malicious tasks. It also allows the user to program their own features, or fix problems, and help the developers. This results in higher quality code and more secure programs. This is why GNU/ Linux is used as the predominantly backbone of the Internet. Most websites that user visits run on GNU/Linux. In fact, as of 2018, all the world's fastest 500 computers run Linux.

Ubuntu is one of the most popular GNU/Linux distribution.

There are two main ways to interact with the computer: The GUI (Graphical User Interface) and the CLI (Command Line Interface)