A COMPUTER

A computer is a general purpose electronic machine that receives/accepts, processes stores, and output data into meaningful information.

OR

A computer is an electronic machine capable of storing vast amount of data and carry out data processing extremely fast.

A Computer is a programmable machine. The two principle characteristics of a computer are:

- It responds to a specific set of instructions in a well-defined manner.
- It can execute a prerecorded list of instructions (a program).

Modern computers are electronic and digital. The actual machinery which includes wires, transistors and circuits is called hardware while the instructions and data are called software.

A Computer is an electronic device or programmable machine, operating under the control of instructions (software) stored in its own memory unit that can accept data (input), manipulate data (process), and produce information (output) from the processing.

Generally, the term is used to describe a collection of devices that function together as a system. Alternatively,

a computer is a programmable device that is capable of allowing input, processing, storing and outputting of information at a very great speed. In very simple terms, computers are machines that process data (or information) and supply results.

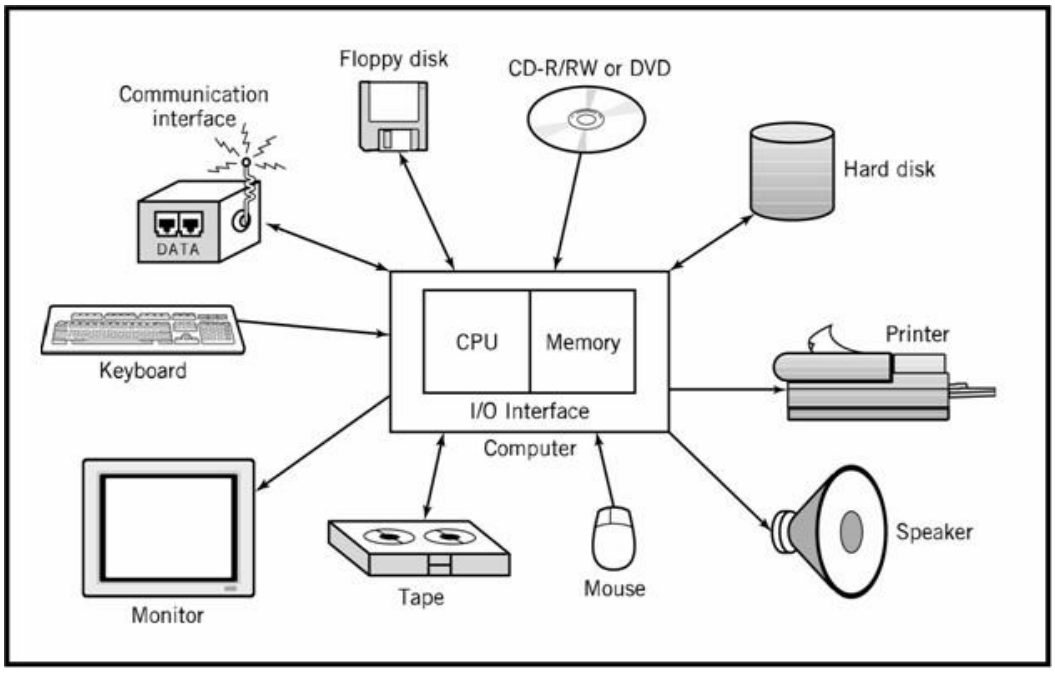
The operational speed of a computer is measured in millions of instructions per second (MIPS) measured in megahertz (MHZ) or gigahertz (GHZ)

PARTS OF A TYPICAL COMPUTER SYSTEM

Each computer system consists of both hardware and software. From the definition of a computer, each of the above functions has devices or components associated to it that enable the user to carry out various activities.

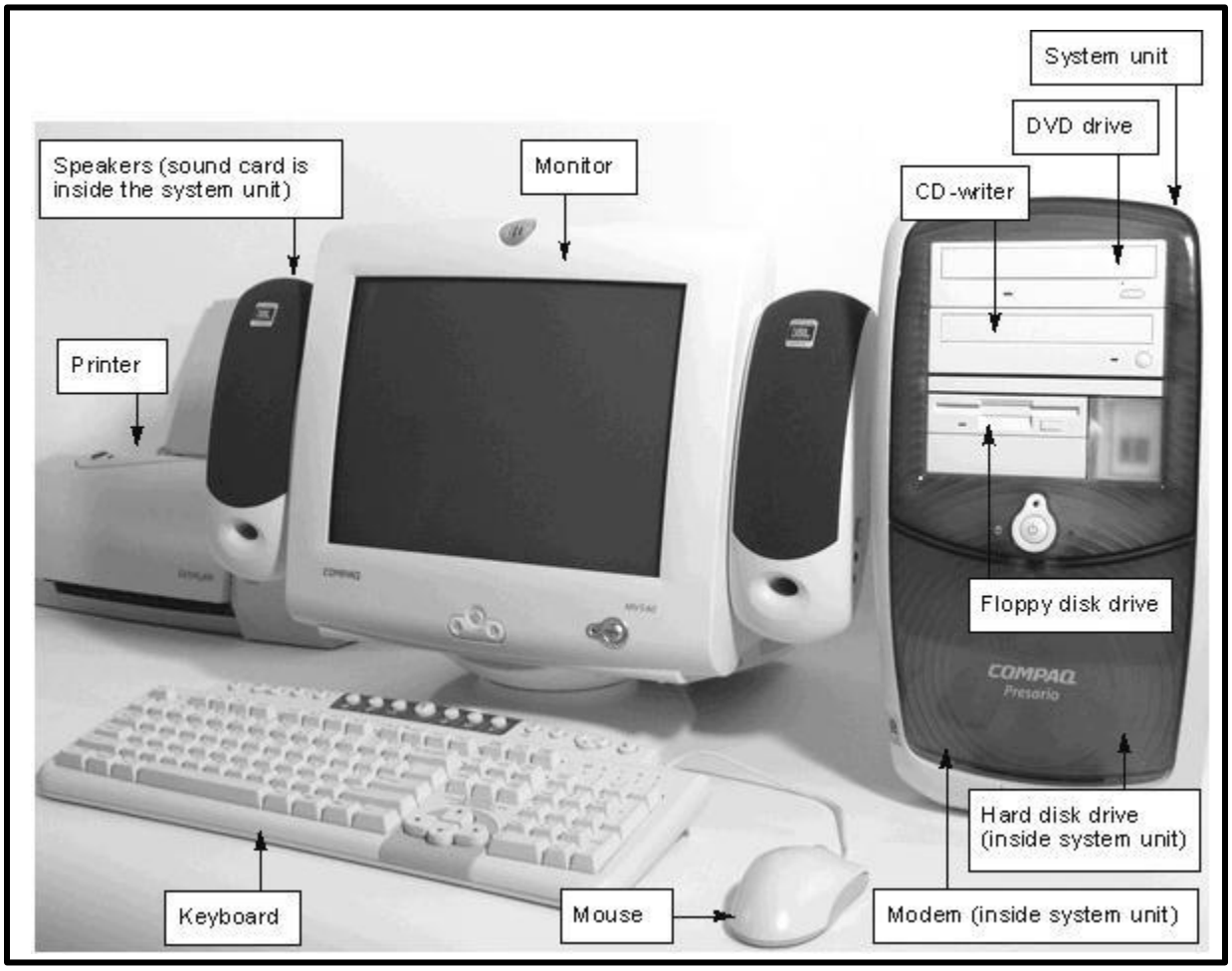
For example; A typical computer system is comprised of Input Components; (Keyboard, Microphone, Punch cards and Mouse), Processing Components; (CPU), Storage Components; (Hard and Flash drives, Floppy disks, Optical Media, Diskettes, Magnetic tapes), Peripherals; (Photocopiers, Scanners, Fax machines), Output Components; (Monitor, Printer, audio speakers etc) and Communication Components (Network Interface Card, Modem and wired cables).

A model illustrating parts of a typical Computer System



The computer comprises of electronic elements like transistors, resistors, disorders etc, with an internal storage or memory for storing both the instructions and data being processed while using programs or set of instructions with specific procedure of operation to be followed.

A Graphical Figure showing parts of a typical Computer System



ACTIVITIES OR FUNCTIONS PERFORMED BY COMPUTERS

Understanding the computer as a computer system is vital to the effective use and management of computers.

A computer system is a system of hardware devices and software components organized according to the following system functions or basic activities which includes for instance; input, processing, output, storage and control.

a) Input: Input into a computer may take the form of information and data provided to the computer by a person, the environment, or another computer.

The input is converted into electronic machine readable form for direct entry or through a telecommunications network into a computer system. For example Input inform of words and symbols, numbers, pictures, audio signals from a microphone, signals from another computer, temperature, speed, pressures, etc.

The typical input devices of a computer system include; sensors, keyboard, touch screens, light pens, electric mice, optical scanners and voice input and so on.

b) Processing: Computer processing takes the format of manipulating data inputs; data are symbols that represent facts, objects and symbols

The CPU is known to be the brain of a computer responsible for executing a given set of instructions both arithmetic (-,/,+,* etc) and logical comparison between two or more statements plus controlling all other hardware.

One of CPU's major components is the arithmetic-logic unit (ALU) which performs the arithmetic and logic functions and the control unit (CU) which controls all the processing functions and communicates with other parts of the computer plus controlling the processing of all instructions and the movement of data with in the CPU.

c) Output: These are converted electronic information and results produced by the computer system into human-intelligible form for presentation to end-users. Examples of output include; images on the monitor, printed documents, sounds, signals to device controllers. Examples of output devices include; video display, units, audio response units, printers etc.

d) Storage: Memory is the area of the computer that temporarily hold data that is awaiting to be processed, stored or output, while storage is the area where data can be left on a permanent basis while it is not needed for processing. Storage devices include: firstly the primary storage unit (Main memory) and secondly, the secondary storage devices (magnetic disk and tape units, optical disks).

e) Control: The control unit of a CPU interprets computer program instructions and transmits directions to the other components of the computer system. One of CPU's major components in charge of control is the control unit (CU) which controls all the processing functions and communicates with other parts of the computer plus controlling the processing of all instructions and the movement of data with in the CPU.

DATA AND INFORMATION

1. DATA
Data is defined as raw facts and figures that have less meaning to the end user.

Examples of raw data include;
1. Student's marks
2. Employee salary and wedges.

2. INFORMATION
Information is a processed data which is meaning full to the end user.

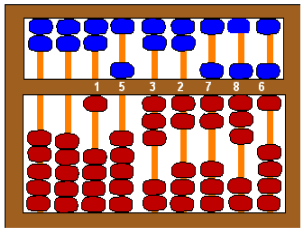
Examples of information
1. A students report
2. Payroll for employees

WHY DO WE STUDY COMPUTER
1. To acquire general knowledge and skills in the use of a computer and related technologies.
2. To use the knowledge acquired in computer studies to other fields like Banking, Education etc.
3. To use variety of computer technologies to access, analyze and interpret information.
4. To exhibit basic computer skills for employment.
5. To acquire knowledge as a foundation for further studies in computer technology.

THE HISTORY AND EVOLUTION OF COMPUTERS

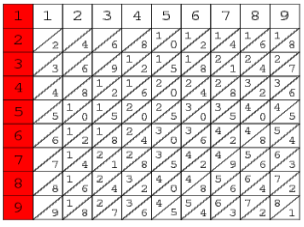
Evolution of computers
Evolution is the gradual development of computers in terms of technology and physical size from the 1st generation to the present generation.

History of Computers
Abacus.



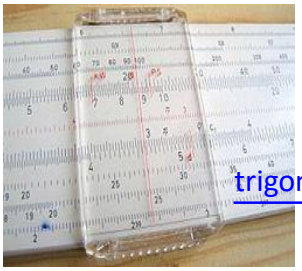
The abacus is also called a ***counting frame***, is a digital calculating machine used primarily in parts of Asia for performing arithmetic processes. Before the 17th century the early Babylonians invented the abacus. It is believed to be the first computer device. It consisted of columns of beads that can slide from and to represent numbers.

Napier's Bones.



This was discovered a round 1614 by a Scott's man John Napier. Napier's bones were rectangular red with readings written on them that led users to division, multiplication and addition of numbers.

Slide rule.



In 1620 an English mathematician William oughtered invented the first mechanical analog device which was known as ***slide rule***. The slide rule is used primarily for multiplication and division, and also for functions such as roots, logarithms and trigonometry, but is not normally used for addition or subtraction.

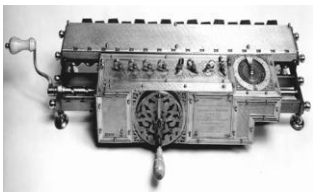
Mechanical Era (Mechanical computers) 1623-1945

The era of the mechanical computer, was between 1623 and 1942. The mechanical computers are machines that are characterized with mechanical gears, wheels, moving parts, electro-mechanical relays, and dials and could use punched cards and tapes for data storage.

Arithmetic Machine/Calculator.

In 1642, a French man Blaise Pascal was given a credit for the first mechanical adding and subtracting machine that used a system of gears and wheels. It had digits from one to nine (1-9) arranged on wheels similar to odometer on motor car.

Leibniz stepped/calculator



In 1694, Gottfried Wilhelm Leibniz a Germany mathematician improved the Pascal design to create Leibniz's calculator that could perform arithmetic operation of addition, subtraction, multiplication, division and square roots.

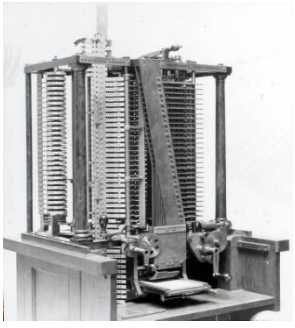
Arithmometer.

In 1820, Thomas De Columnor a French man inverted a calculating machine which he called ***Arithmometer***.
He produced in large numbers and in fact he established an industry for making a calculating machines. An Arithmometer was a mechanical calculator that could add and subtract directly and could perform long multiplications and divisions effectively by using a movable accumulator for the result.

Jacquard Weaving Loom machine

Joseph Jacquard invented a machine for controlling the weaving process when making complex pattern. This system could use metal punched cards with holes for data storage. The machine could store programs or instructions using the hole and no hole method.

Analytical engine

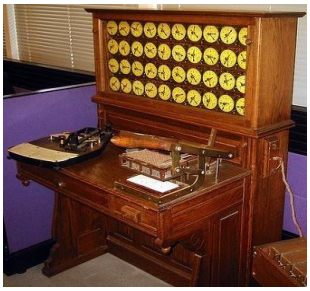


In 1832 Charles Babbage invented an "***analytical engine***".
The machine could follow program instructions to perform mathematical operation. This machine combined the concept of mechanized calculations and stored programs.

Ada Lovelace [The first programmer]

A lady called Ada Lovelace was the world's first computer programmer i.e she came up with the idea of programming and worked with Babbage and later on developed the idea of programming loops.

Hollerith's Tabulator



Herman Hollerith invented a tabulating machine that used punched cards to store and tabulate data. The USA government in 1890 census first used this machine. He started a tabulating machine company and sold the machine over the world.
This merged with others to form the popularly known business machine IBM (International Business Machine).

Electronic Digital Computers

The first operating digital computer was made in German in 1941 by Konrad Zuse. It was destroyed during the world war and was not known outside Germany. The first widely operational computer came in after the world war in 1950's and they were categorized in generations.

COMPUTER GENERATION

Computer generation refers to the state of improvement in the development and advancement of computer technology over years.

OR

Is series of development in technology of computers year after year.

FIRST GENERATION [1944- 1958]

In earliest general purpose computer, most input and output devices were punched cards and magnetic tapes. They were mainly made up of loops of vacuum tubes and magnetic drum. They could run only one program at a time.

Examples of first generation computers are;

ENIAC - Electronic Numeric integrator and calculator.
EDISAC - Electronic Delay Storage Automatic Computer
UNIVAC - Universal Automatic Computer This was used by USA bureau of census from 1953.

Characteristics of First Generation Computers

1. They used vacuum tubes as their active element for internal operations.
2. They were large in size that is they could fill several rooms.
3. They were slow and could run one program at time.
4. They used punched cards and magnetic tapes to input and output data.
5. They used a great quantity of electricity and generated a lot of heat.
6. Programming was done in machine and assembler language.
7. They could not store much information i.e. they had limited primary memory.
8. They were expensive and terminals could be rented.

SECOND GENERATION [1959-1963]

By early 1960's, computers were improved instead of using vacuum tubes they used transistors which were much smaller than vacuum tubes therefore they reduced in size.

Characteristics of Second Generation Computers

1. They used transistors as their active element.
2. They were smaller in size than first generation computers.
3. They used less electricity and generated less heat.
4. They became less expensive than first generation computers.
5. They were speedy and reliable since used removable magnetic disc packs as their storage devices
6. They led to introduction of high programming language e.g. **FORTRAN** [formula translation], **COBOL** [Common Business Oriented Language]
7. They led introduction of super computers e.g. Livermore Atomic Research Computer [**LARC**]

THE THIRD GENERATION [1964-1970]

In the third generation, the integrated circuits *I.Cs'+ replaced the transistors which are small electronic components. The IC is so effective because its components do not need to be wired directly to computer system board. Magnetic discs were used for secondary storage and computers began to support multi programming and time storing.

Characteristics of Third Generation Computers

1. They used integrated circuit IC as their active element
2. They are smaller than second generation computers in size
3. They have low power consumption
4. They supported capabilities such as multi programming and time storing.
5. They were fast and use parallel processing.
6. They led to introduction of simpler programming language e.g **BASIC** [Beginners All Purpose Symbolic Instruction Code]
7. They led to introduction of networking of computers.

FOURTH GENERATION

The fourth generation, Large Scale Integrated Circuits [**LSIC**] and Very Large Scale Integrated Circuit [**VLSIC**] were developed whereby a special IC can contain a loop of up to 10,000,000 of transistors. In 1971 Ted Hoff of Intel Company developed a micro processor which acted as CPU (Central Processing Unit).

Characteristics of fourth generation

1. They use micro processors as their active elements e.g. 386, 486 Pentium 1,2,3,4
2. They are small in size since were made by using **LSIC** and **VLSIC**
3. They are fast and reliable.
4. They have a high primary memory.
5. They led to introduction of wide variety of software e.g. windows, Jet audio e.t.c.
6. They led to the development of inter computer communication e.g. **internet** (is a global system of interconnected computer networks)
7. The price of computers dropped considerably and affordable

FIFTH GENERATION

The fifth generation is under development whereby, they will be using very large scale micro processor circuits in a parallel architecture and highly sophisticated operating system. In this generation, it is believed that computer will be sophisticated to extent that it may be possible to talk to it in a human like manner.

Conclusion:

Computers are becoming increasingly smaller, more powerful and less expensive.

COMPUTERS TODAY

BASIC FEATURES/CHARACTERISTICS OF MODERN COMPUTERS

For a device to be characterized as a computer, it must manifest to all the following characteristics.

1. **High Speed:** Computers are very fast in their operating speed. They have a capability of operating at millions of speeds faster than human beings. A second is very large time period time for computer.

A computer can perform billions of calculations in a second. The time used by a computer to perform an operation is called the processing speed. For example, operating speeds of computers are measured in a number of ways for instance; Milliseconds, Microseconds, Nanoseconds, Picoseconds, Megahertz, Gigahertz among others.

2. **Accuracy:** Computers are known to be so accurate that they hardly make mistakes. In fact they are able to detect mistakes and correct them. It's because they are programmed accurately and are not faulty in terms of components. For example, a modern computer performs millions of operations in one second without any error.
3. **Automation:** They work automatically. They do not need supervision to be able to perform since they are programmed with the relevant software programs to perform various tasks.
4. **Diligence:** They have the capability to perform the same tasks over and over again for long hours without getting tired or bored.
5. **Reliability:** Just as they are accurate, computers are reliable and consistent in the information produced by it. Given the same program and the same data, the result produced should be the same at all times.
6. **Versatility:** Computers are versatile in that they can be used in many fields for example; exam marking, military, teaching, medicine, designing, entertainment, airline seat reservation etc.
7. **Artificial Intelligence:** They are artificially intelligent. They can perform computations as well as making logical decisions. They can respond to requests given to them and provide solutions. All this is accomplished by the power of programs installed in them.
8. **Storage:** They have some kind of work space where data and information are stored. This storage area is referred to as the computer memory. They can store very large amounts of data for long periods of time. For example; Text, graphic, pictures, audio and video files can be stored easily.
9. **Precision:** Another basic feature of computers is precision, whereby it's possible to represent information and data especially in numerical quantities to any (reasonable) desired degree of magnitude. This attribute is very useful in mathematical and scientific applications.
10. **Security:** Because data and information in computer systems are stored in machine readable forms, they are protected to some extent from people who have no access to the computer by the use of passwords or some other form of identification, thus we say that computers provide a measure of security for data and information stored in it.
11. **Processing:** A computer can process the given instructions. It can perform different types of processing like addition, subtraction, multiplication and division. It can also perform logical functions like comparing two numbers to decide which one is the bigger etc.
12. **Electronic or Digital:** Modern computers are electronic and digital. They are actual machines with wires, transistors, and circuits.

UNITS OF MEMORY MEASUREMENTS IN A COMPUTER SYSTEM

In a computer system, data and instructions are stored as patters of ones and zeros, meaning that data is processed and stored in a computer system through the presence of electronic or magnetic signals in the computer's circuitry in the media it uses. This is called a "two-state" or *binary representation* of data, since the computer and the media can exhibit only tow possible conditions of **ON (1) or OFF (0).**

The smallest element of data, (binary digit) which can have a value of zero or one is called a bit. The capacity of memory chips is usually expressed in terms of bits. One bit of information is so little that usually computer memory is organized into groups of eight bits. Because we use very large numbers of bytes for storage, abbreviations are used for large numbers.

These are based on powers of two and are set out in the following table.

Abbrv.	Name	Power of 2	Approximate Number of Bytes	Alternatively
BIT		0 or 1	None	0 or 1
B	Byte	(8bits)	approx. 1 byte	8 Bits
KB	Kilobyte	2^{10}	= 1024 bytes approx. 1,000 bytes	1000 Bytes
MB	Megabyte	2^{20}	= 1 048 576 bytes approx. 1,000,000 bytes	1000 Kilobytes
GB	Gigabyte	2^{30} bytes	approx. 1,000,000,000 bytes	1000 Megabytes
TB	Terabyte	2^{40} bytes	approx. 1,000,000,000,000 bytes	1000 Gigabytes
PB	Petabyte	2^{50} bytes	approx. 1,000,000,000,000, 000 bytes	1000 Terabytes
EB	Extrabyte	2^{60} bytes	approx. 1,000,000,000,000, 000, 000 bytes	1000 petabytes
ZB	Zettabyte	2^{70} bytes	approx. 1,000,000,000,000, 000, 000, 000bytes	1000 Extrabytes
YT	Yottabyte	2^{80} bytes	approx. 1,000,000,000,000, 000, 000, 000,000 bytes	1000 Zettabytes

INFORMATION SIZE MEASUREMENTS

- One **Kilobyte-(KB)** is 1,024 characters and is approximately equal to one page of text in double-spacing. 1KB is about 140 words, about a half page of typed double-spaced text (words only)
- One **Megabyte-(MB)** is 1,048,576 characters and is approximately equal to one book. Which is approximately 1000 KB and 1000000 Bytes equivalent of about 500 pages of text, or one large book
- One **Gigabyte-(GB)** is 1,073,741,824 characters which equals about 1000 MB, 1,000,000 KB, 1,000,000,000 bytes and is approximately equal to 1000 books of text.
- One **Terabyte-(TB)** is 1,099,511,627,776 characters and is approximately equal to a whole library.

APPLICATIONS AND USES OF COMPUTERS

Computers are being used more and more in both the home and the workplace. The use of ICT and the application of computers has now grown to such an extent that life without computers seems almost unthinkable.

1. Solving crime

To help solve crime the police use:

- The Police National Computer (PNC) keeps computerized records (sorted into indexes) of stolen and suspect vehicles, vehicle owners, the names of convicted, wanted, or missing people, the names of disqualified drivers, fingerprints, and DNA obtained from people who have convicted of a crime.
- Databases to handle information gathered during major investigations.
- 3D modeling programs to recreate crimes.
- Centrally controlled and monitored CCTV Security cameras.

2. Supermarkets

Supermarkets use computers.

- To scan the barcodes on products that are sold (this helps to keep stocks of products in shops at the most efficient levels).
- To scan the barcodes on products as they are delivered (this also helps with stock control).
- To add up customers bills (using information from scanned barcode data) and to charge them for what they have bought (using EFTPOS [Electronic Funds Transfer at Point Of Sale]).
- To order new stocks from suppliers (using EDI [Electronic Data Interchange]).
- To plan stores and warehouses (using computer aided design programs).
- To keep all their stores and warehouses fully informed about new products, changes in company policy, and other information (using email).

3. The Music Industry

The music industry uses computers:

- To digitally record music.
- To produce electronic music using synthesizers.
- To 'sample' existing recordings.
- To speed up the production of new recordings (it is much easier to record each element of a recording separately and then blend them together than trying to do it all at the same time).

4. The Television and Video Industry

The TV and video industry use ICT:

- To produce CGI (Computer Generated Graphics) for use in animations, films, and videos.
- To speed up the whole process of producing animations (computers do not need to produce individual film cells for each frame of an animation).
- To create special effects.

5. Medicine

In medicine computers are used:

- To keep patients' records up-to-date.
- To monitor patients who are in intensive care.
- To produce images or scans of parts of the body e.g. ultra-sound scans of the womb for pregnant mothers, PET (Positron Emission Tomography) scans to detect cancer, CAT (Computerized Axial Tomography) scans that produces a 3D image of the inside of a patient's body etc.

6. Banks

Banks use computers:

- For MICR (Magnetic Ink Character Recognition).
- For EFTPOS (Electronic Fund Transfer at Point Of Sale).
- For EDI (Electronic Data Interchange).
- To administer the credit and debit card systems.
- To combat credit and debit card crime.
- For clearing cheques via the BACS (Bankers' Automated Clearing Service).
- To run their network of ATMs (Automatic Teller Machines *'hole in the wall machines'+).

7. Traffic Management

Traffic management uses computers:

- To control traffic lights to maintain an even flow of traffic.
- To manage parking by directing traffic towards empty car parks.
- To control speed monitoring cameras in accident hotspots.
- To control speed limits and traffic flow on motorways via the system of road-side matrix signs.

8. Pollution

Computers can be used to monitor pollution:

- Using remote sensing stations connected to a central monitoring computer via the Internet.

- To predict changes in pollution levels by using modeling based on existing data.

9. Education

In education computers are used:

- For interactive learning (e.g. using whiteboards, self-marking tests, educational games).
- For distance learning (where pupils can access learning programs and/or information from home via the Internet).
- For administration (e.g. examination entries, reports, attendance).

DISADVANTAGES OF USING COMPUTERS

Moral decay

Today the youth are glued on internet watching immoral Pictures, movies and magazines etc i.e. pornography and coping western culture.

Forgery

Computers are misused by some people to create or make fake money, certificates, reports, passports, e.t.c. using sophisticated printers

Power Consumption

Computers are electric devices therefore they need power to operate which is costly and cannot be afforded by many people.

Computer Virus (Destruction Programs)

Computers especially on internet can easily be attacked by computer virus which is so destructive to useful data and programs. Hence may lead to total loss to company/organization.

Eye Defects

Computers can affect human eye sight especially to those users who are frequently using the computer hence they might end up putting on spectacles.

Loss of writing and spellings skills.

Since the computer doesn't involve the use of a pencil or a pen, it results into loss of writing skills and spelling skills since it is capable of correcting the user for any mistake made.

Unemployment

Computers are mainly used by literate people hence cannot be used by illiterate people hence causing unemployment amongst people in a society.

Body Fatigue

This is as a result of using of improper computer chairs and computer tables when using a computer.

COMPUTER CLASSIFICATION

Computers are classified as follows:

1. Classification by process
2. Classification by purpose.
3. Classification by size and capacity
4. Classification by processor power

CLASSIFICATION BY PROCESS:

In the classification by process, computers are categorized according to how data is processed and represented. This classification has three main categorizes namely:

- Digital computers
- Analog computers
- Hybrid computers.

(i) Digital computers:

These perform arithmetic and logical functions. They process data that is represented in form of discrete values (they are numbers that can be defined like 1, 2, 3, etc) examples of digital computers include;

- Digital watches,
- Digital calculators.

Most computers are digital.

(ii) Analog Computers

These process data that is in a continuous form or measurable quantities/units, e.g. voltage, current, length and pressure.

Examples of Analog devices are;

- Hygrometer,
- Thermometer,
- Speedometer, and
- Pressure sensors.

(iii) Hybrid Computers

These are computers that have the combined features of both the digital and analog computers. The hybrid computers are further classified according to the purpose / the work that they were designed for.

CLASSIFICATION BY PURPOSE:

These are categorized in to two classes;

- Special purpose computers.
- General purpose computers.

(i) Special purpose computers

These are designed to handle only a particular task. There form of operation is restricted in nature. They are designed to perform a particular task and there no other tasks. E.g.

- Digital watches,
- Pocket calculators.

Currently special purpose computers are employed in devices like missiles; Lifts in tall buildings also employ special purpose computers.

(ii) General purpose computers:

These are designed to solve a wide range of tasks/ problems. However, they can be adopted to perform a particular task/solve specific problem by means of a special program.

In the past, computers used to be classified according to the use they were put to, e.g.

- Word processing computers were used for only word processing,
- Desktop publishing computers for desktop publishing and
- Rational database computer for a database management.

With a trend in technology, this has been reserved and now it is very common to have a single computer with word processing, desktop publishing and database application capabilities.

CLASSIFICATION BY SIZE

Computer systems can be classified according to their size as follows:

- Micro computers

- Mini computers
- Main frame computers
- Super frame computers

Micro Computers

A micro computer is a single user general purpose computer that can perform all inputs, process, output, and then storage activities by itself. They can be used by one person at a time and they are also known as personal computers (P.Cs)

CHARACTERISTICS OF MICRO COMPUTERS

- They are fast in processing data.
- They are small in size.
- There more reliable then modular.
- The computing power of current microcomputers exceeds that of the mainframe computers of previous generations at a fraction of their cost.
- They have become powerful-networked professional workstations for use by end users in business.
- Are interconnected in a variety of telecommunications networks which includes local area networks (LAN), client/server networks, and internet.
- Microcomputers perform all of its input, process, output, and storage activities by itself.

EXAMPLES OF MICRO COMPUTERS INCLUDE;

- Desktop computers
- Tower model computers
- Note book computers (laptop)
- Handheld computers (palmtop)

(i) Laptop

A Laptop is also referred to as a notebook computer. It is a personal computer small enough to fit on the lap. It has features that are being incorporated.

Characteristics of laptop

- It fast in processing data.
- It consumes less compared to desktop computers.
- It is portable and mainly used for mobility.
- It has limited support of peripheral devices.

***Note**: A peripheral is any device that can be connected to the computer system unit, like mouse, keyboard, projector etc.*

(ii) Desktop Computers.

These are designed to be stationed at one place probably on top of the desk; you can have one in the office and one at home. They are the standard computers (PC's), where by the monitor is placed on top of the system unit.

(iii) Tower model computer.

This has a tall and a narrow system unit that can be placed adjacent to the monitor or on flour.

(iv) Hand Held Computers.

These are sometimes called palmtop computers. These are small/ portable computers that can fit in the palm of the user.

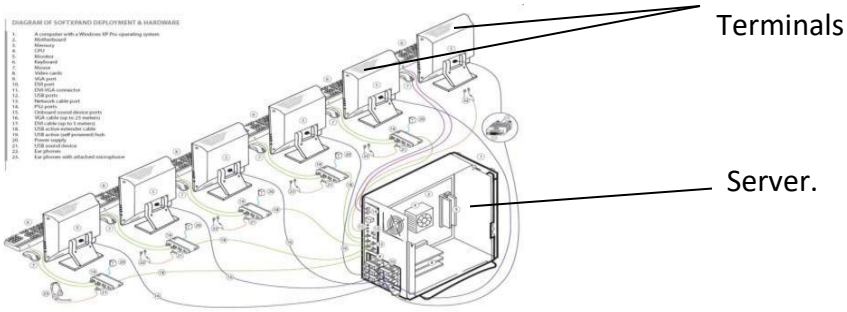
They are designed for those users that are always on the move (travelers).

They can easily be put in the shirt pocket and any time one can check on e-mails, take few notes and keep schedules and appointments with these palmtop computers.

They are also referred to as personal digital assistant (PDA). Modern PDA's have been integrated with cellular phones.

MINI COMPUTERS

A mini computer is larger than a micro computer which is powerful enough and widely used in real time applications e.g. air traffic, factory automation. A mini computer is multi user computer that support many users at time. It falls in the range of **50-500** users at a time depending on the model.
E.g. DECS VAX range and IBM AS400 range.



Characteristics of Mini Computers

- It is physically bigger than the micro computer but smaller than the main frame.
- They can support moderate range of peripherals.
- They are more powerful than micro computers.
- They can support 50 to 500 users at time model.
- They have a large storage than micro computers.
  - They cost less to buy, operate and maintain than the mainframe computers.
  - Have become popular as powerful network servers to help manage internet websites, corporate intranets and extranets plus client-server networks.
  - They can function in an ordinary operating environment for example; they don't require air conditioning or electrical wiring.

APPLICATIONS OF MINICOMPUTERS OR MIDRANGE COMPUTERS

1. It's used by many small and medium-sized organizations for their whole operations for example among the business functions of departments are supported by minicomputers to support the credit and accounts receivable organization.
2. They also serve as industrial process-control and manufacturing plant computers in the manufacturing environment.
3. Most of them can also function in ordinary office environments though they don't need to be in an environmentally controlled room.
4. Serve as front-end computers to assist mainframe computers in telecommunications processing and network management.
5. They are used as powerful network servers and for many multi-user business data processing and scientific applications.
6. They are especially well suited for specialized tasks, usually so as to dedicate computing power to a specific function such as backroom order processing.

MAIN FRAME COMPUTER

The term probably had originated from the early mainframes, as they were housed in enormous, room- sized metal boxes or frames. Later the term was used to distinguish high-end commercial machines from less powerful units.

This is a largest and it's as big as a closet and expensive computer that is capable of simultaneously process data for hundreds and thousands of connected users at the same time. Mainframes are very large, colossal and powerful computers often filling an entire room with very large primary storage capabilities normally from 64 megabytes to several gigabytes of RAM-(Random Access Memory) which helps mainframes process information very quickly at 10 to 200 MIPS.

The main frame computers are used in banks, airlines, and insurance companies. Each user works separately with a separate keyboard and monitor but they all use the same processor/ Central Processing Unit (CPU) E.g. IBM4381, ICL39 series, CDC cyber series.

Characteristics of Main Frame Computers

- They are large computers with a very large storage capacity.
- They can support 50 to 10,000 users concurrently
- They are more expensive compared to minicomputer.
- They can support a wide range of peripherals.
- They are very sensitive to variations of temperatures, dust, humidity therefore should be kept in air conditioned room.
- They are faster in data transfer hence they are speedy.
- They require a qualified operator and a programmer for its operation.
  - They are physically larger and more powerful than microcomputers and mini or midrange computers.
  - They can process hundreds of MIPS.
  - Have larger primary memory storage capabilities ranging from hundreds of megabytes to many gigabytes of primary storage.
  - They are designed to handle the information processing needs of large organizations with high volumes of transaction processing or with complex computational problems.
  - Mainframes have slimmed down drastically in the last few years, dramatically reducing air conditioning needs, electronic power consumption and floor space requirements and thus their acquisition and operating costs.
  - Nearly all mainframes have the ability to run or host multiple operating systems, and thereby operate not as a single computer but as a number of virtual machines. In this role, a single mainframe can replace dozens or even hundreds of smaller servers.
  - Mainframes are designed to handle very high volume input and output (I/O) and emphasize throughput computing.

APPLICATIONS OF MAINFRAMES

The mainframes with its strong security, connectivity and data management capabilities can provide these services;

1. Mainframes (often colloquially referred to as **Big Iron**) are computers used mainly by large organizations for critical applications, typically bulk data processing such as census, industry and consumer statistics, enterprise resource planning, and financial transaction processing.
2. Batch processing: systems that require large amounts of data and processing such as corporate payroll, process on the mainframe.
3. Data management: The corporate repository, a directory of what data is stored where data definitions and standards plus other various data and systems models resides on the mainframe.

4. Network management: the mainframe provides central services for monitoring and controlling the corporate network.
5. Security: The mainframe controls corporate security and user authentication services. It monitors and permits users to access the resources on the corporate network.
6. Enterprise wide back up: The mainframe provides prodigious amounts of storage capacity for use in backing up files and data bases.

SUPER COMPUTER

These are the fastest, largest, most powerful and most expensive computer systems in the world. They are designed specifically for high-speed numeric and mathematical computations needed in very complex applications such as for example; weather prediction, engineering, designing nuclear weapons and other business applications requiring quick processing of lots of data, it uses 12,000 microprocessors to operate at over 30 trillion operations per second and can perform hundreds of millions of instructions per second (MIPS).

They require a special air conditioned room. They are often used for research, among other uses are Worldwide weather forecasting and analysis of weather, oil exploitation, air craft design, Invasion of nuclear weapon system, predications of the spread of epidemic e.t.c. Unlike a micro computer a super computer has several processors hence too powerful.

APPLICATION AND FEATURES OF SUPERCOMPUTERS

1. The are used by government research agencies and large universities plus major corporations
2. Supercomputers are used for highly calculation-intensive tasks such as problems involving quantum mechanical physics, weather forecasting, climate research, molecular modeling (computing the structures and properties of chemical compounds, biological macromolecules, polymers, and crystals), physical simulations (such as simulation of airplanes in wind tunnels, simulation of the detonation of nuclear weapons, and research into nuclear fusion).
3. They use parallel processing architectures of interconnected microprocessors which can execute many instructions at the same time in parallel.
4. Their purchase range from $5 million to $50 million range.

RELATIONSHIP BETWEEN MAINFRAMES AND SUPERCOMPUTERS

The distinction between supercomputers and mainframes is not a hard and fast one, but supercomputers generally are used for problems which are limited by calculation speed, while mainframes are used for problems which are limited by input/output and reliability and for solving multiple business problems concurrently (mixed workload). The differences and similarities are as follows:

1. Both types of systems offer parallel processing, although this has not always been the case. Parallel processing (*i.e.,* multiple CPUs executing instructions simultaneously) was used in supercomputers (*e.g.,* the Cray-1) for decades before this feature appeared in mainframes, primarily due to cost at that time.
2. Supercomputers are optimized for complex computations that take place largely in memory, while mainframes are optimized for comparatively simple computations involving huge amounts of external data
3. Supercomputers are often purpose-built for one or a very few specific institutional tasks (e.g. simulation and modeling). Mainframes typically handle a wider variety of tasks (e.g. data processing, warehousing). Consequently, most supercomputers can be one-off designs, whereas mainframes typically form part of a manufacturer's standard model lineup.
4. Mainframes tend to have numerous ancillary service processors assisting their main central processors (for cryptographic support, I/O handling, monitoring, memory handling, etc.) so that the actual "processor count" is much higher than would otherwise be obvious.

Supercomputer design tends not to include as many service processors since they don't appreciably add to raw number-crunching power.

5. Mainframes are exceptionally adept at batch processing, such as billing, owing to their heritage, decades of increasing customer expectations for batch improvements, and throughput-centric design. Supercomputers generally perform quite poorly in batch processing.
6. There has been some blurring of the term "mainframe," with some PC and server vendors referring to their systems as "mainframes" or "mainframe-like." This is not widely accepted and the market generally recognizes that mainframes are genuinely and demonstrably different.

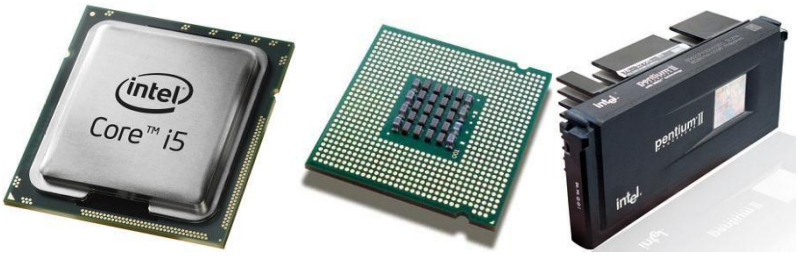
CLASSIFICATION BY PROCESSOR POWER

Because of rapid changes in technology, processor power is also rapidly increasing. Computers are getting faster and faster each year. The higher the processor power, the faster the computer. Previous computers had a processing power of less than 0.4 MIPS but today 15 MIPS is the minimum.

Therefore computers with high processing power require more system resources such as system memory, hard disk space including modern programs. All these put together makes computers with higher processing power better productive tools.

The most common types of processors are;-

- 80286, 80386, 80486,
- Pentium Family;- Pentium 1(80586), Pentium pro, Pentium 2, Pentium 3, Pentium 4,
- Core to dual.
- Dual core.



COMPUTER SYSTEM

A computer system is a complete apparatus for handling all aspects of information/data within an organization.

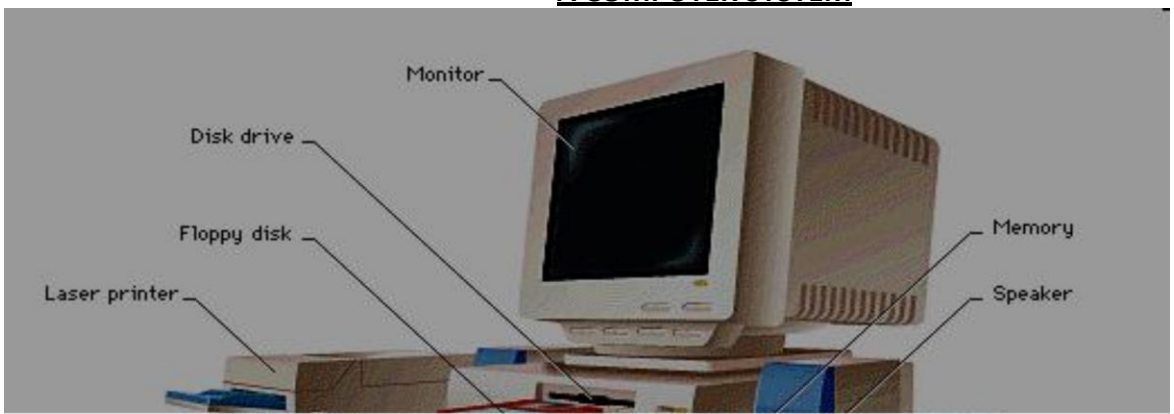
OR

A computer system is a set of independent parts/device that work together to manage and process data and information.

SYSTEM

A system is a group of many inter related parts which work together to achieve a common goal.

A COMPUTER SYSTEM



A computer system is mainly composed of the following components:

- Computer Hard ware.
- Computer Soft ware.
- Human ware.

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)

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

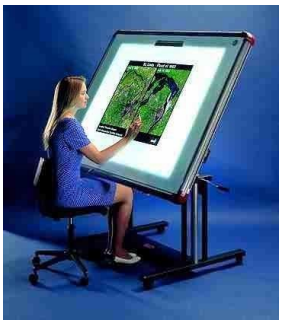
- Touch screens are often used for information kiosks located in department.
- Touch screens are also used for ATM machines to allow easy access of bank accounts.
- Touch screens are also used in some places like stores, hotels, air ports, museums.

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.

Barcodes

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

Pre-printed Characters

ADVANTAGES OF OCR

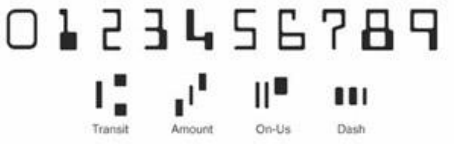
- Written and printed data can be read but some time
- Documents can be read directly in computer without reprinting it
- The input character can be edited by word processing soft ware

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 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.

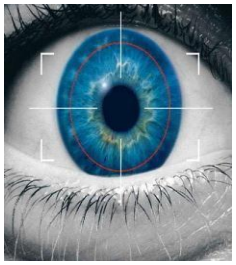
21. CCTV (Closed-Circuit Television) CAMERA

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 massages 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 PRINTER

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 PRINTER

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 PRINTER

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 med lo[pl[pla 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

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	Reminder
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

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

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

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

CONVERTING BINARY BASE TO ANY BASE LIKE BASE FOUR

Example 1

Convert 10000000_{two} to base ten

Solution

Here you have to convert the binary base to decimal base then to a desired base in this case base four

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

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

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

Base	Number	Reminder
4	128	0
4	32	0
4	8	0
	2	

$128_{ten} = 2000_{four}$

Therefore $10000000_{two} = 2000_{four}$

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 waiting for storing data as magnetic spot and large computer tapes are used only in a cartilage. Since tapes use a sequential access media using them is a slow process.

FLOPPY DISKATTE.

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 DISCKETTES

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)

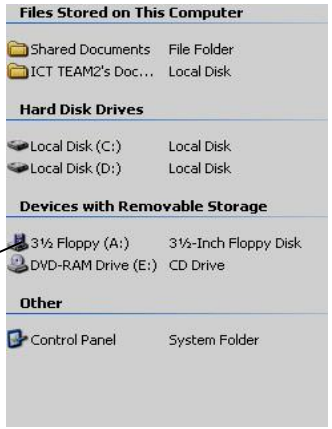
***NOTE**: If you reformate a diskette with data already written on it, all the data will be lost during the reformatting.*

Steps followed while formatting a floppy diskette;

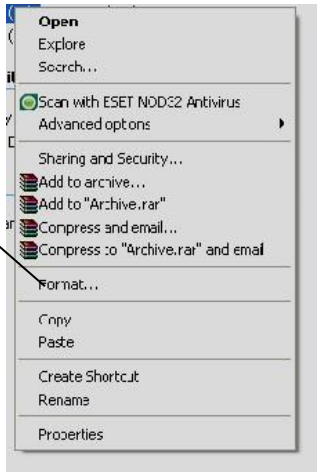
Step 1:
Insert 3½ inch floppy diskette into the drive

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

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



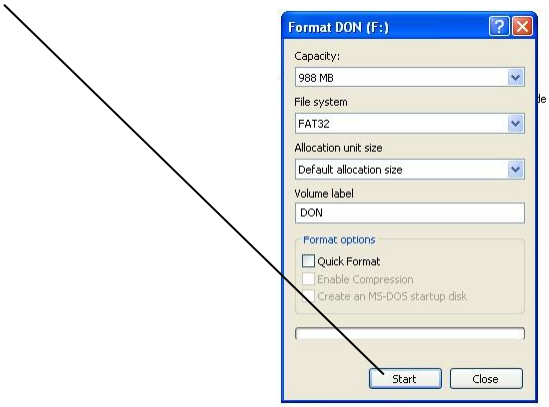
Step 4:
From the shortcut menu which appears, select **Format**



Step 5:

From the Window which appears, click the Start

Button to allow the program to start formatting



TAKING CARE OF THE FLOPPY DISKETTE

- 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.

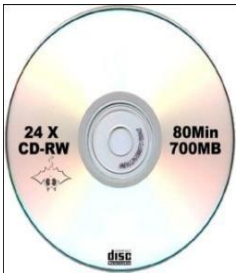
Definition: it is an optical disc format used to hold software or programs and data such as prerecorded text, graphics and sound lick music. It referred to as "read only" because the content was recorded at a time of manufacture and it cannot be erased or written on by the user.

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

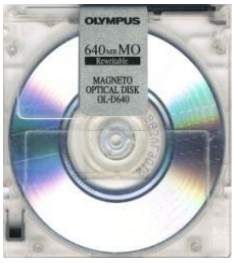
- Always store a DVD or a CD in a jacket or jewel box if not in use.

- 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.

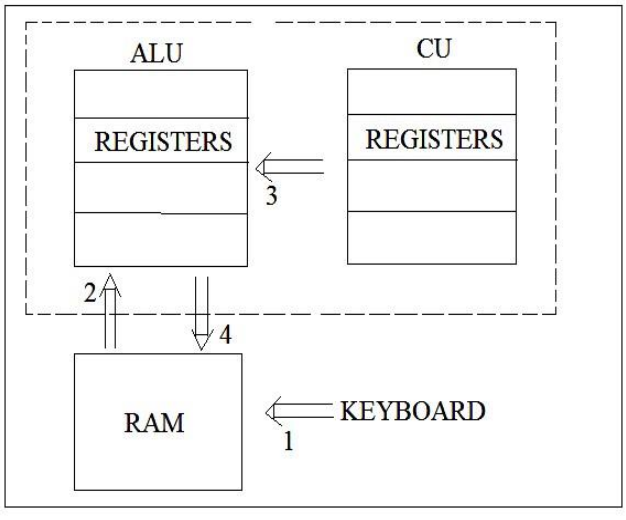
PROCESSOR

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)

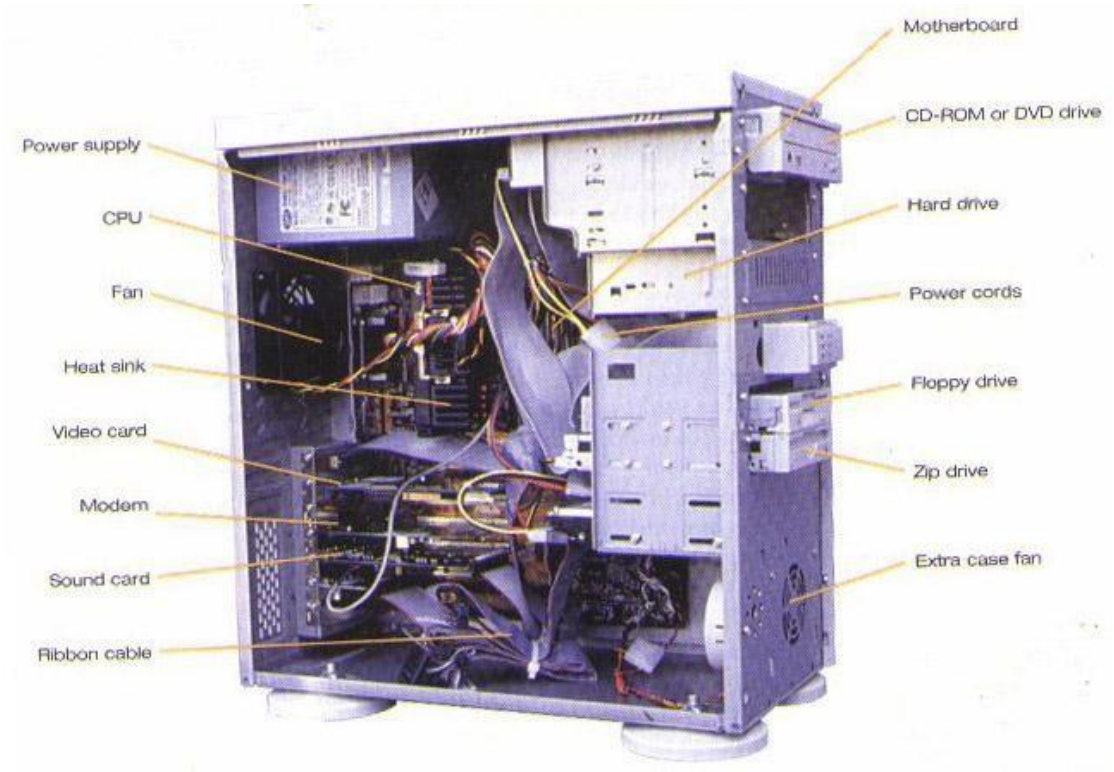
KINDS OF MICRO PROCESSORS

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 DUE & DUAL2CORE.

SYSTEM UNIT

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

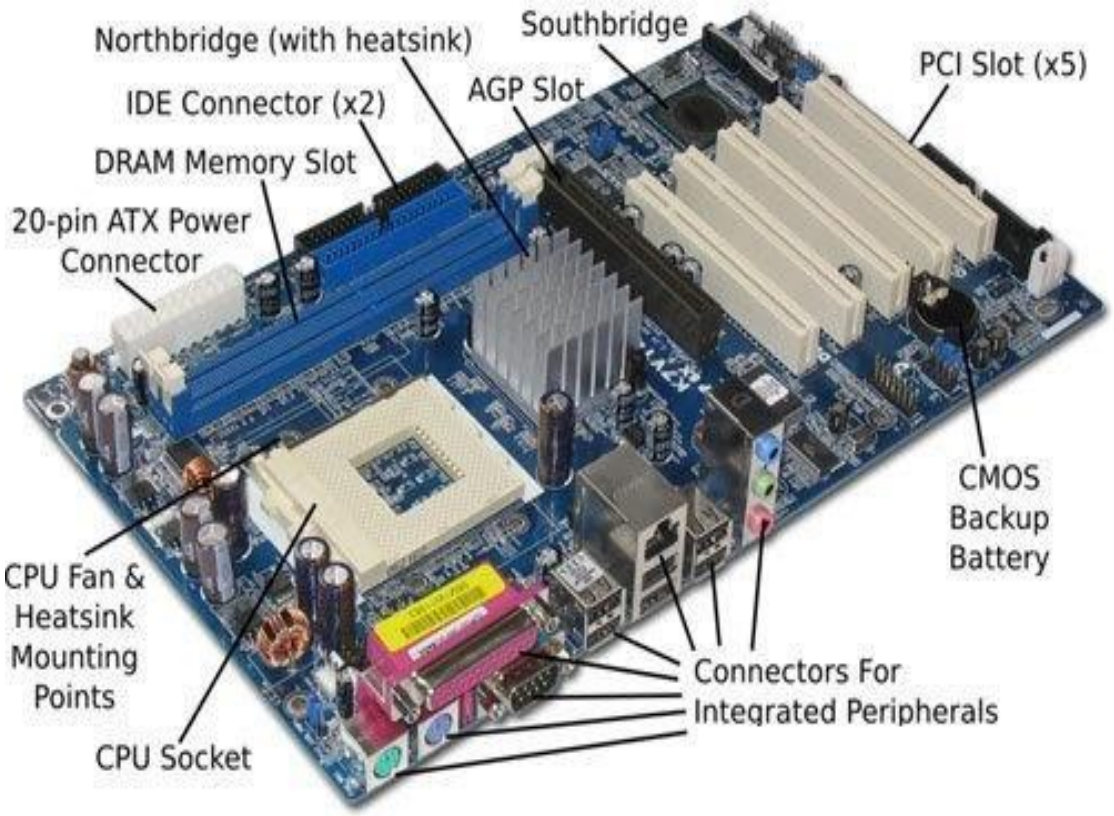


i) Power Supply

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.

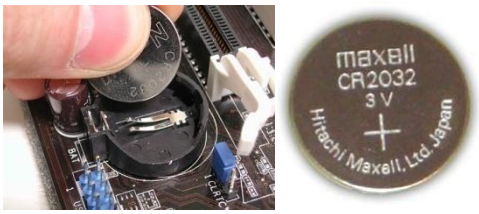


CMOS (Complementary Metal Oxide Semi-conductor).

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.

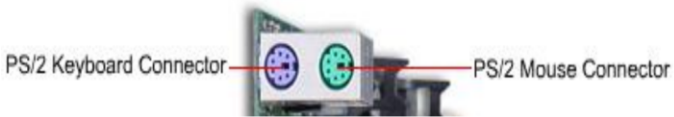
- **Allows System Settings to be called up**;
  A few additional settings are stored by the system. The CMOS battery allows these settings to be loaded into system memory when the computer boots.



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 (Monitor) 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.

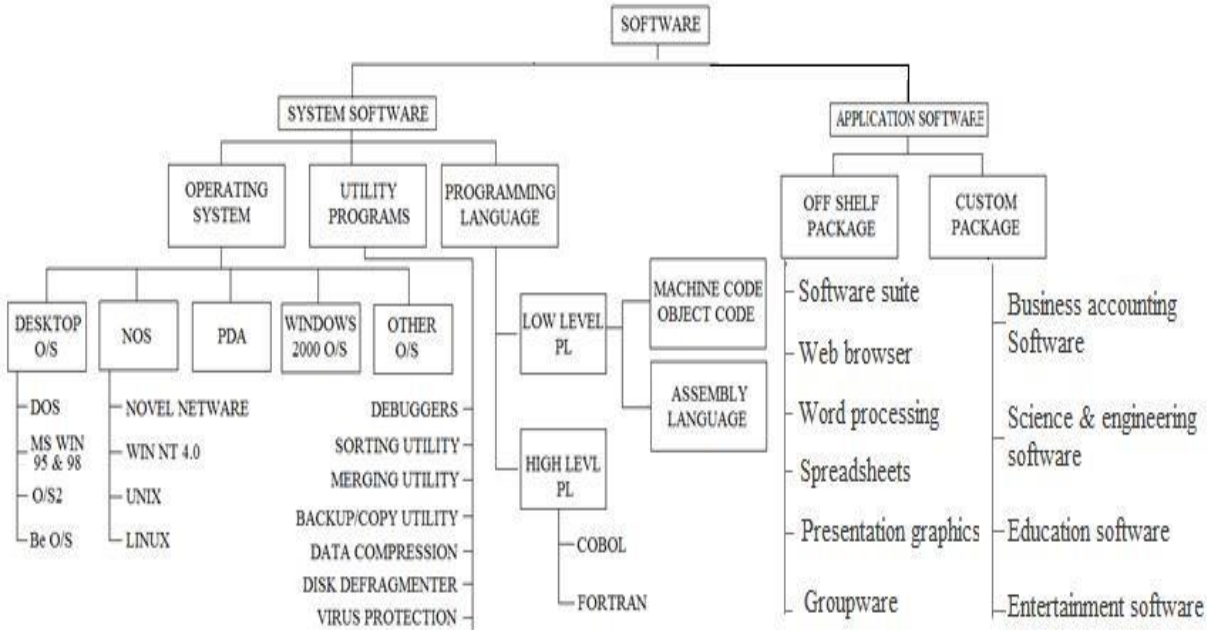
System software
This is the software designed to allow the computer to manage its own resources and run the hardware and basic operations of the computer.

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.

1. UTILITY PROGRAMS

These are system software component which are used to support, enhance or expand the existing programs in a computer system.

OR
Utility programs are referred to as service programs which improve the performance of a computer.

Many operating system have utility programs built in for a common purposes. However, some utility programs are available separately and the common examples of utility programs include the following;

(i) Backup/Coping Utility
This is an operating system utility that makes a duplicate copy of the contents on a disk. It is important to make backups of a disk because you may have a massive loss of the programs or files examples of backup utilities are; Norton backup from Symantec.

(ii) Data recovery Utility
This is a system software utility used to restore data that has been physically damaged or corrupted on a disk. Data can be damaged by viruses, bad software, hardware failure and power fluctuation which occur while data is being written or recorded.

(iii) Data Compression
This is a system software utility which removes redundant gaps or un necessary data from the computer file So that less space is required to store and transmit data.

(iv) Disk Defragmenter Utility
This utility program enables the rearrangement of data files on the disk so that data units of each file are repositioned in other location on the disk, and helps the computer to run its operation faster and efficiently.

Note: *When a file is stored on a disk, usually the data elements are put next to one another, after the user has saved but due to deletion of many files in different locations there remain many scattered areas of deleted data which are too small to be used efficiently. This is called fragmentation.*

(v) Virus Protection
A virus protection utility is used to detect, remove or destroy viruses. This utility is also referred to as anti-virus utility or software. It is used to scan hard disks and memory to detect, remove or even destroy the viruses.

Note*: It is always important to update the anti-virus software frequently in order to detect new viruses.*

Examples of common anti-virus software utility include;
- Norton anti-virus.
- Dr Solomon's anti-virus.
- McAfee Virus Scan.
- Node32.
- Kerspersky anti-virus.

(vi) Software Monitors
These are programs designed to check on specific aspects of the computer system where the bottleneck exists and to remove the bottleneck e.g.
- Disk de-fragmentation.

(vii) Merging Utility;
This is responsible for combining data from more than one file into a single file.

(viii) Sorting Utility;
This is responsible for taking in data and re-arranging data in any order as specified by the user

(ix) Debuggers
These are used during testing of the program. They are able to trace the flow of the program and display various values as requested; therefore errors are traced and removed from a program.

Other utilities

(x) File viewer
This is a utility that displays the contents of the file. An operating system file manager often includes a file Viewer.

(xi) Disc Scanner
This is a utility that detects and correct both physical and logical problems on hard disks or floppy and search for and removes unwanted files.

A physical problem is on the media such as a scratch on the surface of the disk while the logical problem is on the computer, such as corrupted FAT (File Allocation Table).
(xii) Uninstaller
Uninstaller is a utility that removes an application as well as any associated entries in the system file e.g. MCAfee's Uninstaller.

(xiii) Screen saver

A screen saver is a utility that causes the monitor's screen to display a moving image or blank screen if no keyboard or mouse activity occurs for a specific period of time. Screen savers were originally developed to prevent a problem called **ghosting**.

(xiv) Diagnostic utility

This compiles technical information about a computer's hardware and certain system programs and then prepares a report outlining any identified problem e.g. Windows XP includes Dr Watson as a diagnostic utility.

2. OPERATING SYSTEM:

This is the most important system software component that contains master programs called the supervisor that manages the basic operations of computer.

Examples of Operating system include the following;

- Windows 2000, XP, Vista, 7
- Dos
- Macintosh
- Unix
- Linux
- Netware e.t.c.

FUNCTIONS OF OPERATING SYSTEM (OS).

- It coordinates a process called booting. During booting the OS is automatically loaded in to the main memory (RAM) from the hard disk and this accomplished by a program called "Boot Routine" or "Boot Strap Loader".
- The OS loads programs and required data into the main memory.
- It controls hardware and coordinates the flow of data between various application programs and the users.
- It manages the BIOS (Basic Input, Output System) such as keyboards, mouse, and screen/monitor e.t.c.
- It manages the memory and provides a proper use of resources.
- It is used to monitor the system performance whereby it can display reports that help the user to troubleshoot.
- It is used to configure, setup devices such as plug and play devices that are configured automatically like a flash disk.
- The OS is also used to administer security for multiple users where it requires a user to log in by typing the password.

Note: -

*An OS can be classified as a **single** user system which acts as an interface for only one user e.g. **DOS (Disk Operating System)** and it can also be classified as a **multiple** user system which acts as an interface of more than one user, this implies more than one person can use the computer at the same time e.g. **NOS (Network Operating System)***

The operating system consists of different components including;

Kernel is the piece or pieces of software that is responsible for servicing resource requests from applications and the management of resources.

OR

Kernel is the main component of most computer operating systems; it is a bridge between applications and the actual data processing done at the hardware level.

Note: Kernel's responsibilities include managing the system's resources (the communication between hardware and software components)

A kernel is also referred to as memory resident because it is responsible for deciding which *memory* each process can use.

SOFTWARE INTERFACE

This where a user and computer have to get together to communicate. Therefore user interface controls how the user uses data and instruction and how information is displayed on the screen.

VARIOUS USER INTERFACES

- Command line interface.
- Menu driven interface.
- Graphical user interface.

COMMAND LINE INTERFACE

This is an interface where the user types a string of characters to issue commands. This interface could be used by users that have memorized the command.

Examples of OS (Operating System) that used command line interface include;

- DOS
- UNIX
- LINUX.

ADVANTAGES OF COMMAND LINE INTERFACE

- It uses little memory and doesn't require a very fast processor.
- Commands are entered directly to the processor hence its fast in operations.
- It doesn't require a large disk space.

DEMERITS OF COMMAND LINE INTERFACE

- Commands are hard to be learnt and memorized hence difficult to use.
- It doesn't allow the use of a mouse.

MENU INTERFACE

This is an interface where commands are issued through menus. A **menu** is on screen list of options where a user can choose from by the use of either a mouse or a keyboard. The menu driven interface is the one which was improved to a graphical user interface.

GRAPHICAL USER INTERFACE (GUI)

Today most computers use GUI for multi-tasking (A term meaning dealing with more than one task\program at the same time). A GUI is also referred to as **WIMP** (Windows Icons Menu Pointers) interface.

ADVANTAGES OF GRAPHICAL USER INTERFACE (GUI)

- A graphical interface is a user friendly because it is easy to learn and work with.
- There is no need to type and memorize any command language.
- The interface is similar for any application.

DISADVANTAGES OF GRAPHICAL USER INTERFACE

- A graphical user interface normally requires more memory as well as a faster processor.
- It also occupies a large disk space to hold all the files for different functions.
- It is difficult to automatic function for expert user

DIFFERENCES BETWEEN DOS AND WINDOW OPERATING SYSTEM.

DISK OPERATING SYSTEN	WINDOWS OPERATING SYSTEM
It is a single user operating system	It is multi-tasking operating system
It doesn't offer a graphical user interface	It offers modern improved graphical user interface
Cannot take full advantage of modern 32bit micro processor	It takes full advantage of modern 32bit micro processor
Uses command line interface	Uses graphical user interface
It is not user friendly	It is user friendly
It requires less hard disk space	It requires a large disk space
DOS is stable cannot easily corrupted or damaged	Windows is unstable and can easily be corrupted or damaged

GROUPS OF OPERATING SYSTEM

The operating systems can be grouped into the following classes;

1. Desktop operating systems.
2. Network operating systems.
3. PDA operating systems.
4. Windows 2000 operating systems.
5. Other operating systems.

DESKTOP OPERATING SYSTEM

This refers to several single user operating systems that were developed in early 1980's for personal computers. They include the following;

1. DOS (Disk operating system)

There are two types of DOS currently in use in micro computers and they include

- **PC DOS** which was by the IBM Corporation and
- **MS DOS** which were developed by Microsoft Corporation to complete the desktop applications environment.

Earlier versions of DOS used a command line interface while the later versions of DOS included a menu driven user interface as well as improved memory and disk management. DOS is not widely used today because it does not offer a graphical user interface and cannot take full advantage of modern 32-bit micro processors.

2. Window 3x

Windows 3x refers to the three earlier versions of Microsoft windows i.e. windows 3.0, windows 3.1, windows 3.11. These versions of windows 3x were not actually operating systems but operating environments. An operating environment is a graphical user interface that works in combination with an operating system e.g. DOS

3. Microsoft windows 95 and 98

The Microsoft corporation developed these new operating systems as a result of technological advancement over the windows 3x. The 32 bit operating system provided better multi-tasking (working with various

applications at the same time) and faster video displays for games. Their ability for plug and play provided a better way of installing new peripherals (general term that refers to other parts connected to the computer e.g. keyboard and the mouse.)
They also entail improved network support, power management and file management. They also offered improved power battery life and productivity for the laptop computers.

4. OS/2 (Operating system /2)

This is another desktop operating system which offers multi tasking abilities. It was initially created by ***Microsoft*** and ***IBM***, and then later developed by IBM exclusively**.** OS/2 is no longer marketed by IBM, and IBM standard support for OS/2 was discontinued on 31 December 2006.

5. Be Os (Be operating system)

This is one of the most recent developments in operating systems. It was built due to the increased demands in the multi-media industry for large file handling abilities. Its 64 bit system can handle files up to Million terabytes. This makes it ideal to handle files that include videos, sound and other three dimensional images (3D-Images.)

NETWORK OPERATING SYSTEMS.

These are designed to be used on several computers that exist on a network. At times they can be installed on stand-alone computers. Examples include

1. NOVEL NETWARE.

Is a network operating system developed by Novell, It initially used cooperative multitasking to run various services on a personal computer. It was designed for client server network.

2. WINDOWS NT4.0.

This has all the features, which were conceived from 32bit Operating system of Windows 95 & windows 98 but with integral security and networking abilities thereby offering a more stable and secure platform, which is ideal for corporate enterprises.

3. UNIX.

This is multi-user, multi-tasking, time sharing operating system which was developed by the bell laboratories for the mini and main frame computers.

4. LINUX:

This is UNIX everywhere except for the name. It encompasses free software foundation; currently it is increasing being used as a back end server. Companies support it like bell and IBM making it an industrial strength operating system.

PDA OPERATING SYSTEM

These are operating systems, which are specifically designed for hand held computers (PDA). Normally these operating systems, which are pen-driven, or touch sensitive, come when they are already loaded in the computer ROM-BIOS. Common examples include window CE (computer edition). It has a familiar interface

similar to the normal windows environment with a task bar, icons and many recently have come with version for the keyboard PDA.

WINDOWS 2000 OPERATING SYSTEM

Originally called Windows NT 5, it is an operating system from Microsoft. It's a desktop as well as a network operating system for both the small and big corporate organizations. It has many features than earlier Microsoft operating systems.

WINDOWS ME

Windows millennium is an updated version of windows 98 for consumers that uses a computer to surf the internet or for entertainment. Windows Me is designed for home users.

OTHER OPERATING SYSTEMS
These include operating system that are designed especially for particular computers by their manufacturer examples include

1. MAC OPERATING SYSTEM

This was the first commercially successfully graphical user interface. It was released with Apple's Macintosh computers. Mac o/s has the capability of opening, editing, and saving files created by windows and DOS platform.

2. SYSTEM 7 OPERATING SYSTEM

System 7 operating system for Macintosh computers was developed by digital researchers for use on the 8 bit micro computers. These have now been over taken by the 16 bit and 32 bit microprocessor.

3. Windows XP
Windows XP is an operating system that was produced by Microsoft for use on personal computers, including home and business desktops, laptops, and media centers. It was first released to computer manufacturers on August 24, 2001, and is the most popular version of Windows, based on installed user base. The name "XP" is short for "eXPerience".
4. Windows Vista

Windows Vista is an operating system released in several variations developed by Microsoft for use on personal computers, including home and business desktops, laptops, tablet PCs, and media center PCs.

5. Windows 7.

Windows 7 is the latest release of Microsoft Windows, a series of operating systems produced by Microsoft for use on personal computers, including home and business desktops, laptops, notebooks, tablet PCs, and media center PCs.

3. PROGRAMING LANGUAGES

The computer language is a mean of communication used in designing a computer program.

This program is accomplished by designing a list of words and symbols according to a particular syntax (Grammatical rules related to use of a command or programming language). It can be a pre-determined rule of grammar into logical manner to form a computer program.

Basically; there are two categories programming language namely;

i. Low level languages.
ii. High level languages.

LOW LEVEL LANGUAGES

These are called low level languages because they are associated with the processor than high level languages which are nearer to the programmers.

There are two types of low level languages namely;

1. Machine code (Object code).
2. Assembly language

Machine\Object code (First Generation Language).

It is very difficult to learn and very unfamiliar to humans. It is not user friendly at all. Programming in machine code is very tiresome and very many errors are likely to occur, all instructions in machine code language are represented in binary format and an example of machine code instruction would look like this 1010000000001001 – 16bits machine.

Assembly language

It was invented to assist machine code programmers. However much as it looks like a machine code language at least for it, it is more easily understood and remembered by human. An example of the assembly language instruction looks like;

- SUB which means:- Subtraction
- FNO which means:- First Number

However, they have one main disadvantage of depending on registers and memory location in a computer. Therefore they cannot easily be transferred from computer to computer since different manufacturers produce different processors which identify and allocate memory and register differently.

HIGH LEVEL LANGUAGE

These were produced as a further refinement in the assembly language. They made programming much easier to user and shielded programmers from knowing the natural registers and memory addresses which are vital in the assembly language.

In high level language, fewer instructions are written and therefore a lot is done in less time. They are classified as 3 generation language (3GLS), they were originally built for specific operations that is say scientific or business purpose e.g. FORTRAN & COBOL.

They are problem oriented languages and have a wide vocabulary of valid words, symbols and sentences.

PROGRAM TRANSLATION.

Translation of a high level program into the machine code is equivalently done by compilers and interpreters.

COMPILERS
These translate a program written in a high level language into machine code or into an assembly language or program. The entire program is translated into machine code at compilation time.

INTERPRETERS.
An interpreter translates the source program line by line while the program is running. This is done each time the program is executed; as a result a program running under an interpreter runs very slowly as compared to the compiled program.

LINKERS.

These programs combine compiled programs and determine where the program will be located in memory. The linker has transformed an object code, an executable file is generated. These normally result in to the file with the extension ".exe".

Most modern compilers automatically link the object code generated from the source program therefore one may fail to note the linking process.

Common types of programming languages include FORTRAN, COBOL, PASCAL, ALGOL, and C++.
TERMINOLOGIES USED UNDER SOFTWARE

1. **File**:
   A file is a collection of related information that is given a name. it is stored on a disk so that it can be retrieved when needed.

RULES OF DOS FILE NAMING
- A file name should have a maximum of 8 characters.
- A file name should be descriptive of the contents of a file
- It can have 3 characters and not more than that.
- A file name shouldn't be unique and similar with the already one existing in a computer.
- File naming should be consistent for example Abbey, Abby, Blick
- The symbols should not appear in a file /,\.., >,< *?,.
- A file specification should consist of two parts that is file name and the file extension.
- In a file specification, a file name will be separated from a file extension by a period(.).

Types of Files

Filename. Extension	File type
***.doc	Word document
***.xls	Excel file
***.mdb	Access file
***.ppt	Power point file
***.sys	System file
***.exe	Executable file
***.ini	Object file
***.bak	Backup file
***.gif OR ***.jpg OR ***.Jpeg	Image file

2. **Folders**:

A folder is a named storage area in a windows operating system. A folder can be either opened or closed. A group of files can be kept in one folder.

In MS-DOS, folders are referred to as directories and the directories hierarchy is called directory tree or directory structure.

3. **Directory**:

This is a way of arranging files on a machine e.g. all marketing files put together in a marketing file therefore a directory is a collection of files. It has another directory referred to as sub directory.
OR
A directory is a named storage area in a non windows operating system e.g. DOS. A group of files and sub directories can be kept in a directory, therefore a directory is the arrangement of files on a given storage device.

4. **Path**:

A path is a route taken to a particular direction or a file. A path statement may include
A drive letter, the main directory and any of the sub directories. For the path to
KABOWA you write **C:\kampala\lubaga\kabowa**.

The path statement means that a file named **KABOWA** is a folder named **LUBAGA** (sub directory) and in a folder named **KAMPALA** on drive **C:\.**

5. **Desktop**:

A desktop is a work area on which you see your programs. The desktop can contain windows, icons, and the taskbar.

6. **Icons**:

An icon is a little picture on a computer screen (Monitor). Icons on the desktop that have a small white box in the lower left corner of the icons are shortcuts and represent files and programs on the computer.
Typical icons on the desktop include;

1. My computer: -
   It shows the disk drives and hardware connected to the computer
2. Recycle bin :-
   It contains file and folders that you have deleted
3. Network Neighborhood:-
   It provides access to the computers and devices connected to the network.

7. **Taskbar**:

A taskbar is a row of buttons and icons that usually appear along the bottom of the screen. The taskbar has several parts namely: -

1. The start button: - Is usually at the left end of the taskbar.
2. The task manager: - Contains buttons for each window that is open on the desktop.
3. The system tray: - Contains items for some windows 95 programs and folders, including system clock.

8. Start menu:

Lists commands and additional menus that list most or all the programs that you can run on your computer. You can use the start menu to run almost any program installed on the computer.

9. Task manager:

Is a part of the taskbar that shows a button(s) for each program that is running if a program displays more than one window, number of buttons will appear on the task manager.

POWERING ON A COMPUTER

Most micro computers are switched on or powered on by the switch on the system unit and the monitor.

As the system unit is switched on, it does the "POST" (Power on Self Test) before it starts. The POST consists of RAM check, the disk drive controller check and the keyboard check.

If any of the checks is impossible (fails) then an appropriate error message is displayed on the screen. Sometimes an error code is displayed with the message or an abnormal number of beeps are sounded and this is called **Booting**.

The process of turning on the system (computer) and loading operating systems in memory (RAM) is known as "**booting**".

Booting refers to the starting and restarting of a computer system. Booting is of two types namely;

- Cold booting.
- Warm booting.

Cold booting is the starting of the computer from the power socket while **warm booting** is the restarting of the computer.

Warm booting is restarting of the computer system using the keyboard by pressing a combination of buttons or keys "**CTRL+ALT+DEL"** or pressing the **RESET** button/switch on a computer system unit.

There are two ways of booting a computer loaded with DOS or windows:-

1. From the DOS diskette
2. From the Hard Disc

Today, computers boot from windows loaded on to your hard disc. The booting process is complete under windows when a stable desktop is attained with a task bar.

STARTING A COMPUTER FROM DOS/WINDOWS SYSTEMS DISKETTE

DOS or windows systems diskette contain the DOS or window's commands is needed to start and use the computer.

Insert the system's diskette in a drive and then switch on the computer. The sequence of operations on boot up is:-

1. The computer performs Power on Self Test (POST). The POST consists of the Ram check (memory), the hard disk controller, the keyboard check etc.

2. Default drive A: checks for disk operating system (DOS) followed by loading of the DOS from drive A to RAM.

3. Display of information from auto executable file (Auto exec) and windows logon screen appears if the computer is using windows operating system otherwise you go to DOS command prompt.

STARTING A COMPUTER FROM THE HARD DISK.

Computers can be booted up from the hard disk if DOS has already been installed on the hard disk.

In this case you simply switch on the computer to start it up after making sure that there is no diskette in the drive A. The sequence of operation on boot up is as follows:-

1. The computer performs Power On Self Test (POST). The POST consists of the RAM check, Keyboard check, the hard disk check controllers etc.

2. Drive C check for the DOS followed by loading of DOS from drive C to the memory (RAM).

3. Display of information from auto exec batch file and the windows logon appears if the computer is using windows otherwise you go to DOS command prompt.

Users whose computers have a hard disk always prefer to boot their computers using the C: drive (Hard disk). Booting of two types which include:-

UN INTERUPTED POWER SUPPLY.

Momentary power interruption or fluctuations often cause micro processor base instruments to re initialize themselves and computers crush.

The main cause of power disruptions are amplitude fluctuations, low voltage, high voltage, power frequency variation etc.

The potential danger with power disruptions may include:-

1. Damage to storage device
2. Loss of information that had not been saved prior to power disruption.
3. Damage to the power supply.

All power defects are largely eliminated by the use of power correction equipment known as the uninterrupted power supply and other utility power conditioning equipments.

There are four types of utility power conditioning equipments;

- Line conditioners (surge suppressors or voltage stabilizers)
- Standby UPS
- Online UPS
- True online UPS

Line conditioners

These consist of surge suppressors, voltage stabilizers etc. Surge suppressors are only able to reduce power line noise. Voltage stabilizers are capable of correcting voltage surges. They are purposely meant for reducing the amount of current that is supplied to the system.

Stand By UPS
This is a power conditioner with ability to generate its own battery. The stand by UPS has time limitations and this is referred to as "**Transfer time**".

Online UPS
This operates like a Standby UPS, The online UPS is ideal for environments where electrical isolation is necessary or for equipment that is very sensitive to power fluctuations.
The online UPS is generally more expensive but may be necessary when the power environment is "**noisy**" such as in industrial settings, for larger equipment loads like data centers, or when operation from an extended-run backup generator is necessary.

True On Line UPs
This type of UPS is commonly referred to as true on line UPS (Double conversion). It operates like the stand by UPS but it is always on during normal operation thus eliminating the need for any switching in case of power failure.

A true online UPS also has an isolating transfer for eliminating power line noise. These are available with ratings of varying kilo watts. However, the big ones are expensive and bulky, for that matter therefore power systems such as computers, a small UPS is sufficient.

The period of time that the UPS can provide backup also varies from a few minutes to half an hour. The online UPS are more expensive than others.

TYPES OF POWER PROBLEMS

1. Brown out.
   Is the lowered output voltage (power) from the wall socket.

2. Black out.
   Is the total loss of electrical power from the wall socket.

3. Power transients.
   Is the large and potentially dangerous voltage spikes appearing on the wire e.g. due to lightening, loose connections e.t.c.

4. Reducing power problems (power fluctuations)

PC CONFIGURATION

The hardware and software specification required for a PC or any other type of computer is termed as computer configuration.

A typical configuration is given as below;

1. Micro processor of a specified speed
2. Hard disk (10GB, 20GB, 40GB up to 1TB)
3. Floppy disk drive (1.44MB)
4. 14" or 17" digital monitor
5. Multimedia kit which consists of several CD ROM, Speakers and sound card
6. 104 keys keyboard.

7. Desktop version of an inkjet printer (if hard copies are required)
8. A 2-3 mouse button
9. System software (Windows)
10. Application software (Ms office and other software as required by the user)

CARING FOR MICRO COMPUTERS

Like all electronic components, micro computers need to be serviced regularly to maintain their normal operation. Below are some of the measures that should be taken:-

1) Before you Switch on your computer, make sure that other components are switched on e.g. UPS, stabilizers, Hub, the computer peripherals etc.

2) Avoid making connections when the computer is already on e.g. keyboard, mouse, printer etc

3) Avoid abrupt switching on and off the computer system. Follow the right procedures when switching on the computer.

4) Place the micro computer in a dust free environment with good ventilation.

5) Dust covers should be used to protect the micro computer from moisture and when you are using polyethylene covers, then do not cover the computer immediately after shutting down because it will trap heat.

6) The computers should regularly be serviced at least twice a year or more often if the environment is dusty.
   The service should normally include;
   - Blowing the dust from the system unit,
   - Cleaning the keyboard including all keys.
   - Cleaning the monitor.
   - Cleaning the mouse.
   - Externally, also clean your computer equipment regularly with wet rug or cloth.

***Note**: Make sure you don't drop water in a computer system, if water drops in accidentally, do not use the computer immediately. Wait until water dries completely.*

7) It is a good practice to keep a record of daily condition in case of computer failure.

8) Floppy disks used for installation of programs and backups should be safely kept in disk banks and safely kept away from sunlight and magnetic media.

9) Floppy diskettes should be right protected all the time especially for installation diskettes (using the protection tab) and remove the right protect tab when writing on the diskette if they are used for backups.

10) In areas where power fluctuates, it is vital to use a stabilizer, UPS to ensure a steady input of power to a computer system.

SAFETY RULES THAT SHOULD BE FOLLOWED IN A COMPUTER LABORATORY

1) Moving equipments from one PC to another is prohibited.
2) Proper shutdown of the computers.

3) Avoid use of liquids
4) Eating and drinking is not allowed in a computer Lab.
5) Cover all the computers after use to avoid dust entering the computer.
6) Proper air ration
7) A void abrupt switching on and off of the computer system.
8) Avoid making connections when the computer is on e.g. Mouse, Keyboard, e.t.c.

COMPUTER VIRUSES

Computer Viruses are destructive programs designed to affect, or infect a computer negatively by altering the way it normally works without the knowledge or permission of the owner.

TYPES OF DESTRUCTIVE VIRUSES

Massive destruction:- Attacks the formats of diskettes whereby any program or damage will be unrecoverable

Partial destruction:- modifies a specific portion of disk affecting any files stored in that location.

Selective destruction:- erases and modifies specific files or file groups.

Random havoc: - randomly changing data or data in memory during normal program execution, or changing key stroke values, or data from other input/output devices.

Network saturation: - It systematically uses up memory or space to impede performance or cause the system to crash.

NON DESTRUCTIVE VIRUSES

These viruses do not cause any destruction, but are annoying. Their values display messages, change display colors, change key stroke values e.g. changing the effect of the shift keys, and delete characters displayed on visual display.

TYPES OF COMPUTER VIRUSES.

A BOOT SECTOR VIRUSES A boot sector virus executes when a computer starts up because it resides in the boot sector of floppy disk or the master boot record of a hard disk.

CLUSTER VIRUSES

This type of virus makes changes to a disk file system. If any program is run from the infected disk, the program causes the virus to run as well. This technique creates the illusion that the virus has infected every program on the disk.

E-MAIL VIRUSES

These types of viruses can be transmitted via e-mail messages sent across private networks or the internet. Some e-mail viruses are transmitted as an infected attachment (a document file or program that is attached to the message). This type of virus is run when the victim opens the file that is attached to the message.

FILE INFECTING VIRUSES

File infectors operate in memory and usually infect executable files with the following extensions: *.COM, *.EXE, *.DRV, *.DLL, *.BIN, *.OVL, *.SYS. They activate every time the infected file is executed by copying themselves into other executable files and can remain in memory long after the virus has activated.

OVERWRITING VIRUSES
These viruses infect by overwriting part of their target with their own code but, by doing so, they damage the file. The file will never serve another purpose other than spreading the virus further. Because of this they are usually detected quickly and do not spread easily.

PDA VIRUSES
The increasing power of PDAs has spawned a new breed of viruses. Maliciously creative programmers have leveraged the PDA's ability to communicate with other devices and run programs, to cause digital mayhem. Their effects vary from the harmless flashing of an unwanted message or an increase in power consumption, to the deletion of all installed programs. But the threat is growing, and the destructiveness of these viruses is expected to parallel the development of the devices they attack.

MULTIPARTITE VIRUSES
A virus that combines two or more different infection methods is called a multipartite virus. This type of virus can infect both files and boot sector of a disk. Multi-partite viruses share some of the characteristics of boot sector viruses and file viruses: They can infect .com files, .exe files, and the boot sector of the computer's hard drive.

BOMBS
The two most prevalent types of bombs are time bombs and logic bombs. A time bomb hides on the victim's disk and waits until a specific date before running. A logic bomb may be activated by a date, a change to a file, or a particular action taken by a user or a program. Bombs are treated as viruses because they can cause damage or disruption to a system.

PARASITIC VIRUSES
These viruses attach themselves to executables without substantially changing the contents of the host program. They attach by adding their code to the beginning, end, or even middle of the file and divert program flow so that the virus is executed first. When the virus has finished its job, control is passed on to the host. Execution of the host is a little delayed but this is usually not noticeable.

MACRO VIRUSES
Many older applications had simple macro systems that allowed the user to record a sequence of operations within the application and associate them with a specific keystroke. Later, the user could perform the same sequence of operations by merely hitting the specified key.

POLYMORPHIC VIRUSES
This type of virus can change itself each time it is copied, making it difficult to isolate. Most simple viruses attach identical copies of themselves to the files they infect. An anti-virus program can detect the virus's code (or signature) because it is always the same and quickly ferret out the virus.

STEALTH VIRUSES
Stealth viruses actively seek to conceal themselves from attempts to detect or remove them. They also can conceal changes they make to other files, hiding the damage from the user and the operating system.

COMPANION VIRUSES
A companion virus is the exception to the rule that a virus must attach itself to a file. The companion virus instead creates a new file and relies on a behavior of DOS to execute it instead of the program file that is normally executed. These viruses target EXE programs. They create another file of the same name but with a COM extension containing the virus code.

PROGRAM VIRUSES
Like normal programs, program viruses must be written for a specific operating system. The vast majority of viruses are written for DOS but some have been written for Windows 3.x, Windows 95/98, and even UNIX. All

versions of Windows are compatible with DOS and can host DOS viruses with varying degrees of success. Program viruses infect program files, which commonly have extensions such as .COM, .EXE, .SYS, .DLL, .OVL, or .SCR.

TROJAN HORSES

Trojans, another form of malware, are generally agreed upon as doing something other than the user expected, with that "something" defined as malicious.

WORM

A worm is a computer program that has the ability to copy itself from machine to machine. Worms normally move around and infect other machines through computer networks. An entire LAN or corporate e-mail system can become totally clogged with copies of a worm, rendering it useless. Worms are commonly spread over the internet via e-mail message attachments and through internet relay chat channels.

HOW VIRUSES SPREAD FROM ONE SYSTEM TO ANOTHER?

The most likely virus entry points are;

- E-mail,
- Internet
- Network connections,
- Floppy disk,
- Modems or other serial or parallel port connections.

In today's increasingly interconnected workplace (Internet, intranet, shared drives, removable drives, and email), virus outbreaks now can spread faster and wider than ever before.

SOURCES OF COMPUTER VIRUSES

Contact with contaminated systems; any diskettes used on a contaminated system could become contaminated. If the diskettes are used on another system, then the virus will spread.

Pirated software- the use of pirated software introduces the risk that the software may be contaminated by virus code.

Fake games- many people like playing games on computers and for the same reason games programs spread virus very fast.

Freeware and shareware- Both freeware and shareware programs are commonly available from bulletin Board systems (BBS)

PLACES WHERE VIRUSES ARE APPLIED

A macro virus: uses the macro language of an application (e.g. word processor or spreadsheet) to hide the virus code

A logic bomb: is a virus that activates when it detects a certain condition.

A time bomb: is a kind of logic bomb that activates on a particular date.

A worm: copies itself repeatedly in memory or a disk drive until no memory or disk space remains, which makes a certain condition or action is triggered.

A polymorphic virus: modifies its program code each time it attaches itself to another program or file, so that even an anti virus utility has difficulty in detecting it.

SYMPTOMS OF A COMPUTER VIRUS

1. Unfamiliar graphics or quizzical message appearing on screen.
2. Programs taking longer than usual to load
3. Disk access seeming excessive for simple tasks.
4. Less memory available than unusual
5. Access lights turning on for non referred devices
6. Computer hard drive space is reduced.
7. Application programs will not load.
8. The number of hard drive bad sectors steadily increases.
9. A message appears that hard drive cannot be detected or recognized.
10. Strange sounds come from the computer.
11. Failure for the Computer to boot up.
12. Some viruses take control of the keyboard and occasionally substitute a neighboring key for the one actually pressed. Another virus "swallows" key presses so that nothing appears on the screen.
13. Also interesting are system time effects. Clocks going backwards are especially frightening for workers who cannot wait to go home. More seriously though, this type of virus can cause chaos for programs which depend on the system time or date.
14. Some viruses can cost the user dearly by dialing out on his modem. We do not know of one which dials premium telephone numbers but no doubt we shall see one soon. One particularly malicious virus dials 911 (the emergency number in the USA) and takes up the valuable time of the emergency services.

WAYS IN WHICH VIRUSES ARE ACTIVATED ON A COMPUTER

1. Opening an infected file.
2. Running an infected program.
3. Starting up the computer with an infected floppy disk.
4. Transferring data from an infected computer to uninfected computer.
5. Downloading an infected file from the internet.

PRECAUTION TAKEN TO PREVENT VIRUSES

1. Write-protect the recovery disk.
2. Make sure the e-mail received is from a trusted source.
3. Try and use an anti-virus utility.
4. Do not start the computer with the floppy diskette in a floppy drive.
5. Back up important flies regularly.
5. Scan all floppy disk and files for possible virus infection before opening it.

ANTIVIRUS UTILITY

Is a program that prevents, detects, and removes viruses from a computer’s memory or storage devices. One of the popular antivirus is Norton Antivirus.

Antivirus utilities normally look for various signatures to identify a virus. Examples of antivirus utilities include the following:

- MacAfee antivirus.
- Dr. Solomon
- Norton
- Node32
- Penicillin antivirus.
- Avira antivirus

BENEFITS/ADVANTAGES OF ANTIVIRUS SOFTWARE

1. It prevents a virus from damaging your PC or network.
2. Protects your PC or network from viruses and other forms of malware.
3. Prevents downtime, i.e. valuable working time could be wasted if you can not access your PC due to a virus infection.
4. Protects valuable information on your PC.
5. Prevents other people outside your organization being able to access your information whether it is business or personal data. A **firewall** is a device or set of devices designed to permit or deny network transmissions based upon a set of rules and is frequently used to protect networks from unauthorized access while permitting legitimate communications to pass.
6. Potentially prevents emails being sent by your system thereby damaging you and your organization's reputation. Some viruses access your email folders and send an email to all of your contacts with the virus attached.
7. Prevents the time consuming and unnecessary task of having to clean or remove the virus after the damage has been done.
8. Reduces the potential financial implications – getting the technical support required to achieve removal of the virus and to restore your lost information.
9. Legal implications – in some instances it is required to demonstrate that your organization has taken reasonable measures to protect the information you hold about your customers and the email you exchange with them.

DISAVANTAGES OF ANTIVIRUS SOFTWARE

1. Some antivirus packages can slow down the speed of your PC or network.
2. Antivirus software can require a great deal of hard disk and memory.
3. Antivirus checks must be run regularly. Again, ideally you should run your antivirus software daily as internet access and email can potentially cause problems.
4. Not all antivirus software is capable of being effective at dealing with viruses, spyware and adware so you may need to run two or more packages. However, be sure that you are not running two systems that conflict and prevent each other working properly.
5. Antivirus software needs to be updated regularly. It is very important that the antivirus software is updated, preferably on a daily basis, because new viruses and malware are developed and the antivirus vendors will develop counter measures to deal with them. This can be achieved by automatically connecting to your supplier's website via the internet and downloading the necessary files. You can normally set this up to happen automatically.

IMPACT OF VIRUSES ON COMPUTER SYSTEMS

Virus can be reprogrammed to do many kinds of harm including the following;

1. Copy themselves to other programs or areas of a disk.
2. Replicate as rapidly and frequently as possible, filling up the infected system's disk and memory rendering the systems useless.
3. Display information on the screen.
4. Modify, corrupt or destroy selected files.
5. Erase the contents of entire disks.
6. Lie dormant for a specified time or until a given condition is met, and then become active.
7. Open a back door to the infected system that allows someone else to access and even control of the system through a network or internet connection.
8. Some viruses can crash the system by causing some programs (typically Windows) to behave oddly.

COMMUNICATION

Communication or Telecommunication

Refer to transfer of data from a transmitter (sender/source) to the receiver across a distance.

Data communication:-
This is the process of transmitting data signal from one point to another through a network

Data signal
Data signal is an electromagnetic energy which represents the data flow. Data transmitted can be voice, text, video, sound, image or a combination of these (Multimedia).

Types of data signals
1. ANALOG SIGNAL: - represents a continuous electrical signal in form of a wave
2. DIGITAL SIGNAL: - Is a discontinuous electrical signal, expressed as discrete burst in on/off electrical pulses

Direction of transmission (Data communication)
There are three modes of data communication namely:

Simplex transmission refers to communication in only one direction. An example is a traditional radio or television broadcast. The viewer or listener cannot communicate back through the radio or television receiver back to the broadcaster.

Half-duplex transmission refers to communication in both directions but one direction at a time. A sender must first send the data before the recipient can reply. An example, if two police officers are communicating using a 'walkie talkie' radio, one has to say "over" to mark the end of every statement in order for other to respond.

Full duplex transmission refers to communication occurs in both direction simultaneously. An example of full duplex can be found in computers that are sending and receiving data on a network.

Mode of transmission

Asynchronous transmission
In asynchronous transmission data is sent one byte (or character) at a time. It is also called start-stop transmission, where "start" bit represents the beginning of a character, and a "stop" bit represents its end. At rate of only one byte at a time, with start and stop pulses, this is relatively slow method and it is not used when great amounts of data must be sent rapidly.

Synchronous transmission
Synchronous transmission sends data in blocks. Start and stop bit patterns called sync bytes, are transmitted at the beginning and end of the blocks.

Terms Used In Data Communication

***Bandwidth*:-** This is the maximum amount of data that a transmission medium (network cables) can carry at given period of time per second **OR** this is the measure of how much information/bits that can flow from one place to another per second.

Modem *short for modulator/demodulator:* A device that converts the data signal from one form to another. The process of converting digital signal into analog form for transmission over phone lines is called **Modulation**. A receiving modem converts the analog signal back to digital signal in a process known as **Demodulation**.
Figure below shows how an **external** modem is used in data transmission over telephone lines. An **internal** modem performs the same function and is built on the motherboard inside the system unit.

Narrowband describes a channel in which the bandwidth of the message does not significantly exceed the channel's coherence bandwidth.

Coherence bandwidth is a statistical measurement of the range of frequencies over which the channel can be considered "flat", or in other words the approximate maximum bandwidth

A **baud** is a data transmission speed of a bit per second over telephone line using a modem.

ISDN line
ISDN stands for **Integrated Services Digital Network,** which is hardware and software that allow voice, video and data Transmission digital signals over ordinary telephone copper wire.
It is five time faster than phone modem.

It also supports two phone lines so that you can talk on the phone on one line while connection on the internet on the other. Many telephone companies provide ISDN line which perhaps 2 or 3 times costly compared to a regular monthly phone service.

Advantages of ISDN over Modems include:-

- ✓ ISDN provides significant greater speed for data transmission; they are 5 times faster than a modem.
- ✓ ISDN allows multiple devices to a signal. A single ISDN line support two phone calls and two phone numbers and a third data link while a Modem support one phone line.
- ✓ ISDN provides crystal clear digital voice even if the other party is still on an analog line, you will here a clear call which is not the case with a Modem
- ✓ ISDN is an affordable alternative to leased lines in terms of cost.
- ✓ ISDN provides a continuous connections while a Modem provides a periodic dial-up service

Broadband is used to refer to data transmission using ADSL (**Asymmetric Digital Subscriber Line**)

ADSL is a means of transmitting digital signals using telephone lines and can be faster than narrowband. Coaxial cables, fibre optic cables, microwaves and satellites are commonly used to provide broadband. ADSL is considered to be the successor to ISDN

Baseband signal:- is a digital signal that is generated and applied to the transmission medium directly without modulation.

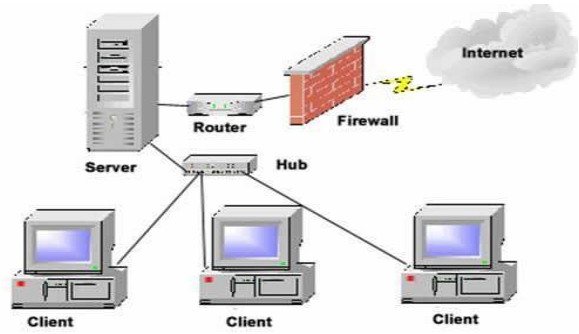
***Attenuation*: -** This is the decrease in magnitude and energy as a signal progressively moves along a transmission medium. **Or** refer to as signal loss in strength as it is transmitted along the media. If the signal is not boosted (amplified), it will be lost along the way and may never reach the destination. Attenuation or signal loss is corrected by placing a signal amplifier called a **Repeater.**

Packet is a maximum-fixed length block of data for transmission. A packet also contains instructions about its destination.

***Packet switching*: -** Packet Switching is a technique for dividing electronic messages into packets for transmission over a wide area network to their destination through the most expedient routes.
The benefits of packet switching are
-It can handle high volume, traffic in a network. it is used in large networks such Tele net.
-It also allows more users to share a network.
-Messages are sent over a long distance, E.g

COMPUTER NETWORK

Computer Network can be defined as the interconnection of computers using transmission media for the purpose of communication and resource sharing. Some of the shared resources include; programs, printers, fax machines, modems, storage devices, communication links etc.



The term Transmission media refers to the physical or non-physical link between two or more computers in which a signal can be made to flow from source to destination.

Types of computer Network
Computer networks can be classified using several aspects but the most common classification is according to size. The three most common are:

1. Local Area Network
2. Metropolitan Area Network (MAN)
3. Wide Area Network (WAN)

Other related types include

4. Intranet.
5. Extranet
6. Internet.

Local Area Network (LAN)
This is a computer network that covers (spans) a relatively small geographical area, like one building or a group of buildings close together such as school campus.

Metropolitan Area networks (MAN)
This is a network that covers a metropolitan area like a town, city or suburb. The MAN size typically covers a radius of between 5 to 50 km.

Wide Area Network (WAN)
This is a network that covers a large geographical area such as a country, a continent or the whole world. WAN consists of many local area networks connected together to form one large network such as Telnet, Internet.

DIFFERENCES BETWEEN LANS AND WANS

- A WAN covers a wide geographical area than a LAN users are within confined geographical area
- WANs unlike LANs usually send data over telecommunication links.
- In the recent past, WANs often used larger computers as file servers well as LANs used typical file servers
- WANs are often larger than LANs and have more terminals or computers liked to the network.
- A WAN can link two or more LANs using gate ways and bridges. A gate way or bridge is a device that is used to connect two separate networks e.g. two LANs in separate buildings.

Intranet:
An intranet is a local version of internet within a company or organization. It offers same features as global internet (www, TCP/IP), but in a localized environment such as factory site or university campus whereby the authorized users are employee of the company.

Extranets:
If a company has an intranet and allows limited access to it by people outside the company, then the intranet is referred to as an extranet.

Purposes (Advantages) of networking
The advantages of setting up computer networks include:

Resource sharing
A resource in the network environment means any component that can be attached to the network for access by users. This includes
- Hardware sharing: sharing of expensive peripheral devices such as laser printers, scanner, and fax machine among many users of company.

- Program and data sharing: in most organizations, people use the same software and need access to the same information, which could expensive to a copy of software for each employee

- Access of same data on a shared storage device hence updates are easily made nd accurately,

- Network links all employees using *groupware* hence work together online on shared project.

Better communication
- Remote communication refers to transmission of data signals between two communication devices at different geographical locations, through remote communication people can share ideas and gives freedom to network users who can work from home just if they were in their offices(Telecommuting)

- One of the greatest features of networks is *electronic mails* which cheap, fast and convenient means of communication.

Distributed processing facilities
Distributed processing refers to run the same program or databases on different networked computers. This mode of data processing has advantages on the network
- In case of failure of one of the computer, does not affect the operation of the other terminals
- Processing load is shared equally hence no time wastage.

Cost effectiveness
Networks are cost effective in organization. Although the initial purchase and laying down of components may be expensive.

Access to databases
Networks also enable users to tap into many databases whether private or public databases of on line services, hence making research simple.

Security of information
Today data backed up on a networked storage device shared by users to avoid data loss.
Computer network is **reliable** because data is transferred with minimum error from source to destination

Limitation (demerits) of networking

Moral and cultural effect
- The internet has chat-rooms and messaging services that may enable teenagers to meet peers and adults on the net whom may have bad intentions.

- Access to pornographic and other bad material has made the fight against social problems such HIV/AIDS, bad sexual behavior and drug abuse more complicated.

Over reliance on the network
- Some organization over- relies on the network and incase of the server breaks down the entire organization activities are bought to a halt.

High initial cost
- The initial cost of buying network hardware and software and installing the network is high.

Risks and threat
- is an increased risk of data corruption. Since many users will be using the system, there is a greater chance of data being corrupted (damaged).

- There is greater risk from viruses. Because they are easily spread between computers are part of a network.

- Organization finds it very challenging to guard information system from constant threats of illegal access.

COMPONENTS THAT REQUIRED FOR NETWORKING

A computer network is made up of several standard components which are classified into three categories namely:

- Data communication media
- Communication devices
- Networking software
- Work station or computers.

DATACOMMUNICATIONS MEDIA

A data communication medium is a pathway used to for carrying data/information from one point to another, which is from source to destination. Various devices on the network are linked together by means of communications media (channels / paths).
Data communication media can be divided into two namely:-

1. Communication Using Cables.
2. Wireless Communication.

COMMUNICATION USING CABLES

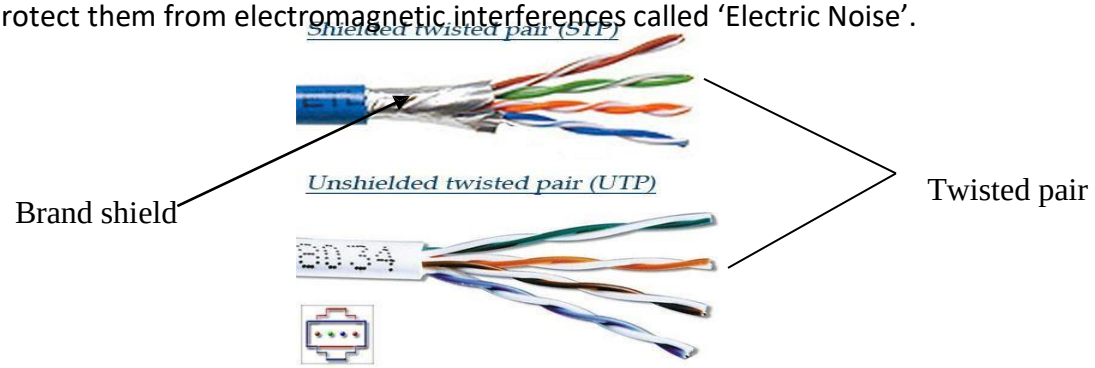
This is a data communication media where data signals are transmitted through physical pathway.
There are several types of network cables but the most common ones are:-
Twisted pair cables
Coaxial cable
Fibre Optic Cables

Twisted pair cable
This consists of two insulated copper wires twisted in a spiral pattern to minimize electromagnetic fields around the two wires as transmit data also called ***crosstalk***. It is the cheapest, most common media for both analog and digital signals. These cables are mostly used to transform voice and data signals form transmission.

There are two types of twisted pair cables are:

a) Unshielded Twisted Pair (UTP)
b) Shielded Twisted Pair (STP)

The difference between the UTP and STP is that STP has a brand shield which is wrapped around the wires to protect them from electromagnetic interferences called 'Electric Noise'.



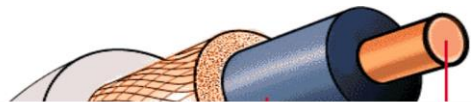
ADVANTAGES OF TWISTED PAIR CABLE

- Installation equipment is cheap and readily available. and
- It is cheap and available because of mass production for telephone use.
- It is easier and convenient to install.

Disadvantages of Twisted Pair Cable

- It suffers high attenuation
- It is sensitive to electromagnetic interference eavesdropping.
- It has low speed on data transmission compared to other cables.

Coaxial Cable
Coaxial cable has a central inner copper core and an outer sheath of copper mesh that are insulated from each other. It resembles a cable which connects a TV to an antenna. Coaxial cable is more expensive than twisted pair and is used to transmit voice, video and data.



Advantages of coaxial cable

- It is very stable even when under high loads.
- It has a large bandwidth (up to 1Gbps) compared twisted pair.
- It is more resistant to radio and electromagnetic interference than the twisted pair cable.
- It can carry voice, data and video signal simultaneously.

Disadvantages of coaxial cable

- Thick coaxial cable is hard to work with.
- It is relatively expensive to buy and to install as compared to twisted pair.

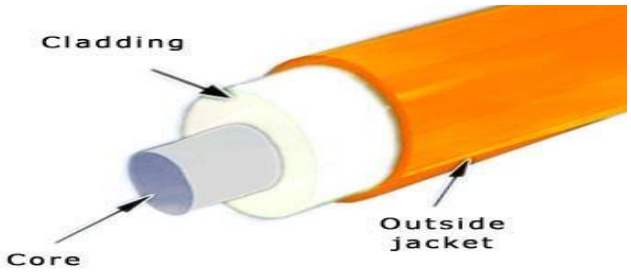
Fibre Optic Cable

The fibre optic cable is made up of thin strands of glass that transmit data signal in a form a beam of light. The fibre optic cable is made of core, cladding and the outside jacket

Core: This is the central part of the cable and it is made up of hollow transport glass or plastic.

Cladding: - This is a protective surrounding of the core. It is a cut covering layer of the core.

Jacket: it is outer covering of the cable.



Advantages of Fibre Optic Cable

- It is immune to electromagnetic interference and eavesdropping.
- It is fast and supports high bandwidth.
- It can be used for long distances because it suffers low attenuation.
- It can be used in hazardous places (highly flammable) because it doesn't generate electrical signal.
- It smaller and lighter than copper cable.

Disadvantages of Fibre Optics Cables

- Connectivity devices and the media are expensive.
- Installation is difficult because the cable must be carefully handled.
- It is relatively complex to configure.

- A broken cable is difficult and expensive to repair.

WIRELESS COMMUNICATION

This is type of communication medium that is used to transport data signals from one point to another without physical connections.

Examples of Wireless Connections

- Micro wave systems..
- Satellite transmission.
- Antenna.
- Radio communication
- Infrared transmitter

Advantages of a Wireless connection

- Wireless medium is flexible in operation as compared to cable that is devices can be moved around without losing access to the network.
- Wireless networks can span a large geographical area.
- Wireless communication can take place via satellite even in a very remote area connection is possible.

Disadvantages of a Wireless connection

- Initial cost of setting up wireless communication is very high.
- It is relatively difficult to establish or configure.

COMMUNICATION DEVICES

These are devices used as interfaces or junctions between terminal devices. **Terminal** equipments are devices at both ends of the communication link such as a computer.

Network Interface Card (NIC)

Network Adaptor or NIC is a circuit board that creates a physical link between the computers through transmission media. A network interface card is plugged into an empty expansion slot on the motherboard. However, most of the computers today come with onboard network interface controller.

Hubs

A hub is a hardware that connects a large number of computers and broadcasts received data to all the computers or other devices attached on the same network. That is, a hub consists of multiple ports. When a packet arrives at one port, it is copied to the other ports so that all segments of the LAN can see all packets.

Bridges

Bridges connect one LAN to another. A bridge can forward data from one LAN to another, and can filter out data not intended for the destination LAN.

The purpose of using a bridge therefore is to:

- Extend the length and number of stations
- Reduce overall traffic flow by allowing broadcasts only in destination LAN.

Switches

A network switch can perform similar functions to hubs and bridges. Unlike hub, a switch forwards a packet directly to the address of network device it is intended for without broadcasting.

Repeaters

A repeater receives signal from one segment of network, cleans it to remove any distortion, boosts or amplifies it to another segment of LAN.

The repeater enables the network to eliminate attenuation problems.

Router

The router interconnects different networks and directs the transfer of data packets from source to destination. Each network has a unique identifier or address called the network address or IP address.

Gateways

A gateway is any device that can be configured to provide access to wide Area Network (WAN) or internet. One of the devices is router. However a gateway may not be necessarily a router, it may be a computer configured to provide access to the internet.

Connector: The RJ45 are attached to the terminals of the twisted pair cables.

RJ 45 Connector Circular Connector

NETWORK SOFTWARE

It is communication software that manages the transmission of data between computers and other devices attached on the network. Network software can be classified in two main groups namely: -

1. Network Operating system (NOS).
2. Network Protocol

Network Operating System (NOS)

These are operating systems designed to manage the network, computers ability to respond to services request. Examples include, Windows NT, XP, Vista , Window Server 2003, Novel Netware, Unix, Linux.

FUNCTIONS OF NOS

- It provides access to network resource e.g. printer and all folders.
- It enables nodes on the network to communicate with each other more efficiently.
- It supports inter-process communication i.e. enables the various processes of the network to communicate with one another.
- It responds to request from application programs running on the network.
- It supports network services like network card drivers and protocols
- It used to implement security features.
- It monitors the operation of the network. It is possible for the network administrator to tell who is using what and when.
- It records and fixes errors in the networks communication.

Network protocols

Protocols are set of rules and procedures that govern communication between two different devices or computers on the network.

For instance, protocol in your communication software, for example, will specify how receiving devices will acknowledge sending devices, a matter called hand shaking.

Protocols will also specify the type of electrical connections used the timing of message exchange, error-detection techniques, and so on.

Examples of protocols include:

- Simple mail transfer protocol (**SMTP**)- An internet protocol for transferring e-mail
- File transfer protocol (**FTP**) - an internet protocol for file transfer.
- Transmission control protocol (**TCP**)-This is responsible for delivery of sequenced data over the network.
- **NetBEUI**- A local area network protocol that establishes communication sessions between computers. It is for Microsoft or IBM networks only.
- Internet protocol (**IP**) and Netware protocols are for packet forwarding and routing.
- Sequential Packet exchange (**SPX**), is a part of Novel internet work packet exchange for sequenced data.

NETWORK TOPOLOGY.

This refers to the way in which computers and other devices have been arranged OR how data is passed from one computer to another on the network. A network topology can either be logical or Physical

LOGICAL TOPOLOGY.

This is also called signal topology. It refers the way data is passed from one device to another on the network.

Logical topology is divided into two categories:

- **Ethernet topology**; is when all the computers listen to the network media when one computer is sending data.

- **Token ring topology**; this uses a token which is used to exchange data from one PC to another. Token is viewed as an envelope where data is placed in it and it is addressed to a particular PC on the network, and then returns in the ring.

PHYSICAL TOPOLOGY

This is the physical layout or arrangement of components on the network.

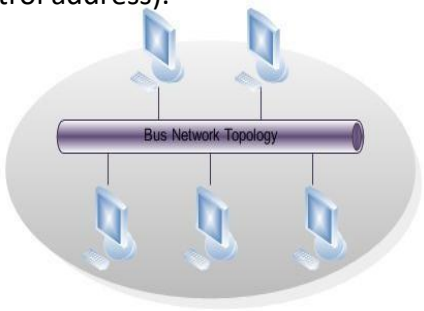
For example

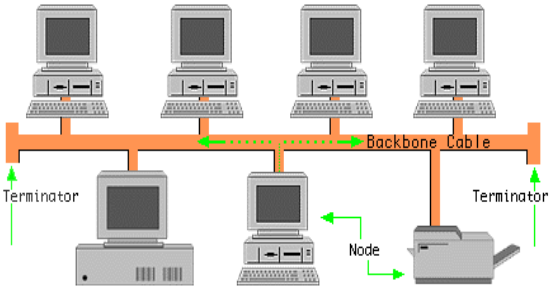
- Ring topology
- Bus topology
- Star topology
- Hierarchical topology.
- Mesh topology.

1. **Bus Topology**

This is a single line or cable with nodes at different points. i.e. all devices are connected to a central cable called bus or backbone cable.

Data is transmitted in any direction along the central cable. As one sends, the rest listen (medium access control address).





ADVANTAGES OF BUS TOPOLOGY

- Extending the network is very easy.
- Only a single backbone cable needs to be installed
- It is less costly.

DISAVANTAGES OF BUS TOPOLOGY

- Any problem with the backbone cable may cause the whole network to malfunction.
- The bus topology limits the number of computers that can be connected because each computer is listening to the cable in order to transmit.
- Data travels in both directions along the network cable so that packets of data may collide.

2. **Star topology**

A star topology is a topology for a Local Area Network (LAN) in which all nodes are individually connected to a central connection point, like a hub or a switch. A star takes more cable than e.g. a bus, but the benefit is that if a cable fails, only one node will be brought down.

ADVANTAGES OF STAR TOPOLOGY

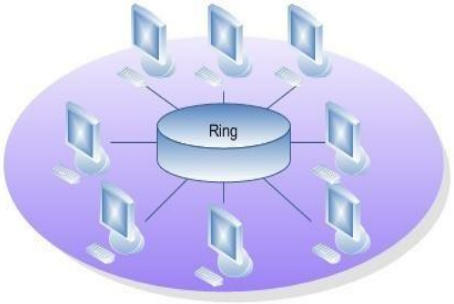
- If a cable stops working, the entire network is not affected; only one computer will be affected.
- It allows centralization of key networking resources like hub and servers which gives the administrator a focal point of management.
- Extending the network is straight forward and easy to configure i.e. adding or removing node easy.
- Easy to detect faults and to remove parts.

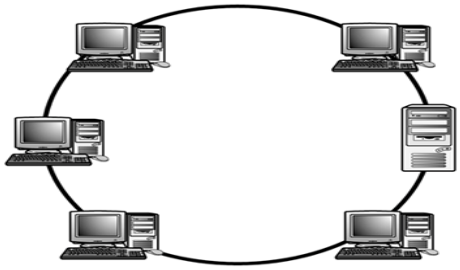
DISADVANTAGES OF STAR TOPOLOGY

- If the central hub fails, the entire network will be down.
- It requires one complete cable per computer. Where each workstation is connected to the central hub hence it uses more and longer cables than bus topology.
- Installing is time consuming because each node forms a segment of its own.

Ring topology

A ring topology, all the devices are connected to one another in a shape of a closed loop. There is no central host computer in the ring network though one node may control overall access to the network





ADVANTAGES OF RING TOPOLOGY

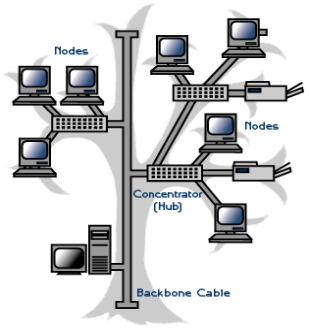
- The ring network is independent of the central computer.
- It is simple to install.
- It uses a short length cable.

DISADVANTAGES OF RING TOPOLOGY

- Adding or removing a device/computer can disrupt the entire network.
- If one workstation malfunctions, it may affect the entire network.
- It difficult to identify the problem if the entire network shuts down.
- Not meant to be used as a stand-alone solution in a large building.

4. Hierarchical/Tree Topology

This is a hybrid topology. Groups of star-configured networks are connected to a linear bus back-bone.



ADVANTAGES OF HIERARCHICAL TOPOLOGY

1. There is Point-to-point wiring for individual segments.

2. It supported by several hardware and software venders.

DISADVANTAGES OF HIERARCHICAL TOPOLOGY

1. Overall length of each segment is limited by the type of cabling used.

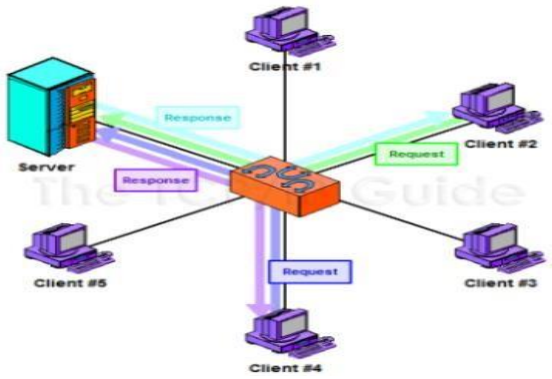
2. If the backbone line breaks, the entire segment goes down.

3. It more difficult to configure and wire than other topologies.

5.Mesh Topology

This is the most common type of topology used in wide area network, where there many paths between different locations.

TYPICAL CABLED LAN OVER VIEW



The LAN (Local Area Network) should have the following:-
1. A server
2. Work station.
3. Communication media
4. Network resource e.g. Printer.
5. Communication Devices like switch, router, hub.
6. Network Software e.g. Network Operating System

A SERVER
A server is a powerful computer that runs the network operating system and allows resources shared over the network.
OR
Servers are dedicated computers on a network that perform one or more functions on behalf of the other computers.

WORK STATION
A workstation is simply a personal computer connected to a LAN. The basic difference between a **stand alone** computer and a **workstation** is that the latter has communications capabilities added to enable it to exchange information with other computers and devices on network (nodes).

WLAN
Wireless local area network (WLAN) differs from a cabled LAN in that computers use wireless link to connect to network instead of using a cable. The wireless connection is made possible by two set of components: wireless access points and wireless NICs
Wireless LAN can be used in places that are difficult or impractical to use a cabled LAN for examples building with many rooms or a large hall. Hence it more flexible; users can be in any location in a building or outside still accessing the internet services.

Types of LAN

LAN can be divided into two categories based on how the computers communicate with one another:

- Client/Server network
- Peer-to-peer network

Client –server LAN

Client-server LAN consists of requesting computers called the **clients** and supplying devices that provide a service, called **servers.**

The server controls communication and shared network resources. Server(s) will also have software that manages: e-mail and internet access. The server may be dedicated to provide a particular function or service requested by the client. A large LAN may have several servers to perform different tasks. For instance;

a) **File server**:

A file server is a computer that stores the programs and data files shared by users on LAN. It acts like a disk drive but in a remote location, whereby network users store files or retrieve files on the server as if they were using their own hard disk.

b) **Print servers:**

A print server coordinates the printing on the network. However, in small networks both file and print management functions are performed by the file server.

c) **Database server** is a computer on a LAN that stores data. Unlike file server, it does not store program files.

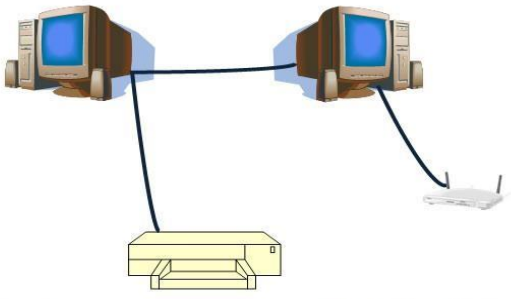
d) **Other servers**:

All kinds of servers can be installed on the network e.g. the fax service i.e. connected to a shared facsimile machine. A LAN user can create a document to a fax server which in turn facilitates transmission of the document via the fax machine.

.

Peer-to-peer LAN

It allows every computer to communicate directly with every other computer on the network without relying on the server. A user can access data from any computer on the network and vice versa. Peer-to-peer LANs are limited to about ten machines, after which the performance drops and the system becomes cumbersome. They are mainly in small businesses and departments.



A LAN (local area network), this is a network which allows one for sharing data and devices such as modems and printers.

INTERNET

The **Internet** is an international network of networks that connects computers worldwide.

It connects universities, research facilities, governmental organizations, businesses, non-profit making organizations and individuals, allowing them to access, share and exchange information.

HISTORY OF INTERNENT.

In 1969, a research body in USA called Advanced Research Project Agency (ARPA) setup a computer network and named it ARPA net.

It was built to serve two purposes; the first was to share research among military, industry, and university sources.

It was to provide communication among military units in event of nuclear attacks. By 1980's many people had seen the importance of computer networking and internet.
Therefore, American government decided to access the internet.

By 1990's 3,000,000 million computers were connected, today the internet has grown and covered the whole world whereby the governments, private organizations and individuals are using the internet in all spheres of daily life like sending massages and conducting business.

CONNECTING TO THE INTERNET
To get connected to the internet you need to link your computer to the host computer. A host computer is made available using IP address through an Internet Service Provider (ISP).

- **IP Address** is a number that identifies a computer on the network or internet. E.g 192.168.243.1
- **ISP (INTERNET SERVICE PROVIDER)**

This is a company that provides direct connection and access to the internet services for a monthly fee. Some of the ISP in East Africa are: Uganda Telecom, MTN, Warid Uganda, Broad band company, Africa online, Afsat, Swiftkenya, etc

FACTOR TO CONSIDER WHEN CHOOSING ISP.

- Inquire about their setup costs, monthly charge/cost and cost of other requirements used in connecting.
- The ISP software should be compatible with your computer system.
- Inquire about the speed of the Modem and check whether it matches with the speed of the computer(s) other wise data transfer will be slow
- Ask how long the ISP has been in business
- Ask how long it takes for them to connect you.
- Inquire if they have online e-mail help incase one is not a computer expert.

The most common methods to connect to the internet

1. Dial-up connection
2. Dedicated connection (through ISDN or ASDL)

DIAL-UP CONNECTION.
A computer dials a phone number to connect to your internet service provider (IPS) using telephone line

A dial up connection to the internet involves the following steps;

- Ensure that you have a standard telephone line
- Ensure that the computer is configured with a phone and a modem; a computer system must have an installed modem.

Dedicated connection: This is means that a user has permanent connection of internet services at all times.

BASIC REQUIREMENTS FOR INTERNET CONNECTION

- Computer with good specifications i.e. processor speed, RAM capacity with NIC
- Modem incase of Dial-up connectivity
- Communication Software (NOS)
- Communication Media and devices (cables, hubs, switch,)
- Internet Service Provider (ISP)

USES OF INTERNET

1. **RESEARCH:** Internet provides access to a vast amount of research material including resource from libraries, research institutions. It lets the user to search through reference materials like online encyclopedia, magazines, catalogs

2. **BUSINESS**: Internet provides various business facilities such as E-commerce where by many companies today use internet to sell and buy goods and services on .

3. **E-LEARNING:** Internet provides a distance education and home schooling through a process known as virtual reality. Learning through interaction with special programs on the computer is called electronic learning.

4. **MASS MEDIA:** with internet you can expect to get latest news where by most of the major root sites are updated throughout the day. Some of the news sites include BBC, CNN, Aljazeera, Sports zone, Bukedde, New Vision e.t.c.

5. **HEALTH:** Internet provides latest medical news and research; it provides the patient with medical information about the different diseases.

6. **ENTERTAIMENT:** it's also possible to listen to music on the web and to watch video clips if your computer is multimedia.

7. **DOWN LOADING:** It is possible for a user to download software, pictures, music files, video clips from the web and this is possible for the computers connected to the internet.

INTERNET SERVICES

WORLD WIDE WED (WWW)

The World Wide Web or also simply called "the web" is a multimedia service that runs the internet. That is, it interconnects system of sites or servers all over the world that can store information in a multimedia form i.e. sound, photo, video, and text**.**

ONLINE BANKING

it now possible to bank your money in the bank by the use of computers without you going physical to the bank and this has helped to avoid congestion.

Online banking is a banking service via internet whereby the customers of the bank can access their accounts using the web instead of visiting the bank's branches.

Advantages of online baking

- Customers can access their accounts at any time
- Customers can meet their bills automatically such as water bills, electricity bills by direct debits in advance.
- Low charges encountered by customer since the cost to banking services are much less.
- There is an immediate reply of messages or complaint sent by the customer without visiting any branch.
- It completely reduces congestion at the bank branches.

Main disadvantage

- Thieves may obtain your banking details by **phishing,** which is sending a customer an e- mail asking for his/her bank details as if it has been sent by the bank.

ON LINE SHOPPING

Online shopping is increasingly popular in some developed countries, where one can order goods online and pay for them using a credit or debit card. The goods will be delivered to the address specified by the customer.

Advantages of online shopping

- Shopping is convenient and is done at any time of the day.
- No need of visiting shop after shop looking for required goods.
- One can still shop regardless of bad weather.
- It is helpful to people who are disabled or hand capped.
- It is flexible since one can acquire goods as far as abroad.
- There is much greater potential market online.
- Goods online are globally advertised.

ELECTRONIC DISCUSSION FORUM

These include: mailing list, newsgroups/Bulletin board, chat rooms

Mailing list is a group of people using e- mail to communicate their views on common issues or interest by subscribing to be a member.

Newsgroup or **bulletin board** enables group of people to discuss on specific topics, where by the subscribers of newsgroup can post the messages on the internet for all users to access.

CHATTING ON THE NET

People can sign into chat room and exchange ideas freely. Chat rooms are group of people with common interests exchanging idea with one another in real time. Different ways of chatting include:

- **Text Based chat**: when one enters a chat room is identified by a name to other members in a discussion. He/she can participate on posted comments.
- **Internet Relay Chat** (**IRC**): This is a real-time conference system that discusses/chats on specific topics that suits your interest using text messages.
- **Instant messaging**: one chats privately with another using a mixture of e-mail and mobile phone messages.
- **Multimedia chat**: One can now chat using a microphone on a computer to talk to another via internet.

TELNET

Is an internet feature that allows micro computer users to connect (logon) to remote computers as if they were directly connected to those computers.

GOPHER

Gopher is an old browsing tool or Internet program that allows users to use a system of menus to browse through and retrieve (open) files stored on different computers.

INTERNET ADDRESSES

Internet addresses are used to identify an individual or resource on the network. Each internet address must be unique; therefore the internet's addressing scheme was developed in 1984 and is called **Domain Name Scheme (DNS)**.

TYPES OF INTERNET ADDRESSES

- E-mail Address.

- Web Address.

E-MAIL ADDRESS

An e-mail address directs the computer on the internet to the destination of the e-mail message. A typical e-mail should look like this:

kuulemuda2@yahoo.ie

1. **kuulemuda2** is a user name or user ID, it is created by the user during e-mail account registration.
2. **@** is a symbol for "at", it separates the user name from Domain name.
3. **Yahoo.com** is a domain name of the host computer i.e. the computer on which the e-mail account is hosted or located.
4. The period "**.**" Is read as dot and it separates the domain name components
5. **com** is a domain type that identifies the type of institution offering a particular service, meaning commercial institution

Other common domain types are

.com	Commercial institution.
.co	Company.
.edu	Education institution.
.gov	government institution.
.org	Organization.
.mil	Military organization
.net	Host network

WEB ADDRESS or Uniform Resource Locator (URL)

This is an internet address that is used to access a website. A **web site** is a file or files stored on a web server as part of the World Wide Web.

To access a web site, you type in the web address or URL (Uniform Resource Locator), which is an address that points to a specific site on the web. Example of URL, *http://www.google.com*

1. HTTP stands for **Hypertext Transfer Protocol** which is a protocol for transferring web files.

2. **WWW** is a portion of the address that stands for **World Wide Web** which is the interconnected system of sites on the internet that store information in a multimedia form.

3.The last part of the address is google.com is a Domain name of host computer, **.com** being the root domain

ACCESSING INTERNET

The internet is accessed through application software called **web browser**.

Web Browser: Is software that enables a person to access information available on the web. **OR** it is software that translates **HTML** documents and allows you view web pages on the screen.

Examples of popular web browser are:

Microsoft Internet Explorer,

Netscape Navigator

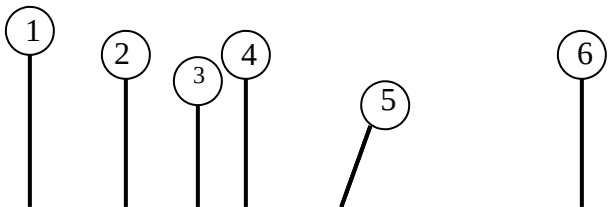
others

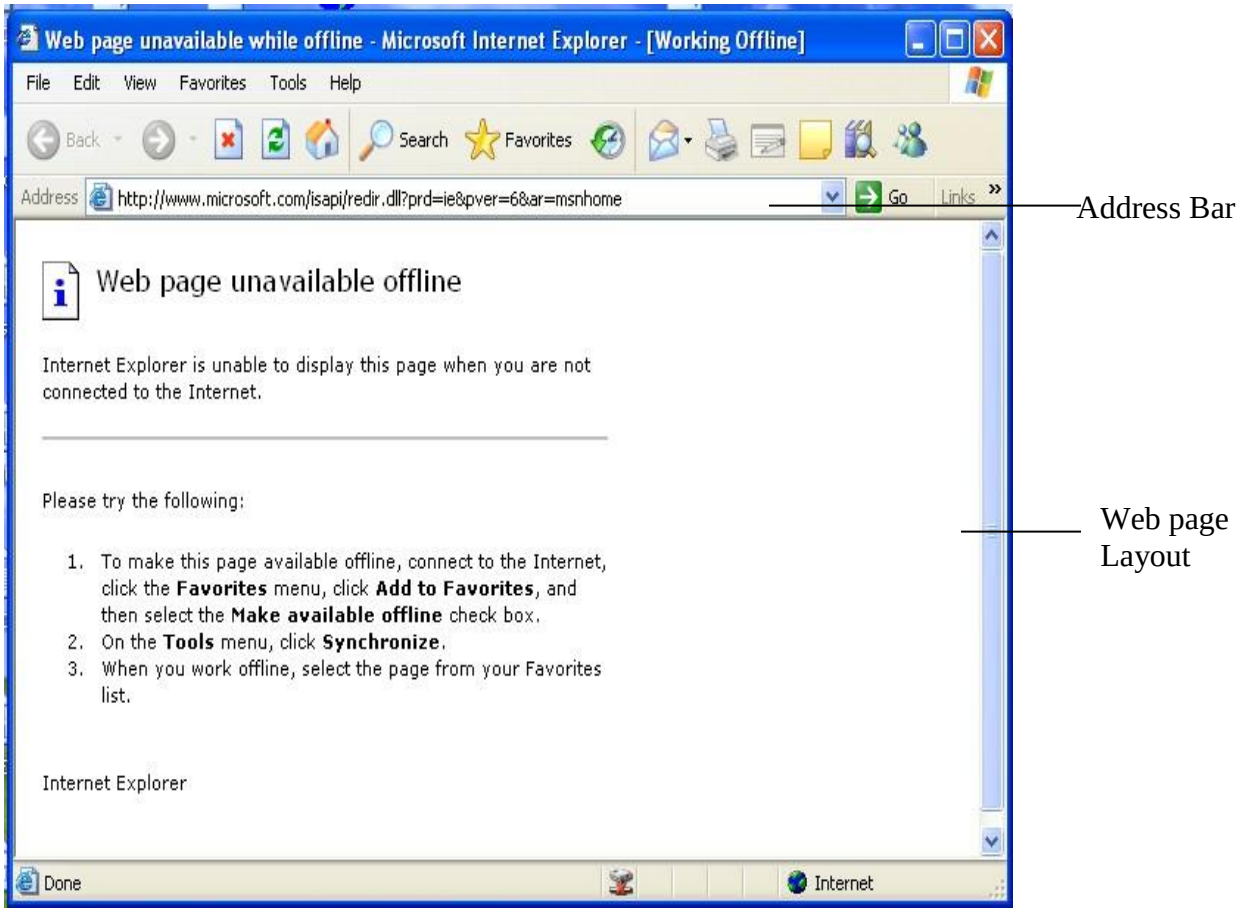
Mozilla fire fox

Opera

Google chrom

The general window layout of Internet Explorer





Functions of the buttons on the window

1. Back button returns the browser to the immediate former web page
2. Next button moves the browser to the next web page incase you clicked back button
3. Stop button tells browser to terminate searching or loading the website.
4. Refresh button tells the browser to try accessing the website address again after failure.
5. Home button moves the user to the first page of the website.
6. History button displays the website addresses that were visited in the recent few moments past.
7. Address bar allows the user to type the address of website to be visited.
8. Favorite button, displays all web addresses in the favorite folder where a user may store frequently visited websites
9. Search button, enables a person to search for words on the website
10. Print button, enables the user to print the current page of the website.
11. Mail button enables the user to view and send mails
12. The Go button tells the browser to load the current web page whose address is in the address bar.

Surfing the web

Surfing or browsing the web is the process of accessing internet resources like the web pages and websites. Mainly using hyperlinks and search engine

Hyper links: These are underlined or highlighted texts on the website page that indicate links to other sites. Hyper link can be identified by the fact that the mouse pointer changes to hand icon when it passes over it. A picture that used as hyper link is called **Hotspot**.

Searching the web

There various tools that can be applied to find or search information on the web, namely;

- **Directories**

These are lists of websites classified by topics, e.g. Yahoo directory provides a list of broad categories of information and services.

- **Search engine**

This is a search tool that allows the user to find specific documents through key-word search or menu choices.

It has a special program called **Spider** that traverses the web from one hyperlink to the next and new material is found that is added to their indexes or databases. The user search for a word by typing few words in the search field of the search engine.

Example of search engines are: www.google.com, www.excite.com , www.lycos.com. www.msn.com

Electronic mail (e-mail)

E-mail refers to the sending and receiving of electronic messages (text, sound, video and graphics) on the internet. It is now the most popular and widely used service on internet.

Advantages of E-mail over traditional ordinary mails

- **Speed**: E-mail is much faster than mail delivered by the traditional postal system. An e- mail can be sent in any part of the world in a matter of minutes.
- **Expense**: Apart from fixed monthly subscription fee to Internet Service Provider (ISP) for internet service e-mail services are free.
- A sender can send as many e- mails as he/she likes without extra charge unlike in the traditional postal mail a sender is charged per letter.
- **Feed back**: Data transmitted is confined to its destination hence user is convinced of his/her massages unlike ordinary mail were user is uncertain.
- **Real-time**: The E-mail is convenient and time saving when sending same e-mail to many recipients in real time.
- **Available 24hrs** One can access the e-mail any where at any time of the day, unlike the traditional mail which has a specific time of operation.
- **Attachments:** it supports multimedia attachment such as big documents, video, music graphics.

Disadvantages of E-mail over ordinary Post mail

- **Expensive:** Incase of initial cost setting up the network and internet. It is more expensive than traditional mail which requires buying a stamp for postage.
- **Needs a media to be delivered:** E-mail can only be accessed through a computer device that is connected to a network or internet.
- E- mail may be corrupted by a computer virus hence it may not open
- **It doesn't support the sending of parcels.** Physical items can't be sent with e-mail while with post, one can.
- E-mail favors one who knows how to use the computer while post favors only those who can write.

E-mail facilities

- **E-mail server:** This is the computer that receives incoming messages and delivers outgoing messages. It allocates a certain amount of storage to hold mail for registered user called **mailbox.**

- **Mail client:** This is a program that enables the user to read and compose e-mail messages, send and access e-mail from the server, e.g. Ms Outlook Express.

Checking an e-mail message

In order to check mail the user has to open his/her e-mail account by providing

1. User name
2. Password which is a secret code that gives users access to their e-mail accounts.

To compose a message,

Simply click the **compose** button. A blank screen opens on which you can type the new message.

Sending an e-mail message

To send an e-mail:

1. **To:** text box: - Is a field in the e-mail header where the sender types in the correct e-mail address of the recipient.
2. **Cc:** (**Carbon Copy)** textbox: - Is a field in an e-mail header that enables one to send a copy of the e-mail to other people and each recipient will view all the addresses of other recipients.
3. **BCC** (**Blind Carbon copy**) textbox: - Is a field in an e-mail header that enables a sender to send a copy of an e-mail to other recipients but each recipient cannot view e-mail address of the other recipients.
4. **Subject**: textbox: - Is a field where a sender enters a phrase that describes what an e-mail is about.
5. Type the message and finally click the **send** Button.

Forwarded messages can be read and sent to other people. Most of such messages are fun pages, poems, e-cards, gifts etc after reading you further forward to people by simply click forward button and then provide the addresses of the recipients. Then click Send button to send.

File attachment

You can also send attachments along with the original e-mail. An attachment can be a word processed document, spreadsheet file, a database file, picture, sound or video file

To attach a file

- in the mail client window i.e. Ms outlook express
- click New or compose button
- specify the recipient's address and the subject
- click the attach files button then a dialog box appears, where files are browsed from their location and scanned for attachment

WEB DESIGN

Web design is the process of planning and creating a website.

Text, images, digital media and interactive elements are used by web designers to produce the page seen on the web browser.

A **Web design program** is a computer program used to create, edit, and update web pages and websites.

Examples of Web designing software

1. CoffeeCup Visual Site Designer
2. Serif WebPlus
3. Web Easy Professional
4. NetObjects Fusion
5. Evrsoft First Page
6. HTML-Kit Tools
7. AceHTML 6 Pro
8. Adobe dreamweaver cs5.5
9. UltraEdit
10. TopStyle/ HTML editor
11. HTML Editor
12. Xsitepro
13. Web studio 5.0

What is a Web page?
Is a document available on the World Wide Web that is created using HTML (Hypertext Markup Language) and viewed with an Internet browser (e.g. Netscape or Internet Explorer).

It can contain text, graphics, links and other multimedia components.
A Web page can be made up of one or several separate documents.

A web page can be made up of one or several separate documents. A web page is usually a collection of documents that make up a web site.

A home page is usually the main or cover page of a web document that contain and index or table of contents to the rest of the document.

What makes a good web page?

1. Using the right combination of text, links and multimedia
2. Making the page accessible and useful to as many users as possible.

What is a Web site?
Is a set of related web pages.
A website is hosted on at least one web server, accessible via a network such as the Internet or a private local through an Internet address known as a Uniform Resource Locator

What is URL?

URL in full is Uniform resource Locator previously known as Universal resource Locator.

A **Uniform resource Locator** is the unique address for a file that is accessible on the Internet.

A common way to get to a Web site is to enter the URL of its home page file in your Web browser's address line e.g. **www.facebook.com**

What is a Web Browser?

It is a software program that is used to access and view web pages.

What is an HTML file?

HTML stands for Hyper Text Markup Language.
An HTML file is a text file containing small markup tags.
Markup tags tell the web browser how to display the page.
An HTML file must have an **htm** or **html** file extension. An HTML file can be created using a simple text editor.

Do you want to try it?

If you are running windows, start notepad.

Steps followed;

- Click start on you task bar
- Select All Programs then accessories
- Click on Notepad.

The first tag in your HTML document is **<html>.** This tag tells your browser that this is the start of an HTML document.

The last tag in in your document is **</html>.** This tag tells your browser that this is the end of the HTML document.

The text between the **<head>** tag and **</head>** tag is the header information. Header information is not displayed in the browser window.

The text between the **<title>** tag and **</title>** tag is the title of your document. The title is displayed in your browser's caption (title bar)

The text between the **<body>** tag and **</body>** tag is the text that will be displayed in your browser.

Example;

```
<html>
<head>
<title>Title of the page</title>
</head>
<body>
This is my first homepage. <b>This text is bold</b>
</body>
</html>
```

Save the file as "homepage.htm" or "homepage.html" on your desktop.

In the above example tag and tag make the text between bold.

Open the file you have just created by using any browser on your computer (internet explorer, Firefox, Opera),

Now you should see an address in the dialog box for example "**C:/desktop/homepage.htm**" if you are using windows XP and "**file:///C:/users/Username/Desktop/ homepage.htm**" if you are using windows 7.

The above address will always specify where that file is located on a computer or server.

Frequently asked questions.

Qn.1
After I have edited an HTML file, I cannot view the result in my browser. Why?

Answer:
Make sure that you have saved the file with a proper name and extension.

Qn.2
I have edited an HTML file, but the changes don't show in the browser. Why?

Answer:
When you have modified a page, the browser doesn't know that. Use the browser's refresh/reload button/ press F5 on the keyboard to force the browser to load the page again.

HTML ELEMENTS

HTML documents are text files made up of HTML elements. HTML elements are defined using HTML tags.

HTML tags are used to mark-up HTML elements.
HTML tags are surrounded by the two characters **<** and **>**, the surrounded characters are called angle brackets.
HTML tags normally come in pairs like **** and ****.
The first tag in a pair is the **start tag**; the second tag is the **end tag**.
The text between the start tag and the end tag is the **Element content**.
The HTML tags are **not case sensitive**; means the same as <B>

BASIC HTML TAGS

The most important tags in HTML are tags that define headings, Paragraphs and line breaks.

HEADINGS
Headings are defined with the <h1> up to any number.

In this we are going to create 6 headings that is from <h1> to <h5>.
<h1> defines the largest heading while <h5> defines the smallest heading.

```
<h1> This is a heading</hi>
<h2> This is a heading</h2>
<h3> This is a heading</h3>
<h4> This is a heading</h4>
<h5> This is a heading</h5>
```

HTML automatically adds an extra blank line before and after a heading.

PARAGRAPHS
Paragraphs are defined with the **<P>** tag

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<p> This is a paragraph</p>
<p> This is another paragraph</p>
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HTML automatically adds an extra blank line before and after a paragraph.

COMPUTER ETHICS

Computer Ethics is a branch of practical philosophy which deals with how computing professionals should make decisions regarding professional and social conduct.

DATA AND INFORMATION SECURITY

Information security means protecting information and systems from unauthorized access, use, disclosure, disruption, modification, perusal, inspection, recording or destruction.

Data security involves;

1. Denial of data and information to unauthorized users.
2. Provision of data and information to authorized users.
3. Protection of Data and Information against modification or unauthorized access.

Data and information privacy

Private data or information is that which belongs to an individual and must not be accessed by any person unless with direct permission from the owner.

Security threats and control measures
1. Viruses

A computer virus is a computer program that can copy itself and infect a computer negatively without the permission of the owner by altering the way it normally works.

Common types of computer viruses include;

1. Boot sector viruses - Destroy the booting information on a storage device.
2. File Viruses - Attach themselves to files.
3. Worms - Viruses that sticks in the computer memory.
4. Hoax viruses - Comes as an e-ail with an attractive subject and launches itself when e-mail is opened.
5. Trojan horse.

Control measures against viruses

1. Install a latest version of antivirus software on the computer and make sure you continuously update it monthly.
2. Avoid opening mail attachments before scanning them for viruses.
3. Avoid foreign removable storage media in the computer room or on your computer. If they have to be used, they must be scanned for viruses before use.
4. Avoid use of un trusted software on your computers.

2. Unauthorized access

Data and information is always under constant threat from people who may want to access it without permission. Such people will usually have either to commit fraud, steal the information and corrupt or destroy data. Unauthorized access may take the following forms

i. Eavesdropping

Eavesdropping is the unauthorized real-time interception of a private communication, such as a phone call, instant message, and videoconference or fax transmission.
OR
Eavesdropping is tapping into communication channels to get information.

Note: - Hackers mainly use eavesdropping e.g. to obtain numbers of credit cards. A **hacker** is a person who breaks into computers and computer networks for profit, in protest, or because they are motivated by the challenge

Control Measures

1. Use authentication mechanisms that do not transmit the password over the network such as Kerberos protocol or Windows authentication.
2. Make sure passwords are encrypted (if you must transmit passwords over the network) or use an encrypted communication channel, for example with SSL (Secure Sockets Layer). SSL is the standard security technology for establishing an encrypted link between a web server and a browser.

ii. Surveillance (Monitoring)

This is where a person may keep a profile of all computer activities done by another person or people. The information gathered may be used for one reason or the other e.g. spreading propaganda or sabotage.

iii. Industrial espionage.

Spying on your competitor to get information that you can use to counter or finish the competitor. This is mostly done with an aim to get ideas on how to counter by developing similar approach or sabotage.

Control measures against unauthorized access

1. Enforce data and information access control policies on all employees.
2. Encrypt the data and information during transmission
3. Keep the computer room when nobody is using it.
4. Reinforce the weak access points like doors and windows with metallic grills and burglar alarms.
5. Enforce network security measures.
6. Use file passwords to deter any person who may get to the electronic files.

3. Computer errors and accidental access.
Some threats to data and information come from people making mistakes like printing sensitive reports and unsuspectingly giving them to unauthorized persons. If the end users have privilege that allows them to change or access sensitive files on the computer then accidental access mistake may occur.

Control measures against computer errors and accidents
1. Give various file access privileges and roles to the end users and technical staff in the organization.
2. Set up a comprehensive error recovery strategy in the organization.

4. Theft
The threat of theft to data and information is real. Some data and information is so valuable the business competitor or some governments can pay a fortune to somebody who can steal the information for them to use.

Control measures.
1. Reinforce weak access points to the computer lab like windows and doors with metallic grills and strong padlocks.
2. Create backups in locations away from the main computing centre.
3. Employ guards to keep watch over data and information centre and backups.
4. Burglar proof the computer room.
5. Install security cameras for surveillance 24 hours.

COMPUTER CRIMES

Computer crimes are criminal activities, which involve the use of information technology to gain an illegal or an unauthorized access to a computer system with intent of damaging, deleting or altering computer data.

OR

Computer crime or super crime refers to any crime that that involve the use of a computer and a network.

Computer crimes include the following;

1. Hacking
A hacker is a person who intentionally breaks codes and passwords to gain unauthorized entry to computer system and information.
The most vulnerable computers to this crime are the networked computers face with hackers working remotely.

2. Cracking.
Cracking refers to the use of guesswork over and over again by a person until he\she finally discovers a weakness I the security policies or codes of the software.
Cracking is usually done by people who have some idea of passwords or user names of authorized staff.

3. Trespass

Trespass is of two types namely

i) Illegal physical entry to restricted places where computer hardware, software and backed up data is kept.
ii) Accessing information illegally on a local or remote computer over a network.

Trespass is not allowed at all and should be discouraged.

4. Tapping.

This involves the sending of an intelligent program on a host computer that sends him information from the computer.

Another way is to "Spy" on a network using special programs that are able to intercept messages being sent and received by the unsuspecting computer.

5. Piracy.

Piracy means making illegal copies of the copyrighted software, information or data. Software, information or data are protected by the copyright law.

There are several ways of reducing piracy which include the following;

i. Use license and certificates to identify originals.
ii. Make software cheap enough to increase affordability.
iii. Set installation passwords or key that deters illegal installation of the software.
iv. Enact laws that protect the owners of data and information against piracy.

6. Fraud

Computer fraud is the use of computers to conceal information or cheat other people with the intention of gaining money or information.

Fraudsters can be either employees in the company or outsiders who are smart enough to defraud unsuspecting people.

Some fraud may involve production and use of fake documents.

7. Sabotage

This is the illegal destruction of data and information with the aim of crippling service delivery or causing great loss to an organization.

Sabotage is usually carried out by disgruntled employees or those sent by competitors to cause harm to the organization.

8. Alteration.

This is the illegal changing of data and information without permission with the aim of gaining or misinforming the authorized users.

Alteration is usually done by people who wish to hide truth. To avoid this, do not give data editing capabilities to just anybody without vetting.

The person altering data may be forced to sign in order for the system to accept altering the information.

Alteration of data compromises the qualities of good data like reliability, relevance and integrity.

9. Phishing

Phishing is the act of attempting to acquire sensitive information like usernames, passwords and credit card details by disguising as a trustworthy source.

Phishing is carried out through emails or by luring the users to enter personal information through fake websites.

10. Cyber stalking:

The use of communication technology, mainly the Internet, to torture other individuals is known as cyber stalking. False accusations, transmission of threats and damage to data and equipment fall under the class of cyber stalking activities.

DETECTION AND PROTECTION AGAINST COMPUTER CRIMES

Below are some the measures that can be taken to detect, prevent computer crimes and seal security loopholes

1. Data encryption

Encryption is the conversion of data into a form, called a ***cipher text***, which cannot be easily understood by unauthorized people.

The massage to be encrypted is called **plain text** document, after encryption it is sent as **cipher text** on the net work up to its destination and then decrypted.

Decryption is the process of converting encrypted data back into its original form, so it can be understood.

The massage is encrypted using a particular order called **algorithm or key** and it sent to the receiver as cipher text. The recipient receives it and decrypts it using a reverse algorithm to the one used during encryption called a **decryption key** to get the original plain text document.

Hence without a decryption key nobody can be able to reconstruct the initial message.

2. Firewalls

A firewall is a set of related programs, located at a network gateway server that protects the resources of a private network from users from other networks.

OR

A firewall is a device or software system that filters the data and information exchanged between different networks by enforcing the host network access control policy.

The main aim of a firewall is to monitor and control access to or from protected networks. People who do not have permission cannot access the network.

3. Log files

A **log file** is a recording of everything that goes in and out of a particular server/computer. This is because each user is assigned a user name and password or account.

The information system administrator can therefore easily track ho accessed the system, when and what they did on the system.

4. Audit trial

A record showing who has accessed a computer system and what operations he or she has performed during a given period of time.

Audit trails are useful both for maintaining security and for recovering lost transactions.