Introduction to computer

Definition Computer

A computer is an electronic device, operating under the control of instructions stored in its own memory that can accept data (input), process the data according to specified rules, produce information (output), and store the information for future use

Characteristics of computer

• Speed: The computer can process data very fast, at the rate of millions of instructions per second. Some calculations that would have taken hours and days to complete otherwise, can be completed in a few seconds using the computer. For example, calculation and generation of salary slips of thousands of employees of an organization, weather forecasting that requires analysis of a large amount of data related to temperature, pressure and humidity of various places, etc.
• Accuracy: Computer provides a high degree of accuracy. For example, the computer can accurately give the result of division of any two numbers up to 10 decimal places.
• Diligence: When used for a longer period of time, the computer does not get tired or fatigued. It can perform long and complex calculations with the same speed and accuracy from the start till the end.
• Storage Capability: Large volumes of data and information can be stored in the computer and also retrieved whenever required. A limited amount of data can be stored, temporarily, in the primary memory. Secondary storage devices like floppy disk and compact disk can store a large amount of data permanently.
• Versatility: Computer is versatile in nature. It can perform different types of tasks with the same ease. At one moment you can use the computer to prepare a letter document and in the next moment you may play music or print a document. Computers have several limitations too. Computer can only perform tasks that it has been programmed to do.

Limitation of computer

1. No Self-Intelligence. **Computer** does not have intelligence of its own to complete the tasks. They give wrong output if the input given by humans are wrong. ...
2. No Thinking and Decision Making Power. The **computer** cannot think itself. ...
3. No Feeling. Lack of feeling is another limitation of computer.

Central Processing Unit (CPU) :

A CPU is brain of a computer. It is responsible for all functions and processes. Regarding computing power, the CPU is the most important element of a computer system.

The CPU is comprised of three main parts :

Arithmetic Logic Unit (ALU): Executes all arithmetic and logical operations. Arithmetic calculations like as addition, subtraction, multiplication and division. Logical operation like compare numbers, letters, or special characters

Control Unit (CU): controls and co-ordinates computer components.

1. Read the code for the next instruction to be executed.

2. Increment the program counter so it points to the next instruction.

3. Read whatever data the instruction requires from cells in memory.

4. Provide the necessary data to an ALU or register.

5. If the instruction requires an ALU or specialized hardware to complete, instruct the hardware to perform the requested operation.

Memory Unit : Memory unit include primary memory and secondary memory

Primary Memory:-

1. RAM: Random Access Memory (RAM) is a memory scheme within the computer system responsible for storing data on a temporary basis, so that it can be promptly accessed by the processor as and when needed. It is volatile in nature, which means that data will be erased once supply to the storage device is turned off. RAM stores data randomly and the processor accesses these data randomly from the RAM storage. RAM is considered "random access" because you can access any memory cell directly if you know the row and column that intersect at that cell.

2. ROM (Read Only Memory):

ROM is a permanent form of storage. ROM stays active regardless of whether power supply to it is turned on or off. ROM devices do not allow data stored on them to be modified.

Secondary Memory:-

Stores data and programs permanently :its retained after the power is turned off

Types of computer

Personal computer: A small, single-user computer based on a microprocessor. In addition to the microprocessor, a personal computer has a keyboard for entering data, a monitor for displaying information, and a storage device for saving data.

Workstation : A powerful, single-user computer. A workstation is like a personal computer, but it has a more powerful microprocessor and a higher-quality monitor.

Minicomputer : A multi-user computer capable of supporting from 10 to hundreds of users simultaneously.

Mainframe : A powerful multi-user computer capable of supporting many hundreds or thousands of users simultaneously.

Supercomputer : An extremely fast computer that can perform hundreds of millions of instructions per second.

Laptop: A laptop is a battery or AC-powered personal computer that can be easily carried and used in a variety of locations. Many laptops are designed to have all of the functionality of a desktop computer, whichmeans they can generally run the same software and open the same types of files. However, some laptops, such as netbooks, sacrifice some functionality in order to be even more portable.

Tablet Computers*:* Like laptops, tablet computers are designed to be portable. However, they provide a very different computing experience. The most obvious difference is that tablet computers don't have keyboards or touchpads. Instead, the entire screen is touch-sensitive, allowing you to type on a virtual keyboard and use your finger as a mouse pointer. Tablet computers are mostly designed for consuming media, and they are optimized for tasks like web browsing, watching videos, reading e-books, and playing games. For many people, a "regular" computer like a desktop or laptop is still needed in order to use some programs. However, the convenience of a tablet computer means that it may be ideal as a second computer.

Types of computer languages

Machine language

Machine language or machine code is the native language directly understood by the computer's central processing unit or CPU. This type of computer language is not easy to understand, as it only uses a binary system, an element of notations containing only a series of numbers consisting of one and zero, to produce commands. The computer's processor needs to convert high-level languages into this language before it can run a program or do a user-defined command. To convert a certain language into machine code, the computer processor needs a compiler, a program that converts a source code written in one language into a different language syntax. The compiler generates a binary file, or executable file, that the CPU will execute. Every computer processor has its own set of machine code. The machine code will determine what the computer processor should do, and how it should do it.

Assembly language

A study in the early 1950s has led to the development of low level languages or Assembly Level Language. Also considered as second-generation language, Assembly Level Language is a set of codes that can run directly on the computer's processor. This type of language is most appropriate in writing operating systems and maintaining desktop applications. It allows the programmer to perform several tasks like registry access, memory management and clock cycle correspondence. With the assembly level language, it is easier for a programmer to define commands because he has the prerogative when it comes to naming the variables. However, this language is not flexible because the user cannot reuse the set of codes written using this language. It is not as explanatory as compared to its other counterparts. The user has to encrypt this language into machine language in order for the computer to process the commands written by the programmer.

High Level Language

The development of high level languages came about when the computer programmers started to have problems regarding the computer's increasing lack of portability. High level languages ignore the unimportant details found in low level languages. Many programmers consider the high level language as a momentous solution to hassles brought about by computer languages because of its ease of use and low tendency to produce bugs. Programmers often refer to high level languages as mid-level languages that only use the concepts of abstraction and constructs to the extremes**.**

Translators

There are three type of translator.

Complier

A compiler is a translator used to convert high-level programming language to low-level programming language. It converts the whole program in one session and reports errors detected after the conversion. Compiler takes time to do its work as it translates high-level code to lower-level code all at once and then saves it to memory.

A compiler is processor-dependent and platform-dependent. But it has been addressed by a special compiler, a cross-compiler and a source-to-source compiler. Before choosing a compiler, user has to identify first the Instruction Set Architecture (ISA), the operating system (OS) and the programming language that will be used to ensure that it will be compatible.

Interpreter

Just like a compiler, is a translator used to convert high-level programming language to low-level programming language. It converts the program one at a time and reports errors detected at once, while doing the conversion. With this, it is easier to detect errors than in a compiler. An interpreter is faster than a compiler as it immediately executes the code upon reading the code.

It is often used as a debugging tool for software development as it can execute a single line of code at a time. An interpreter is also more portable than a compiler as it is not processor-dependent, you can work between hardware architectures.

Assembler

An assembler is is a translator used to translate assembly language to machine language. It is like a compiler for the assembly language but interactive like an interpreter. Assembly language is difficult to understand as it is a low-level programming language. An assembler translates a low-level language, an assembly language to an even lower-level language, which is the machine code. The machine code can be directly understood by the CPU.

Primary storage devices

A primary storage device is any storage device or component that can store non-volatile data in computers, servers and other computing devices. It is used to hold/store data and applications temporarily or for a shorter period of time while the computer is running.

Secondary storage devices

Secondary storage hard drives, which store data for the long-term (while primary storage stores it for the short-term) include internal and external types. Smaller hard drives even include USB thumb drives or your smart phone when

you hook it up to your computer for the express purpose of viewing or transferring files.

Primary storage divices
Ram :
RAM (random access memory) and cache are both examples of a primary storage device. Primary storage's key differences from the others are that it is directly accessible by the CPU, it is volatile, and it is non-removable.
A primary storage device may also be referred to as internal memory, main memory, main storage, and primary memory.
ItiscalledRandomAccessMemorybecauseanyofthedatainRAMcanbeaccessedjust asfastasanyoftheotherdata.
There are two types of RAM:
–DRAM (Dynamic Random Access Memory)
–SRAM (Static Random Access Memory)

ROM:
Thismemoryissuedasthecomputerbeginstobootup.Small programscalledfirmwareareoftenstoredinROMchipsonhardwaredevices(likeaBI OSchip),andtheycontaininstructionsthecomputercanuseinperformingsomeofthe mostbasicoperationsrequiredtooperatehardwaredevices.
ROMmemorycannotbeeasilyorquicklyoverwrittenormodified.

Types of Rom

PROM: -PROM stands for Programmable Read Only Memory is the type of ROM is written only. It was meant to fulfil the requirement of a group of ROMs which may contain a selected memory content. It's memory is written just the once and programmed electrically by the user at the time or when the initial chip fabrication. the required content file is equipped by the user and inserted within the machine referred to as storage coder. There exist a fuse at every programmable association and it's blown once the association isn't required.

EPROM: -EPROM stands for Erasable Programmable Read Only Memory is also the type of ROM is read and written optically. To write associate EPROM, its storage cells should stay within the same initial state. EPROM provides reduced storage permanency as compared to PROM as a result of the EPROM is receptive to radiation and electrical noise. in the construction of EPROM, MOS transistors are used.

SecondaryStorage

HardDisk

•Theharddiskdriveisthemain,andusuallylargest,datastoragedeviceinacomputer.
•Itcanstoreanywherefrom160gigabytesto2terabytes.
•Harddiskspeedisthespeedatwhichcontentcanbereadandwrittenonaharddisk.
•Aharddiskunitcomeswithasetrotationspeedvaryingfrom4500to7200rpm.
•Diskaccesstimeismeasuredinmilliseconds.

Compact Dics

A Compact Disc, also called a CD are small plastic discs which store and retrieve computer data or music using light. ... CDs that have computer information on them are called CD-ROMs, or Compact Disc - Read Only Memory. The diameter of a normal CD is 120 mm. The middle hole in a CD is about 1.5 cm).

Pen Drive

A pen drive being inserted into a USB port. The definition of a pen drive is small storage device shaped like a pen with built-in data storage that connects to a computer by a USB port. An example of a pen drive is a pen with a hidden USB port for saving data.