DEFINITION OF A COMPUTER

A computer is an electronic (digital) machine, which accepts input data (raw facts) from an input device e.g. a keyboard. It can processes the raw facts (using the processor) and finally displays the processed facts (information) via an output device. The computer temporarily stores data.

Models of Classifying Computers

The following factors are classified as:

Functional performance: This defines the speed of data processed. Mainframe computer have a better functional performance than mini personal computer.

Storage: The storage capability of a computer is the amount of data it can store. Different computers have different capability.

Cost: This refers to the initial and maintenance cost.

Size: This determines the type of computers too be used because the large the computer the more the space it occupies.

Types of Computer Systems

Super computers
- Developed in the 1970s,
- Fastest of all computers
- Got the highest capacity
- They are the most Expensive
- Occupy special air-conditioned rooms and often used for research. E.g. oil exploration, aircraft design, evaluation of aging nuclear weapons systems, prediction of spread of epidemics etc.

Mainframe computer
- They have greatly enhanced facilities.
- They are less powerful than super computers.
- They are less expensive than super computers.
- There size varies depending on how many concurrent users they are serving.
- They support enhance internal and backing storage.
- They are used in large business organization. E.g. Banks, Airlines, Insurance companies, universities, Revenue services etc.

Mini computer
- They are medium in shape i.e. physically larger than microcomputer but smaller than mainframe computer.
- They support average internal and backing storage.
- They are more powerful and reliable than microcomputers but are lower than mainframe computer capability.
- They are more costly than the microcomputers but are cheaper than the mainframe computers.

Workstations
- Introduced in the early 1980s
- Are expensive powerful computers used by engineers, scientists, and special effects for dedicated purposes.
- Used for tasks like designing airplane fuselages, prescription drugs, and movies special effects.
- Normally connected to large computer systems to facilitate the transfer of data and information.

Microcomputer
- They are referred as personal computers
- They are the smallest of the three
- They have the smallest internal memory and backing storage.
- They are the cheapest of the three
- They are the most common forms of computers in offices today.
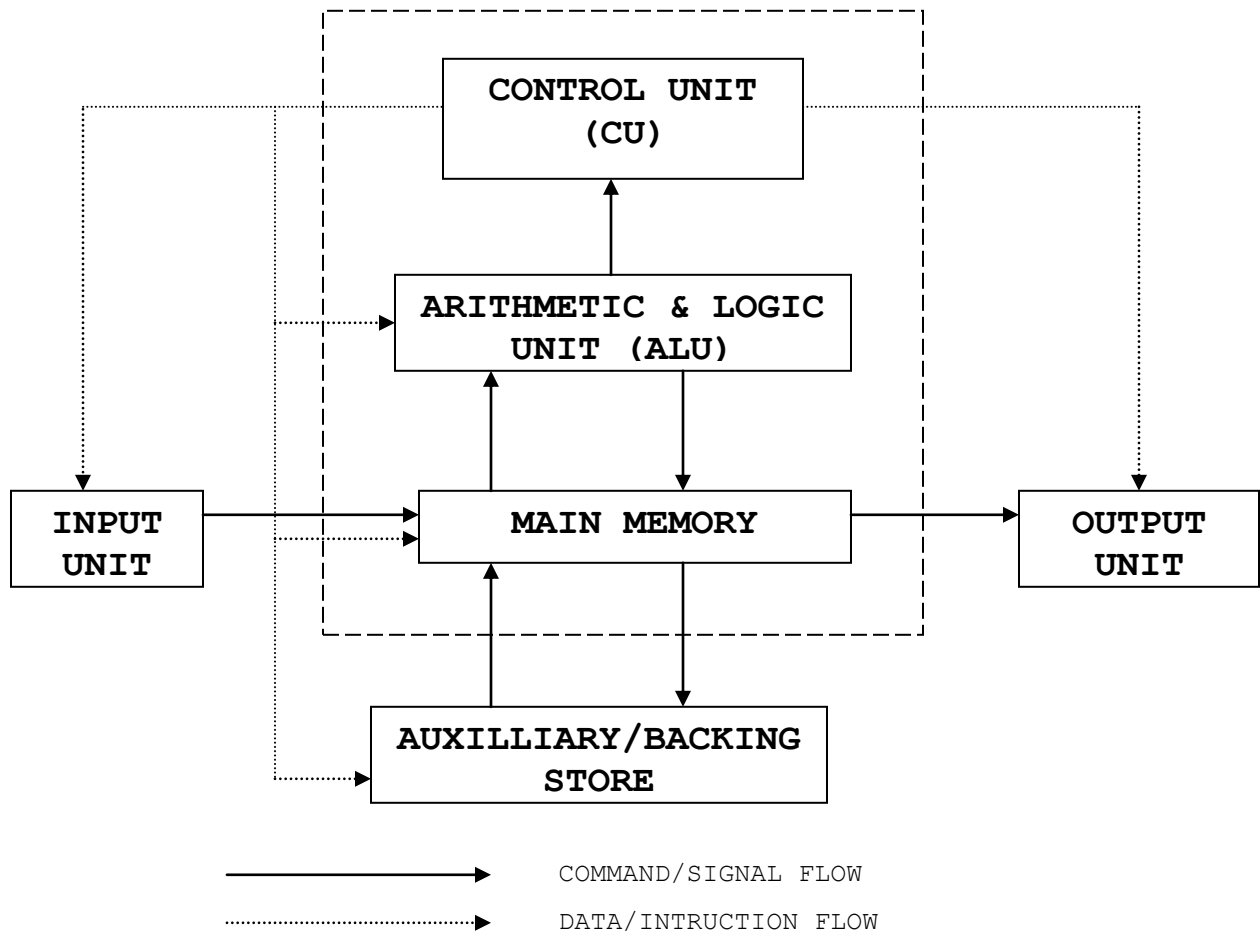
Micro Controllers.
- Also called embedded, dedicated, or hidden computers.
- They're tiny computers installed in "smart" appliances like microwave ovens and pocket calculators.
- Dedicated to performing a restricted number of tasks.

THE FOUR STAGE MODEL OF A COMPUTER

The four main element\component of a computer system are:
1. The input unit,
2. The control processing unit (C.P.U),
3. The output unit,
4. The backing storage.

This is illustrated in the block diagram below

```
                    ┌─────────────────────┐
                    │   CONTROL UNIT      │
                    │      (CU)           │
                    └─────────────────────┘
                               ↑
                    ┌─────────────────────┐
                    │ ARITHMETIC & LOGIC  │
                    │    UNIT (ALU)       │
                    └─────────────────────┘

┌──────────┐        ┌─────────────────────┐        ┌──────────┐
│  INPUT   │        │    MAIN MEMORY      │        │  OUTPUT  │
│  UNIT    │        │                     │        │  UNIT    │
└──────────┘        └─────────────────────┘        └──────────┘

                    ┌─────────────────────┐
                    │ AUXILLIARY/BACKING  │
                    │       STORE         │
                    └─────────────────────┘
```

COMMAND/SIGNAL FLOW

DATA/INTRUCTION FLOW

Input unit
It presents data to the computer in a way, which provides easy conversion into its own electronic form e.g. keyboard, mouse etc.

Output unit
This is for displaying information: soft copy output is available on the visual display unit (v.d.u) or monitor while hard copy refers to any point outs e.g. printers.

Backing /Auxiliary Storage Unit
It supplements the main memory by holding the processed data, which is not immediately required. This enables the permanent storage of a data in hard disk, floppy diskette and CD-ROM.

CENTRAL PROCESSING UNIT C.P.U
It controls all hardware and caries out arithmetic and logic operation on user data.
C.P.U acts as the brain of the computer.
It accepts and stores data (main memory).

It consists:
Main memory which:
1. Holds data for processing,
2. Hold instructions being executed,
3. Hold processed data waiting to be given as output,
4. Store temporary results,

FOUR FUNDAMENTAL COMPUTER OPERATIONS

They are:
1. Data movement
2. Arithmetic operation on data
3. Logic operation on data,
4. Data storage.

APPLICATIONS OF COMPUTER

- Used for education in School, Colleges etc,
- Used in hospital for controlling machines,
- Used for entertainment e.g. games e.t.c.
- Used for communication e.g. Internet, E-mail e.t.c.
- Used in business e.g. recording of data system,
- Used in military,
- Used for security,
- Computer network in an organization saves cost.

COMPUTER GENERATIONS

First Generation
1. Existed between 1944 – 1958
2. They were general-purpose computers.
3. Input/output media were punched cards and magnetic tapes
4. Main memory was made of hundreds of vacuum tubes – magnetic drum also used for main memory.
5. Computers were slow and large.
6. Produced a lot of heat (vacuum tubes failed frequently).

7. Could only run one program at time.

Second Generation
1. Existed between 1961 –1963
2. Were faster, smaller and more liable than 1st generation computers
3. Transistor (an electronic switch that alternatively allow s or does not allow electronic signals to pass.) were used in computers circuitry.
4. Removable magnetic disk packs were used for storage

Third Generation
1. Existed between 1964 –1970
2. Were smaller and used Integrated Circuits (IC's).
3. Magnetic disks became widespread.
4. Computer started to support multi programming.
5. Production of operating system and application of software packages increased rapidly.

Fourth Generation
1. Have been used since 1971 to date.
2. Input/output devices allowed data and instruction to be entered directly through the keyboard.
3. The microprocessor combined all the circuitry for the C.U and the A.L.U on a single chip.

Fifth Generation
1. Often referred to as the computers for today and the future.
2. They are computers with faster operation speed, greater processing capacity and unlimited memory.
3. Their circuitry is based on gallium arsenide instead of silicon.
4. It's assumed that they'll perform parallel processing i.e. many processors operating simultaneously.

COMPUTER MEMORY
Every computer has a main memory where data and instructions being executed are stored.
Computer memory is in the form of binary digits (bits), which is expressed in bytes, kilobytes, and Megabytes e.t.c.

> 1024 bytes = 1 KB
> 8 Bits = 1 Byte
> 4 Bits = 1 Nibble

Computer memory is a temporary storage location and is also referred to as main memory.

Classification of main memory
Main memory is classified into two namely: -
1. Random Access Memory (**RAM**)
2. Read Only Memory (**ROM**)

Random Access Memory

Characteristics
1. Programs can be written into and read from RAM
2. It is the largest part of main memory
3. It is volatile i.e. its contents are lost when power failure occurs
4. RAM is reusable

Functions of RAM
➢ Stores data and application waiting to be processed
➢ Holds instructions which are being executed or whose parts have been executed by the computer
➢ Stores results before they are communicated to recipients

Read Only Memory

Characteristics
1. Contents can only be read
2. It is non-volatile i.e. data is not lost as a result of power failure.
3. ROM cannot be overwritten.
4. It's contents are always entered during manufacture.

Functions of ROM
➢ Stores data and instruction that are necessary for the normal functioning of computer system hardware
➢ It stores control programs that are necessary for the initial activation of the hardware.

INPUT DEVICES

These are devices through which data in entered into the computer. They include keyboard, mouse, and light pen; touch sensitive screen, mouse, and digitizer e.t.c

Keyboard
- It is an input device, which is a system of keys
- It passes raw data to the CPU. When the user presses a key, the keyboard sends a signal to the computer, which displays the corresponding character on the screen

Mouse
- It is an alternative to the keyboard and provides an online direct input
- It is a box like device with sensor buttons and a ball, which slides on a flat surface
- It controls the cursor to move about the screen as desired
- It selects a function when the user clicks its button.

Joystick
- An input device used for playing computer games on domestics computers
- It is an analogue to digital converter that can move sideways, upwards or downwards

Light Pen
- It is a pen like device, which is light sensitive
- This method is usually used with the VDU, which is able to sense the touch point on the screen.
- It requires no typing.

Digitizer
- Converts graphical drawings on the paper into digital signals and conveys them to go as computer input
- They have a sensitive device on which a material to be digitized is placed
- They are used in banks for signature verification

DOCUMENT READERS
A document reader is a device, which can read data directly from source documents, which include Bank for signature verification.

Types of Document Readers

There are two types of document readers namely:
1. Optical readers
2. Magnetic reader

Optical readers
Used the principle of light to read data from source documents.
There are two basic methods of optical document reading namely
Optical mark reader: done by the optical mark reader.

Optical character reading: done by the optical character reader.

Magnetic reading is where a document is passed through a strong magnetic field causing the iron oxide in the ink and the coded character to become magnetized. The two types of magnetic reader's principles: -
    (a) Magnetic Ink Character Recognition – which is accomplished by the magnetic ink character reader (M.I.C.R)
    (b) Barcode Reader – which is done by the barcode reader.

Optical mark reader

OMR is a flexible system because the value of mark on an O.M.R document is unique to the particular type of document.
A program written specifically for that type of document interprets the mark.
The document reader converts the mark\ no mark into ones and zeros, which are then passed to the computer for interpretation

Advantages of O.M.R:

i).   No special equipment is needed for making e.g. pens, papers etc.
ii).   Marks can be made with a variety of methods e.g. pencils.
iii).   Its very straight forward to use hence less error prove.
iv).   It's fairly cheap (long-term cost).

Disadvantages of O.M.R

i).   They are usually for alphabetic data since it can't recognize characters
ii).   It requires printing to be clear.
iii).   It requires frequent re-designing of document.
iv).   The initial cost of the O.M.R. machine is high.

Application of O.M.R

They are used in order form
They are used in time sheet
They are used in examination mark reader.

Optical character reader (OCR)

These are human readable and have the same meaning to the optical reader as the people.
It only recognize the character and not marks
Characters include numeral, alphabets and symbols.

Advantages of OCR

It is natural method hence documents are understood by everyone.
It is less expensive compared to hand printing/typing
OCR documents are fully printed in clearly readable characters

Disadvantages of OCR

Initial cost of OCR machine is high
Documents require re-designing quit frequently.

Application of OCR

Sales orders with order details
Payment data printed in OCR font (form refer to the appearance of character)
Stock sheets

Magnetic ink character reader (M.I.C.R)

The concept behind M.I.C.R. is not suitable as a general method for holding data for cheaper input. This is because printing of magnetic ink character call for very precise positioning and print quality control.
The amount of printing is limited to one line of character in a pre-determine position
These methods are commonly used in banking for bankcard and cheques books.

Bar code reader

It is a group of parallel dark bar of ranging width separated by a white space.
Variation of width of the bar and space between them can be used to encored different information
Bars are often added at the beginning and at the end of the cord to prevent other printing from being accidentally interpreted as part of the code.
They also indicated the direction in which the cord should be read
Are widely used in supermarkets to identify items

OUTPUT DEVICES

They give the processed information to the user either in soft or hard copy.
Examples include printers, plotter and VDUs

Printers

Are output devices, which are used to produce hard copy output?

Factors to consider when selecting a printer

Cost
This refers to the printer's initial cost and subsequent cost of maintenance as well as consumable items e.g. papers, ribbons and toners.

Speed
Is determined by the volume of printing expected. A big organization needs a fast printer like laser printer

Print quality
This is determined by the nature of reports to be generated and their recipients

Computer system interface
A printer should be able to connect to almost all computers

Capability range
It should be able to give multiple copies, good print styles etc

Classification of printers

Printers can be classified into to major groups namely
1. Impact
2. Non impact

Impact printers

Provide print by the printing head element coming into actual contact with the stationery through the inked ribbon, which is found, between the printing head element and the stationery
Example include dot matrix printers, daisy wheel printers, thimble printers, golf ball printers etc

Non-impact printers

They provide prints by the print head element not coming into actual contact with the stationery but make use of other techniques such as ink spray, thermal, electrostatic principles or laser technology.

Examples include laser printers, inkjet printers, thermal printers etc

Comparing impact and non-impact printers

Impact	Non impact
Cheap	Expensive
Are slow	Are fast
Produce poor quality printouts	High quality printouts
Are noisy	Are quiet printers

Dot matrix printers

➢ They produce outputs by firing pins (also known as print wires) an inked ribbon which touches and leaves marks on the paper i.e. they print by a pattern of dots.
➢ The pins are contained in the print head, which is secured to a moving carriage that sweeps across the paper, and produce the effect described above.
➢ The pins are moved or fired by coils of wire called solenoids. When a coil is energized it forms a strong electromagnet that causes the metal firing pin to move sharply forward and strike the ribbon. A strong permanent magnet moves the pins back into their resting position immediately after firing.
➢ The output quality of dot matrix printer is largely governed by the number of pins in the print head.
➢ Modern dot matrix printers use 9 pin or 24 pin print heads, which offer an improved print quality
➢ They consist of a lever, which adjusts the gap between the print head and the platen (platen gap) to accommodate different thickness of paper
➢ Consumables include carbon or nylon ribbons, print heads and paper
➢ They print single character at a time

Daisy wheel printers

▪ They use an interchangeable print head which resembles a daisy flower.
▪ Each spoke on the daisy wheel holds one character. To print the character the wheel is rotated and a hammer strikes the back of the spoke then presses it against the paper. The daisy wheel moves along the next position and the process is repeated
▪ Their consumables include carbon ribbon and print head and paper
▪ They have a print speed of 15-100 characters per second (cps)

Thimble
▪ Similar to daisy wheel except that characters are on a thimble shaped print head
▪ They use carbon ribbons to produce fair quality printouts

Golf ball
▪ Has a moving type sphere or print head
▪ The print head is shaped like a golf ball which moves across the stationery
▪ It is the print head which moves and not the paper

Inkjet printers
- An inkjet print head is composed of very small holes or nozzles behind which can be found a reservoir of ink
- Under normal conditions the ink cannot flow through the nozzles because the gap is very small and the ink reservoir is kept at a pressure slightly below that of the ambient pressure
- When a small amount of ink is forced through the voltage charged deflection plates and onto the paper, character are formed
- They use electrostatic principles to produce printouts
- Consumables include ink reservoirs, print heads and paper.

Laser Printers
- Like dot matrix printers they produce their printed output in a series of dots, however they produce much smaller dots
- A laser printer operates on the whole image as a single item. This means that the amount of memory (RAM) installed in a laser printer determines the amount of graphics and text which it can handle per page
- After the printer receives the data for one page, the data is broken down into a series of single dot strips (called **rasters**) in a process known as rastering.
- Laser printers contain a photosensitive drum known as the organic photoconductor (OPC) drum whose coating can hold a very high electrostatic charge. Using its primary corona wire, the laser printer applies a uniform negative charge to the OPC drum. This process is referred to as electrostatic charging or conditioning
- During laser imaging, the surface coating of the OPC drum losses its charge by being exposed to light. A laser removes the charge line by line as the drum rotates. As the laser receives the image information it fires a short pulse of light for each dot in the raster. The pulsing light beam is reflected onto the OPC drum by an oscillating mirror that spreads the dot information across drum. The OPC ends with a series of raster line with charge/no charge areas representing electrostatic picture of the image to be printed
- During image development, the toner is fed evenly onto a magnetized roller known as the developer roller. The developer roller is located very close to the OPC drum and is charged to the same negative polarity hence it does not interact with the OPC drum. Once the charge is removed from the OPC drum by the laser, the toner is attracted to it and sticks to its surface. The OPC drum then rotates until it reaches the paper.
- During image transfer, the paper is picked up from the paper tray, pulled through the printer by a system of wheels and roller and passes between the OPC drum and high voltage wire (corona wire). The wire generates a strong electrostatic field on the paper which attracts the toner from the OPC drum onto the paper
- During fusing, the paper continues past the OPC drum and passes between a hot roller and a pressure roller so that the toner is fused or melted onto the surface of the paper
- To complete the printing cycle, the OPC drum is cleaned to remove any remaining charge and toner particles. This is done by a metal bar that rests on the surface of the drum

Laser printer consumables
- Toner
- OPC drum
- Corona wires
  They are fine wires used to place electrostatic charge on the OPC drum, developer and paper. Due to their high voltages, they eventually break down hence they are often installed in removable housings.

- Ozone filter
  The high voltages generated by the laser printer can ionize the air inside the Mechanism and lead to the production of zone (corrosive gas). Some laser printers Incorporate a small fan and a carbon based air filter to remove this gas before it can Damage the printer or affect its users.

Thermal printers
These are non-impact printers, which create print images on a special paper by heated wires in the print head.

Printer paper feed mechanisms
Friction feed
The paper is gripped between two rollers like in a typewriter. It is suitable for single sheets
Traction feed
Specially designed paper with holes along the edge fits over wheels with corresponding spoke for the holes. The wheels revolve to draw the paper
Cut sheet feeder
This is also referred too as form feed. It automatically feeds sheet paper into a friction feed printer.

VISUAL DISPLAY UNIT (VDU)
It is an output device, which produces a soft copy output. The two types of VDUs are monochrome and colour

VDU specifications
Resolution and pixel density
The number of display dots, which are addressable on the screen, is referred to as pixel density. A pixel is an addressable dot on the screen. The resolution is usually 5000 to 1500 horizontally and 200 to 1200 vertically. The higher the pixel density the better the resolution.

Colour range
This is defined by the number of colours, which can be reproduced by the VDU. Some systems produce only four colours (namely red, green, blue and white) while others can give a million colours by colour combination and intensity

<u>Screen shape and size</u>
VDUs are available in a variety of shapes and sizes. The standards screen however has a size ration of 4:3 width to height

<u>Reflections</u>
Can be avoided by reducing the polished finish on the VDU glass screen. This can also be done using anti glare screen.

PLOTTERS
- ➢ A plotter is an output device, which produces a hard copy output and is mostly used for printing graphics. The most commonly used plotters are the XY plotter and the flatbed plotter.

- ➢ The XY plotter operates from coordinate geometry i.e. it has X and Y axes
- ➢ The flatbed plotter consists of a pen and a cylinder. The pen moves on the X while the cylinder rotates on the Y plane

NB:
Before buying a plotter it is important to consider the same factors considered for printers

AUXILIARY STORAGE DEVICES

They include
- a) Magnetic tapes
- b) Magnetic disks
- c) Optical disks

Magnetic tape

<u>Physical characteristics</u>
- ➢ It is typically 1.5 inch wide and 2400 feet long
- ➢ It has a plastic base coated with magnetized material on one side.
- ➢ Data is recorded as magnetized spots each representing a binary digit.
- ➢ Data is stored in tracks, which run the length of the tape.
- ➢ An aluminum strip called the **Load Point Marker** marks the physical beginning of the tape for recording purposes.
- ➢ An end of tape marker marks the physical **end of the tape**

<u>Advantages of magnetic tapes</u>
1. Are relatively cheap.
2. A magnetic tape is capable of transferring data to and from internal storage at very high speeds.
3. Old data may be erased and the tape reused.
4. Data can be sorted by a computer into the sequence required for updating.

Disadvantages
1. It is only possible to access records serially i.e. one bit at a time
2. Updated information cannot be written back to the same location on the same tape
3. Transaction file has to be in the same location as the master file before updating starts

Magnetic Disks

Physical characteristics
➢ They are made from a light alloy coated on both sides with a layer of magnetized oxide.
➢ Data is stored on the disk surfaces along concentric tracks.
➢ These tracks are divided into sectors similar to blocks on magnetic tapes.
➢ Data in the disk is stored in binary code.
➢ Read/write heads do not come into contact with the disk surface

Advantages of magnetic disks
➢ Any item of data can be directly addressed depending on the method of file organization used
➢ Magnetic disks have a high data transfer rate
➢ Input of data can be done at random
➢ Latest disks e.g. 30Gb have a high storage capacity

Disadvantages
1. They are expensive
2. Data may be accidentally erased or overwritten.
3. Data will be lost if the disk is subjected to stress.
4. Data will be lost if the disk is subjected to magnetism.

Note:
The two types of magnetic disks are
    1. Hard disks
    2. Floppy disks
A **hard disk** is a high performance drive where data can be read at very high speeds
A **floppy disk** (diskette) is a popular storage medium for microcomputer systems.

Precautions for handling magnetic disks
1. Write on labels before you fix them on the disks.
2. Do not touch exposed areas such as the red/write heads.
3. Store disks in protective jackets in upright positions.
4. Do not bend or use paper clips on disks.
5. Keep disks away from magnets.
6. Do not remove a floppy diskette from the floppy disk when the green or yellow floppy drive light is still on.
7. Do not expose disks to dust.

Optical disk

- This device works on a similar principle to that used for the audio compact disks (CDs)
- They are read only devices.
- Information is held on a metallic layer sandwiched in a protective envelope made of glass or plastic.
- The information is stored in the disk by laser beam, which burns the hole in the metallic layer or raises as small blister.
- Optical disk devices are expensive but the cost is justified by the amount of data they can store.
- Data stored in an optical disk cannot be erased, as is the case with magnetic disks.

SOFTWARE

This is a term used to describe all programs that are used in a particular computer installation together with their associated documentation.

Types of software
There are two major categories of software namely
   i)   System software
   ii)   Application software

System software

This is software, which is provided by the manufacturer e.g. Microsoft
System software refers to programs that are necessary for the control and performance of the PC
System software can be divided into the following classes
   i)   Operating systems and control programs
   ii)   Languages translators
   iii)   Utilities or service programs
   iv)   Database managements systems

Application software
There are two categories of application software namely
   ➢ Application packages
   ➢ User application programs

Application packages
There are two types of application packages namely
   ➢ General
   ➢ Special
   ➢ Special application packages perform specific tasks and cannot be damaged or programmed to perform a different task. Examples include payroll and packages
   ➢ General application packages are usually available from manufacturers and software house and can bee applied to a variety of tasks

OPERATING SYSTEMS
An operating system is a suite of programs that manage the computer resources such as 1/O transfers, memory and CPU time. the operating system takes over the control of the computer by allowing a number of programs to be run

Tasks performed by the operating system
These include
   ➢ Booting housekeeping tasks
   ➢ User interface
   ➢ Managing computer resources
   ➢ Managing files
   ➢ Managing tasks

Booting
The term booting refers to the process of loading an operating system into a computer's main memory from diskette or hard disk. This loading is accomplished by a program known as bootstrap loader that is stored permanently in the computer's electronic circuitry. The O/S is therefore important when booting a computer. If it is running properly then the command prompt will always be displayed

Housekeeping tasks
It performs common repetitious "housekeeping tasks"e.g formatting blank diskettes to electronically prepare them so that they can store data or programs.

User interface

User interface is the part of the operating system that allows the user to communicate or intact with it. There are three types of user interfaces for both operating systems and application software namely.
- Command driven.
- Menu driven.
- Graphical.

Command driven
Requires the user to enter commands by typing in codes or words e.g. DIR in MS-DOS instructs the computer to display a directory list of all file names on a disk.

Menu driven
Allows the user to choose a command from a menu

Graphical interface
- The graphical user interface (GUI) uses images to re[present options. Some of this images take the form of icons (small pictorial figures that represent functions, programs or tasks)
- GUI uses windows to divide the display screen into sections
- CUI permits liberal use of the mouse

Managing computer resources
- Suppose you are writing a report using a word-processing program and you want to print out a portion of it while continuing to write, how does the computer manage both tasks?
- This activity is performed by the **supervisor** or **kernel**, the central component of the operating system

Managing task
In word-processing a computer accepts input data, stores the data on a disk and prints out a document, it thus manages different tasks

Types of Operating Systems

Single program operating systems
It allows one program to execute at time
The program must completely finish executing before the next can begin

Concurrent
This allows a single CPU to execute what appears to be more than one program at the same time when only one program is being executed, this processing happens so fast that it appears as if the programs are being executed simultaneously.

Time sharing operating system
This allows multiple users to access a single computer system. The attention of CPU is switched among user on timed basis, controlled by the operating system.
If the number of users exceeds the operating systems capability, there will be a delay in processing it can also be called multi-user operating system.

Multiprocessing Operating System
This allows for the simultaneous execution of programs on a comp that has several CPU,S sharing the same memory.

Real Time Operating System
It allows the computer to control task performance by other machines and people by responding to the input data in the required amount of time for controlling process, immediate response is usually necessary.
For monitoring processes periodic response it adequate.

Multiprogramming Operating System

It is also referred to as multi tasking operating system.
It occurs when more than one program is being processed at the same time.

UTILITIES OR SERVICE PROGRAMS
Are system programs that provide useful service to the user of the computer by providing facilities for performing specific tasks. Common types include file copying, sorting, tracing and debugging, dump etc.

File copy
Also referred to as media conversion and is a program that copies data from one medium to another e.g. from floppy diskette to hard disk drive

Sort
Is a utility used to arrange file programs in a specific sequence e.g alphabetically or numerically

File maintenance
Allows for file updating i.e. deleting, modification etc.

Tracing and debugging
This is commonly used in conjunction with the testing of application programs on the computer. Tracing involves dumping internal storage after obeying specific instructions so that the cycle of operations can be traced and errors located.
Debugging is the term given to the process of locating and eliminating errors from a program.

Dump
The term dump means copying the contents of main storage onto an output device. This program is useful when an error occurs during the running of an application.
It also refers to copying contents of main storage to an auxiliary storage device.

Text editors
They are used to provide facilities for the creation and amendment of programs.

LANGUAGE TRANSLATION

A translator is a program that converts statements written in one language, to statements in another language e.g converting assembly language or low level language to machine language. In this case assembly language will be called the program (code) and the machine language program will be called the object program code (opc)

There are three types of language translator;
    (1) Assemblers
    (2) Compilers
    (3) Interpreters

Assemblers
- This is a program that converts statements written in assembly language or low level language (source code) to machine language (object code).
- Assembler addresses into machine addresses.

Compilers
    A compiler translates a high level language (source codes) into machine language (object code).
    Main machine instructions are generated for each source statement
    A compiler translates the whole document at ago and terminates a list of errors found during compilation.

Interpreters
    This translates and executes high level language source statements into an object code by following a logical sequence.
    It translates high level language program on statement by statement basis

DATABASE MANAGEMENT SYSTEM (DBMS)
It is software that constructs, expands and maintains the database by adding new records, deleting old records and amending records

APPLICATION PACKAGES
There are two types of application packages namely
  Special
  General

   Special application packages perform specific tasks and can not be changed or programmed to perform a different task, examples include payroll and musical packages.

   General application packages can be applied to a variety of tasks. A spreadsheet for example has features and capabilities to create one worksheet to calculate a payroll and another worksheet to monitor personal investments.
General application packages are usually available from manufacturers and software houses.
Examples include: Spread sheets-Lotus 1-2-3, Excel Databases- Dbase, Access, Word Processing-WordPerfect, Wordpad

Advantages of using application packages
  They are used by developers to suite the changing demands and technology.
   Packages are usually easy to learn and use.
   Packages have a minimum errors because they've thoroughly tested before release
   Testing of packages is less expensive.
   Compared to user made programs, using packages is cheaper considering the time, which would be required to develop the programs.
   The service of specialist like programmers are not needed hence cost saving.
   Implementation usually takes a shorter time.

Disadvantages of application packages
    Most unlikely to march the users requirements exactly.
   Programmer training may be difficult.
   They are not usually as efficient as user made programs.
    Not all packages are compatible with all computer systems.
    When changes occur, extra cost is usually needed from the user.

Factors to examine when considering an application packages for use

1. Whether the cost is within your limit.	6. Is the package simple to learn.
2. What is the actual type of the package?	7. Can it be interfaced with existing software?
3. Whether the suppliers maintain the package.	8. Can it be used in a variety of comps?
4. Is the documentation adequate and simple to follow.	9. Can the software be modified by the users
5. What are the views of independent users.	10. Which version of it currently in the market.

USER APPLICATION PROGRAMS
These are programs designed by the user/programmer to perform specific tasks e.g. a programmer can write a program to control the menu of a hotel

COMPUTER PROGRAMMING
A computer program is a set of sequential and logical instructions written in a computer language.

Stages of Program Developments
1. *Problem analysis*
   The analyst becomes familiar with requirements of the user. The analyst refers to what's needed to meet the user requirements

2. *Program Design*
   The logical steps of computer program are defined. This involves the user of pseudocodes and flow charts

3. *Coding*
   It involves writing program instructions in a programming language (source-code)

4. *Translation*
   It involves transforming programs from the SOS code to the object code so that the comp can understand and execute the program.

5. *Testing and debugging*
   This is the stage where the programmer makes sure that the program performs, as it should by running test data and removing all functional or logic errors.

6. *Documentation*
   This involves writing a description of the program, the instructions for using and providing the information necessary to maintain it.

Programming Languages

The four levels of programming languages are:-
Machine Language
Low level or assembly Language
High level languages
Fourth generation languages. (4GLs)

Machine Languages
It is commonly referred to as computer language programming
All comps operate in their own machine language
These are programs written in binary form, which can be directly understood by the comp hence they require no transistors.
They occupy little space in the C.P.U