COMPUTER HARD WARE

These are the physical components of a computer that can physically be touched and felt (tangible). Parts you can see, feel then touch e.g. keyboard, mouse, C.P.U (system unit)

CATEGORIES OF COMPUTER HARDWARE:

- Input devices/hardware
- Output devices/hardware
- Storage hardware /devices
- Processing devices/hardware
- Communication devices/hardware

COMPUTER INPUT DEVICES:

Input devices are hardware that are used to enter/ capture data then convert it into a suitable form (digital form) for computer processing e.g. keyboard, mouse, scanner, digital camera, light pen, touch screen, web cam, sensors, joystick, microphone, touch pad.

KEYING INPUT DEVICES

1. KEY BOARD

This is an input hard ware/ device that is used to type and enter instructions into a computer. It looks like the keyboard of an ordinary typewriter but with some special keys like:-The control key (CTRL), the Alter key (ALT), the Escape key (ESC), the Arrow keys, and the function keys ranging from F_1 to F_{12} and each key has its function.

A keyboard consists of the following sections:

1. Typing area that includes the letters of alphabets, numbers, punctuations marks and other basic keys.
2. Numeric keypad- This is laid out like keys on a calculator. It has two purposes;-
   i. When the num keys is off, the numeric keys may be used as arrow keys for cursor movements and for other purposes such as;
   ii. Page up (pg up) and page down (pg dn)

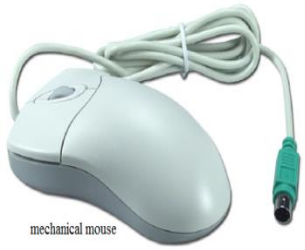
3. **Function keypad area.**
   This consists of the function keys ie f1 to f12.they all have particular functions
4. **Editing keypad area.**
   This consists of the editing keys like delete, insert, end, home etc and also has arrow keys which help to navigate through the document

POINTING INPUT DEVICES

2. MOUSE

A mouse is an input device that acts as an electronic finger that is used to select icons and applications on a computer screen (monitor). It complements the keyboard as regards input of data.

The mouse employs the principle of moving a ball in which turn moves rollers adjacent to it. The rollers then translate the electrical codes that relocate the pointer or cursor on the different points or parts of the screen, to select icons.
Icons are graphics or pictures that represent a program or folder or a file on a computer.


mechanical mouse

TERMS USED WHEN USING A MOUSE

Point
It is to move a pointer to a desired spot on the screen such as over a particular object or word.

Click
It is to press and quick release the left mouse button. A click often selects an item on screen

Double click
It is to press and release the left mouse button twice as quickly as possible. Double click often opens a document or it starts a program.

Drag
It is to press and hold down the left mouse button and move it in different locations on the screen.

Drop
It is to release the mouse button after drag therefore drag and drop is an activity that moves item on different positions on the screen.

Right click
It is to press the right mouse bottom and release which brings up popup menu with oppositions to chose from.
ADVANTAGES OF USING A MOUSE

1. A mouse is user friendly for computer beginners.
2. A mouse is easy and convenient to use with a graphical user interface.
3. Using a mouse to select items or move to a particular position on the screen is faster than using a keyboard.
4. A mouse can be operated by one hand.

DISADVANTAGES OF USING A MOUSE.

1. it is not easy and convenient to input text with a mouse.
2. Issuing commands with a mouse is slower than by using a keyboard.
3. It needs some practice in order to control a mouse properly.
4. A mouse is not accurate enough for drawings that require high precision.
5. A mouse usually requires a flat surface to operate.
6. A mouse needs more desk space to operate when compared with a trackball or a touchpad.

PROBLEMS THAT AFFECT THE PROPER FUNCTIONING OF A MOUSE.

1. Dirt disrupts motion of ball.
2. Nature of the roll surface.
3. Disconnection of the chord in case the mouse falls on hamps.

WAYS THROUGH WHICH MOUSE CAN BE PROTECTED FROM THE ABOVE PROBLEMS

1. Cleaning the ball and rollers regularly.
2. Providing the correct roll surface or a mouse pad.
3. A void mouse falling or hanging on the chord by tying twists on both the Mouse and keyboard cables

3. TRACK BALL

This is another pointing device that functions like a mouse. A track ball has a movable ball on top of stationary device that is rotated with finger or palm of a hand. A track ball is in built into the key board especially on some portable devices like laptop, phones e.t.c.

3. TOUCH PAD

A touch pad is a flat rectangular device that has weak electric fields to sense the touch as the users moves the finger tips. It used to control the pointer with a finger. The Cursor follows the movement of the finger on the pad. You can click by tapping the pad surface.

4. **JOYSTICK**

This is a pointing device that consists of a vertical handle which looks like a gear shift lever mounted on a base with two buttons. It mainly used in video games in some computer aided design system and in accomplished robot system.

5. LIGHT PEN

This is a pointing device that can detect the presence of light. These are used in high technological designs. They have a beam of light that is radiated into different parts of a specialized screen to input data. These beams of light are very small and sharp and therefore much précised. They are used in the designing of integrated circuits (I Cs), also used by health care professionals e.g. doctors and dentists work

6. TOUCH SCREENS

A **touch screen** is an electronic visual display that can detect the presence and location of a touch within the display area. The term generally refers to touch or contact to the display

of the device by a finger or hand. Touch screens can also sense other passive objects, such as a pen.

Areas where touch screens are used

- Touch screens are often used for information kiosks located in department.
- Touch screens are also used for ATM machines to allow easy access of bank accounts.
- Touch screens are also used in some places like stores, hotels, air ports, museums.

ADVANTAGES OF TOUCH SCREEN

- No extra peripherals are needed except the monitor.
- Touch screen allows easy access commands, which are usually identified by words or symbols on the screen

7. DIGITIZER:

This looks like the mouse except that it has a glass with a cross hair in the middle. The cross hair acts as a guide during the input of data. It is used in conjunction with a digitizing tablet. It is mainly used in cartography (map making and architectural drawing to accurately trace the outlines on a map.

8. STYLUS AND GRAPHIC TABLET

A stylus is a pen like pointing device which uses pressure to write texts and drawing.

Graphic Tablet is a flat rectangular electronic plastic board on which a stylus writes and draws.

A graphic tablet corresponds to a specific location on screen. A graphic tablet can be used to digitize drawing with great accuracy. Styles and graphics tablet are mainly used for computer aided design and drafting by architects, map maker, artists and designers.

ADVANTAGES OF STYLUS AND GRAPHICS TABLET

- A stylus can be appointed to different positions on the tablet quickly

DISADVANTAGES

- A stylus and graphics tablet normally has to work together and can it work separately.

SCANNING INPUT DEVICES

These are hard ware that capture images of hard copy and converts them into a digital form for a computer processing.

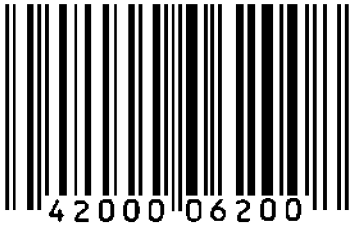
EXAMPLES OF SCANNING INPUT DEVICES

9. OPTICAL SCANNERS

This is a device that can read text or illustrations printed on paper and translate the information into a form the computer can use (digital form). It uses a laser beam and reflected light to translate hard copy image of text, drawings, and photos in to the computer in a digital form. The image can then be processed into the computer, displayed on the monitor and then stored on the storage devices like a flash disk.

10. BAR CODE READER

Bar codes are vertical strips or line marks or striped marks printed on retail products and other items.



A **barcode reader** is a photo electric scanner that translates the barcode symbols into digital form of which the corresponding information about the items is relived from store computer and printed out for a customer as a receipt.

Records of sales are easily input into a computer which in return may be used for accounting and restocking.

Places where Barcode readers are mainly used

1. medical stores,
2. book shops,
3. departmental stores and
4. supermarkets

ADVANTAGES OF USING A BARCODE READER

1. The process of data entry fast and accurate.
2. Bar codes can be printed by normal printing method.
3. There is no need to write the name of the commodity and its price by use of a pen and paper.

DISAVANTAGES OF USING A BARCODE READER

1. Bar codes cannot be read directly by people
2. Only numbers can be coded.
3. Barcode readers may misread the barcodes if there is any dirty on the code.

11. OPTICAL MARK RECOGNITION READER (OMR)

This is scanning technology that reads pencil marks and converts them to the computer. OMR readers are often used for making multi choices, answer sheets; capturing data from questionnaires, interviewed environment forms, mark sheets etc

ADVANTAGES OF OMR READER

- O M R has a better recognition rattan and fewer mistakes are made by machines to read marks than OCR.
- A large volume of data can be collected easily and quickly without the need of trained staff

DISADVANTAGES OF OMR READER

- Documents for O M R are complicated to design.
- The OMR reader needs to be reprogrammed for each new document flow
- Any folding or dirty on the form may prevent it from being read correctly

12. OPTICAL CHARACTER RECOGNITION READER (OCR)

It uses a scanning technology that reads special pre – printed characters and converts them into a computer in a digital form. OCR readers are often used to turn around documents e.g. electricity bill. OCR can also recognize hand human characters but generally must be block printed

ADVANTAGES OF OCR

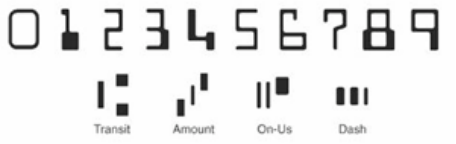
- Written and printed data can be read but some time
- Documents can be read directly in computer without reprinting it
- The input character can be edited by word processing soft ware

DISAVANTAGES OF OCR

- It doesn't work well with hand written character or those unusual fonts.

13. MAGNETIC INK CHARACTER RECOGNITION READER (MICR)

Magnetic Ink Character Recognition (**MICR**) is a technology that allows details from **bank cheques** to be read into a computer **quickly** and **accurately.** The **cheque number** and **bank account** number are printed at the bottom of each bank cheque in **special magnetic ink** using **a special font.** These numbers can be detected by **an MICR reader.**



Special font
Used on the cheques

ADVANTAGES OF MICR READER

- The error rate for the magnetic scanning of a typical cheque is smaller than with optical character recognition system.
- The use of magnetic printing allows the characters to be read reliably even if they have been overprinted or obscured by other marks, such as cancellation stamps.
- The "can't read" rate is usually less than 1% while the substitution rate (misread rate) is in the order of 1 per 100,000 characters.

DISADVANTAGES OF MICR READER

- M I C R reader is very expensive.
- The system only accepts few character sets

14. MAGENATIC STRIP READER

Magnetic strips readers are used to read information contained on magnetic strips on cards (credit cards). A magnetic strip detects the pattern of magnetic ion and converts it in to numeric data.

ADVANTAGES

- Reading is accurate and fast

DISADVANTAGES

- The amount of data that can be stored on strips is limited.
- The magnetic strips can be damaged by exposal to a strong magnetic field

15. VOICE RECONITIION DEVICE

Voice recognition, speech recognition is a computer capability to distinguish spoken words. Voice recognition programs don't actually understand speech; they only recognize vocabulary of reprogrammed words. Voice recognition programs are speaker dependent or speaker independent.

Voice recognition on Samsung phone

ADVANTAGES OF VOICE RECOGNITION

- No typing of data is necessary.
- The system can be used by people whose hands are occupied or disabled.
- Voice recognition systems are also ideal for blind or visually impaired users.

DISADVANTAGES OF VOICE RECOGNITION

- Error rate is still high at the moment.
- Recognition of words is slow.
- Words sound the same e.g. see and sea can't be distinguished.
- The system is not suitable for use in noisy places
- The software must be trained to recognize specialists of technical words.
- Many people find it difficult to speak in writing style.

16. A DIGITAL CAMERA

A digital camera is an input device that takes video or still photographs, or both, digitally by recording images via an electronic image sensor. It stores the images on a flash memory card or compact disc (C.D) or micro drive

ADVANTAGES OF DIGITAL CAMERA

- It saves money and time since it doesn't require a film and time to develop the film.
- The image taken can be viewed and even edited
- unwanted image taken can be deleted quickly
- Photographic images can be digitized directly without using a scanner
- Digital cameras are best for 3 dimensional objects while scanners are best for dimensional objects

DISADVANTAGES OF DIGITAL CAMERA

- Digital cameras are normally more expensive than ordinary film cameras with similar functions
- Photo printing cost for digital cameras generally higher than the of ordinary film cameras.

17. WEB CAMERA (webcam)

This is a video camera whose output displays on a web page.

18. MICROPHONE

A microphone is an input device that allow user to speak to the computer to enter data and instructions into the computer

19. MIDI DEVICE

MIDI (Musical instrument Digital Interface) is an electrical music industry's standard that defines how sound are represented electronically by digital musical devices. MIDI devices connected to the sound card of the computer. Examples of MIDI devices include the following;

- Electronic Piano keyboard.
- Synthesizer or drum machine


20. SENSOR & REMOTE SENSOR

A sensor is an input device that detects external changes in an environment. An external change includes; levels of light, temperature, Sound, position PH value and humidity. The data received can be processed indirectly to influence the out of the system. When sensors are located at some distance from the computer system they are known as remote sensors.

Remote sensor

Examples of sensor application include;

- Freezers and chiller cabinets which are used in supermarkets to monitor temperature.
- Smoke sensors that are used in builds to detect any fire outbreak.

21. CCTV (Closed-Circuit Television) CAMERA

CCTV cameras can produce images or recordings for surveillance purposes, and can be either video cameras, or digital stills cameras. Marie van Brittan Brown was the inventor of the CCTV camera.

22. BIOMETRIC SCANNERS

Biometrics consists of methods for uniquely recognizing humans based upon one or more intrinsic physical or behavioral traits.

- Physiological Traits are related to the shape of the body. Examples include, but are not limited to fingerprint, face recognition, DNA, Palm print, hand geometry, iris recognition, which has largely replaced retina, and scent.
- Behavioral traits are related to the behavior of a person. Examples include, but are not limited to typing rhythm, gait, and voice. Some researchers[1] have coined the term behaviometrics for this class of biometrics




COPMUTER OUTPUT DEVICES

These are computer hardware that converts processed data into a usable form. The outputs are mainly categorized as printed output. (By use of Printers and plotters) examples of outputs include; screen displays, speech output e.t.c.

Examples of output devices include the following;

1. DISPLAY DEVICE (monitors & Projectors)

i) MONITIORS

These are devices which are used to display the computer output. Information on a display device is called a "**soft copy**" because it exists electronically. There are two types/kinds of monitors which include

- Monochrome (One color)
- Color monitors

ADVANTAGES OF USING COLOURED MONITORS

1. They make the screen display more attractive.
2. They can be used to highlight error messages and menu options.

DISADVANTAGES OF USING COLOURED MONITORS.

1. Screens with a lot of colors take longer time to process.
2. More money is required for colored display.

CATEGORISES OF MONITORS (DISPLAY DEVICES)

- CRT (Cathode Ray Tube) monitors.
- LCD (Liquid Crystal Display) monitors.
- Plasma

CRT (CATHODE RAY TUBE) MONITORS.
These works like a standard television, a CRT monitor is made of small picture elements called pixels. It grows at varying intensities to produce colored images.

ADVANTAGES OF CRT MONITORS

- They can produce fast and reach color sights.
- They can be viewed from a very wide angle.
- They are cheaper than LCD monitors.

DISVANTAGES OF CRT MONITORS

- They emit more EMR (Electro Magnetic Radiations) than LCD monitors.
- They consume more electricity than LCD monitors.
- They occupy more space.
- Doesn't break easily

LCD (LIQUID CRYSTAL DISPLAY)

LCD of flat panel screen use liquid and crystals to create images on the screen normally used on portable computers such as Laptops, digital watches, Calculators, phones e.t.c

ADVANTAGE OF LCD MONITORS

- They consume less power.
- They occupy less space.
- The radiation emitted is negligible.
- They are weightless hence portable
- Displays sharp excellent images

DISADVANTAGES OF LCD MONITORS

- Usually more expensive
- Can only be viewed from a narrow angle
- Can easily break

A PLASMA DISPLAY

A plasma display is an emissive flat panel display where light is created by phosphors excited by a plasma discharge between two flat panels of glass. The gas discharge contains no mercury a mixture of noble gases (neon and xenon) is used instead. This gas mixture is inert and entirely harmless.

MONITORS VIDEO CARD VGA (VIDEO GRAPHICAL ARRAY)

A video card is required to display colour on monitor. It converts digital output from the computer in to analog video signal that is sent through cable to display devices. The number of colors that a video card displaces is damaged by its BIT depth

TYPES OF VIDEO ADAPTORS

1. CGA color graphical adaptor Displays 320×200 pixels in 4 colors
2. EGA (Enhanced colour Graphics Adapter)
   -640X480 pixels in 16 colours.
   -220X200 pixels in 256 colours.
3. Video Graphic Array (VGA)
4. SVGA.
5. MDA- Monochrome Display adaptor

ii) PROJECTORS

A projector is an output device that takes the image on a computer screen and cast it on to a large screen for audience to see it clearly.

OR

Is a device that receives a signals from the computer and projects the corresponding data signal on a projection screen using a lens system.

There are two types of projectors which include the following:

i) DLP (Digital light Processing) PROJECTORS
DLP projectors use thousands of tiny mirrors on a small chip, along with a spinning color wheel, to project the image.

ii) LCD PROJECTOR
It uses liquid crystals display technology to produce a low quality image only.

iii) CRT PROJECTORS
These are the original and, arguably, still offer the best picture. CRT projectors use three large tubes to project the image, in a way similar to your TV.

3. PRINTERS
A printer is an output device that produces texts and graphics on a physical medium such as paper. The printer information output on a physical medium is called **hard copy** which is more permanent than screen display (**soft copy**)

PRINTING MECHANISM

i) CHARACTER PRINTING

These are low speed printers that mimic the action of type writers by printing one character at a time. The characters are output on the print heads directly. This means the character font type cannot easily be modified e.g.

- Daisy wheel printer
- Thimble printer

They are relatively cheap and are commonly found in small business systems

ii) LINE PRINTING

These also use the same principle during printing just like the characters except that these are much faster unlike character printers. Line printers print the whole line of characters at once i.e. they print on one end of the paper to the other end of the line hence line printers.

iii) PAGE PRINTING

This is prints the whole page at a time. They are relatively expensive and intend to deal with very large volume of print out put in large organization. They are versatile whereby they can print wide rage characters including graphics

THE CLASSIFICATION OF PRINTERS

Printers are classified into two:

1. Impact printers
2. Non impact printers

IMPACT PRINTERS

These are printers that produce a hard copy output with the print mechanism/heads physically touching the print media.

Print Medias include;

- Papers
- Transparences
- Cloth

They work like an ordinary type writer.

Examples of Impact printers include;

- Dot matrix printers
- Daisy wheel printers
- Ball printer printers.

DOT MATRIX

A dot matrix printer is an impact printer that produces printed images which a print head striking mechanisms

ADVANTAGES OF DOT MATRIX

1. Dot matrix printers can multi part forms
2. They can with stand dirty environment vibrations and extreme temperatures.
3. They can print on continuous paper or multipart document.
4. They are the only printers which can use stencils
5. They are relatively cheaper compared to other printers.

DISADVANTAGES OF DOT MATRIX

1. They are generally noisy because of the striking mechanism
2. Print quality of dot matrix printer is not as good as those from ink jet printer of laser printers.
3. They are generally noisy because of the striking mechanism.
4. They are not readily available on the market
5. They are not easily serviced because they are based on old technology.
6. The colour print is limited to two (black and red)
7. They are relatively slow.

DIASY WHEEL

This is an impact printer that uses a wheel as a printer head

ADVANTAGES OF DIASY WHEEL

- Can print latter quality characters

DISADVANTAGES OF DIASY WHEEL

- Printing speed is very slow
- Cannot print graphics

BALL PRINTER

This is an impact printer that uses a rotating ball as a printer as a print head.
Impact printers have direct contact with the paper and non impact printers don't have direct contact with the paper.

NON IMPACT PRINTER

Non-impact printers are those printers that produce a hard copy output without the print head touching the printing surface.

They use techniques such as ink spray, heat, xerography or laser to form printed copy.

Examples of non impact printer are;

- Laser printer.
- Inkjet printer.
- Thermal printer.
- Bubble jet.

INK JET

An inkjet printer is a non impact printer that forms characters and graphics by spreading tiny drops of liquid ink on to a piece of paper

LASER PRINTER

The mechanism of a laser printer is similar to that of photo copier. Laser printers are also known as page printers because they process and store the entire page before they actually print it.

ADVANTAGES OF LASER PRINTER

1. They are generally quiet and fast during printing.
2. They can produce high quality output on an ordinary papers
3. The cost per page of toner cartridges is lower than other printers.

DISADVANTAGES OF LASER PRINTER

1. The initial cost of buying laser printers is high compared to other printers
2. They are more expensive than dot matrix printers and ink jet printers.

THERMAL PRINTERS

It generates images by posting electrically heated pins against a heat sensitive paper.

ADVANTAGES OF USING MONITORS OVER PRINTERS.

1. They are generally quite.
2. No need of paper.
3. Output can be modified or changed easily.
4. Transmission to another device is faster e.g. on a LAN.
5. Time taken to display the image is fast.
6. Screen display can include text, graphics and colour.
7. Scrolling enables focus on a particular or part of the document.

4. PLOTTER

A plotter is a sophisticated printers used to produce high quality drawings that can be quite large (e.g. width up to 60 inches)

ADVANTAGES OF PLOTTER

1. Information produced is permanent

DISADVANTAGES OF PLOTTER

1. The time to get the print output is slow when compared with display devices
2. Paper is wastage for obtaining out put
3. They are generally nosier than displays devices

COMMON FACTORS CONSIDER WHILE BUYING A PRINTER

1. Page per minute print out put
2. Memory of at least two mega bytes
3. Price of the cartridge or toner
4. A availability of the toner or cartridge
5. Purpose for which the printer is going to be put to use
6. Printer drivers. Most printer drivers are installed on a computer in order to enable the printer to communicate with a computer and can carry out printing.

5. FACSIMILE \FAX MACHINE

This is advice that transmits and receives documents on telephone lines. Documents sent or received via fax machines are known as faxes.

A fax modem is a communication device that allows a user to store received electronic documents as fax.

ADVANTAGES OF FAX MODEM

1. I t saves paper.
2. It allows the user to store received faxes on a computer received faxes can be emailed to others.

ADVANTAGES FAX MACHINE

1. Hard copies are produced

DISADVANTAGES FAX MACHINE

1. Sending a big document via takes a lot of time (slow)
2. It wastage of paper when a jack fax is sent.

6. MULT I FUNCTION MACHINE

This is a single piece of equipments that provides the functioning of printer, screen, photo coping machines and fax mail

ADVANTAGES

1. A multi functioning device takes up less space than having a separate printer, scanner , copy machines and fax machines
2. It is also significantly less expensive than purchasing each device separately

DISADVANTAGES

1. If a malfunctioning machine breaks down it loses all its functions

7. TERMINAL

A terminal is a device with a monitor and key board. The term terminal can also refer to any device that sends and receives computer data.

Kinds of terminals include;-

1. DUMB TERMINAL

It has no processing power and cannot act as a standalone computer and must be connected to server to operate

2. INTELLIGENT TERMINAL

It has memory and processor so it can perform some functions independent of host computer.

Uses of terminals

i) An EPOS (electronic point of sell)

Terminal is used to lead purchase at the point where the consumer purchases the produce or services

ii) EFTPOS (electronic fund transfer point of sell)

Terminal are able to transfer funds from a customer bank account direct to a retile out lets account after reading the customer debit card. Automatic teller machines attached to host computer through a telephone network

8. HEADPHONES.

These are a pair of small speakers, or a single small speaker, used to output sound from the computer. They are similar to speakers, except they are worn on the ears, so only one person can hear the output at a time.

9. SPEAKERS.

These are output used to output sound from the computer. Most of PCs have small internal speaker that output only low quality sound. Users who need high quality sound out put may use a pair of speakers for example Sub woofer connected to parts on so card

ADVANTAGES

1. They are ideal for visually impaired people

DISAVANTAGES

1. They are not suitable for use in noisy environment
2. No permanent copy is produce

COMPUTER STORAGE DIVICES

Storage refers to a media on which data, instructions and information are kept.

STORAGE DEVICES

These are physical materials on which a computer keeps data, instructions for later retrieval or for future references

UNITS OF DATA

BIT	Bit refers to binary digit which is the basic unit of data. Bit is represented by either 0s or 1s
NIBLE	One nibble consists of 4 bits e.g. 0100
BYTE	One consists of 8 bits e.g. 011100010
WORD	One ward consists of a least 16 bits or 2 bytes

Summary;

1 Character = 8 bits

1 byte = 8 bits

1 Kilobyte = 1024 bytes

a) **A Kilo Byte. (KB**) is about 100bytes (1024 bytes)

b) **A Mega byte: (MB)** is about 1 million bytes (1,048,576 bytes)

c) **A Giga byte: (GB)** is about 1 billion bytes. (1,073,741,824 bytes)

d) **A Tera byte (TB)** is about 1 trillion bytes (1, 009, 511, 627, 776 bytes)

1 Megabyte = 1024 kilobytes
1 Gigabyte = 1024 Megabytes
1 Terabyte = 1024 Gigabytes

Note: - *The 1024bytes are approximated to 1000byte*

1,000,000 Bytes = 1000 Kilobytes = 1 Megabyte
1 Billion Bytes = 1000 Megabytes = 1 Gigabyte
1 Trillion Byes = 1000 Gigabytes = 1 Terabyte

Example1.
Convert 128bytes to kilobytes

Solution

1kilobyte (KB) = 1000bytes

Therefore; 1byte = $\frac{1}{1000}$ KB

128bytes = $\frac{1}{100}$ x 128 KB

128bytes = $\frac{128}{100}$ KB

= **1.28KB**

Therefore 128bytes = 1.28kilobytes. ✓

Example2
Convert **128byte** to **Megabytes**

Solution

1,000,000 Bytes = 1 Megabyte

Therefore; 1byte = $\frac{1}{1000000}$ MB

128bytes = $\frac{1}{1000000}$ x 128 MB

= **0.000128MB**

Therefore 128bytes = 0.000128 MB ✓

Example3
How many bytes are in name **NUSIFAH**?

Solution

From; ***1 character = 8 bits***

A name **NUSIFAH** has **7** characters

Therefore; 7 characters = (7 X 8) bits

= **56 bits**

Then we have to convert the bits to bytes

But 1byte = 8 bits

1bit = $\frac{1}{8}$ bytes

Then 56bits = $\frac{1}{8}$ x 56 bytes

= 7bytes ✓

Therefore; from the above example **1character** is equal to **1 byte.**

Example 4
Convert 0.000127 MB to bytes (KB)
Solution

1 Megabyte = 1,000,000 Bytes

0.000127 MB = (0.000127 X 1,000,000) Bytes

= **127 Bytes** ✓

CONVERING DATA UNITS TO BINARY BASE

Exampel1

Convert 128 to binary base

Solution

Base	Number	Remender
2	128	0
2	64	0
2	32	0
2	16	0
2	8	0
2	4	0
2	2	0
	1	

Therefore $128_{ten} = 10000000_{two}$

CONVERTING BINARY BASE TO DECIMAL BASE (BASE TEN)

Example 1

Convert 10000000_{two} to base ten

Solution

$1^7 0^6 0^5 0^4 0^3 0^2 0^1 0^0{}_{two} = (1 \times 2^7)+(0 \times 2^6)+(0 \times 2^5)+(0 \times 2^4)+(0 \times 2^3)+(0 \times 2^2)+(0 \times 2^1)+(0 \times 2^0)$

$= 128 + 0 + 0 + 0 + 0 + 0 + 0 + 0$

$= \mathbf{128_{ten}}$

TYPES OF STORAGE DEVICES

There are two types of storage devices namely primary storage devices, secondary storage devices

PRIMARY STORAGE DEVICES

Primary storage is the main memory which is also referred to as the internal memory.

This is a type of memory/ storage on a computer which can immediately be accessed by the computer's CPU.

The primary memory is divided into two namely;

- RAM (Random Access Memory)
- ROM (Read Only Memory)

RAM (Random Access Memory)

RAM is the working area during the processing of data. The data and instructions are temporally held in RAM during processing and after processing and it disappears when you turn off the power of computer hence RAM is volatile.

NB: You always save regularly to avoid your work \ data to be wiped off when power is off
Saving is process of transferring data\information from RAM to a secondary storage device.
Execution is the process of carrying out the interpreted commands.

TYPES OF RAM

1. SDRAM (Synchronous Dynamic Random Access Memory)
2. DDRSDRAM (Double Data Rate Synchronous Dynamic RAM)
3. RDRAM (Rambus DRAM)
4. DIMMs (Double in-line memory module)
5. SIMMs (Single in-line memory module)
6. RIMMs

ROM (Read Only Memory)

ROM chips contain programs or instructions that are built on the computer at the time of manufacturing. Some special instructions that are built include;

1. The execution instructions when you turn on the computer.
2. Instructions or information that is recorded permanently by the manufacture is known as fire ware.

ROM CHIP

Examples of data in ROM include:-

- The date when the computer was manufactured
- Manufacturer of the computer.
- Model name and model number of the computer,
- Predetermined configurations for some of the hardware that will be added onto the computer.

ROM CHIPS

It is also called firm ware which is a term used for software permanently stored on a chip.
ROM chips in micro-computer contain instructions used to transfer information between keyboard, screen, printer, and other peripherals and the processor. These instructions are called **ROM BIOS** (Basic Input Output System)

There are three ROM chips used in a special situation

PROM – Programmable Read Only Memory.

It is a blank chip on which the user/buyer can write a program on it with a special equipment once is written it can't be modified or changed.

EPROM – Erasable Programmable Read Only Memory

This is a chip or a content that can be written on it and erased once using special equipment.

EEPROM – Electronically Erasable Programmable Read Only Memory

These are ROM chips that are designed to be modified by the user for more than one time.

DIFFERENCES BETWEE RAM AND ROM

RAM (Random Access Memory)	ROM (Read Only Memory)
1. It is volatile	It Is non volatile
2. It is temporarily	It is permanent
3. It is read and write	It is read only
4. it can be increased or changed or altered	It is normally not increased or changed or altered
5. it boosts instructions	It pauses instructions

Note: ***Volatile*** *means that it is not permanent and can be change. It needs power supply to keep the data stored in it*

READING

Is the process of transferring information, data instructions from device into RAM

OR

Reading is the process of transferring information from memory (RAM) to storage media i.e. using a save command.

SECONDARY STORAGE (auxiliary storage)

This is also known as auxiliary storage which are designed to retain data and instructions and programs in a relatively permanent form.

There are two main types of secondary storage.

1. Magnetic storage devices.
2. Optical storage devices.

EXAMPLES OF STORAGE DIVICES

1. Floppy disks.
2. Hard disks.
3. Magnetic tapes.
4. Flash memory.
5. Punched cards.
6. MP3 player and MPEG player.

7. Zip disk.
8. iPod.
9. Compact disks.

EXAMPLES OF OPTICAL STORAGE DISKS

Compact disks e.g. CD-ROM, CD-R, CD- RW, DVD-ROM, DVD-R, DVD-RW.

There are two methods of which information is transferred from the computer and written to a storage device namely;

(i) Sequential storage
It means data stored is in sequential tape flow, in the category of sequence storage Data/ Information must be accessed in a sequential order.

(ii) Direct access storage
Also called Random Access Storage (is a storage medium that allows computer to go directly to the information you want)

MAGNETIC STORAGE DEVICES

These are secondary storage devices that have magnetic writing on the disc surface (tapes) for storing data as magnetic spots.

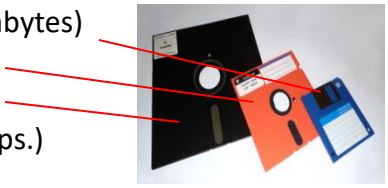
EXAMPLES MAGNETIC STORAGE DEVICES

MAGNETIC TAPE.
This is a thin plastic tape that has been magnetically watting for storing data as magnetic spot and large computer tapes are used only in a cartilage. Since tapes a sequential access media using them for pad up a slow process.

FLOPPY DISKETTE.
This is also called a diskette. It is a removable secondary storage medium that consists of a thin, circular flexible plastic disc with a magnetic coating enclosed in a square shape plastic shell.

A diskette is called a floppy because the plastic disc is flexible and not rigged. There are mostly four types of diskettes but the common ones are;

- 3.5 ($^1/_2$) inch of a storage capacity of 1.44MB (Megabytes)
- 5.25 ($5^1/_4$) inch,
- 8 inch
- 2 inch (which is now the latest version for the laptops.)



Each size works only with a device made for its size.
Some diskettes are referred to as low density (single sided version). The single sided are designed such that the data can be only recorded on one side.

Some diskettes are referred to as high density (Double sided version). The high density diskettes are double sided and data can be recorded or stored on both sides hence high density accommodates or stores more data.

FLOPPY DISC DRIVE

A floppy disc drive is a slot (an opening) on the computer system unit where a diskette is inserted in order to read from and write to it. The drive is labeled “A:”
If the computer has two floppy disc drives, the second one becomes “Drive B:”

CHARACTERISTICS OF FLOPPY DISCKETTESX

Diskettes have the following characteristic;

Tracks and sectors,

Tracks are concentric rings which are invisible. Each track is divided into sectors under intersection of tracks and sectors setup the file allocation table (FAT) where data is located.

Right protect feature.

Diskettes have features to prevent someone from accidentally write, erase or making changes to the program files. To right protect the diskette press or push towards the edged of the diskette and the hole opens.

Data capacity,

Not all diskettes hold the same amount of data, diskettes capacity depends on its recording density e.g. the bytes per inch that can be written on the surface of the diskette e.g. High density (HD) diskette can store 1.44MB

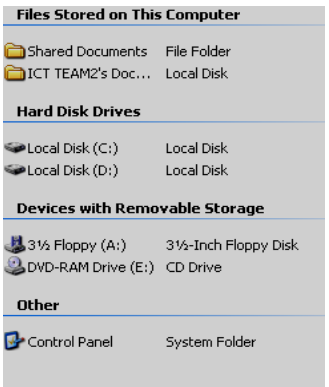
Formatted Diskettes,

Unformatted diskettes are manufactured without tracks and a sector therefore "**Formatting**" is a process of preparing a diskette so that the operating system can write information on it. This process includes defining the tracks and sectors on the disk as well as setting up **FAT** (File Allocation Table)

***NOTE**: If you reformate a diskette with data already written on it, all the data will be lost during the reformatting.*

Steps followed while formatting a floppy diskette;

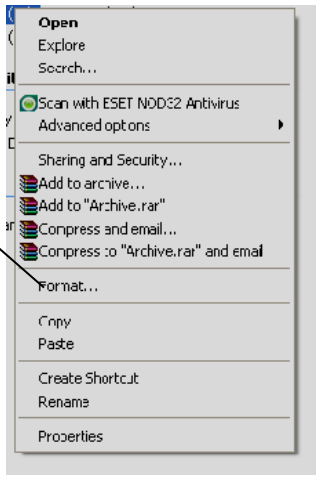
Step 1:
Insert 3½ inch floppy diskette into the drive



Step 2:
Click on **Start** and select **My Computer**

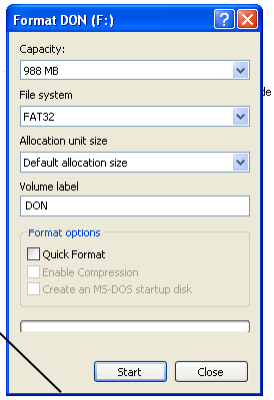
Step 3:
In the Window which appears, right click on **3½" floppy (A)**

Step 4:
From the shortcut menu which appears, select **Format**



Step 5:

From the Window which appears, click the Start Button to allow the program to start formatting



TAKING CARE OF THE DISKETTES (FLOPPY,CDs,DVDs etc)

- Don't touch the diskette surface; don't touch anything visible through the protective case such as the data, accessed area on the disc surface.

- Handle the disc gently, i.e. don't throw diskettes into your pockets or back pocket because the protective plate can easily slide away from the plastic case.
- Don't put weights on floppy diskettes.
- Don't try to bend them.
- Don't use floppy diskettes for coffee and soft wastes because moisture can spoil and damage the disc surface.
- Avoid risks with physical environment e.g. heat
- Don't expose the disc in to direct sunlight
- Don't expose the floppy diskettes to chemical substances such as cleaning solvents and alcohol
- Always keep the floppy diskette in its jacket.
- Do not expose it to an X- RAY.
- Do not insert or remove it from its drive when the drive active light is on.
- Do not force it into its drive. It should slip in with little or no resistance.
- Do not scrub a diskette to label it
- Don't leave a floppy diskette into the drive. Take the diskette from the drive because if you leave it in the drive, the read and write head remains resting on the surface.
- Keep diskettes away from magnetic fields i.e. near radio speakers, on top of the system unit case, near electric motor etc-
- Store the disks in their boxes after use.

ADVANTAGES OF FLOPPY DISKETTE

- It is potable and flexible.
- Data on floppy diskettes can be right protected from being changed accidentally.
- It can be used to transfer date from one computer to another.
- Its storage capacity is wide considerably bigger.

DISADVANTANGES OF FLOPPY DISKETTE

- It's not durable due to dusty and magnetic fields.
- The access time of a floppy disc is slow.
- A storage capacity of a floppy is limited only to 1.44MB.

HARD DISC

It's made up of inflexible material and consists of several rigged metal discs called platters. Platters are covered with substance that allows data to be held in form of magnetized spot. Data can be recorded on both sides of the disc platters.

The hard disc is also tightly sealed and enclosed in the system unit to prevent any foreign matter which may result into head crush

ADVANTAGES OF HARD DISCS OVER FLOPPY DISCS

HARD DISCS	**FLOPPY DISCS**
Has a large storage capacity	Has a small storage capacity
It fixed in to the system unit	Not fixed into the system unit hence portable
It takes less access time i.e. it takes less time in saving and retrieving of information.	It takes more access time in saving and retrieving of information.
It is sealed into the system unit hence not exposed to environmental hazards.	It's exposed to natural hazards.
It's usually more reliable	It is not reliable
Data is stored on combination of tracks of several platters caged cylinders track	Store data in a combination concentric rings called a track and sectors

DISADVANTAGES OF A HARD DISC COMPARED TO FLOPPY DISC

- Hard disc is not portable accept removable hard disc which is very expensive.
- Data becomes less secure if left on the hard disc
- Hard disc can easily crush due to extreme shock contaminators.
- The disk is fixed inside the computer and cannot easily be transferred to another computer.

OPTICAL DISCS

This is a removable disc on which data is written and read by means of a laser beam. The most optical discs are CD-ROM. Examples of optical disks include;

i) CD-ROM It stands for Compact Disc-Read Only Memory.

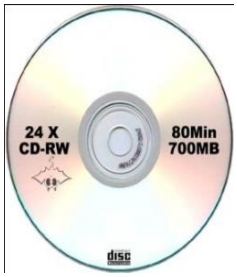
Definition: it is an optical disc format used to hold software or programs and data such as prerecorded text, graphics and sound lick music. It referred to as "read only" because the content was recorded at a time of manufacture and it cannot be erased or written on by the user.

ii) CD-R It stands for Compact Disc Recordable.

This is a CD format that allows the user to write data only once i.e. once data is recorded, it can't be changed/written over again e.g. photo CD

iii) CD-RW This stands for Compact Disc Writeable.

This is a CD format that allows the user to erase data so that the disc can be used over and over again. A CD-RW acts as a floppy disc since it allows re-writing on it multiple times.



ADVANTAGES OF A CD OVER A HARD DISC

- A CD is more portable than a hard disc.
- A CD is used to transfer data from one computer to another easily.

ADVANTEGES OF A CD OVER A FLOPPY DISC

- A CD has a large storage capacity than a floppy disc
- The access time of a CD is faster than a floppy disc

DISADVANTAGES OF A CD

- A mere crack can easily fail the CD from writing or reading
- Some kinds of CDs are read only hence the user cannot change or add data on it.
- The access time of a CD is slower compared to the hard disc.

iv) DVD is an abbreviation for Digital Versatile Disk.

A computer version of a DVD is called a DVD-ROM disk which has exactly high capacity capable of storing from 4.7GB to 17GB. Other versions of DVDs include DVD-RAM, DVD+RW, DVD-R e.t.c.

CARE OF COMPACT DISKS OR DVDS

- Always store a DVD or a CD in a jacket or jewel box if not in use.
- Always hold a CD by its edge.
- Never touch the underside of the CD.
- Never stuck disc on top of each other.
- Never expose the disc to excessive heat or sunlight.

OTHER TYPES OF STORAGE MEDIA

Magneto-Optical Disk (MO)

This combines the basic features of magnetic and optical disk technology. MO disk has a high storage capacity like an optical disk and can be written on over and over like a magnetic disk.

SMART CARD

It is similar in size to ATM or credit cards, it stores data on a thin micro processor embedded in the card. When it inserted in the card reader the information on it can be read and up to date.

APPLICATION OF SMART CARDS

- Storing prepaid dollar amount e.g. prepaid telephone cards.
- Storing patient records and other health care communications.
- Tracking customers and employee information.

ZIP DISK.

It is slightly larger and about twice as thick as a floppy disk. A Zip disk can be of 100MB, 250MB, and 700MB of storage capacity.

ONLINE STORAGE

It is also called internet hard drive. It is a service on the web that provides the user with storage for free or for minimal monthly fee.

FLASH DISK (MEMORY STICK)

It is also a **USB** (Universal Serial Bus) flash drive typically a removable and a rewritable disk. It has a high storage capacity to several gigabytes (GB). The capacity of a flash disk is always indicated on it.

ADVANTAGES OF FLASH DISKS

- They are more reliable and durable due to their lack of moving parts.
- They are faster in their access time

DISADVANTAGES OF USING FLASH DISK

- Data can easily be lost due viruses.
- Its storage capacity is limited to 32GB.

COMPUTER PROCESSING DEVICE

The computer control centre is made up of processing and main memory devices which are housed in a computer system unit or system cabinet.
A system unit contains a CPU, Motherboard e.g. adaptors like network card, VGA card.

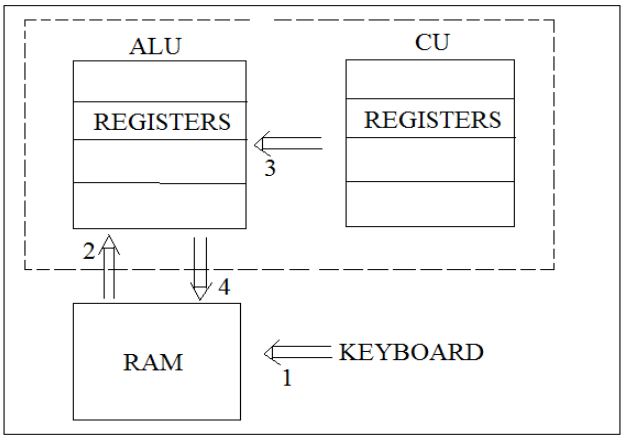
PROCESSOR

A processor consists of two main parts which include the following;

1. Control Unit (CU)
2. Arithmetic Logic Unit (ALU)

The two components are connected by a kind of electronic path called a BUS.

STRUCTURE OF A PROCESSOR (CPU)



1. Data to be processed is input from input devices or secondary storage in RAM
2. Data to be processed goes to the registers(Main tore) in ALU from RAM
3. The control unit tells the ALU which logic or arithmetic operation to perform.
4. Processed results Arrives in RAM and then output or stored to the storage device.

PARTS OF THE CPU

Control Unit

This is a part of the CPU that tells the rest of the computer system how to carry out programs instruction, i.e. directs the movement of electronic signals between RAM and input and output devices.

Arithmetic Logic Unit

It performs arithmetic operation e.g. addition, subtraction, multiplication and division and logic operations ALU compares two data items to see whether one is equal to, greater than, or less than the other. The other includes;
>= Greater than or Equal to
<= Less than or equal to
< > Less or Equal

***NOTE**: ALU & CU contain register that connects to the main memory (RAM) by the bus. Registers are temporary storage holding processed and unprocessed data. It also provides working area for processing*.

FUNCTIONS OF THE MAIN MEMORY (RAM)
It holds data for processing.
It holds functions for processing the data.
It holds data after it processed
It aids the booting process of the computer.

RAM CAPACITY

The main memory capacity is stated in bytes i.e. megabytes (MB) however, the RAM capacity of the main frame computers and super computers is measured in gigabytes (GB) and Terabytes (TB)
1KB – 2^{10}
1MB – 2^{20}
1GB - 2^{30}
1TB – 2^{40}

WORD SIZE
This refers to the numbers of bytes a processor can hold in its register during the processing; therefore a 64 byte word processor is faster than a 32bit can process a byte in the same given time.

PROCESSING SPEED

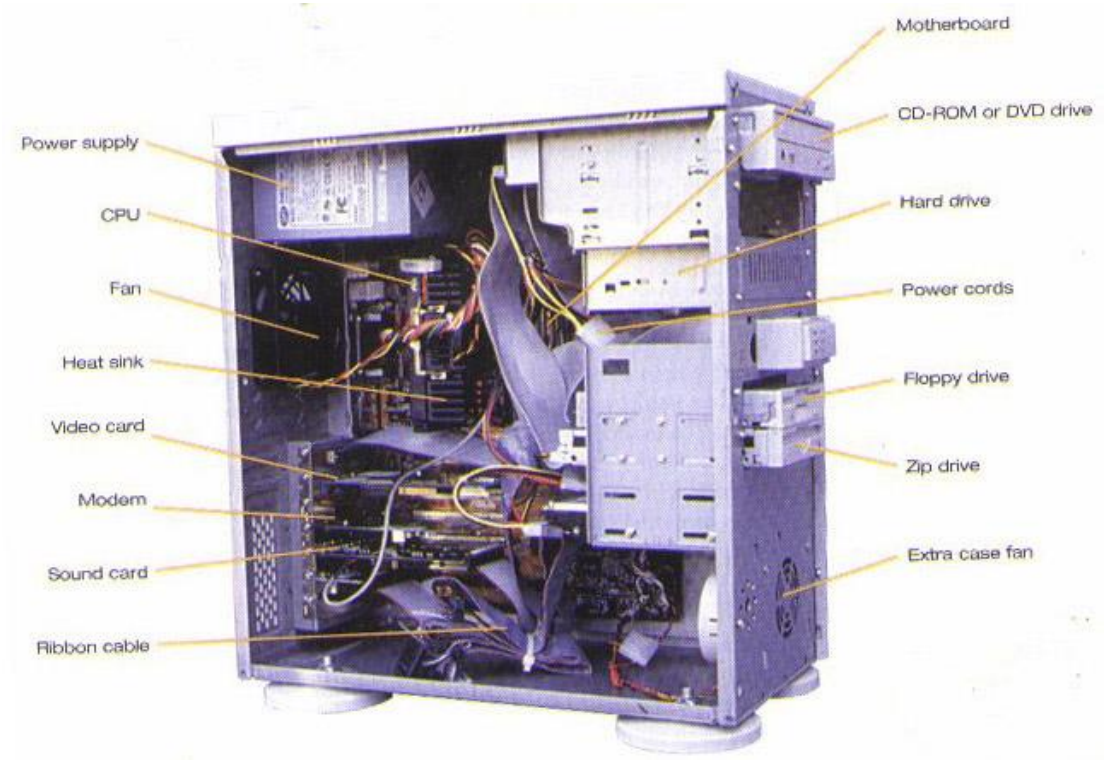
Computers with large word size can process more data in each instruction cycle, micro computer speed are measured in megahertz. The speed of large computers are measured in millions of instruction per second (MIPS) and Floating Point Operation Per Second (FLOP)

KINDS OF MICRO PROCESSORS

1. **Intel Chips**; Intel makes chips for personal computers such as Compaq, Dell, Gateway, Toshiba. INTEL used to identify its chips by numbers 8086, 8088, 8286, 8386, 8486, 8086 family series
2. **Motorola Chips;** Motorola produces the family of apple, Macintosh computers.
3. The Intel succession to x86 chips is the Pentium family. The list of Pentium family from the slowest to the fastest from Intel are Pentium1, Pentium MMX, Pentium Pro, Pentium 2, Pentium 3, Pentium 4
4. Today the most popular micro processers are CORE 2 DUAL & DUAL2CORE.

SYSTEM UNIT

This is a box or cabinet containing the electrical component that carry out computer's processing, it contains the following;

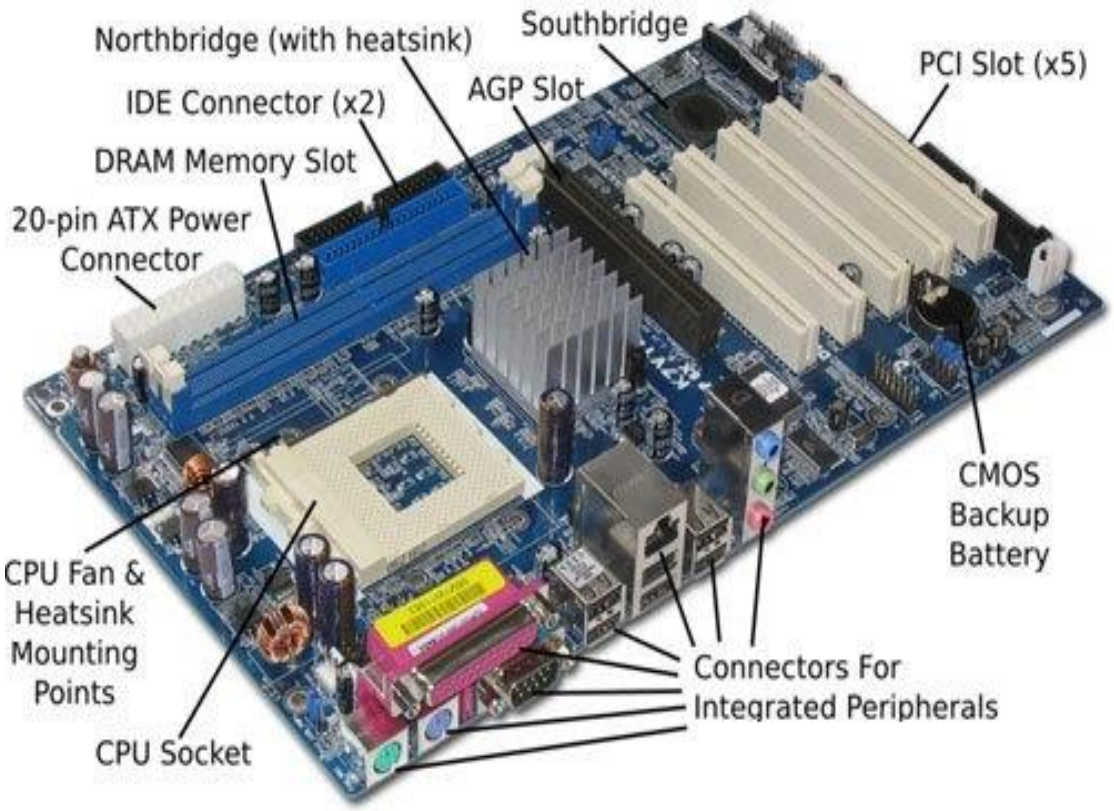


i) Power Supply

It is a device that converts power from Alternating Current (AC) to Direct current DC to run the computer.

ii) Motherboard

It is a system board which is the main socket board that can hold chips such as processor, ROM, RAM and expansion slot. OR it is a circuit board where all computer peripherals (input/output/communication/Memory and storage devices) are connected.

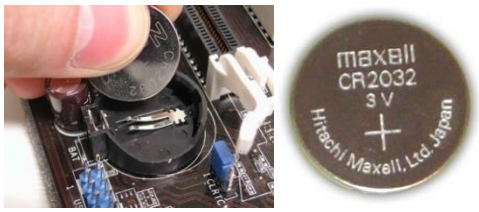


CMOS (Complementary Metal Oxide Semi-conductor).

The CMOS battery has the following functions;

- **Keeps the System Date and Time**;
  The CMOS battery stores the system time and settings that most be loaded when you turn the system on. Older computers reset to a date of 1-1-1980. Computers running Windows XP or later will set the system date to the date of the last saved system restore point.

- **Allows System Settings to be called up**;
  A few additional settings are stored by the system. The CMOS battery allows these settings to be loaded into system memory when the computer boots.



Ports

These are connecting sockets outside a computer processing unit that are connected to the main board (motherboard). Ports are of several types and they include the following;

1. Parallel Ports.

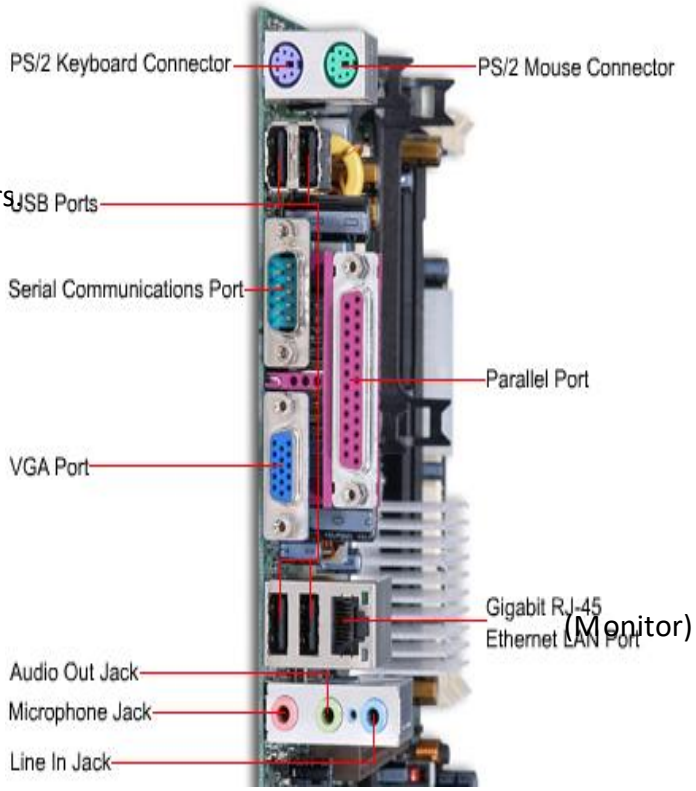
They are also called female ports.
They transmit 8 bits simultaneously.
They are mainly used to connect printers.

2. Serial Ports

They are also called male ports.
They transmit one bit at a time. They are used mainly to connect mouse, scanners, modem e.t.c.

3. Video Adaptor Port

It is used to connect a video display outside the computer to the video adaptor card on the motherboard inside the computer.



4. SCSI
(Small Computer System Interface)

It is used to transfer data at high speed especially for external hard disk, magnetic tapes, CD-ROM, Scanner.

5. Game Port

It is used to connect a game playing device such as joy stick on system unit.

6. USB Port (Universal Serial Bus)

This is a type of port that allows a user to connect up to 120 devices using one port and it is supports most of the new devices.

SOFTWARE

Software is made up of group of related programs written in a special code called programming language. Therefore software is a set of programs in a computer system.

A **program** is a set of related instructions that perform specific processing tasks.

***NOTE**; the software acquired to perform a general business function is often referred to as software package.*

Software is generally divided into two categories;

- System software.
- Application software.

System software

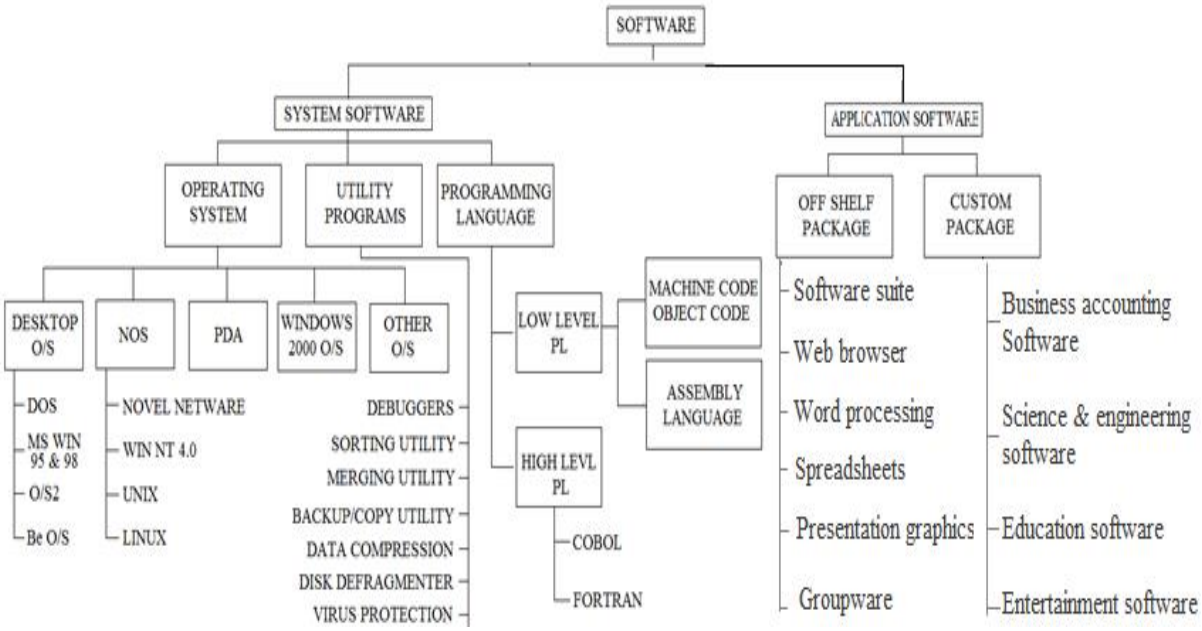
This is the software designed to allow the computer to manage its own resources and run the hardware and basic operations of the computer.

Therefore system software runs the operation of a computer.

Application software

This is software designed to perform specific tasks which benefit or assist the end user. Examples of application programs include word processing, desktop publisher.

COMPUTER SOTWARE CLASSIFICATION



SYSTEM SOFTWARE

System software consists of;

1. Utility program.
2. Operating system.
3. Programming languages.