Certified Computer Fundamentals (MS Office) Professional Sample Material

V-Skills Certifications

A Government of India
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V-Skills

1. COMPUTER APPRECIATION

1.1 Introduction - What is Computer?

Computer is an electronic device, which is used for computing and processing the data. The word computer is derived from compute; meaning to calculate, thus it is a machine, which can perform arithmetical operations at a higher speed. Computer is a device used for computing, logical decision-making, sorting, merging and communication.

People would not only do most of their work on or with a computer, nearly every aspect of their homes and personal lives would be affected by computers, it was envisioned that consumers would pay bills and do most of their shopping on the computer.

1.2 Characteristics of computer

Speed It refers to the speed of computation. A computer is a high-speed device. It can perform a task in seconds for which, manual manpower may require a year or even more. The units of speed are measured in microseconds and nanoseconds. A computer is capable of performing 3 to 4 million simple arithmetic calculations per second.

Accuracy It refers to the precision with which calculations can be done. A computer maintains high degree of accuracy provided there is no human mistake i.e. faulty programming or inaccurate dates. If 10 million calculations are to be performed, the computer will do with same accuracy.

Consistency It means continuous. A computer can work for hours without lack of concentration or emotional feelings. It does not get tired and will do the jobs with same speed and accuracy even if is first job or its millionth job.

Versatility It means dynamic or varied. A computer can perform various types of jobs like it can do scientific calculation, make drawings, etc. It can change over to various types of jobs within a very short span of time. With the help of multitasking, the processor can switch to various jobs associated with it can do typing as well as printing at the same time. One moment it is preparing results and the next moment it is busy preparing fee slips.

Remembrance power Human brains are volatile and remember only imp. Information, which may be lost as the time passes. A computer has permanent storage device where each and every piece of information can be retained for a long period. This power of the computer has two aspects

- ✓ The information remains in the same format, as it was stored and when so ever it is retrieved
- ✓ Computer's memory can be increased or decreased as per needs

Lack of IQ IQ means Intelligence Quotient or intelligence to take decisions. A computer can only perform operations programmed or instructed by a person.

Malfunction Just like any man -made machine, it is subject to occasional breakdown or malfunction.

Wrong output It cannot correct wrong instructions by itself so; wrong input results in wrong output.

No feelings since computer is a machine it is free from emotional and sentimental feelings.

1.3 Generation of computers

The progress of human technology to make life easier has brought many changes in computers. Generation of computers details, how computer technology has progressed to its current state from ancestors. Thus, 'Generation' signifies the advancements in computers. In 600BC a manual device was used for purpose of calculation.

First Generation Computers

Vacuum tube technology was used in this generation of computers.
ENIAC (Electronic Numerical Integrator & calculator) was first general purpose computer developed in USA was designed using 1800 vacuum tubes (Diode or Triode valves)
EDVAC (Electronic Discrete Variable auto Computer) was able to store programs and data in the memory. It is considered, as first digital computer using 1's and 0's to represent all characters.
UNIVAC –I (Universal automatic Computer) first digital computer produced on mass scale for commercial use.

Advantages of First Generation computers

- ✓ They were faster than other computing devices
- ✓ Electronic devices now were able to do computation, as this generation had shown the technology

Disadvantages of First Generation computers

- ✓ Vacuum tube required lots of power for operation
- ✓ Vacuum tube generated a lot of heat, hence air-conditioning was required
- ✓ Computers were bulky and were not portable
- ✓ Computers occupied a lot of space
- ✓ Due to frequent breakdown, constant maintenance was required

Second Generation Computers

They were designed using transistors. Ferrite core was used for main memory. For secondary memory Magnetic tape/ Disks/Drums were used. High-level languages like FORTRAN, ALGOL COBOL, were used for programming. SGC were more reliable and faster. They used to generate less heat but air-conditioning was required. IBM-1620, IBM – 7090 CDC-1604, PDP-1, PDP-5.

Advantages of Second Generation computers

- ✓ They were faster in computation, than the first generation computers
- ✓ They occupied less space, as transistors were small, as compared to the first generation computers

Disadvantages of Second Generation computers

- ✓ Transistors generated heat, hence air-conditioning was required
- ✓ Computers were still bulky and were not portable

- ✓ Computers occupied a lot of space
- ✓ Due to breakdown, frequent maintenance was required

Third Generation Computers

They were designed using integrated circuits (IC's) technology. They have core magnetic memory or semiconductor memories (RAM and ROM) Computers were having the cache memory feature. Secondary storage memories were similar to 2nd generation computers. Concept of multiprocessing and multiprogramming was introduced. IC chip means integrated circuit chip i.e. a chip is an area less than 5mm. Square and IC chip means integrating or joining electronic circuits in less 5mm. Square area.

Advantages of Third Generation computers

- ✓ They were faster in computation, than the second-generation computers
- ✓ They occupied less space, as IC chip were small, as compared to the transistors
- ✓ Due to high reliability less maintenance was required

Disadvantages of Third Generation computers

- ✓ IC chip technology was more complex and thus, expert persons were required

Fourth Generation Computer

Its features are

- ✓ Uses VLSI chips for memory & CPU
- ✓ RAM 1to 256 MB or more available
- ✓ Cache memory on CPU chips
- ✓ Concept of super computer having more than 1 CPU's
- ✓ Additional Numerical processor
- ✓ Larger hard disks 1.2-6.5 GB or more
- ✓ Optical Disks for mass storage
- ✓ Audio/Video capability

e.g. IBM PC 8086/8088/80286/80386/80486, PENTIUM-MMX, PENTIUM II/III, IBM-AS/400, CRAY Y-MPC, PARAM 10000.

Advantages of Fourth Generation computers

- ✓ They were faster in computation, than the third generation computers
- ✓ They occupied less space, as it shrunk the area required by electronic circuits
- ✓ They were more reliable and low maintenance was required

Disadvantages of Fourth Generation computers

- ✓ Due to breakdown, frequent maintenance was required
- ✓ IC chip technology was more complex and thus, expert persons were required

Fifth Generation Computers

The aim of 5th generation is to bring machines with general intelligence, the ability to reason logically. It is not just data processing but knowledge processing. Some of the expected features of 5th generation computers are as follows

- ✓ These computers will use ULSI chips (Ultra Large scale integration) to achieve more efficiency
- ✓ The input and output is speech & graphics, in future they will understand languages like English, Japanese
- ✓ Computer will do the job of programming
- ✓ Extensive use of parallel processing will be used
- ✓ All data may not be stored in main memory; they may flow through processing units by activating them according to the computers

These computers are yet to come and scientists are doing research on them. Computer will be having its own intelligence. Hence, it will take decisions on its own. ULSI and AI (Artificial Intelligence) technology will be used in these computers.

1.4 Classification of Computers

Computers can be classified on basis of design, usage and size. Classification is detailed as

Super Computer

Super computer is the most powerful computer in world, which is used for solving complex problems. They use parallel processing. A super computer has multiple processors (100 or more) fitted inside. It is used mainly in spaceship control, defense and meteorological departments. Scientists build their complex processes and simulate them on supercomputers. PARAM is an example of such computer, which is made in India by C-DAC. CRAY, USA also makes super computer.

Mainframe Computer

They are used where large number of computers (100+) needs frequent access to the information. The mainframe computers are big in size and require big room for installation. HP 9000, IBM es/9000 are examples of same.

Mini Computer

These computers are comparatively smaller than mainframe. These computers are used as servers with many computers (usually less than 100) connected to them. The computers are used by Banks, and Data Processing Centers. E.g. PDP-11, IBM As/400.

Personal Computer

PC's are most popular computers in today's world

- ✓ It is used for various purposes like office management, education designing etc.
- ✓ They are smaller in size and can be placed on table
- ✓ They are available with microprocessor chips, manufactured by Intel or AMD

Some of other common computers types are

Notebook computer

It can fit easily inside a briefcase or bag. Laptops can operate on plug – in current or with in-built batteries. Laptops with small screen (10") are called netbook and are also low in price.

Personal Digital Assistant

They are the smallest of portable computers. They are used for small operations like displaying telephone numbers.

Workstation

The most powerful PC's, which are used by engineers, scientists and graphic artist, are known as workstations.

Home Computer

They are PC's used in homes for entertainment and computational purposes.

1.5 Applications of Computer

Some of the fields where computers are being used are

Offices

Computers are widely being used in offices to perform day to day works like preparation of forms, letters contract documents memorandums, project reports, create budgets, communicate with co-workers, find information etc. Computers are vital in accounting department, for manipulating large set of numbers, which accounting departments do daily. Word processing and spreadsheet packages like work-sheet Ami-pro, Excel, are popular office packages that help in creating a paper less office.

Publication and Printing

Popularly known as desktop publishing, design, layout and composition of books, brochures leaflets, visiting cards, letter heads using popular packages like PageMaker, Ventura, CorelDraw, QuarkXPress etc. Output of the designs is taken on laser printer. Using a camera negative/ positive design is prepared which is used in offset/screen printing according to the colors specified.

Education

In educational departments, institutes, computer is used as teaching aid, which is referred as computer assisted instructions (CAI). The CAI programs can be prepared in a variety of modes like tutorial, problem solving modeling etc. For multimedia computers CD's are also available for educational /training purposes on almost every subject with audio/video features known as CBT (Computer Based Training).

Computer Aided Designing

Computer Aided Design (CAD) and computer aided manufacturing (CAM) are one of the most powerful application applications Engineers, scientist and designers use CAD software to design a machine, car, building etc. These designs can be viewed in 3D before the production of machines. Computers can also control manufacturing machines like drill, lathe machines. An integrated CAD/CAM system help to produce quality machines, where a software takes designing information from CASD database and convert them into other program which controls and activate the manufacturing machines.

Computers in Medical

Computer aided diagnostic machines are used to diagnose various types of disease. It also helps in surgery and treatment. Eye testing, scanning of internal parts of brain, by pass surgery, pathological tests are the examples where computers are used effectively.

Animation & Graphics

Specialized software like Corel Draw, Harvard graphics Photoshop, etc., can be used to draw pictures and designs. It helps an artist to improve his skill and reduces the time consumed when drawn manually.

Military

For the defense purposes in military computer plays an important role. A guided missile fitted with its own
computer that decides about the target and path. Similarly system uses for processing data and image display.
Fighter planes are fitted with computerized system controls to decide about range height etc. of the target.

1.6 Commonly Used Computer Terms

Hardware

Physical components of the computer system are known as hardware e.g. Monitor, keyboard, mouse, chips, wires, buses etc. They are tangible hence, can be touched or seen by humans.

Software

Instructions, programs, written for the computer to run specific task are known as software. They are of two types System Software and Application Software. E.g. Word Application Package, Operating Systems Software etc. They cannot be touched or seen by humans.

Firmware

Instructions or software substituted for hardware and stored in read-only memory. Software programs made available on hardware i.e. ROM used as BIOS.

1.7 Basic Operations of a Computer – Input, Process and Output

All computer systems perform the following 5 basic operations

Input

The process of entering the data and instruction into computer System. It involves three steps - accepting the list of instruction from user in their format. Then converting these instructions in computer acceptable form. Supplying the instructions to computer system for processing.

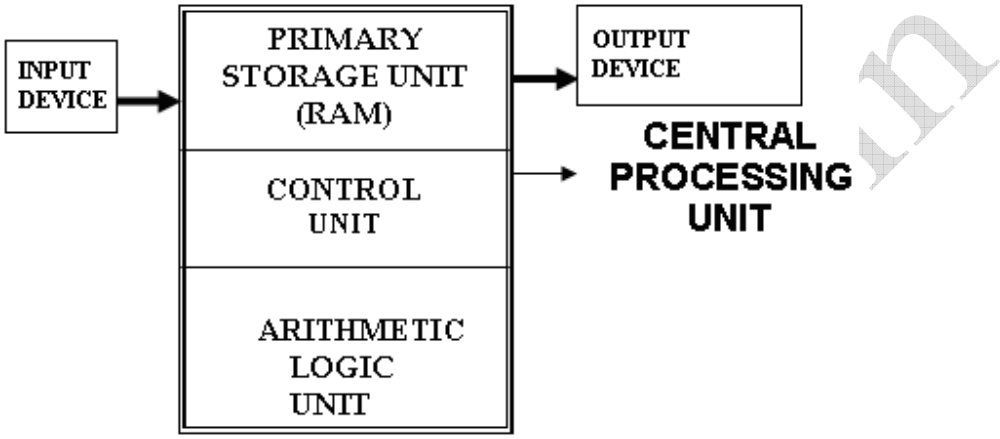
Process

It is the actual processing in the CPU that takes place on the data, as per the given instructions.

Output

The process of output of the data from the computer system. It accepts the results produced by computer, which are in coded form. It converts the coded form to human acceptable form. It supplies the converted results to user.

Block Diagram of a Computer



1.8 Units of a computer system

Input Unit

Data and instructions from the user are given by this unit. It consists of keyboard, mouse etc.

Output Unit

Processed data is given to the user by this unit. It consists of printer, monitor etc.

Storage Unit

All the data to be processed and instructions required for processing are stored in it. It also stores the intermediate and final results of processing before the results are released to output device.

Central Processing Unit

The Control Unit and Arithmetic Logical Unit of system are jointly known as CPU. It is the brain of the system.

Arithmetic Logical Unit

It is a place where actual execution of instructions takes place during processing of data. Computations of arithmetic (addition, division etc.) and logical (less than, equals, etc.) takes place in it.

Control Unit

It is able to maintain order and direct the operation of the entire system by selecting interpreting and seeing to the execution of program instruction. It controls the flow of information in the computer.

1.9 Representation of information

Difference between Data and Information

Data	Information
Data themselves are meaningless	Information is meaningful
Data is raw facts like numbers, characters etc. For e.g. Number of items sold today is data, as it is just a number.	Information is processed or manipulated data. For e.g. Which product sells more in a week.

Binary Number System

This number system use only two symbols to represent data, i.e. 0 and 1. Therefore the base of binary number system is 2. In the table given below the decimal numbers are shown with their binary equivalents.

DECIMAL	BINARY
0	0
1	1
2	10

Computer being a device easily understands two states i.e. ON (Current is coming) or OFF (Current is not coming). Thus all data and instruction given to a computer is expressed in these two states, known as binary states (Bi meaning two). Hence, data is also measured by computer on the basis of these two states, as we measure distance in Kilometer, time in minutes or seconds, similarly we measure the amount of data in various terms as

Memory Size (Bit, Byte, KB, MB)

BIT

It is the basic unit of information. It means BInary digit (BIT). It represents either a zero (0) or One (1). Computer
works on the principle of "on" or "off" of electronic pulses. 1 represents the passing of the pulse while 0 means
blocking of pulse. Bit is therefore the smallest unit of information.

For example	0	1 bit
	11	2 bit
	110	3 bit

NIBBLE

It is a collection of 4 bits

BYTE

It is a collection of 8 bits.

KILOBYTE (KB)

It is equals a thousand (Kilo) bytes, but in Binary form it is represented as 1024 (210). Thus 1KB= 1024 bytes.

MEGABYTE (MB)

It equals thousand Kilo Bytes or 1 MB= 1024 KB or 1 MB = 220 bytes.

GIGABYTE (GB)

It equals thousand Mega Bytes or 1 GB= 1024 MB or 1 GMB = 230 bytes. Thus above information can be summarized as

Unit	Equals
1 Bit	0 or 1
1 Nibble	4 bits
1 Byte	8 bits
1 KB	1024 bytes
1 MB	1024 KB
1 GB	1024 MB

ASCII

In computer system data is stored in a format that cannot be read by human beings. Every computer stores numbers, letters and other special character in a coded form. The most widely used coding system is the American standard code for information technology (ASCII) which can represent 256 different symbols by using 8 bits.

1.10 Input Devices

Keyboard

A computer keyboard is similar to a typewriter keyboard. It is an input device. Data can be entered into a computer through the keyboard. Usually it has 101 keys arranged in 5 groups

- ✓ ***Alphanumeric keys*** - in QWERTY layout (the first six letters on the top row of the letters are Q,W,E,R,T,Y) with A-Z ,0-9 plus some more characters.
- ✓ ***Modifier keys***- In addition to letters and punctuation marks, the alphanumeric keys include the modifier keys as they are used in conjunction with other keys. E.g. Shift, Ctrl (control key), Alt (alternate key).
- ✓ ***Function keys***- The function keys (F1, F2....F12) are usually arranged in a row along the top of the keyboard. They allow us to give the computer commands.
- ✓ ***Cursor movement keys***- Arrow keys which let us change the position of cursor on the screen. In a word processing program, there is a mark on the screen where characters we type will be entered, this is called insertion point or cursor.
- ✓ ***Special purpose keys*** - Each of the special keys performs a specialised function.
- ✓ ***Esc***- Key is used to back up one level in a multilevel environment, it can be used to close multiple opened programs in reverse order.
- ✓ ***Print screen*** - This key copies an image of the screen's contents to the clipboard.
- ✓ ***Scroll lock*** - Scroll lock causes the cursor to remain stationary on the screen and the document's contents move around it, as in MS-Excel.

- ✓ ***Pause***- In some programs, the pause key can be used to stop a command in progress.

The numeric keypad usually located on the right side of the keyboard looks like an adding machine with ten digits and mathematical operators (+,-,/ and *).

Mouse

Mouse is a pointing device used to position the pointer. The pointer is an on-screen object usually an arrow, that is used to select a text, menus, move files or interact with programs, files or data that appear on screens. It also allows us to create graphic elements on the screens, such as lines, curves and freehand shapes. Clicking and drag-and-drop editing technique is used with the mouse. Earlier, ball-mouse connected via PS/2 port was used but now USB port connected optical mouse is prevalent.

Scanners

Image scanners

Image scanners convert any printed image into electronic image by shining light onto the image and sensing the intensity of the reflection at every point. Bar code reader is an image scanner.

Optical Character Recognition (OCR)
It is used to translate the image into text that we can edit. It uses specialized OCR software.

Optical Mark Reader (OMR)
These scanners are capable of recognizing a pre-specified type of mark made by pencil or pen. They are used in evaluation of answer sheets of objective test.

Magnetic Ink Character Recognition (MICR)
They are used in banking industry to process cheques. Cheques have bank identification code and cheque numbers in a special ink that is read by MICR devices.

Touch Screens, Voice Recognition Devices are also some of the input devices.

1.11 Output Devices

Monitor

It is also called as screen. It is a soft copy output device. It is similar to television. Earlier monochrome (Black & White) or Colour CRT (Cathode Ray Tube) monitors were used but now LED & LCD monitors are prevalent. We can see the input information supplied to the computer as well as the results obtained after processing on monitor. The computer screen is divided into rows and columns. The number of rows and columns that can be displayed is known as the resolution like 640 x 480, 1024 x 768, etc. The intersection of row and column is called a pixel (Picture Element).

Following are the different types of monitors generally used with computers

- ✓ LED (Light Emitting Diode) Monitor
- ✓ SVGA (Super Video Graphic Array) Monitor
- ✓ LCD (Liquid Crystal Diode) Monitor

Printers

Printers are used for producing the hard copy output on paper. Printers can be broadly classified into Impact Printers & Non-impact Printers.

Impact Printers

Dot Matrix Printer A printer that produces output by printing dots onto the page. They are often inexpensive. They are available in 80 and 132 columns with print speeds from 100 characters per second to 1200 characters per second.

Non- Impact Printers

Ink jet Printer It uses nozzles which spray jets of ink onto the paper. The operating cost of the ink jet is low and expensive maintenance is rare. The only part that needs replacement is the ink cartridge, which typically costs less. Its speed is to print 2-4 pages per minute.
Laser Printer Laser printers are more expensive than inkjet printers. Their print quality is higher and is faster. They use direct scanning of laser beam on the roller which fuses ink to the paper.

Plotters

Plotters are output devices, which plots big size drawings on to the sheets. They are used in plotting of engineering drawings, architectural maps, design layouts, etc.

1.12 Storage Devices

It is an important unit of computer. It is further divided into primary and secondary memory. There is important difference between address number and the contents of the address. The contents stored may be any text, number or any thing but the address at which they are stored is fixed.

Primary Storage Devices

A primary or internal storage section is in all computers and consists of cache, processor register ROM & RAM.

RAM (Random Access Memory)

It provides random selection and usage of memory location to store and retrieve data. It is also called read/write memory because information can be read and can also be written into it. It is a volatile memory; it gets erased as and when the computer is switched off. Whenever a new data is stored, the previous data is erased and new data takes place. It is present in 512/1024 MB.

ROM (Read Only Memory)

A read only memory (ROM) is one in which information is permanently stored. The information from the memory can only be read and it is not possible to write into it. It is non-volatile, i.e. when the power supply is switched off, the contents on ROM do not get erased, and they are permanent and are written only by the manufacturer. The programs, which are always required for running the machine, are stored in ROM. The ROM usually contains the BIOS (Basic Input & Output System) which checks the hardware for proper functioning and in case of problem it stops booting of computer and audio beeps are given. BIOS also load the Operating System into the memory.

Processor Registers

They are located in the CPU to load instructions for execution by the CPU. They function with speed of CPU and hence are the fastest memory. It is present in few KB.

Processor Cache

Processor cache is used for speeding up the data supply to CPU. It stores the most frequently used data from the main memory. When the CPU needs the particular data item, it can simply access the cache memory which is closely located, instead of accessing the much slower main memory. It is present in KB (256/512).

Secondary Storage Devices

Magnetic Tape

The magnetic tape is similar in appearance to an audiocassette. This storage device uses plastic strip coated with the magnetic material as a storage medium. The strip is present in plastic casing. The strip is a plastic ribbon approximately ½ inch in width. The strip is housed in the cartridge. Magnetic tape is slower in accessing the data, but there input and output speeds are high. They are available up to 5120 GB capacity.

Disk Drives

A drive is the name for several types of storage media. They are assigned a drive letter. During start up, drives are typically recognized by System Software (ROM BIOS + Operating System). At the end of this configuration, the appropriate drive letter is identified with each drive. If a drive is not "seen" during start up, it will not be accessible to the operating system. Some examples are

Storage Media	Drive Letter
Floppy Disks	A: B:
Hard Disk	C: D: E:
CDROM/ DVD	F:
USB	G: H:

Track & Sectors

The disk surface comprises several tracks arranged in concentric circles called tracks which are further subdivided into sectors. The greater the number of tracks, the more is the storage capacity of the disk. When all the sectors, of a track are full, drive starts using the next track.

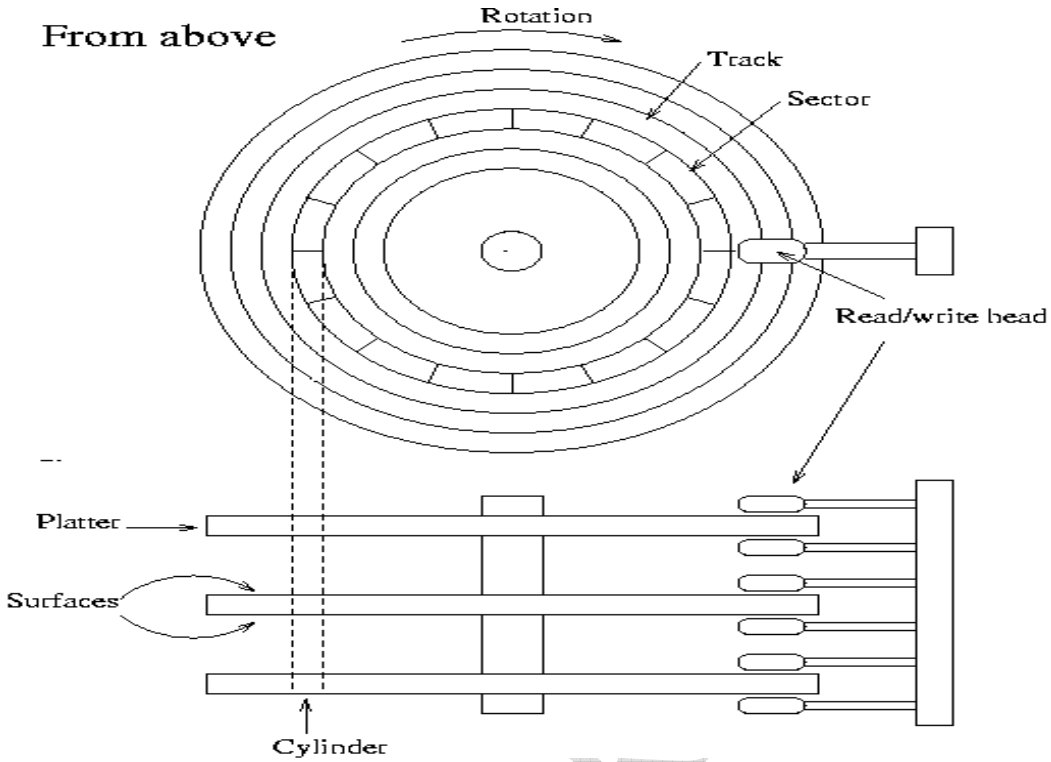


Figure – Hard Disk

Hard Disk Drive

Hard disk is used for mass storage of data needed for direct access. It is non-volatile random access memory. The disk comes in different sizes such as 3.5, inch, 5.5 inch and 8 inch. Hard disk. It has disk platters mounted on a spindle, on which data is read/written by read/write head. It comes in 250-1024 GB capacity.

Advantages

- ✓ Large storage capacity
- ✓ Low per MB cost
- ✓ Direct addressing leading to random access addition and deletion of records

Floppy Disk Drive

A floppy disk is made of flexible plastic material which is coated magnetic substance. Each floppy disk is packaged in a protective paper or plastic envelope from which it is never removed. Floppy disks are mainly used, for the purpose of backup and transportability of data, for small data volumes. Floppy comes in different sizes. 5.25"and 3.5"floppies. Floppy have 1.2 MB and 1.44 MB capacity.

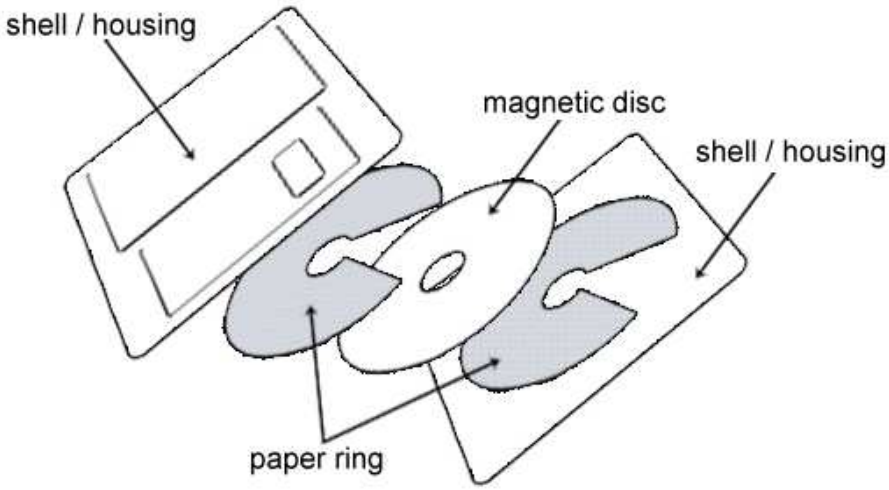


Figure – Floppy Disk

Optical Disk

An optical disk uses optics or light for storage and retrieval of information. The disk is made up of polycarbonate. The disk is coated with a reflective material, whose reflecting property changes when high power laser beam is focused on it. The high power laser beam burns the surface of disk as per the data to be stored on the disk. Low power laser beam is used for reading data from the disk. Most common optical disk is the CD-ROM (Compact Disk – Read Only Memory). CD-ROM has an important property of speed rating, which means the amount of data that can be transferred from the disk. 1X refers to 150 Kbps, 2X refers to 300 Kbps, similarly 4X, 8X, 16X, etc. These days CD- ROM drives have speed rating of 52X. CD-ROM has 700 MB capacity. DVD is high capacity optical disk which can store up to 4.3 GB of data. Blue ray disk is upcoming optical disk technology which can store up to 50 GB data.

Flash Memory

The practical application of this type of volatile computer memory can be seen in USB flash drives, memory cards and portable hard discs. These allow the data to be written to them and can be detached from the system. They can be attached to another computer system to read and transfer the data to it.

Central Processing Unit (C.P.U)

The Central Processing Unit (CPU) is responsible for interpreting and executing most of the commands from the computer's hardware and software. It is often called the "brains" of the computer. The CPU is also known as processor, microprocessor, and central processor. The Central Processing Unit (C.P.U) can be further divide into the following ways.

Control Unit

The control unit is the circuitry that controls the flow of information through the processor, and coordinates the activities of the other units within it. It generates signal as per which the processing is done and is given in MHz/GHz (mega Hertz/ Giga Hertz) .In a way, it is the "brain within the brain", as it controls what happens inside the processor, which in turn controls the rest of the PC. The functions performed by the control unit vary greatly by the internal architecture of the CPU, since the control unit really implements this architecture.

Functions of Control Unit

A control unit can be described as a sort of circuitry that supervises and controls the path of information that runs over the processor and organizes the various activities of those units that lie inside it.

- ✓ It controls the execution of instructions in a sequential order.
- ✓ It guides the flow of data through the different parts of the computer.
- ✓ It interprets the instructions.
- ✓ It regulates the time controls of the processor.
- ✓ It sends and receives control signals from various peripheral devices.

Arithmetic Logic Unit

The arithmetic-logic unit (ALU) performs all arithmetic operations (addition, subtraction, multiplication, and division) and logic operations. The data required to perform the arithmetic and logical functions are inputs from the designated CPU registers and operands. The ALU relies on basic items to perform its operations.

Functions of Arithmetic Logic Unit

Almost all the calculations of the computer are done by it. It gets its data from processor register. After the data gets processed, its results get stored in output registers of the arithmetic logic unit.

- ✓ It performs integer arithmetic operations like addition, subtraction, etc.
- ✓ It can also perform bitwise logic operations like AND, OR, XOR, etc.

1.13 Types of Software

As, we earlier noted that software is instructions, programs for the computer, but there are various types of software. Software can be classified as

System Software

Software which control the operation of a computer system. They directly interface with the hardware of the computer system. They provide a platform over which application software runs. It controls the execution of application programs. For example Operating System like MS-DOS, MS-WINDOWS XP/ 2003, LINUX

Operating System Software

It is a type of system software. It is a master program which runs in the computer and controls the hardware and running of the application software. It is the software, which is loaded into the memory first, when a computer is started. The operating system manages the data in the computer system, various jobs or task assigned to it and is responsible for the security and proper functioning of the computer. Every general-purpose computer must have an operating system to run other programs. Operating systems perform basic tasks, such as recognizing input from the keyboard, sending output to the display screen, keeping track of files and directories on the disk, and controlling peripheral devices such as disk drives and printers. LINUX, Windows XP/2003, MS-DOS are common examples of operating system.

The major functions of an Operating System are

- ✓ Resource management - The resource management function of an OS allocates computer resources such as CPU time, main memory, secondary storage, and input and output devices for use.

- ✓ Data management - The data management functions of an OS govern the input and output of the data and their location, storage, and retrieval.
- ✓ Task management - The Task management function of an OS prepares, schedules, controls, and monitors jobs submitted for execution to ensure the most efficient processing. A job is a collection of one or more related programs and their data.
- ✓ Command Interpretation - The OS establishes a standard means of communication between users and their computer systems. It does this by providing a user interface (Graphical based as in Windows or Character based as in DOS) and a standard set of commands that control the hardware.

Some of the typical uses of an Operating System are

- ✓ 1. Executing application programs.
- ✓ 2. Formatting floppy or hard or flash disk.
- ✓ 3. Setting up directories to organize your files.
- ✓ 4. Displaying a list of files stored on a particular disk.
- ✓ 5. Verifying that there is enough room on a disk to save a file.
- ✓ 6. Protecting and backing up your files by copying them to other disks for safekeeping.

Device Drivers

A device driver is a program that controls a particular type of device that is attached to computer. There are device drivers for printers, displays, CD-ROM readers, diskette drives, and so on. When you buy an operating system, many device drivers are built into the product. However, if you later buy a new type of device that the operating system didn't anticipate, you'll have to install the new device driver. A device driver essentially converts the more general input/output instructions of the operating system to messages that the device type can understand. In Windows operating systems, a device driver file usually has a file name suffix of DLL or EXE. A virtual device driver usually has the suffix of VXD.

Application Software

These types of software fulfill a specific user's requirement. They run over the system software. Application programmers develop the application software. They carry out operation for a specific application. For example accounting software, word processor software, etc. Some of application packages are

Word Processing Software

This software is used to create and to edit documents such as letters, reports, essays etc. The word processing software provides several features for document editing and formatting. In. editing process, text is entered into the document, deleted, copied or moved to another location etc. In formatting process, different formats can be applied on the text to make the document more attractive before to print on the printer. The most popular word processing software programs are Microsoft Word, Word Perfect etc.

Spreadsheet Software

Spreadsheet software is used to store and process data in an electronic sheet having columns and rows. The data is entered into the cells of the sheet. The intersection of a row and a column is known as cell. Each cell is a unique address. The numbers and formulas are entered into the cells

and the computer can automatically perform the calculation on numerical data in cells. The spreadsheet software is commonly used for business application such as for performing financial calculations and recording transactions. The most popular example of spreadsheet software is Microsoft Excel etc.

Database Management Software

Database management software is used to create and manage databases. A database is a collection of related information or records on any subject such as records of the books in a library, information about the students of a college etc. Database Management Software stores and manages records in databases. These records can be accessed very quickly when required. The Microsoft Access, Oracle etc. are most popular examples of Database Management Software.

Presentation Graphics Software

The presentation graphic software is used to create slides for making presentations. The presentation graphic software also has pre-drawn clip art images, which can be inserted into slides and can be modified. The PowerPoint is an example of presentation graphic software.

Communication Software

The Communication software is used to exchange information electronically. It is most commonly used software to send and receive information on the Internet. It also allows for sending and receiving faxes directly. The computer files can also be transferred from one PC to another through this software. The Internet Explorer is an example of this software.

Other Software Terms

Utility software

This software is a kind of system software designed to help analyze, configure, optimize and maintain the computer. A single unit of utility software is usually called a utility or tool. They are often rather technical and targeted at people with an advanced level of computer knowledge. Most utilities are highly specialized and designed to perform only a single task or a small range of tasks. However, there are also some utility suites that combine several features in one piece of software. Most major operating systems come with several pre-installed utilities. Disk defragmenter, disk cleanup, backup are common utilities of Windows.

Custom Made Software

Custom Made Software is the software, which is made for fulfillment of the user's requirement. Software programmers develop the software for the customer, as per the customer's needs.

Packaged Software

Off the shelf or packaged software is readymade software, which we purchase like a commodity.

Translators

A language translator or a language processor is a general term used for any assembler, compiler or other routine that accepts statements in one language and produces equivalent statements in another language. The language processor reads instructions in a language called source program and converts to other language usually in machine language, also called the executable program.

Computers understand machine language which we humans do not understand hence, a translator between human and machine language is needed. Three types of translators are

Assembler

This is a program used to translate assembly language program to machine code. It was used earlier and is not widely used these days.

Compiler

A computer translates program written in high-level language into executable program. Compiler is more complex program than assembler or other system programs and hence they need more memory. The language processor translates the complete source program as a whole in machine code before execution. The C and C++ compilers are best examples of compilers.

Interpreter

It also translates high-level language into machine language. But unlike compilers it translates a statement in program and executes the statement immediately before to translate the next statement. When an error occurs in the program the program is halted and an error message is displayed. An interpreter does not generate a permanent saved object code file. Whenever a program is re-executed the translation process is repeated. The QWBASIC is an example of interpreter.

1.14 Disk Organization

Disk organization refers to the manner in which the disk drive is organized for storage of data. Some related terms are discussed.

Disk Storage Capacity

It refers to the amount of data that a disk drive can store. It is measured in Megabyte or Gigabyte (MB, GB).

Boot Record

It is present on the first sector also called as the boot sector of a disk drive, from where the operating system starts to be loaded into the memory when the computer is started.

Disk partitioning

It is the process of creating primary and extended partitions on the disk drive. These partitions are logical division of the disk drive that can be used for formatting for use by a file system. Different partitions are required for better utilization of disk drive's storage capacity and backup of critical information.

File Allocation Table (FAT)

It is a file system used by MS-DOS and MS-WINDOWS. As per the name, it is a table, which stores information about sectors of disk, which all are occupied by a file or not. With the help of FAT, operating system is able to locate a file and do processing as instructed. Since, it is very important, MS-DOS keeps another duplicate copy of FAT, which will be used if the first FAT gets corrupted. FAT also stores details of damaged sectors of a disk.

Memory Capacity

It refers to the amount of data a storage device can hold. It is measured in KB or MB or GB.

Access time

It is time measured in milliseconds to access a data element for a storage device.

Memory Address

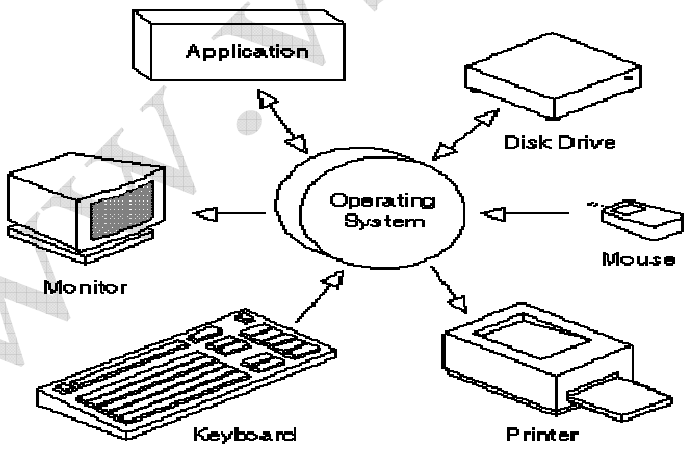
Generally, in a personal computer data is stored in storage locations termed as address or memory address. The computer process the data by accessing data by the memory address where data is present.

1.15 Operating System

Introduction

An Operating System is system software, which may be viewed as an organized collection of software consisting of procedures for operating a computer and providing an environment for execution of programs. Operating system is an interface between the user and the hardware of a computer. There are many important reasons for studying operating systems. Some of them are

- ✓ User interacts with the computer through operating system in order to accomplish his/her task since it is his primary interface with the computer
- ✓ It helps users to understand the inner functions of a computer very closely.
- ✓ Many concepts and techniques found in operating system have general applicability in other applications.



Operating System interaction

What is an Operating System?

An Operating System is a large collection of software, which manages resources of the computer system, such as memory, processor, file system and input/output device. It keeps track of the status of each resource and decides who will have a control over computer resources.

An Operating System is a set of programs that control the operations of a central processing unit (CPU) and enable the user to communicate with the system. The major ones for microcomputers are DOS, WINDOWS and UNIX.

Before the user starts interacting with the computer, a series of steps are executed. As a first step the processor starts executing the ROM-BIOS instructions stored permanently in ROM and is activated each time when machine is switched on. ROM-BIOS stand for READ ONLY MEMORY BASIC INPUT-OUTPUT SYSTEM. The first ROM-BIOS instruction is the start-up routine. These instructions test to see if computer is in good working order. It checks all the area of RAM and looks all the connections to see if they are functional. This testing activity of ROM-BIOS is called POST (POWER-ON SELF TEST).

Roles of Operating System

- ✓ It processes commands, which are entered at the command prompt.
- ✓ It helps to load program from external storage to internal storage.
- ✓ It helps in managing the hardware.
- ✓ It allows to control the reading and writing of data on to floppies and hard disk
- ✓ It helps in controlling and printing operations.
- ✓ It communicates messages to the user through monitor and takes input from the keyboard.
- ✓ It provides facilities such as copying, deleting, renaming etc. of files

Terms Related to Operating System

Batch Processing

In batch mode, each user prepares his program off-line and submits it to the computer centre. Then these programs are collected on top of another and then they are executed after loading. The method of batch processing reduces the idle time of the computer system because transition from one job to another does not require operator's intervention.

In batch processing the data are collected for a given period of time and the resulting "batch" of data is processed as a single job. Batch processing is quite useful when majority of records in a large database must be processed at the same time. Many organizations prefer to use batch-processing method for billing. Telephone, gas and electric, for example, prepare their bills using batch processing, salary calculations.

On-Line Processing

On Line processing permits transaction data to be fed under CPU control directly into secondary on-line storage devices from the point where data originates without first being sorted. The CPU can make programmed input control checks during this process. Using these input data, appropriate records (which are normally organized in the secondary storage unit in random fashion) may be quickly updated. The access to and retrieval from that record is quick and direct. On-line processing and direct access to records require unique hardware and software. E.g. Business transactions, on-line transactions on Internet.

On – line systems can reduce data – processing costs, offer better customer service and provide a strategic advantage over competitors. In this approach the CPU processes data instantly. As a result, whenever a user is interested to access or enter data, the request is granted with in a few

seconds. Unlike batch processing, each request is processed individually – there is no waiting while groups of requests are batched and processed together. On-line systems are thus preferred when selected records must be processed at any single point of time or when the user and computer system must interact.

Real Time Processing

Real time means immediate response from the computer. A system, in which a transaction accesses and updates a file quickly enough to affect the original decision making, is called a real time system. Real time processing system may be described as an online processing system with severe time limitations (with tighter constraints on response time and availability). It may be noted here that a real-time system uses on-line processing, but an on-line system need not necessarily operate in real time mode. E.g. Airline Reservation Systems, Traffic Control, Stock market evaluations. In these systems data is processed to make results available within a time scale that can influence external events, either automatically as in process control system, or via a human resource.

Multiprocessing

The term multiprocessing is used to describe interconnected computer configurations or computers with two or more independent CPU's that have the ability to simultaneously execute several programs. Different CPU's can process instructions from different and independent programs at the same time.

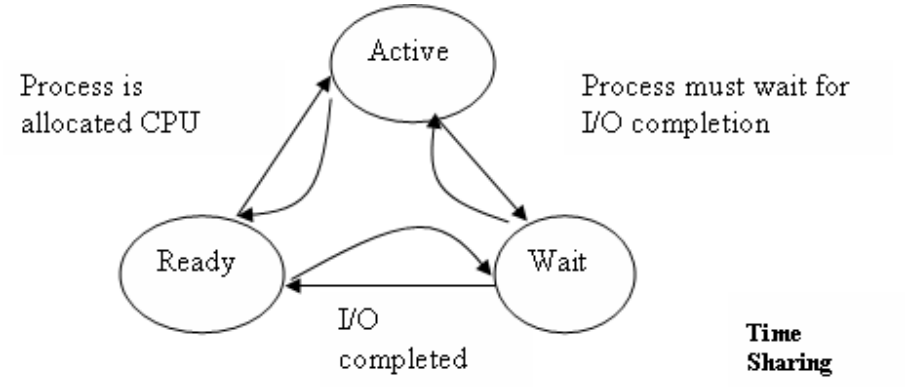
Multiprogramming

Multiprogramming is the name given to the interleaved execution of two or more different and independent programs by the same computer. In order to overcome the problem of under-utilization of main memory and CPU, the concept of multiprogramming was introduced in operating systems. The CPU switches from the one program to another almost instantaneously. Since the operating speed of CPU is much faster than that of I/O operations, the CPU can allocate time to several programs instead of remaining idle when one is busy with I/O operations.

Time Sharing

Time Sharing is a term to describe a processing system with a number of independent, relatively low speeds, online simultaneously usable stations. Each station provides direct access to CPU. Time-sharing refers to the allocation of computer resources in a time independent fashion to several programs simultaneously. The principal notion of a timesharing system is to provide a large number of user direct accesses to the computer for problem solving. In Time Sharing system, the CPU time is divided among all the users on a scheduled basis to allow all user programs to have a brief share of the CPU time in turn.

This short period of time during which a user gets the attention of the CPU is known as time slice. All the users who are using a Time Sharing system will fall in one of the following three status groups.



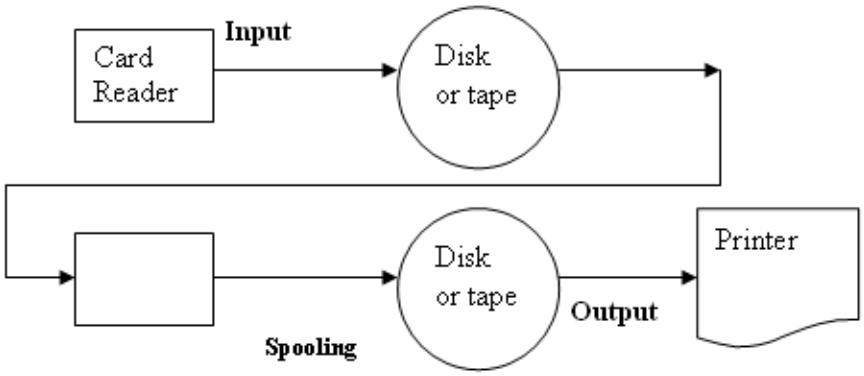
- ✓ Active The users program currently has control of the CPU. Only one user will be active at a time.
- ✓ Ready The user's program is ready to continue but is waiting for its turn to get the attention of CPU.
- ✓ Wait The user has made no request for execution of his job or the user's program is waiting for some I/O operations.

Advantages of Time Sharing

- ✓ Reduces CPU idle time
- ✓ Provides advantages of quick response
- ✓ Reduces the output of paper
- ✓ Avoids duplication of software

Spooling

Spooling is a technique that has been successfully used on a computer system to reduce the speed mismatch and in turn the idle time of the CPU. It is the process of placing all data that comes from an input device or goes to an output device on either a magnetic tape or disk. Special spooling programs are executed by the operating system to transfer the data from the disk or tape to the main memory or an input or output device. The disk or tape device acts as a buffer area between main storage, which is extremely fast, and I/O devices, which are relatively slow. Spooling programs are executed when the CPU is not too busy with other jobs



File

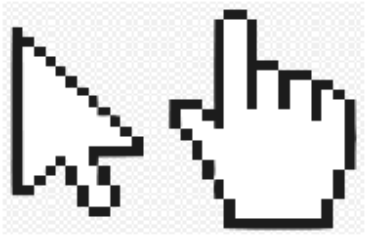
It is like a physical file having specific information. It has two main parts File name, which is the name given to the file to distinguish it from other files and file extension, which tells us about the application software used to create or edit this file and the type of data in the file for example MS-Word file have 'DOC' file extension and the file will be having letter or memo information but MS-Excel files have 'XLS' extension and stores numbers and formulas for calculation.

Directory

It is collection to store related files like a physical file rack having specific types of files. For example maps of a colony are stored in specific rack thus each map refers to a computer file and a computer directory refers to the rack. It is also called as folder.

Pointer or Cursor

It is an indicator used to show the position on a computer monitor or other display device that will respond to input from a text input (keyboard) or pointing device (mouse). The flashing text cursor may be referred to as a caret in some cases. The mouse cursor may be referred to as a mouse pointer, owing to its arrow shape on some systems.



Mouse-cursor and hand pointer