ICT

(INFORMATION AND COMMUNICATION TECHNOLOGY)

Definition:

ICT is the integration of computers and telecommunication facilities for the purpose of communication.

ICT is the hardware and software used to collect data, process it into information that is stored and communicated to users.

TERMS COMMONLY USED IN ICT

1. **Data:**

   Data are raw facts that do not have much meaning to the users.

   Examples

- ❖ Numbers
- ❖ Letters
- ❖ Symbols
- ❖ Musical notes
- ❖ Examination scores
- ❖ Images

2. **Information:**

   Is the processed data that is meaningful to the user.

   Examples of information;

- ❖ Grades, words, essay, report, pictures, comments, mathematical formulae, songs and video.

3. **A user:**

   Is a trained person using a computer and its applications.

4. **Program**:

   Is a set of instructions given to a computer to perform a specific task.

5. **Communication:**

   Is the process of sending and receiving information. Communication can wired (guided) or wireless (un guided)

- **Wired communication (Guided)**
  Is the physical connection between the sender and the receiver. E.g computers connected using cables.
- **Wireless communication(Un guided)**
  Is where there is no physical connection between the communicating devices. E.g. mobile phones, blue tooth.

6. **Information technology**

   This is the technology used for processing information on computer systems.

7. **Data processing:**

   Is the collection and manipulation of data to produce meaningful information.

Ways through which ICT has improved communication.

- Video conferencing
- Radio communication
- Television communication
- Telecommuting (workers work from their homes)
- E-commerce
- E-learning

INTRODUCTION TO COMPUTING/ COMPUTERS

A computer is a multipurpose and electronic device that makes work easier.

OR

Computer is a programmable electronic device that accepts input data, processes it, stores it and gives out useful information.

Characteristics of computer.

1. **Speed:**
   Computers are relatively faster in their processing speed when compared to human beings and other data processing means. Their operation speed is measured in millions of instructions per second (MIPS)
2. **Communicative:**
   This is the ability of a computer to send and receive information over a network. Eg. Email message on the internet.
3. **Accuracy:**
   This is the ability of a computer to produce results without errors. Computers are capable of detecting mistakes and correcting them once made by users.
4. **Diligence:**
   A computer has the ability to do work persistently, tirelessly and repetitively without getting bored.
5. **Automation:**
   Computers receive and work on instructions on their own. They work on minimal human intervation once instructions are given.
6. **Reliability:**
   Computer has the ability to perform its required functions under instructions.
7. **Artificial intelligence:**
   Computer can receive and respond to requests by giving required response.
8. **Memory capacity/ storage**
   Computers are capable of storing data for a long period of time unlike other data processors like the type writer.
9. **Versatility/ flexibility.**
   This is the ability of a computer to perform a wide range of tasks. It can easily change from one activity to another.

Advantages of computers

- ❖ Documents made by computers look more better for business.
- ❖ Computers are used for study purposes.
- ❖ Editing and formatting a document becomes easier while using a computer.
- ❖ Computers have eased communication through the use of mobile phones, internet.
- ❖ Computers have improved people's standards of living by learning from them.
- ❖ Industries use computers to improve on quality and quantity of their products by help of computer aided designs.
- ❖ Use of internet has greatly improved in the area of research.

Disadvantages of computers.

- Computers are expensive to buy and maintain
- Computers need expensive and specialised skills to use and maintain.

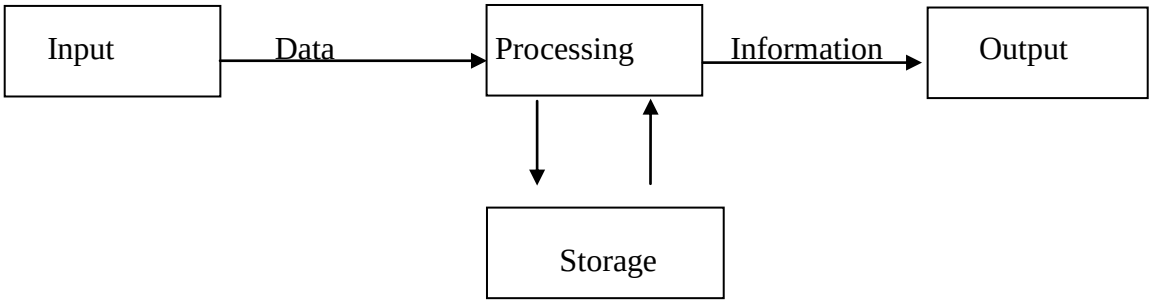
- Over use of computers can lead to health effects such as eye strain, and noise which causes stress.
- Computers lack human judgement.
- Computers lead to wastage of time through unnecessary computer games.
- Computers have increased crime through forgeries.
- Unemployment as less skilled people get replaced and their roles taken over by computers.
- Data on the computer has no guaranteed security
- Computers have resulted into moral problems through access to pornographic materials on the internet.
- Due to over dependence on computers, reasoning and creativity can decrease. Corn men and women use computers to practice pharming.
  Note: (Pharming) is a cyber attack intended to redirect a website's traffic to another fake site)
- Computers can easily be affected by viruses.

Why do we study ICT?

- ✓ To get basic skills needed for employment
- ✓ To get knowledge and skills on the use of computer
- ✓ To promote creative skills for solving problems.
- ✓ To encourage learners to development as independent users.
- ✓ To use the acquired knowledge in computer studies to enhance learning other subjects.
- ✓ To acquire knowledge as a foundation for further studies in computer technology.
- ✓ To get subject combination.

INFORMATION PROCESSING CYCLE (IPC)

This refers to a sequence of processes involved in transforming data into information. IPC undergoes 4 stages as illustrated below;



1. **Input**: This refers to entering data into the computer. Examples of computer input devices include; keyboard, mouse, microphone, scanner, digital camera and graphic tablet.
2. **Processing**: This is the manipulation of data to produce information. It involves tabulation, analysis, sorting and coding. Processing is particularly done by the central processing unit (CPU) or micro processor which is referred to as the Brain of the computer.
   Examples of CPU include; Pentium I, Pentium II/ Rentium pro, Pentium III, Pentium IV, Rentium *i*3 core, *i*5, *i*7, Dual core.
3. **Storage**: This is the keeping of data or information for future reference. Examples of storage devices include; hard disk,flash disk, memory card, DVD,CD, Random Access Memory (RAM), Read Only Memory (ROM).

4. **Output**: This is presenting/ displaying information using output devices after processing. Examples of output devices include; monitors (Visual Display Unit, VDU), printer, head sets, speakers LCD projectors (Liquid crystal Display)

COMPUTER SELECTION.

The following are the factors individuals should consider when acquiring computers;

A. Hardware considerations.

1. **Processing speed**. This determines how fast the computer processes on. It is measured in Mega Hertz (MH_Z).
2. **Hard disk capacity**. This determines how much information will be stored on computer. It is measured in Giga bytes.
3. **Random Access Memory (RAM**). This is a computer memory used to hold programs while being executed. The more the RAM, the faster the computer performs.
4. **Expansion slots**. Computer buyers should buy computers with enough expansion slots to accommodate future changes.
5. **Portability**. Travellers are always advised to buy a laptop or any other hand held device.
6. **Compatibilit**y. Always buy computers that interact with the existing hardware.
7. **Warranty**. It is recommended to always buy computers from dealers who agree a warranty period. This saves the buyer from incurring losses through repair and purchase of spare parts in case the system brakes down just within the warranty period. The recommended warranty period is one year.
8. **User needs**. This refers to what a user intends to use a computer for. For example the computer system that would be used for office work need low processing.
9. **The cost of a computer.** The cost of a computer is related to its size and any additional components. If it is an outdated brand, it should be bought cheaply.

B. Software considerations.

1. **Authenticity**. Always ensure that you purchase software from legal vendors to avoid damage to computer systems in case of illegal copies. Authentic software is normally licensed and protected by the licence key provided by the developer.
2. **Reliability**. Always ensure that the software you purchase has support to prompt bugs (errors) that may arise while running the software.
3. **User friendliness**. Software should be easy to use and understandable by the user.
4. **User needs**. Software should meet the users' needs by at least performing the major function

AREAS WHERE ICT OR COMPUTERS ARE BEING USED.

- ✓ Business
- ✓ Military
- ✓ Education
- ✓ Research
- ✓ Science and Engineering

- ✓ Health
- ✓ Politics
- ✓ Entertainment
- ✓ Sports
- ✓ Office
- ✓ Homes

IMPLICATION OF ICT IN OUR SOCIETY

In this world, the mostly used ICT tools in society include; computers, mobile phones, internet, radios, television and the related software systems.

1. **Business. (Positive)**
   - Computers are used for advertisement of business products on TV, radios, and internet.
   - Computers are used to design receipts, invoices and other business documents.
   - ICT is used for business communication through emails and telephone.
   - Computers are used to transfer money electronically in banks.
   - Computers are used to keep business documents in an electronic form.
   - ICT has created jobs for machine operators, engineers, data analysts, programmers and network administrators.
   - ICT has led to the production of high quality and valuable products.
   - Electronic commerce has made business across continents easy, simpler and cheap.

   (Electronic commerce is where business transactions are carried out electronically without the physical interaction between the buyer and the seller)

   Advantages of E-commerce.

- ➢ With E-commerce, some items once paid for may never be delivered.
- ➢ Computers consume a lot of power which uses power bills.
- ➢ Unemployment. Many messengers have lost their jobs and their work taken over by computers.
- ➢ Loss of data. Virus has caused a lot of organisations to lose their data.
- ➢ Forgery. The rate of forgery has increased and some organisations have lost huge sums of money.

2. **Education. (Positive)**
   - ➢ Computer Assisted Learning (CAL) helps students to learn at their own pace. (CAL is where students use computers and appropriate programs to learn at their own pace).
   - ➢ Computers Assisted Assessment (CAA) is used to assess student's performance.

   CAA is a reduction in time and labour to mark answer scripts.
   - ➢ Through telecommunication, one can register, attend lectures and graduates at home.
   - ➢ Notes and tests can easily be shared among students and teachers through the use of internet.
   - ➢ Computers are used to carry out educational research on every topic from the internet.
   - ➢ E-library is used by students to search and borrow books.
   - ➢ Edutainment. Computers are used to entertain students as they are learning.

   Negative

- Students end up spending much of their time on unnecessary computer games.

3. **Health (Positive)**

   Internet has facilitated research and collaboration among doctors to deal with complex diseases.

- New drugs for complicated diseases have been discovered with computer research (internet).

- Computers are used to monitor patients in ambulances as they are being rushed to the hospital.
- Computers are used to run machines that reduce peoples' weight and make them physically fit.
- Computers are used in hospitals to design forms, monitor the sick and diagnose.
- They are used to test DNA (Deoxyribose Nucleic Acid) molecules and establish people's true parentage.
- They are used for medical collaboration through telecommunication.
- Simulation has helped medicine students to have experiences of surgery without risking human life.

Negative

- Increased infertility rate among men by laptops.
- Headache is common with programmers because of engaging the brain to fix bugs(errors)
- Eye strain due to much light from computer monitors.
- People have had eye defects due to radiations from computer monitors.

4. Sports.

Positive

- Computers are used to design computer games.
- They analyse athlete's movements to enable them maximize their abilities.
- Play backs by computers have helped players to realize their mistakes and improve.
- Computers are used to broad cast sports live events like live matches on sky sport and DSTV.

5. **Politics and Military**.

Positive

- Computers are used by electoral commission to carry out electronic voter registration.
- Computers are used by politicians solicit support through sms and websites.
- The government uses computers to store information which reduces storage costs.
- Computers are used in teleconferencing to coordinate people in different offices.
- Computers are used to analyze satellite information which helps to seek and destroy enemies.
- Computers are used to carry out day to day government businesses like word processing and emailing.
- Computers are used to design modern weapons like drones and warships.
- Computers are used to monitor government accounts in different areas.
- Satellites and CCTV cameras have improved security through monitoring the suspected criminals.
- Drones have made it easy for missions in dangerous places for human to reach.
- Smoke and water leakage detectors have improved security by automatically calling the police for action.

Negative

- Personal security has been compromised by hackers who obtain person's private information for wrong deals.
- Internet provides an efficient plat form for rebel's collaboration and recruitment.
- Government secrets have been handed in the hands of enemies because o hacking.
- Computers have been used to make destructive weapons which are used to kill people.

6. Science and Engineering

Positive

- ✓ Computers are used to carry out millions of complex calculations.
- ✓ Computers are used by a astronomers to test physics theories and make accurate conclusions.
- ✓ Computers are used in forecasting complicated weather patterns.
- ✓ Computers are used to unlock DNA (Deoxyribose nucleic Acids) molecules.
- ✓ Computers are used in processing images for construction designs.

7. **Homes**. Positive

- ✓ Computers are used to entertain and educate
- ✓ Computers are used to keep track of personal budgets.
- ✓ Computers are used in home mobile banking where a person can make his transactions while at home.
- ✓ One can register, attend lectures and graduate while at home using a computer. (E-learning)
- ✓ A person can communicate with friends and relatives on social media (facebook, whatsup) using computers.

Negative

- ✓ Pornography
- ✓ Loss of data
- ✓ Laziness
- ✓ Addiction

TERMS USED

1. **Mobile banking**: Is where an account holder in a bank can perform banking transaction using his/her own mobile phone.
2. **Internet/Online banking**: Is where an account holder in a bank can perform banking transaction using internet.

   Online banking transactions include;
   - ➢ Paying bills
   - ➢ Obtain loan applications
   - ➢ Download monthly transaction information.
3. **Electronic Fund Transfer (EFT)/** Electronic banking: Is the transfer of money between two different accounts electronically. For example when paying for goods and services using a credit card, money is transferred electronically from the customer's account to the recipients account (seller).
4. **Telecommuting**: Is where an employee works at home using a computer connected to the work place network.

   Advantages

- Reduces travel expenses
- Avoids inconveniencies like traffic jam.

5. **Video conferencing**: Is where people in different locations can communicate while seeing each other.

   Devices used are computer, digital camera, speaker, microphone and a communication software which are connected to the computer.

   With such devices and appropriate communication software, a person can participate in a virtual conference room.

   Virtual reality is a condition in which a person is psychologically immersed in an artificial environment generated by a computer system.

   Simulation is the science of presenting the behaviour of a real life situation by using computerised models.

Examples of communication softwares used in video conferencing

- Skype
- I chat
- I visit
- Gizmo

6. **Biometric analysis**: Is the study, measurement and analysis of human biological characteristics. Biometric device attached to a computer is used to identify a person's one or more specific attribute like finger prints, voice, lips, and facial features like iris colour.
   Examples of these devices include;

- Video camera
- Biometric scanners like Biometric Voter verification Kit (BVVK) used in Uganda during the 2016 presidential elections.

COMPUTER MANAGEMENT

A. COMPUTER BOOTING

Booting is the process of starting or restarting the computer which involves loading the operating system into the memory.

Types of booting

There are two main types of booting, namely;

- Cold booting
- Warm booting

1. **Cold booting**. Is a type of booting which occurs when the computer is powered up when it was originally off. Ie both the operating system and the hardware are started. It is also called boot up.
2. **Warm booting**. Is the process of restarting a computer without interrupting its power supply.
   OR.
   Is the process of restarting or resetting a computer that is already turned on.
   Note:
   With warm booting, we need not to switch the power off to restart the computer but we can restart the system by pressing a combination of ALT + CTRL + DEL keys.
   How to start the computer

- Switch on the power mains (outlet)
- Switch on the stabilizer/power back up/Ups (Un Interruptable power supply)
- Switch on the system unit
- Switch on the monitor or the visual Display Unit (VDU) because what it displays is from the system unit

SHUTTING DOWN A COMPUTER.

- Close all the applications (active windows)
- Click on the start button and then click on shut down or turn off computer.
- Finally switch of the system unit and the monitor.

How to start a program

Computer program is a set of instructions that guide a computer on what to do. There are two types of programs ie application and system software.

Steps (procedure)

- Click on the start button.
- Click all programs menu
- Select the program from the list by clicking on it.

OR

From the desk top, double click on the program icon.

Conditions under which warm booting is necessary

- In case of freezing
- After installing a software
- When the conductor response speed is slow
- When configuring the hardware.

B. FILE MANAGEMENT (File System)

This refers to a system that an operating system uses to organise and keep track of files.

File. Is a collection of data or information on a single memory location unit given a unique name (file name)

Files are of different types;

- Text files
- Audio files
- Video files
- Picture files

- Picture files are in different formats with different file extensions such as JPEG, GIF (Graphics interchange format) layered image files (photo shop images)
- Audio files are only listened to and have file extensions like MP3, WAV, WMV, MOV, MP4 etc.
- Text files is a structured sequence of lines of electronic text with file extension like t x t.

FILE EXTENSION

This is a group of letters occurring after a period (dot) in a file name indicating the purpose of the file. A file extension is the last part of a file name after the period(dot). Examples include

- Zip for zipped files (To compress a file to a smaller size)
- Doc for Microsoft word files/word documents
- Ppt for power point presentations
- Xls for Microsoft excel documents
- Db for database files.
- Pub for Microsoft publisher documents
- Exe for executable files.

File format

Is a standard way that information is encoded for storage in a computer file. A file format specifies how bits are used to encode information in a digital storage medium.

Note: Computer understands the language of Os and Is. Encode- convert plain text into codes.

File attribute

Is a specific condition set to a file or directory.

Examples of file attributes.

- Read – only
- Hidden
- Compressed
- Archive
- System file.

Read – only: Protects the file from any unauthorised change or deletion.

Hidden: These are concealed and cannot be viewed in windows explorer and thus cannot be opened or viewed or deleted unless one knows their names.

Compressed: The files content are compressed to occupy a relatively smaller space.

Archive: This shows that a file has been modified and needs to be backed up or archived.

Folder: Is a container that holds files and sub folders. For example: I have picture called sunset. JPG and I saved it on my computer somewhere. If I saved it at;
C:\Administrator\my pictures\sunset. JPG.
My pictures – is a folder containing a file sunset. JPG.
C- Hard disk partition or location on which it is saved.
Administrator – is the profile of the person who created the file.
Sunset. JPG – is the file extension.
JPG – is the file extension.
Subfolder:
Is a folder/directory in another folder.
Storage location.
Is the location on the computer where you save your files.
Icon.
Is a picture on a screen (desktop) that represents a specific file, folder or hardware resource and a program.

DESKTOP

Customising the Desktop.

This is changing your desktop appearance to what you want it to look like.
It involves the following

- Changing the screen resolution
- Changing the font size of desktop icon names
- Changing the colour theme
- Changing desktop back ground image
- Changing the wall paper.

Steps in customising the Desktop

- Right click on the desktop
- Select properties / personalize
- Specify how you want your desktop to look like

Major icons on the Desktop

- My document
- Network places
- Recycle bin
- My computer.

Recycle bin

It holds all temporally deleted items both files and folders. From the recycle bin you can choose to delete it permantly or restore it to the location you deleted it from.
Working with files and folders

How to create a new file.

- Click file menu in the program you are using, and then click New
- When you have finished working with the new file
- Click the file menu again,
- And then click “Save As”
- Select the location you want to save your file
- Type the file name in the file name box
- Click save to save it on your computer.

How to create a folder on the desktop.

- Go to the windows desktop.
  Right click on any blank space of the desktop. In the menu that appears, click New, Folder.

A new folder will appear and then type the folder name and press enter.

To delete a folder

- Right click on the file/folder
- Select delete

OR

Select the file or folder and press the delete key on the key board.

COMPUTER LABORATORY CARE AND MAINTENANCE.

1) COMPUTER LITERACY

Is the knowledge and ability to use computers and related technology efficiently.

OR

Is the comfort level someone has in using computer programs and other applications.

Computer skills

Is the ability to use the software and the hardware of the computer.

Reasons for being a computer literate.

- To stay in touch with the world e.g the use of electronic mail has spread over the whole globe.
- For entertainment e.g. playing games, music and movies
- It helps in carrying out electronic commerce.
- It has increased the earning potential i.e. the source of income.
  to acquire knowledge as a foundation for further studies in computer technology and other disciplines
- To understand important issues of technology based society and exhibit them using computers.

2) SECURE LABORATORY ENVIRONMENT

Computer laboratory is a special room set a side for teaching and learning of computer and related technology.

Factors to consider before starting computer laboratory.

- Security of the computer hardware and software.
- Reliability of the source of power
- Number of computers to be set up
- Maximum number of users.

Basic computer laboratory equipment.

- Computers
- A server
- Switch (is a network equipment to which all computers are connected)
- Printer
- Scanner
- Projector
- Head sets
- Camera.

Areas of laboratory security.

1. Physical security. This deals with safety of all physical equipment i.e. computer, printer, scanner etc.
2. Air conditioning. This is a system that provides a cool environment for both computers and users.
3. The backup system. This enables having copies of all software systems and data on separate storage devices to be able to recover them in case of system or software break down.

4. Electronic power security. This handles the safety of both the users and electrical equipment. It can be handled by un interruptable power supply (UPS).
5. Fire extinguisher. These hold carbon dioxide which is used to combat/fight fire in case of fire outbreak.

The computer laboratory rules and regulations.

- ❖ Students should not enter the laboratory unless supervised.
- ❖ Do not bring any kind of drinks or eats into the computer laboratory.
- ❖ Strictly no hand bags are allowed in the computer laboratory.
- ❖ Strictly avoid movements of seats unless instructed.
- ❖ Avoid touching/playing with the power sockets/switches.
- ❖ Strictly avoid un necessary noise while in the computer laboratory.
- ❖ Scan storage devices before they are used
- ❖ Report any problem related to the system to the teacher.
- ❖ Do not remove/load any software into the computer.
- ❖ Keep magnets away from the computer
- ❖ Internet facilities are strictly for educational purposes.
- ❖ Shut down the computer accordingly after use.

Computer physical protection/measures that protect computers from theft.

- ✓ Use of strong padlocks and keys
- ✓ Installation of burglar proofs e.g. metallic doors.
- ✓ Deployment of security guards.
- ✓ Installation of closed circuit television (CCTV) cameras
- ✓ Installation of alarm systems.

Measures that protect computer users against harm.

- ✓ Installing lightening arrestor.
- ✓ Having wide emergency exists – doors
- ✓ Installing fire extinguishers
- ✓ Proper cabling to avoid naked wires that can cause electric shock.
- ✓ Ensuring that the lab has first aid kit.

3) COMPUTER SERVICING AND MAINTENANCE

Computer servicing is the maintenance and enhancing computer operations.

Computer repair: Is the correcting of errors and replacement of computer broken components.

Importance/reasons of/for servicing and maintaining a computer.

- ▪ It speeds up the computer
- ▪ It prevents your computer from virus attacks
- ▪ It prevents information loss
- ▪ It gives the computer long life
- ▪ It reduces operational costs of a business or enterprise in the long life.
- ▪ It reduces the CPU overheating.

Terms used under computer maintenance and servicing.

1. **Software update.** Is a freely downloaded software that provides features for enhancement and compatibility.
2. **Software upgrade.** Is the process of replacing a product with a newer vision of the same product.
3. Hardware update. Is the process of replacing a product part in a computer system e.g. a motherboard.

4. **Hardware upgrade**. Is the process of replacing the entire hardware device with a new one that provides better performance.
5. **Software installation.** Is the process of adding a new system or application program for use on a computer.
6. **Un installation**. Is the process of deleting an already installed program from a computer.
7. Trouble shooting. Is the process of identifying and fixing computer problems.

COMPUTER SYSTEM.

Is a structure of interrelated components that work together to achieve a computing goal.

Is a collection of entities that collectively work together to achieve a stated goal.

Components of a computer system

- Hardware
- Software
- Live ware/ human ware
- Data

COMPUTER HARDWARE

Are physical or tangible components of a computer.

Examples of hardware components;

- Monitor
- Mouse
- Hard disk
- Keyboard

Classification/Categories of a computer hardware components.

Input devices. These are used to enter data into the computer.

Output devices. These bring out information to the user.

Storage devices. These are used to store information for future use.

Processing devices. These are used to manipulate data into information.

Communication devices. These are used in sending and receiving information.

A. INPUT DEVICES

Are devices/gadgets used to feed/enter data into the computer.

Categories of input devices.

1. **Keying devices**. These are devices that are used to type as a way to input data in a computer.

Examples

- Traditional keyboard
- Flexible keyboard
- Braille keyboard (blind)

2. **Pointing devices.** These are devices used for controlling the cursor on the screen.

Examples

- Mouse
- Light pen
- Joy stick
- Track ball

3. **Scanning devices.** (Video Input devices). These are devices that send image data to a computer.

Examples

- Scanners
- Webcam
- Digital camera
- Card readers
- Bar code reader
- Magnetic ink character recognition reader(MKR)

4. **Audio (Voice) input devices.** These capture sound and send it into the computer.

Examples

- Microphone
- Electric guitar
- Midi keyboard.

5. **Touch screen.** They are used by touching the display area with a finger, or light pen. They are found on mobile phones, video games, and tablet personal computer.

Examples of Input devices in details

1. Scanners

This is used to capture existing printed documents into softcopy digital form. Scanners are used in banks, schools, insurance companies to verify signatures by comparing a customer's signature against the one stored in the computer.

There are two main types of scanners,

- Hand held scanner
- Flat bed scanner

- Flat bed scanner works like a photocopying machine except that it creates a file document or image document rather than a paper copy (hard copy)
- Hand held scanner. This is manually passed over the object to be scanned.

The quality of a scanner is determined by its resolution (Number of pixels/dots forming the image) and the colour depth.

2. Digital camera.

This takes photographs and keep them in a softcopy form which is entered into the computer for further processing.

3. **Touch screen.** These are screens that can sense when a particular part of the screen is touched on. Data is entered into the computer by touching it with a finger.

Advantages

- It is effective where the keyboard or mouse cannot be used e.g. when a person is standing r moving.
- No extra peripheral is needed except the monitor which must be sensitive to touch.

Disadvantages

- It is unsuitable for entering large amounts of data.
- It is tiring to keep reacting to touch and data thus not suitable for office use.

4. **Document reader**. Is an input device that can read data directly from a source document such as a cheque, electric metres, and convey them in an electronic (digital) form.
5. **Sensors.** These are devices connected to computers to record physical quantities like temperature, light and humidity. Examples of sensor instruments include thermostats, pressure pads that monitor and control traffic lights on the road.

6. **Optical Character Recognition Reader (OCR).** Is used to mark multiple choice type answers in academic departments.
   Is also used to read turn around documents like water meters, and electricity bills.
7. **Bar Code Reader.** This uses Laser beams to read the bar codes by using light patterns that is passed over the bar code lines. Barcode readers are widely used in super markets and libraries.
8. **Voice Recognition equipment/microphone**. This is used to capture and enter sound into the computer.
9. **Keyboard**. This is used to enter (type) data and instructions into the computer.

Keyboard lay outs.

- Qwerty key board
- Chinese lay out
- USA lay out
- Portuguese key board.

Types of keyboard

- 82 keyboard
- 102 keyboard
- $102/_3$ keyboard (Most common standard keyboard)
- 105 keyboard

Parts of a keyboard.

1. **Function keys.** Are usually located along the top of the keyboard. They are labelled F1, F2 up to F12. It is used to perform specialised functions according to the operating system used. For example pressing F1 key in most programs starts the help menu.
2. **Alphanumeric keys (Typing keys**). This is used for text data entry. These are labelled alphabetic letters A to Z, numbers arranged in line – 1, 2, 3, ----0 and special symbols such as ?,], % etc. this group also includes, Tab, Enter, Caps lock, Space bar and back space keys.
3. **Numeric keypad keys.** These are meant to help the user to rapidly enter numeric data and are located on the right hand side of the keyboard. The Numeric keypad is only used when Num lock key is turned on. It consists of numbers 0 to 9,and arithmetical signs like +(addition), * (Multiplication), - (subtraction) and / (division)
4. **Special purpose keys.** These are used in combination with others to give certain commands to a computer. For example CTRL + ESC is used to display the start menu. They include SHIFT, CTRL, ALT and ESC.
5. **Cursor control (Navigation) keys.** These are used to move the cursor in all directions. They include;

- Arrow keys
- Page up and page down
- Home and End keys

Editing keys are used to delete and insert characters in a document. They include;

- Delete key
- Insert key

10. Mouse.

This is a pointing device that enables the user to select items on the screen/ monitor. To select an item, the user moves the mouse which consequently moves the cursor on the monitor to an item to be selected.

Parts of a mouse.

1) Left button/ primary button. This is the most commonly used button. It is found on the left hand side of the mouse. It is used to carry out following.

- Clicking. This is the act of pressing the left button twice quickly/instantly.
- Dragging .this is the act of moving items on the screen.
- Scrolling. This is the act of moving long pages up or down the screen.
- Selecting/blocking/highlighting. this is the act of choosing an item on which to apply an effect/change.
- Moving the cursor.

2) Right button/secondary button. It is found on the right hand side of the mouse. It is used for right clicking.
3) The wheel. This is found in the middle of the left and right buttons. It is used to scroll long pages up or down.

Functions of a mouse.

- Right clicking.
- Clicking.
- Dragging
- Scrolling.
- Creating short-cuts.
- Drawing pictures.
- Selecting/highlighting.
- Double clicking.

Types of mice.

1. Desk-top mouse. Used on desk-top computers.
2. Track ball mouse. Commonly used on laptop computers.
3. Touch pap mouse. Commonly used on laptops.
4. Optical mouse. This uses the laser beam to transmit signals to the CPU.
5. Cordless mouse. This has no wire attached to the system unit.

B. OUT PUT DEVICES.

An output is data that has been processed into useful form called information. Output devices are devices that bring out computer held information to users. Output is of two forms;

- Soft copy.
- Hard copy.

Soft copy. This is the output displayed or listened to.

OR: Is the un printed digital document file.

Hard copy. This is the information recorded on a physical medium e.g. paper, film etc.

OR: Is a permanent reproducible/ copy on any media suitable for direct use by the user.

Output devices like speakers and monitors produce softcopy output while output devices like printers and plotters produce hard copy output.

Examples of output devices

1. **Speaker**. These are used to produce sound output. A speaker's sound output is measured in watts of power output. The higher the speaker's rating, the better the sound output.

   Audio output devices include;

- Speakers
- Headsets (Head phones)

2. **Projectors.** Projectors are used to display information for bigger audiences on bigger screens. Data projectors are of two types;

- Liquid crystal display projectors; are projectors that use liquid crystal technology to produce lower quality images.
- Digital light processing (DLP) projectors are projectors that use tinny mirrors to reflect light. It can produce much better quality images in a well – lit room.

3. **Printers.** This is an output device that brings out permanent records on a physical medium like a paper, plastic.
   Types of printers
   Printers are categorised according to how they produce images on a print media.
   Printers are of the two types, namely;

- Impact printers
- Non impact printers

a) **Impact printers**. These are printers that produce hard copy output with their print medium. The print media include, paper, cloth, plastic etc.
   Impact printers are further classified;

- Character printers
- Dot printers
- Line printers
- Plotters
- Thermal printers.

(i) **Character printers.** These print one character (letter at a time. E.g daisy wheel printer and thimble.

(ii) **Dot printers.** This work by using pins which form patterns of dots to make characters.

(iii) Line printers. These print a line of characters at a time.

(iv) **Plotters**. These are output devices used to produce accurate graphical output e.g. diagrams and maps. Plotters are used for printing much architectural or engineering work.

Advantages of impact printers.

- They are cheap
- They can with stand harsh (dusty) conditions.
- They produce bulk work easily.
- They are easy to maintain.
- They can print on continuously paper especially dot matrix printers.

Disadvantages of impact printers.

- They are noisy during operation.
- They have a lower print resolution
- Their print heads normally over heat which shows the entire process
- They are slower in printing compared to non impact printers
- They use a lot of power.

b) Non impact printers

These are printers that produce hard copy out put without their print heads physically touching on the print media.
They are further classified as;

- Inkjet printers
- LaserJet printers
- Bubble jet printers
- DeskJet printers.

(i) **Inkjet printers**. These are printers that work by spray painting liquid ink in a parttern to form characters.Eg lex mark 2020 colour jet printers.

(ii) **DeskJet printers.** These work like inkjet printers.

(iii) **Bubble jet printers**. These are printers which work by having their nozzles in the print heads spraying tiny droplets on the print media.

(iv) **Laser jet printers**. These uses a laser beam of light to create characters on paper. These are high quality printers with greater near letter quality (NLQ) capacity and high speed output. E.g Hp Laser jet P2030 series.

Advantages of Non Impact printers.

- ✓ They produce high quality work ie clear resolution.
- ✓ They do not produce a lot of noise
- ✓ They are faster than impact printers
- ✓ They use little power compared to impact printers
- ✓ They generate less heat during their operation.

Disadvantages of non impact printers

- ✓ They are usually expensive
- ✓ They suffer from paper jam easily
- ✓ Replacing cartridge is expensive
- ✓ They are affected by dust and high temperatures
- ✓ They require high quality papers
- ✓ They cannot print on continuous papers

Factors to consider when buying a printer.

- The initial and maintenance costs
- Portability
- Size
- Amount of work to be printed
- Speed of a printer
- Availability on the cartridge on the market
- Range of capabilities of a printer
- User needs

4. Monitors

This is an output device that brings out computer held information in a soft copy/ visual form.

Classification/categories / types of monitors.

There are two main types of monitors;

- Liquid crystal display (LCD) monitors
- Cathode Ray Tube (CRT) monitors

(i) Cathode Ray Tube (CRT) monitors

These are big in physical size and heavy. They have extension behind which make them look like box TV sets. They consume a lot of power.

Advantages of CRT

- They produce fast and rich colour output
- They can be viewed from a wide angle
- They are cheaper to buy than LCD.

Disadvantages of CRT

- They consume a lot of power
- They consume a lot of space in a room
- They are bulky to carry

- They emit higher electromagnetic radiations which affect the eyes than LCD.

(ii) Liquid crystal Display (LCD) monitors.

LCD is a flat screen that uses liquid crystals to display information. They are made of two sheets that is polarised and flexible plastic material with a layer of liquid crystal between them.

Advantages of LCD

- They use less power
- They are lighter and easy to transport
- They occupy little space on the desk
- They emit little radiations with less effect on eyes.

Disadvantages of LCD

- They are more expensive than CRT
- They can only viewed at a very narrow angle
- They have poor output

Other ways of classifying monitors

- ✓ Flat panel monitors. These are used in laptops and other small computers.
- ✓ Touch screen monitors. These provide a sensitive screen with icons which are touched on to execute a task.

Factors to consider when buying a monitor

- ✓ Size of the screen/ monitor needed
- ✓ Technology used either LCD or CRT
- ✓ Monitor controls like brightness & display area
- ✓ Resolution

NOTE: All devices that reside outside the computer system case whether input or output are called peripheral devices.

Computer ports

1. USB (Universal Serial Bus) ports. This connects storage, output and input devices.
2. PS/2 ports. This connects a mouse or keyboard.
3. Serial port. This connects modem, scanner, a mouse etc (sends and receives data one bit at a time)
4. Parallel port. This is used to connect newer versions of printers and other peripherals such as monitor. They transfer data faster than the serial port.
5. VGA port (Video graphics Array). This only connects monitors.
6. Fire wire. This connects storage, output and input. Fire wire is made to handle more data than USB particularly audio and visual information.

(C) **STORAGE DEVICES**

Storage devices are gadgets used to keep computer information for future reference.

A storage drive /media is a device on the system unit where storage devices are inserted to be read and written on.

Writing data means recording data from memory to the storage device.

Reading data. Means transferring data from a storage media to computer's memory.

Capacity is the number of bytes (characters) a storage device can hold.

There are two types of storage devices

- ✓ Primary storage devices
- ✓ Secondary storage device

1. PRIMARY STORAGE DEVICES (Main Memory)

Is the type of storage that is directly accessible by the processor.

Main memory is classified into;

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

(a) Random Access Memory (RAM)

RAM is used to keep data and programs temporarily as they are waiting to be executed. The bigger the RAM, the faster the computer.

Characteristics of RAM

- It stores data temporarily
- RAM size can be changed or increased
- RAM is a read and write memory
- RAM occupies a bigger portion of the main memory (70%)
- RAM is volatile. It can easily lose its contents

TYPES OF RAM

1. Static RAM (SRAM): Is a type of memory which holds its contents as long as there is power
2. Dynamic RAM (DRAM): Is the type of RAM that holds its contents for a short time even when power is on.

NOTE:SRAM is faster compared to DRAM.

(b) Read Only Memory (ROM)

ROM stores programmed instructions permanently or semi – permanently. It keeps in built instructions entered at the time of manufacture e.g. Basic input output system (BIOS) such instructions are called firmware.

Types of ROM

There are 4 types of ROM depending on the performance of the instructions stored there;

1. **Mask ROM; (MROM):** Once data has been written on this ROM, it can never be changed.
2. **Programmable ROM (ROM):** This type of ROM allows the user to alter/ change its content only once after the content has been written on it.
3. **Erasable programmable ROM (EPROM).** This is a type of ROM with a transparent window through which its content can be erased by exposing it to Ultra Violet (UV) light and then reprogrammed for another use.
4. **Electrically Erasable Programmable ROM (EEPROM).** This is a type of ROM that can be erased and reprogrammed using electricity.

DIFFERENCES BETWEEN RAM AND ROM

RAM	**ROM**
It is volatile	It is non volatile (content cannot be lost even when the computer is off)
Is read and write	Is read only
It offers temporary storage	It offers permanent storage
Its size can be increased	Its size may not be increased (i.e. fied)
Its contents are user defined	Its contents are defined by the manufacturer
It occupies a bigger portion of main memory (70%)	It occupies a smaller portion of the main memory (30%)

NOTE: Firm ware are instructions and information which is recorded permanently by the manufacturers.

2. SECONDARY STORAGE DEVICES

These are storage devices that store data and instructions permanently. These devices are non – volatile.

There are three types of secondary devices, namely;

(i) Hard disk. Is a permanently fitted storage device in a computer. The hard disk is usually fitted in the hard disk drive.

The hard disk capacity is in gigabytes and access to data is much faster.
Hard disks are internal or external.

Advantages of hard disks

- Data stored on internal hard disk is secure since it cannot be misplaced
- Access time to data on hard disk is very fast and convenient
- Their data life is long compared to other storage devices
- They store large amounts of information

Disadvantages of hard disks

- Any virus attack may cause heavy data loss
- The hard disk may fail due to violent shaking and vibration
- Hard disks are very expensive to buy compared to other storage devices
- Transfer of data from one machine to another may be difficult since some are internally fixed.
- Hard disks expand & contact with change in temperature and this may cause data loss.

NOTE: Hard disk partitioning/ disk slicing is the creation of one or more regions on a hard disk so that each region separately.

Reasons for disk portioning

- ✓To provide space for data backups access
- ✓To safeguard specific information from unauthorised
- ✓To speed up computer operations.

(ii) Magnetic tapes. Is a flexible plastic ribbon on which data can be written on using magnetic process.
Magnetic tapes are sequentially accessed i.e. to access information at the end of the tape, it needs to read the entire tape which may take some time.

Advantages of using magnetic tapes

- ✓They are light and easy to carry
- ✓They are relatively cheap
- ✓They store large amounts of data of up to 1 telabyte. (1000 GB)

Disadvantages of magnetic tapes

- ✓Data quality gradually reduces with time
- ✓Environmental factors like dust and moisture can spoil data/information on it
- ✓It is time consuming since records are accessed sequentially.

(iii) Floppy disk/diskettes

Is a removable storage device that is made up of thin circular plastic disk with a magnetic coating. Diskettes are random access capacity. The common one has a storage capacity of 1.44MB.

ADVANTAGES

- It is easy to transport (portable)
- They were cheap to buy
- Data access took shorter time (Random Access)

Disadvantages

- They have limited space of up to 1.44MB
- They were prone to virus attacks and this caused data loss
- Environmental factors like dust, temperature and sunlight could spoil the information stored

(b) Optical Storage devices

These are electro – mechanical units coated with high reflective material. Data is written on the disk by focusing it on a high power laser beam. These include;

(i) CD –R or CD (Compact disk Read memory)

This is a compact disk which can be written to only once and can be read many times. The data on this disk cannot be erased.

(ii) CD – RW (Compact disk Re – writable)

This is an erasable compact disk that can be written to multiple times.

CD R and CD – RW have a standard storage capacity of 700MB (MEGA BYTES)

(iii) DVD – R (Digital Versatile Disk)

Data on this disk cannot be erased once written on its storage capacity is 4.7GB

(iv)DVD – RW

This is similar to CD – RW except that it has a storage capacity of up to 4.7GB.

ADVANTAGES OF COMPACT DISKS

- ✓ They have high storage capacity of 700MB
- ✓ They are portable hence transfer information easily
- ✓ They are resistant to virus attacks
- ✓ They are relatively cheap compared to other storage devices
- ✓ Their data life is nearly 100% reliable if it has no scratches.

DISADVANTAGES

- ✓ To record data on a CD one needs a CD writer
- ✓ Their average access time is slower compared to hard disk
- ✓ Their destruction rate is high since a single scratch may render it useless.

(C) Solid state storage devices (SSS)

Is a type of computer storage device made from silicon microchips. SSS store data electrically instead of magnetically. These include;

(i) Memory

These are micro storage cards mainly used in small digital devices like mobile phones, digital camera and personal computer.

(ii) Flash Disk

This is a small external pen – like storage device that can store all data types it connects through the USB ports.

MEMORY CAPACITIES

1. Bit. Is the smallest unit of the measurement in computer memory and storage. It is a single binary digit or code (i.e. 0 or 1). It is the basic unit of memory.

BIT is an acronym abbreviation for Binary digit

2. Nibble. Is half a byte which is a group of 4 bits e.g. 0101
3. Byte. It is a string/sequence of eight (8) bits e.g. 01010001. It is a standard unit for measuring computer memory.

- ➢ It is also defined as a single character in a computer
- ➢ A space between two words is also a byte
- ➢ Two or more bytes make up a word.

There are other larger units for measuring computer data. These include;

- ✓ Kilobyte KB
- ✓ Megabyte MB
- ✓ Gigabyte GB
- ✓ Terabyte TB

NOTE

1 KB = 1024 bytes (2^{10} bytes) ≈ 1000 bytes

1MB = 1024 KB (2^{20} bytes) ≈ 1,000,000 bytes

1GB = 1024MB (2^{30} bytes) ≈ 1 billion bytes

1TB = 1024 GB 2^{40} bytes ≈ 1 trillion bytes

Using the above demonstration try the following

1. Calculate the number of bytes in 1.5GB
2. How many bytes are in the statement "COMPUTER IS GOOD"
3. How many bits are in one byte?

Solution

1. 1024 x 1024 x 1.5 =
2. Include spaces between words
   = 17 x 1 = 17 bytes
   Since a character = byte
3. 1 byte = 1 x 8 = 8 bits
4. Compute the mega bytes found in a folder occupying 2.5GB on the hard disk of the computer.

1GB = 1024 x 2.5

= 2560 MB

5. Consider the phrase STORAGE

(i) How many bytes are in above phrase?

1 character = 2 bytes on modern computers

STORAGE has 7 characters = 2 x 7 = 14 bytes

For old computers, 1 character = 1 byte

7 x 1 = 7 bytes

Is also correct

(ii) How many bits are in the phrase

1 byte = 8 bits

14 bytes = 8 x 14

= 112 bits

(D) PROCESSING DEVICES

This also called the central processing unit CPU or microprocessor or the processor. The CPU is a device that transforms data into information.

The processor is composed of the following components

- ✓ The control unit
- ✓ Arithmetic Logic Unit ALU
- ✓ Registers

(i) The control unit

This coordinates all the processing activities in the central processing unit as well as the input, storage and output operations. It determines which instruction is to be executed next.

It sends the processed results back to the main memory (RAM)

It also fetches data from the main memory and puts it in proper order for the processor.

(ii) Arithmetic Logic Unit (ALU)

This is where all arithmetic and logical operations are carried out.

The arithmetic operations include;

- ✓ Addition
- ✓ Multiplication
- ✓ Division
- ✓ Subtraction

Logical operation is the ability of a computer to compare two quantities or numbers to determine which is greater or equal or less than the other.

(iii) Registers

This is a special temporary storage and location found in the CPU.

Before processing of any data, it must first be held in the registers.
NOTE: The number of registers a CPU has and the size of each determine the power and speed of the CPU. E.g. A32 – bit CPU is one with in which each register is 32 bit wide. Thus each CPU instruction can manipulate 32 bits of data.

OTHER TYPES OF MEMORIES

1. Buffer. Is a region of memory that is used to temporarily hold data while it is being moved from one place to another.
2. Virtual memory. Is the kind of memory storage where the operating system allocates a portion of storage (usually on the hard disk) to function as additional RAM or in the absence of RAM.
3. Cache memory. Is the memory that stores data/files temporarily that is automatically registered for on the web page. Cache memory is meant to enhance memory performance. Cache memory is closer to the CPU than the main memory RAM.
4. Complementary Metal Oxide Semi Conductor(CMOS)
   Is the memory used to store configuration information about the computer which includes;
   - ✓ Current date and time
   - ✓ Password
   - ✓ Amount of memory

Questions

1. (a) What is a **machine cycle**?

(b) Briefly describe each of these operations of the machine cycle.

(i) **Fetching**; Is the process of obtaining data items from memory

(ii) **Decoding**; Is the process of translating instructions into commands that the computer understands.

(iii) **Executing**; The process of carrying out commands

(iv) **Storing**; Is the process of writing the results into the memory

(v) **Parallel processing**; Is the use of multiple processors to execute a program at the same time.

(vi) **Multi – processing**; Is the execution of more than one program by the same processor.

(vii) **Multi – programming**; Is the processing of two or more programs by the same processor at the same time.

2. (a) List any two versions of micro processors on the market you know

- Pentium duo – core
- Pentium i – 3 core
- AMD Duron
- AMD Sempron
- AMD Duo core
- Pentium M
- Pentium VI
- Pentium III

COMPUTER SOFTWARE

Is a set of instructions that guide a computer on what to do.

OR.

Computer software is an interface between users and the hardware.

OR.

Is a sequence of instructions written to solve a particular problem.

A computer cannot do anything without programs or instructions.

Computer software is classified into two broad categories.

- System software
- Application software

(A) SYSTEM SOFTWARE

This is a type of a software that manages and controls the operations of the computer and other soft wares that run on it. System software is usually provided by the manufacturers.

It coordinates all the activities of all external hardware such as the mouse, keyboard, printers, speakers etc.

There are three types of system softwares;

- Operating system
- Programming languages
- Utility programs

(i) Operating system

This is a soft ware that coordinates all activities among the computer software and hardware devices.

O.S ensures that all parts of a computer is switched on plat form on top of which application programs run.

Examples of operating systems

- Windows Vista
- Windows XP
- Windows NT (New Technology)
- Windows 98
- Windows 7
- Windows 8
- Windows 10 (Latest version)
- Linux
- Unix
- Windows ME (Millennium)
- DOS
- Windows 3X
- Windows 95

Types of operating systems

Operating systems are classified according to;

- Number of users they can accommodate at a time
- Number of tasks it can run at a time
- How they process those tasks
- User interface

(a) Number of users

(1) Single – user O.S; This is a type of operating system that allows only one user at a time.

(2) Multi – user O.S; This is an operating system that allows multiple users to access the computer system concurrently.

(b) Number of tasks.

(1) **Single tasking O.S**: This is an operating system that allows only one program to run at a time.

(2) **Mult tasking O.S**: This is an O.S that allows multiple tasks to run at a time.

(c) How they process.

1. **Multi processing**: An O.S is capable of supporting and utilizing more than one computer processor.
2. **Multi threading**: Is the ability of an O.S to manage its use by more than one user at a time.

(d) User Interface (Human computer interaction)

1. Graphical User Interface (GUI). Is a pictorial representation of information on the computer screen. GUI is the latest effort to make the interface user friendlier.
2. Menu driven interface: This provides the user with a list of options to choose from.
3. Command line based O.S: This lets the user to type a command at the command prompt.

Features of GUI

- ❖ Icons
- ❖ Menus
- ❖ Pointing devices
- ❖ Desktop
- ❖ Pointer

Functions of operating systems

1. **Booting the computer**. The O.S facilitates the starting of the computer.
2. **File management**. The O.S keeps track of the information in the computer and its location.
3. **Memory management**. O.S determines how much memory is allocated to a particular program.
4. **Error handling**. The O.S deals with errors produced during execution and keep the computer running.
5. **Job scheduling**. The O.S schedules and monitors jobs for continuous processing by the CPU.
6. **Resource control**. The O.S controls the use of input, output and processing devices
7. Providing the user interface. The O.S provides the way the user interacts with the computer.
8. **Processor management**. The O.S decides on the program to be allowed in the CPU and the time it should spend there.
9. **Resource sharing**. The O.S provides sharing of files between users.
10. **Administering security**. The O.S usually requires the user to have a user name and a pass word to access the system.
11. **Configuring devices**. The O.S supports plug and play and can configure devices automatically.

(ii) Utility programs

These are programs that enhance computer functionality.

Examples of utility programs

1. Anti – virus: This is a utility that scans the computer for the possibility of computer viruses. The anti – virus can detect, prevent and remove viruses from the computer's memory.
2. Disk cleaners. This helps the user to decide on what to delete when the hard disk is full.

3. Sorting utility. This arranges data as specified by the user in ascending or descending order.
4. Disk compression. This transparently compresses or uncompresses the contents of the disk hence increasing the capacity of the hard disk.
5. Disk partition utility. This divides an individual disk into multiple logical partitions.
6. Network utilities. This utility analyzes the computer network connectivity, configures network settings, and log events.
7. Screen savers. This causes the blanking of the screen or filling it with images when the computer is not in use. Importance
    - It is used for advertisement
    - It protects the screen from burning out
    - It is used for entertainment
8. Debuggers. This tests the flow of a program, detects errors and notifies the user
9. Merging utility. This allows data from many files to be combined to make one file
10. Defragmentor utility. This moves fragments of files to one location.

(iii) Programming languages

This is a means of communicating with the computer.

Categories of programming languages

- Low level programming languages
- High level programming languages

(1) LOW LEVEL PROGRAMMING LANGUAGES

These are binary languages that are closely related to the computer processor. They are written in binary format of Os and Is

Examples of low level languages

- Machine code/ object code programming language/ 1st generation
- Assembly language / 2nd generation language

(i) Machine code/ 1st generation language

This is written in binary format i.e. in Os and Is

Characteristics

- It is very difficult to learn to human beings
- Programs are likely to have errors
- It is easily understood by the processor
- An example of a machine code instruction on a 16 – bit machine is 1000 000 000 1001

(ii) Assembly language

This is a language inverted to simplify machine code language

Characteristics

- ❖ It closely looks like machine code language.
- ❖ It is easier to understand that the machine code
- ❖ It uses few English abbreviations or words e.g. SUB for subtract, FNO for first number

(2) HIGH LEVEL PROGRAMMING LANGUAGES

These are languages that use English words aimed at making programming much easier.

Advantages

- ❖ These were introduced as an improvement for assembly language
- ❖ They make programming much easier due to use of English words
- ❖ Less time is spent to write a length program

Disadvantages

- ❖ The language cannot easily be understood by the processor.

Categories/ classification of high level programming language

- 3rd generation languages
- 4th generation languages
- 5th generation languages

3RD GENERATION LANGUAGES

Examples

- PASCAL (Named after its inventor Pascal)
- COBOL (Common Business Oriented Languages)
- BASIC (Beginners All Purpose Symbolic Instruction Code)
- C
- C+
- C++
- Java
- Javascript
- LOGO,Ada
- PL/1, PL/M
- Visual Basic
- HTML etc

4TH GENERATION LANGUAGE

Characteristics

- One does not need to know the details of the actual program
- Codes are generated automatically
- The programmer only changes a few codes in order to come up with the program he wants

Example

SQL (Structured Query Language)

5TH GENERATION LANGUAGE

Characteristics

- They mimic (Imitate) human actions
- These languages manipulate facts to reach a conclusion
- They are extensively used in artificial intelligence projects like mars exploration

LANGUAGE PROCESSORS/TRANSISTOR

These are programs that are used to translate high level languages into low level languages and vice versa

Examples of language processors

1. Compliers: These translate an entire program written in high level language into machine code or assembly code at the time of compiling.
2. Assemblers: These translate assembly instructions into machine code or binary code
3. Interpreters: These translate a program line by line while the program is running
4. Linkers: These combine compiled programs and determine where the program will be located in memory.

(B) APPLICATION PROGRAMS

These are programs designed to solve particular problems or tasks. E.g

- payroll program used to compute salaries for organisation
- word processing to create documents
- data base management systems to manage records

Characteristics of application programs

- They are user friendly i.e. users find them easy and flexible to use
- Their output is directly displayed on the screen
- They benefit the computer user more than the computer itself
- The computer can do with or without them
- They are menu driven i.e. commands are easily got under menus

APPLICATION SOFTWARE CLASSIFICATIONS

They are classified according to

- Purpose
- Acquisition
- Share ware
- Free ware

(a) Purpose

(i) General purpose/packaged/off the shelf software

These are soft wares designed for a variety of tasks. E.g word processor is used to write a novel, restaurant menu and even make posters.

(ii) Special purpose/custom made/ bespoke

This is a software designed to execute one specific task. E.g.

- A camera on the phone will allow one to take and share pictures
- A chess game only allows one to play chess.

(b) Acquisition

(i) Customised application software

This is a software made/designed for a specific user or organisation for a specific job. E.g.

- A factory may require a software to run a robot to make cars; however it may be the only factory making cars in the whole world, so the software required would have to be made specifically for that factory.
- For military, they may need a missile

Advantages of customised application

- They are more durable (long lasting)
- They are easily modified in case of need
- They are always brand new
- They can easily be upgraded
- They often satisfy user's needs

Disadvantages of customised application

- They are expensive to develop
- They need special training
- They take too long to develop and test before being implemented for use
- They are rarely used
- They are less compatible with other hardware platforms
- They are not multi – purpose

Examples of application softwares

- Word processor
- Electronic spread sheet
- Electronic presentation
- Publisher
- Microsoft Access/Database

(c) Freeware

This is a software provided at no cost to users e.g. most of the applications on phones like whatsapp

(d) Share ware

This is a software that is distributed free for a trial period and payment is required for using the software beyond the trial period.

(ii) Commercial application software

They are purchased from vendor stores. Installation on a number of computers is specified by the software producers.

Users only buy the licence to use it. Users may not be allowed to install the software on more than one machine/ computer.

Advantages

- They are cheap
- They are easily found
- They are easily to learn and use i.e. menu driven
- They come with manuals for the user's easy application

Disadvantages

- They can be out dated hence non durable
- They may contain packaged viruses
- They may not completely suit the buyer's need and interest
- It may be a duplicated or pirated program

DATA COMMUNICATION AND NETWORKING

DATA COMMUNICATION

Is an electronic transmission of information from the source to destination.

OR

Is a high speed data exchange between the computer and other electronic devices through cables or wireless.

Data are raw facts that do not have much meaning to the user.

Digital information is the information encoded in discrete form. It is composed of a sequence of binary digits, Os & 1s called bits.

Groups of 8 bits create a data byte or a character.

These characters make up the so called alphabets (including alphabetic letters, numeric used in data communication.

Elements of data communication

There are six elements of data communication; namely

- Sender
- Receiver
- Transmission media

- Protocol
- Message
- Communication software

1. **Sender**

   This is a device that initiates an instruction or message to be sent.

2. **Receiver**

   This is a device that receives the message from the sender

3. **Message**

   This is data/ information/ content to be transmitted over the transmission media.

4. Transmission media

   This is a communication path/ channel through which data signals are sent. E.g. the physical (cables) or wireless (radio, micro waves. E.g. cables, hub/switch, router, Ethernet, bridge.

5. **Protocol**

   Is a set of rules and standards that govern the electronic communication

6. Co**mmunication device or signal converter (**which can be done by the help of modem)

   This is a device that converts data or instructions from the sending device into signals that can be carried by a transmission media to the receiver.

DATA COMMUNICATION TOOLS

These are tools used in sending and receiving information.

1. **Electronic mail**

   This facilitates the sending and receiving of messages across the globe. This is achieved by the use of devices like computers and phones.

2. **Instant messaging (IM)**

   This is a form of communication over the internet that offers an instant transmission of messages from the sender to the receiver. This facilitates real time sending and receiving of messages.

Advantages of instant messaging

- It is cost saving since it can be done without paying for domestic or international call charges.
- Messages are sent in real time and response is instantaneous
- Files and pictures can be sent.

Disadvantages of instant messaging (IM)

- There is a possibility of the spread of computer viruses.
- They are often used for rumour mongering
- It is prone to hackers who can gain access to confidential information in the computer.

3. **Skype**

   This is a tool/ service that facilitates face to face interactions between distant people.

4. **News group/ cat rooms**

   This is a tool/ service that facilitates people to discuss and exchange information on a vast array of topics and share information.

Advantages

- It provides an opportunity to create new friends
- It creates ideas that may not rise in classrooms
- It improves the typing skills for people since it is text based
- It helps people with hearing problems to communicate easily over the internet
- It is a recreational activity for spending leisure time

Disadvantages

- It encourages rumour mongering
- It presents an opportunity for cyber bullying and sending un wanted messages
- There are high chances of being cheated or corned

Modes of data communication

1. **Simplex**

   This is a communication that takes place in only one direction. The listener or viewer cannot communicate back to the person sending the message. E.g. radio and television communication

2. **Half duplex**

   This is a communication in both directions but one at a time. E.g. radio call/ walkie talkie radio.

3. **Full duplex**

   This is a mode of communication which occurs in both directions simultaneously e.g. mobile phones and computers.

Advantages of electronic data communication

- It is faster than traditional means of sending messages
- It is cost effective since most of the data communication tools like email are free
- It guarantees message delivery and gives a feed back when the message arrives
- It is secure since it is protected by password and does not pass through people's hands
- It is convenient since messages can be sent at any time of the day

Disadvantages of electronic data communication

- It necessitates network/internet which is expensive and un reliable
- Eavesdropping. People can tap into communication channel for messages that are not meant for them.
- Hackers. Privacy is not guaranteed as the message can be accessed by unauthorised people.
- Masquerading. One may pretend as the rightful sender or receiver thereby tricking people into revealing confidential information.
- Spoofing. A program can be attacked and illegally accessed despite its continuity to run normally.
- Phishing. This is where people are tricked to give secret information like password, username and credit card details
- Pharming. A person may be redirected to another unwanted/fake site.

Data transmission media

This is a communication channel/path through which data signals are sent from the source to destination.

Types of data transmission media

Data transmission media is divided into two categories

- Physical/guided transmission media
- Wireless/unguided transmission media

(A) Physical/guided/wired transmission media

Is a transmission media in which signals are directed to a specific path using cables/wires. These include;

- Twisted pair cables
- Coaxial cables
- Fiber optic cables

(i) Twisted pair cables

These are cables made up of two wires twisted together to reduce electromagnetic interferences/noise.

There are two types of twisted pair cables

- Shielded Twisted Pair (STP) cables
- Unshielded Twisted Pair (UTP) cables

Application

- ✓ It is mainly used in telephone networks
- ✓ They are used in Local Area Networks (LAN) for connecting personal computers.

Causes of electromagnetic Interference (EMI) / electric noise

- Lightening sparks
- Radio signals
- Motor vehicles
- Radiators

NOTE: STP cables are most suitable for environments which are electronically noisy because they protected by the shields.

(ii) Coaxial cables

This cable has a central copper core which is made up of a solid wire. It is very effective at carrying analog signals at high frequencies.

Coaxial cables are mostly as back bones to connect two or more separate LANs because of their high band width.

Advantages

- It has a large band width of up to 1GBPS
- It can carry voice, data and video simultaneously.
- It is more resistant to radio and electromagnetic force than twisted
- It is stable even under data traffic (loads)

Disadvantages

- They are relatively expensive to buy and install as compared to twisted pair
- Coaxial cables are thick and thus hard to work with

(iii) Fiber optic cables

Signals are transmitted in a transparent plastic inform of light signals for long distances.

It is normally used as a back bone to interconnect networks. It is normally used through under seas.

Advantages

- It transmits data at a very high speed
- It supports high band width
- They have lower attenuation thus transfer data for long distances
- It is smaller and lighter than copper cables hence better for space limited situations
- It is resistant to electromagnetic interference (EMI) and eavesdropping.

Disadvantages

- It is very expensive to buy and manage
- It is very complex to configure
- A cable broken is very difficult to repair
- Installation of cables is difficult

NOTE:

Attenuation. Is a gradual diminishing in the strength of a signal

Is the reduction in the signal strength as it moves along a transmission media.

Band width. Is the maximum amount of data

(B) Wireless/unguided transmission media

This is a data transmission media where there is no physical connection between the communicating devices. Usually the transmission is sent through the atmosphere.

There are 3 types of wireless media;

- Radio waves
- Micro waves
- Infrared waves

1. **Satellite transmission**

   These receive micro wave signals from earth based communication facilities (satellite dishes), amplify them and re-transmit the signals to the communication facilities. The earth based stations use large shaped antennas to transmit and receive data from satellites.

   The transmission to the satellite is called uplink and the transmission from the satellite is called a downlink.

NOTE: The communication satellites are placed in orbits about 50,000km above the erth.

Application of communication satellites

- It is used for TV broad casts
- It is used in radio broad casts
- It is used in paying and global positioning system

Advantages of satellite

- Lots of data can be sent simultaneously
- It allows high quality broad band communication across continents.
- It covers a very large geographical area of data communication

Disadvantages

- The fee to launch a satellite is extremely expensive
- The infrastructure needed to access satellite communication is also expensive
- Most users do not have control over the satellite
- There is high level of dependences most people cannot afford owning private satellites

2. **Bluetooth.**

   This facilitates one to one wireless connection in a short distance e.g. mobile phone laptops.

3. **X-rays**

   These rays penetrate easily through materials such as fat and muscle but not bones, this is why they are widely used in medicine.

4. **Gamma rays**

   These are the most energetic form of electromagnetic radiation which can penetrate resistant objects like lead. Most of these radiations are dangerous to humans.

5. **Infrared waves**

   These transmit data in a line of sight e.g. TV remote.

6. **Radio waves**

   These transmit signals by modulation of electromagnetic waves. It transmits data in a wide area e.g in a country.

7. **Ultra – violet rays**

   This is the light which transmits data at a high frequency. Too much exposure to ultra – violet rays leads to skin cancer (where are they used)

8. **Visible light**

   This is the light we see. It is used to transmit data in a short distance.

Advantages of wireless communication

- It is cheaper to configure since it does not require cables
- It can easily be installed in remote and rugged areas at a low cost
- It can span (spread) to large geographical area

- It is easily scalable (can easily be changed to cover a large area)
- It is flexible since devices can be moved around without losing access to the network

Disadvantages of wireless communication

1. Relatively difficult to establish
2. The initial cost of acquisition and installation is very high
3. They are easily interfered by electro-magnetic interferences from lightening and sun

Factors affecting Data Transmission

- ✓ Virus infection in the transmitting devices
- ✓ Communication protocol used (set of rules used) or duplex
- ✓ Amount of traffic on the network at a time (band width)
- ✓ The device transmission speed/rate

Other terms used in data communication

1. **Node:** This is a device connected on the network
2. **Link.** This is a connection between adjacent nodes
3. **Path.** This is an end – to – end route within a network
4. **Packetizing.** This is the act of dividing messages into fixed length packets prior to transmission over a network's communication media.
5. **Routing.** This is determining the shortest and fastest path for sending and receiving messages
6. **Multiplexing.** This is the ability of a communication channel to transmit two or more different signals as one. An example is a TV which sends graphics, sound and text data at the same time as one signal.
7. **Sesson.** This is a communication dialog between network users.
8. **Network.** Is the interconnected group of computers and communication devices.

COMPUTER NETWORKS

Computer network is a group of interconnected computers to share resources like printers, computer programs etc.

OR

Is a collection of computers linked together using transmission media for the purpose of communication and resource sharing.

Transmission media is a communication channel through which data signals are sent. E.gs cables, hub/switch, bridge, router, Ethernet etc.

BASIC REQUIREMENTS FOR SETTING UP A NETWORK.

1. **Computer/work stations/clients**

   This may be a laptop or desktop
2. **Network Interface Card (NIC)**

   This is a computer device that acts as a connection point between the computer and transmission media e.g. Ethernet cables. Using a unique hardware address (MAC address) encoded on the card clip, the data link protocol employs these addresses to discover other systems connected to the network so as to transfer data to the right destination.

   There are two types of network cards
   - ✓ Wired
   - ✓ Wireless
3. **Gateway**

   This is a device that provides access to wide area networks
4. **Hub/concentrator**

This is a device that allows interconnection of computers to form a network. It is like a distribution center. It provides the central point for the cables in a network.

Note: Switch is like a hub but built in with advanced features

5. **Repeater.**

   This is a device that regenerates and resends an attenuated/ distorted signal.

6. **Internet service provider (ISP)**

   This is to provide internet connectivity.

7. **Cables**

   This is a transmission media which transmits communication signals. Different devices on the network are connected with different cable types that is

- Twisted pair
- Coaxial
- Fibre optic

8. **Network software**

   This is the network operating system used on the network.

   e.g.

   - linux

   Unix

   Novell Netware

   Windows NT 4.0

9. **Modem (Modulator – Demodulator)**

   This is used to connect a computer, to the internet. Modem converts data and instructions into signals that can be carried over a transmission media from the source to the destination.

   Modulation. Is to convert digital signals into analog signals

   Demodulation. Is to convert analog signals into digital signals.

Advantages of computer networks

1. **File sharing**
   Computer networks allow file sharing and remote file access
2. **Resource sharing**
   Computer networks allow resources like printer, modem to be shared
3. **Low set up costs**
   Shared resources mean reduction in the hardware costs for setting up a network.
4. **Increased storage space**
   More than one computer on the network share files and thus storage capacity gets resolved to a greater extent.
5. **Centralised administration**
   This reduces the number of people needed to manage the devices and data on the network, thus reducing cost to the company.
6. **Software upgrade** is easily done since it is done on the server only
7. it enables online learning/e-learning, electronic connection
8. it facilitates easy communication through e-mail

Disadvantages of computer network

1. **virus infection**
   Once one computer on the network is affected by a virus, there is likelihood that all computers on the network will be affected too.
2. **Lack of robustness (persistent to total failure despite damage)**
   If the main file server breaks down, the entire system becomes useless.

3. **Lack of independence**
   Since most networks have centralised server, the client users lack any freedom what so ever.
4. There is increased risk of data corruption
5. Increased exposure to hackers which puts private data at risk
6. Initial costs of installing the network cables, network cards and software are expensive
7. Time can be wasted on social networks
8. Needs an efficient handler (network administrator). It requires skilled knowledge since networks have many issues that arise.

Types of computer networks (Models)

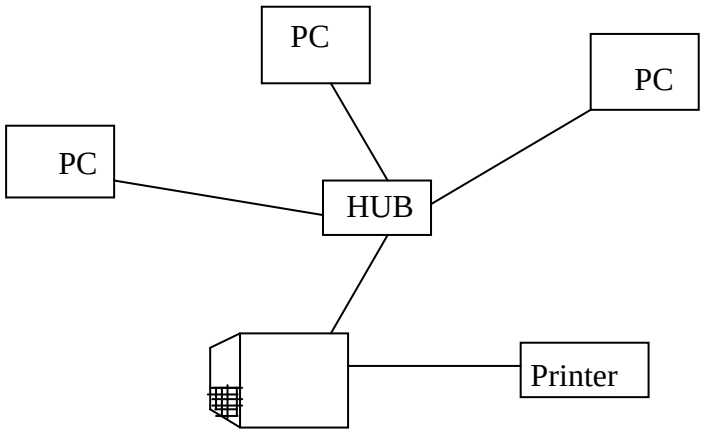
Computer networks are categorised in the following types;

- ✓ Local Area Network (LAN)
- ✓ Metropolitan Network (MAN)
- ✓ Wide Area Network (WAN)

(I) Local Area Network (LAN)

LAN is a group of interconnected computers in a limited geographical area such as a school computer laboratory, an office or a group of closely positioned buildings.

LAN allows individual users to locally share computer files and hardware such as printers.



Kinds/ forms of LAN

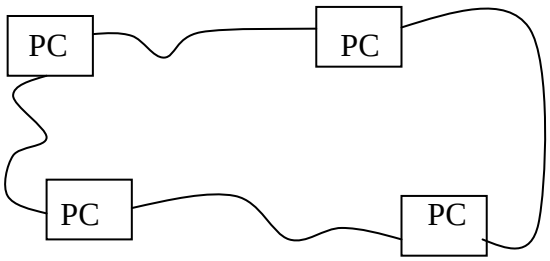
There are two types of LAN namely;

- ✓ Peer – to – peer networks
- ✓ Client – server networks

(i) Peer – to – peer networks

This is a group of interconnected computers where computer act as both a client and server.

Each computer on the network can share connected devices



Advantages

- It is very easy to setup
- It is easy to configure
- Computers communicate easily
- Users can manage their own resources

- They do not require network administrator
- It is appropriate in case of small networks
- It is easy to maintain

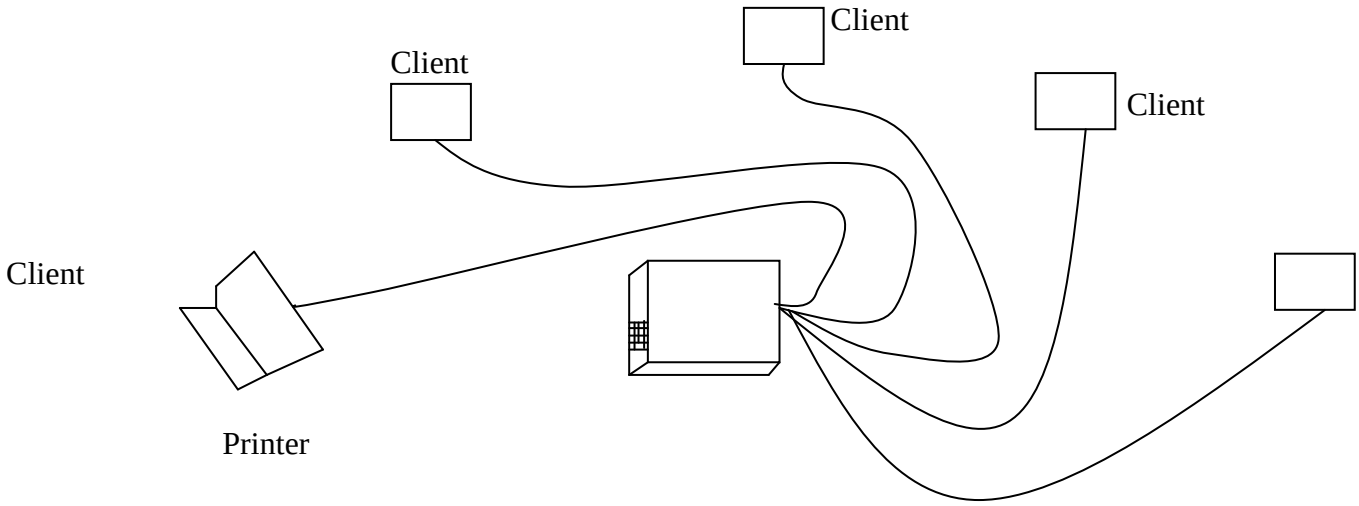
Disadvantages

- It lacks security due to absence of the server
- It is not appropriate for bigger networks
- There is no central administration
- Computers with shared resources suffer from sluggish performance
- It provides a limited number of connections for shared resources.

(ii) Client – server – networks

This is a network that consists of a central computer (server) on which other computers (clients) are connected.

The central computer provides services to the client computers.



Advantages

- It ensures high security network through access controls installed on the server
- It is easy to solve network problems
- It is easy to solve network problems
- It is easy to install a software since it is installed on only the server
- It is easier to monitor system performance on the server
- It offers reliable centralised storage and file sharing

Disadvantages

- It is expensive to set up
- It involves extra expenses for living a network administration
- If the server fails, the entire network will not work
- It requires an expensive, more powerful hardware for the server machine.

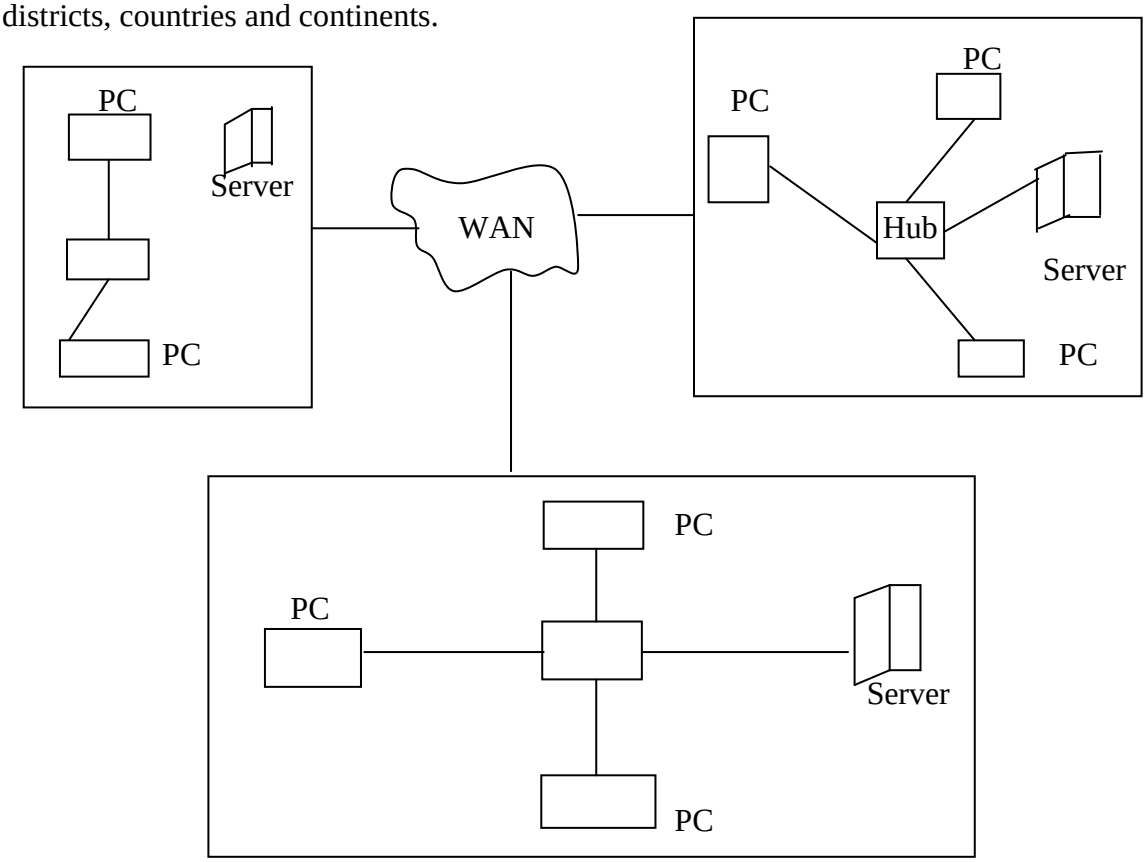
(II) Metropolitan Network (MAN)

MAN is a network that spans over a physical area like a city or a town. MAN is smaller than a WAN but larger than a LAN.

MAN are often owned by single entities like banks, government agencies that may have other branches across a metropolitan area each having its own LAN.

(III) Wide Area Network (WAN)

This is a network used to interconnect computers that are widely separated in various cities, districts, countries and continents.



WANs are designed to;

- Operate over a large geographical area
- Allow access over several interfaces operating at a low speed
- Provide full time and part time connectivity
- To connect devices separated over wide or global areas.

Advantages of WAN

1. Sharing data and information stored on the other computers on the network is possible
2. Allows tight control over who has access to what data
3. Reduces costs by sharing hardware (e.g. printer) and software (e.g. using a network version)
4. Facilitates communication because people can communicate efficiently through messaging, chartrooms and video conferencing
5. It covers a large geographical area, so long distance business can connect on one network.

Disadvantages

1. WAN is expensive to setup
2. Once setup, maintaining it is a full time job which requires network supervisors and technicians to be employed.
3. They need firewall to restrict outsiders from entering and disrupting the network
4. The network can be slow if weak computers are used
5. Information may not meet local needs or interests
6. WANs are vulnerable to hackers and other outside threats.

NETWORK TOPOLOGY

This is the physical arrangement of devices in a communication network.

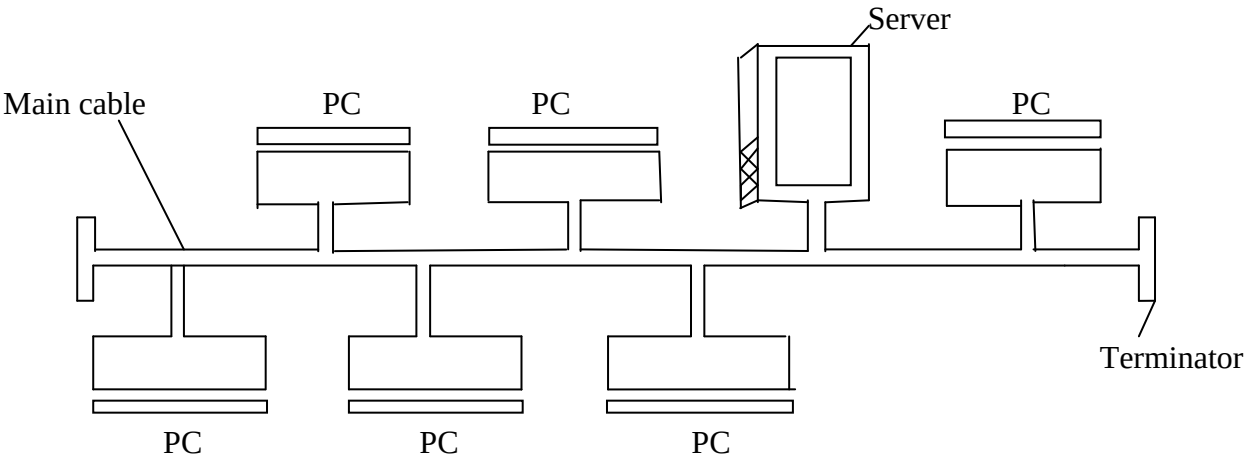
The commonly used network topologies are;

- Bus
- Ring
- Star

(i) Bus topology/Linear/Daisy wheel topology

This is a network that consists of a single central cable that connects all computers and other devices.

The physical cable that connects computers and other devices is called the bus or back bone. Data, instructions and information can be transmitted in both directions.



Advantages

- It is easy to implement
- Failure of one device does not affect others
- It is easy to connect a device to the network
- It is well suited for temporary networks

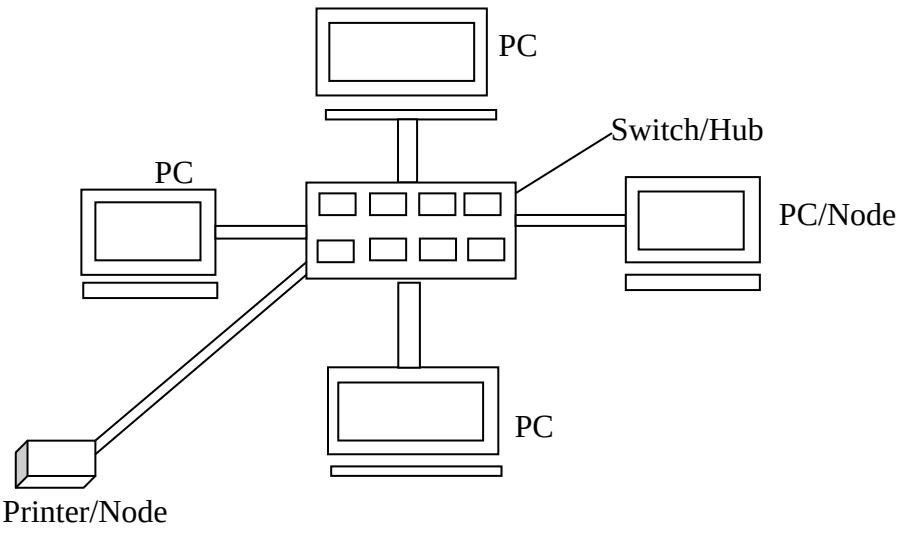
Disadvantages

- The main cable broken can disable when entire network
- Difficult to identify a problem when the entire system shuts down
- Maintenance costs may be high in the long run
- Not meant to be used as a standalone solution in large buildings
- Terminators are required at both ends of the main cable
- Performance degenerates with additional computers

(ii) Star topology

This is a network where each node is connected to the central computer/hub/switch. The central computer/switch provides a connection point for devices on the network.

The switch manages and controls all the functions of the network.



Advantages

1. Easy to install
2. Easy to detect faults and correct them
3. Good performance. Data packets re sent quickly since data does not pass through unnecessary nodes
4. It is reliable because each device connects directly to the hub. If one device fails, it does not affect the network.

Disadvantages of star topology

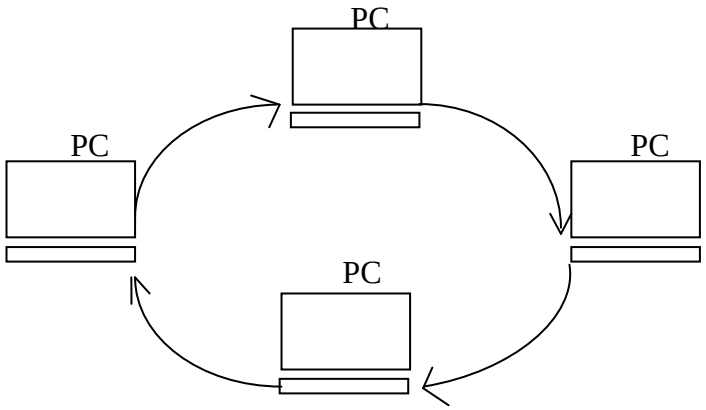
1. If a hub/switch fails, the entire network is inoperable
2. Lots of cables are required during installation of long distanced nodes
3. It is more expensive to install since more cables are needed

(iii) Ring topology

This is a network where a node is connected to two other nodes on the network.

Ring topology is made up of cables forming a closed ring or loop with all computers and devices in the network.

A ring network links all nodes together in a circular chain.



Advantages of ring topology

1. The growth of the network has minimal impact on the performance
2. All stations have equal access
3. Each node on the ring acts as a repeater allowing a ring network to span greater distance than other physical topology.
4. No collisions occur because data takes one direction only
5. The speed of data transmission is faster than in a bus topology.

Disadvantages of ring topology

1. There is no central host computer to control the network
2. If the cable fails, the whole difficult to establish
3. Data messages/packets travel in only one direction from device to device around the entire ring.
4. If a node in a ring fails, all nodes after the failed node cannot function.

Other Network topologies

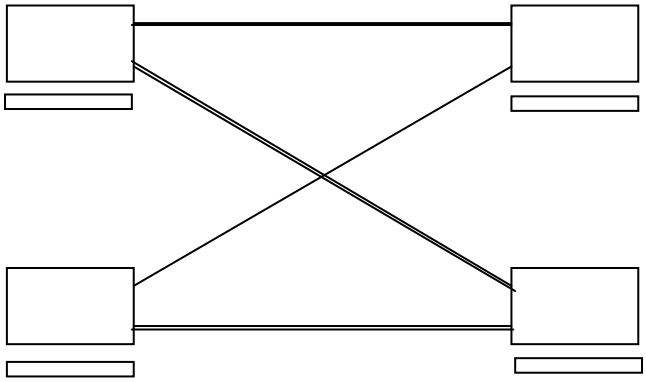
- Mesh topology
- Tree topology

Mesh topology

This is a type of network topology in which each of the nodes is connected to each of the other nodes in the network

Fully connected mesh topology makes it possible for data to be transmitted simultaneously from any single node to all other nodes.

PC PC



Advantages of mesh

1. Data will always be delivered
2. Data transmitted in the network takes the shortest path to the destination computer
3. In case of failure in one of the links, data takes an alternative path to the destination.

Disadvantages of mesh topology

1. It is too costly to set up
2. It is complex for practical networks
3. Network is limited by the number of interconnections that can be made between computers.

Tree topology

Tree topology is also known as the hierarchical network topology. This is because it contains different levels of hierarchy.

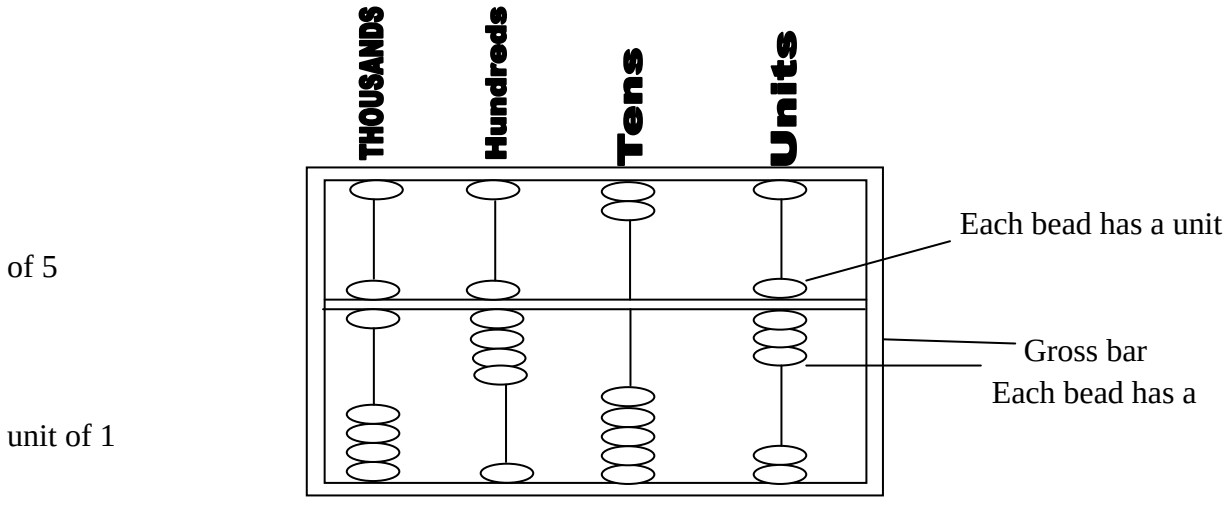
THE HISTORY AND EVOLUTION OF COMPUTERS

(A) NON ELECTRONIC (SIMPLE CALCULATING DEVICES)

(a) Abacus

The abacus is the first computation device.

It was a Chinese counting instrument which dates back to 3000BC. The abacus has bead – like that move along rods. Each bead above the middle bar stands for 5 units. Each bead below stands for 1 unit.



1+5 = 6 5+4=9 0+0=0 5+3=8

(b) Napier's bones

Napier's bones was developed by John Napier, a Scottish Mathematician in the 17th century. John Napier developed the first Logarithm tables. He published his log tables in 1614. Napier's bones were use for multiplication and division.

(c) Slide Rule

In 1620, an English Mathematician, William Oughtred developed the first analog device and it was also based on the concept of logarithms. This was a ruler with numbers written on it and could do simple math by sliding a bar to and from.

Early Discovery – Mechanical Era

In the 17th century, two further signifies developments took place. Computers composed of mainly movable parts i.e. wheel and axles.

(a) Pascal's Arithmetic Machine or Calculator

In 1647, a French man, Blaise Pascal made the first mechanical **adding** and **subtracting** machine that used a system of gears and wheels. It had digits arranged from 1-9 on wheels similar to Odometer on a motor car.

(b) Leibnitz's Tepped Reckoner

In 1694, Cottfried William Leibtniz a German Mathematician improved Pascal's design to create Leibniz calculator that could perform arithmetic operations of **addition, subtraction, multiplication** and **division.**

Start of computer Age

In the 19th century, other developments were outstanding in computer. Computers that are electronic with movable parts.

(a) Analytical Engine (Babbage)

The Analytical Engine was designed by an English Mathematician, Charles Babbage (1792 – 1871). The engine was recognised as the first real computer and Charles Babbage as the father of computing.

This machine introduced the idea of memory for storing results and the idea of printed output.
It could also follow programmed instruction to perform mathematical operation.
Ada Lovelaace (lady) was the first person to come up with the idea of programming loops.

(b) Jacquard weaving loom

Joseph Jacquard invented a machine for controlling the weaving process when making complex patterns. This system could use **metal cards punched** with holes in storing data. This machine could store programs or instructions using the hole and non – hole method.

(c) Hollerith's Tabulator

Herman Hollerith invented a tabulating machine that used **punched cards** to store and tabulate data. The U.S government in the 1890's census first used this machine.
He started a tabulating machine company and sold machines all over the world.
This company merged with others to form **international Business Machine (IBM)**

ELECTRONIC COMPUTER GENERATION

Computer generation is the advancement of computer technology over years. In 1950's, first widely operational computers came in and we divide them into generations.
Each generation is characterised by dramatic improvement over;

- Technology used to build the computer
- Internal organisation of the computer
- Programming languages

First Generation Computers (1946 – 1956)

Technological development or Innovation

- These computers were very large physically and relied/used vacuum tubes or thermionic values
- They used magnetic drum memories
- The maximum memory size was approximately 2000bytes (2 kilobytes)
- They used punched cards for input and output

- Programming was done in machine language

Setbacks

- Limited primary memory
- They consumed a lot of power
- They generated a lot of heat
- They were short lived and needed a standby technician
- They were expensive and few people could monopolise computers
- They were not portable
- They needed very many people to operate it because of it huge size.

Examples of first generation

- Electronic Numeric Integrator and Calculator (ENIAC)
- International Business Machine 650 (IBM 650)
- Universal Automatic Computer (UNIVAC)
- Electronic Delay Storage Automatic Computer (EDSAC)
- Electronic Discrete Variable Automatic Computer (EDVAC) invented by Dr John Von Newman.

Second Generation Computers (1957 – 1963)

Technological development

- They operated using transistors for internal operations
- Memory size expanded to 32 kilobytes of Random Access Memory.
- Speed reached 200,000 to 300,000 instructions per second
- They used magnetic core memories
- There was introduction of high level programming languages e.g. FORTRAN (Formula Translator), COBOL (Common Business Oriented Language) etc.
- Introduction of super computers e.g. Livermore Atomic Research Computer (LARC) and IBM 7030
- Computers became less expensive than first generation
- Computers generated less heat compared to first generation
- Computers were made smaller than first generation computers
- Transistors were much more stable and reliable than vacuum tubes

Examples of second generation computers

- IBM7030
- Livermore Atomic Research Computer (LARC)
- IBM
- IBM 1401
- IBM 7070
- Honey well 200

Third generation computers (1964 – 1979)

Technology development

- The third generation computers used integrated circuits (ICs) which are made by combining several transistors
- Third generation used **magnetic disks** for the purpose of storage
- Computer memory expanded to 2megabytes of RAM
- Speed accelerated to 5 million instructions per second (5MIPS)
- There was production of the first micro computers (1974) in this generation
- There was use of parallel processing
- Introduction of operating systems e.g multics
- Introduction of simpler high level programming languages like BASIC

- Introduction of networking of computers
- Introduction of first mainframe computer such as IBM 360, IBM 370
- Low cost, high reliability, small size, low power consumption made computers popular.

Examples of third generation

- IBM 360
- ICL 19000 series
- IBM 370

Fourth generation computers (1979 – 1989)

Technological development

- Fourth generation computers used large scale integration (LSI) and very large scale integration (VLSI) circuits
- Memories used included magnetic disks, bubble memories and optical speeds to 50MIPS
- Development of microprocessors
- Development of microcomputers
- Introduction of a wide variety of software
- Computers became more powerful and cheap enough that schools and homes were able to purchase them.

Examples of fourth generation computers

- 8088
- 80286
- 80386
- 80486
- Pentium I
- Pentium II
- Pentium III

Fifth generation computers (1990 – present)

1990 to present is the merging of telecommunication and computing technology.

The technology currently used under this generation include;

- ✓ Parallel Architecture
- ✓ Three – dimensional circuit design
- ✓ Super conducting material

These technologies have led to the development of extremely fast computers referred to as super computers with speeds in the range of 1 Giga to 1 Tera instructions per second.

In addition to this, the development of computer networking has reached a level of turning the world into a single village (World Wide Web)

Summary

Generation	**Major Innovation**
Generation one	Vacuum Tubes
Generation two	Transistors
Generation three	Integrated circuits
Generation four	Large scale integrated circuits
Generation five	Three dimensional circuit design

EXAMPLES OF APPLICATION SOFTWARE

(A) WORD PROCESSOR

This is a program that is used to create, save, edit, format and print documents.

Examples of word processors

- Word pro
- Microsoft word 2003, 2007, 2010, 2013, 2016
- Word pad
- Microsoft works
- Lotus notes

Advantages

- ✓ Print previews are possible
- ✓ Paragraphs can be indented in any form
- ✓ It is possible to include graphics
- ✓ You can create tables ie rows and columns
- ✓ It enables editing without retyping the entire document
- ✓ There is mass production of work such as mail merging to address many people

Application of word processor

- Writing reports
- Projects
- Typing and creating books
- Writing memorandum
- Designing a curriculum vitae

FEATURES OF WORD PROCESSING APPLICATION

1. **Cut and paste**
   This allows to remove (cut) a section of text from one place in a document and insert it (paste) somewhere else.
2. **Copy**
   This allows you to duplicate a section of the document/text.
3. **Search and replace**
   This allows you to direct the word processor to search for a particular word/phrase and replace it with another one.
4. **Word wrap**
   The processor automatically moves the cursor to the next line when you have filled a line with text and it will re – adjust the text if you change the margin.
5. **Print.**
   This allows you to send a softcopy document to the printer to get a hardcopy.
6. **Font specification**
   This allows the change of fonts in a document. For example you can specify bold, italic, underline, change in font size, and font colour.
7. **Header, footer and page numbering**
   This allows one to specify customised headers and footers that word processor will put on top or bottom of every page.
8. **Merges**
   This allows you to merge text from one file to another. This is particularly useful in generating many files that have the same formats but different data.
   Generating mail merge letters is an example of using merges.
9. **Spell checker**
   This allows the user to check spellings of the whole document at once.

10. Thesaurus

This feature suggests alternative words with the same meaning (synonyms) for use in the document.

11. Grammar checker

This reports grammatical errors usually by wavy green lines and suggestions on how to correct them.

12. Drop cap

This formats the first letter in a paragraph to be dropped within 2 or more lies.

13. WYSIWYG (What You See Is What You Get)

A document appears on the display screen exactly it will be printed.

14. Word count

This establishes the number of words, characters, paragraphs etc in a document.

15. Templates

This establishes the initial document layouts and formats for different document types.

Starting Microsoft Word

- Boot the computer Desktop appears
- Click the start button
- Point to all programs (programs)
- Click Microsoft office folder
- Click Microsoft word 2003/2007/2010/2013/2016.
- Microsoft word screen appears.

Alternatively

- Click the start button
- From the menu list, click Microsoft word 2003/7/16.

OR

- Point to and double click Microsoft word icon from the desktop

Essential elements and parts of Microsoft word window.

1. **Title bar**
   This displays the name of the window or program running. For example, document 1 – Microsoft word.
2. **Control menu box (control buttons)**
   These buttons are located in the upper right hand corner of the Microsoft word window. They include,

- Minimise (⊟): this shrinks the window to the task bar and the window is hidden but not closed.
- Maximise (▭): This expands the window to the full size of the screen.
- Restore (❐): This returns the maximised window to the smaller size.
- Close (X): This closes the active window once clicked on.

3. **Menu bar**

This is just below the title bar and it displays a set of munes such as home, page layout, view, review, mailings, format etc

When you click on one of these, it displays the available commands (secondary menu)

4. **Formatting bar** □

This is just below the menu bar and contains the features for formatting documents such as the font style (Calibri, Times New Roman etc) font size, bold, italic (I), underline (U), subscript (O2) superscript (X^2), change case etc.

5. **Status bar**
   This displays messages about the current activity and how certain features are used for example, page numbering (e.g. 2 0f 5), No of words typed, zoom etc.
6. **Typing/document area**
   This is the available window where you can type or manipulate data from.
7. **Standard tool bar**
   This allows you to access crucial features such as file, save, redo, draw table etc.
8. **Naming and saving**
   Saving is storing document for future reference.
   A document can be saved internally on a hard disk (Drive CD etc) or externally on a storage device such as compact disk, memory card, flash disk etc.

To save a document consider the following steps;

- Click on the office button (top left hand corner)
- Point to "Save As" option, click on word document
- From the dialog box that appears, select the storage area of your choice. (Either Local Disk D, desktop my document or removable disk)
- Type the file name of your choice
- Specify the save as type
- Click save or press enter button on the keyboard.

Saving changes

Every time, you add or delete information to or from your document, it is important to save the changes made;

The keyboard short – cut is CTRL + S

Editing a document

Editing is the process of adding, deleting and correcting errors in a document.

Editing involves the following;

1. **Blocking/selecting/highlighting text**

   This is done to make the document ready for modification and manipulation.

✓ Press the left button of the mouse, drag across document, then release the mouse button.
✓ To select the entire document, press CTRL + A

2. **Undoing and Redoing**

   Undoing is the process of deleting a letter, text or sentence from the document.

To undo; from the tool bar, click on the undo icon (↶) or press CTRL+Z

Redoing is the process of bringing back what was accidentally removed by the undo command.

To redo; from the menu bar, click on the redo icon (↷) or press CTRL+Y

3. Deleting text
4. Inserting text

Text and Document Formatting

Formatting means improving on the appearance of a text or document.

It involves the following;

- Font colour, size, type
- Paragraph formatting (line spacing)
- Paragraph Indenting (distance between the margin and text)
- Changing character cases

- Text Justification/Alignment
- Bullets and numbering
- Borders and shading
- Super script and superscript
- Drop capping

Paragraph formatting (Line spacing)

Line spacing is the vertical distance between lines. Vertical displace can be increased or decreased before and after typing the text.

Procedure

- Select the text whose vertical space you want to change
- Click on home from the menu bar
- From the paragraph menu, choose "line spacing" optim choose the line spacing of your choice from the drop down menu that appears e.g 1.0, 1.5, 2 etc.

Paragraph Indenting

This refers to increase or decrease in the amount of space between the text and the margin.

After typing the text;

- Select the work to be indented
- Click on home from the menu bar and choose paragraph (using the drop down arrow besides the paragraph menu)
- Select the Indent type (either left or right, etc) and the measurement of your choice e.g. .0, 1.5 etc.

There are 5 types of paragraph Indent

Left Indent: This indents the lines of text in the paragraph from the left margin.

Right Indent: This Indents lines of text in the paragraph from the right margin.

Double Indent: This indents lines of text in a paragraph from both sides.

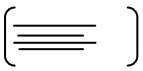
Paragraph from both sides

First line/Tab Indent: This indents the first line of the paragraph only.

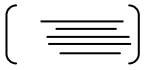
Hanging Indent; This indents the rest of the lines in the paragraph excluding the first one.

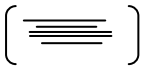
Text Justification/Alignment

This involves aligning the text either to the left, right, centre or full justify (both left and right)

Aligning text to the left. 

The keyboard short cut is CTRL + L

Aligning ext to the left. 

Aligning text to the centre 

The keyboard short cut is CTRL + E

FULL Justification (Justify text) 

BULLETS AND NUMBERING

This formats paragraphs with bullets (spots or dots) or with numbers. This can be applied before or after typing the text.

After typing the text;

- Select paragraphs to be formatted with bullets or numbers
- From the menu bar, choose bullets or numbering icon
- Select bullets or numbering type of your choice from the bullets and numbering library.

After typing

- Select the text to which you want to apply the border or shading
- From the menu bar, click on page layout
- Choose page border
- From the border and shading dialog box, choose "borders" tab
- Click on box or shadow or 3D
- Check the line style, colour and width
- Click ok.

Drop capping

A drop cap is an artistic (enlarged) letter beginning a sentence or paragraph.

Applying a drop cap

- Position the cursor at the beginning of the sentence or paragraph to be drop capped.
- From the menu bar, click on insert
- Choose drop cap
- From the drop cap dialog box, select the drop cap option of your choice.

PAGE LAYOUT

Setting Margins

It is possible to set up margins of pages from top, bottom, left and right.

Procedure

- From the menu bar click on page layout
- Choose "margins" tab from the page layout section that appears.
- From the dialogue box that appears, choose the option you want.

Inserting page numbers

Inserting page numbers in the document help to have a clear page information and specification.

Procedure

- From the menu bar, click on the "insert£ tab
- Choose page numbers
- From the drop down arrow that appears, point to either top of the page or bottom of the page option for the position of the page numbers.
- Select the alignment of your choice and style of the page number.

Page break

A page break is terminating a page forcefully or prematurely. It is also the one that forces the breaking or insertion cursor to move to the top of the next page.

Procedure

- Position the cursor where you want the page break to be inserted.
- From, the menu bar, click on insert
- Select the page break option.

To remove page break

- Position the cursor where the page break was inserted
- Press the delete key until the displaced text comes back to the original position.

Header and Footers

Header is a constant text appearing on top of every page

Footer is a constant text appearing at the button of every page.

Procedure

- From the menu bar, click on insert
- Choose either footer or header
- Select the desired header or footer of your choice by scrolling through various options.

Alternatively;

- ✓ Double click in the header area/ footer area
- ✓ Make the desired changes
- ✓ Double click in the document area to come out of the header/footer area.

DATA TABULATION

A table is a combination of the intersection of rows and columns forming cells where data is entered and stored.

Creating tables

Tables can be created using two ways;

- ✓ Insertion command
- ✓ Drawing technique

Insertion command

Procedure

- ✓ Position the cursor where you want to insert the table
- ✓ From the menu bar, click on insert
- ✓ Choose the table and click command
- ✓ Select the "insert table" command
- ✓ From the dialogue box that appears, specify the number of rows and columns you want and
- ✓ Click ok

Formatting table cells

(i) **Merging cells**

This is combining two or more cells into one.

Procedure

- ✓ Select the cells to be merged
- ✓ Right click in the selected area
- ✓ From the drop down arrow that appears, choose the "merge cells" option.

(ii) **Splitting cells**

This is dividing a cell into two or more cells

Procedure

- ✓ Select the cell to be split
- ✓ Right click in the selected cell and choose "split cell" option from the rop down menu
- ✓ Specify the number of rows and columns you want
- ✓ Click ok

Inserting Rows and Columns

This is adding extra rows or columns to the table

(a) Inserting row

- ✓ Select a row above or below where you want the new row to be inserted
- ✓ Right click in the selected area
- ✓ From the drop down menu, choose insert
- ✓ Specify whether insert row below

Alternatively

- ✓ Click in front of the row at the right and side of the table
- ✓ Press enter for the row to be inserted below the row clicked in front

(b) Inserting columns

- ✓ Select a column to which you want the new column to be inserted
- ✓ Right click in the selected area
- ✓ From the drop down menu that appears, choose insert column
- ✓ Specify either insert column to the left or right

(c) Inserting columns in a text

- Select the text
- From the menu bar, click on page layout
- Choose the number of columns you want

USING OTHER SOFTWARE OBJECTS

1. Inserting text boxes

A text box is a four sided figure that enables text to be typed within its borders

Procedure

- ❖ Position the cursor where you want to insert a text box
- ❖ From the menu bar, click on insert
- ❖ Select the text box option
- ❖ Click the drop down arrow
- ❖ Choose the text box style of your choice or choose "Draw text box" to draw the text box manually.

Formatting text box

Different formats can be applied to a text box. They include fill effects, line colour, weight and style.

Procedure

- Position the cursor at the edge of the text box and right click on that point
- From the drop down menu that appears, choose format text box
- You can now select your colour choice, fill effects and line style and then click ok

2. Inserting Word Art graphics

Word Art graphics is a program used for creating text to appear in an attractive artistic style.

Procedure

- Position the cursor at the position you want to insert the word art
- From the menu bar, click on insert
- Choose the word art by clicking on the drop down menu underneath it
- Choose the style of your choice
- From the edit Word Art text dialog box that appears type the text you want to give word art style
- Specify the font size you want
- Click ok

3. Inserting Auto shapes

Microsoft has a gallery of predefined shapes that can be inserted in a document. The shape galley consists of 6 categories;

- ➢ Basic lines
- ➢ Basic shapes
- ➢ Block arrows
- ➢ Flow charts
- ➢ Callouts
- ➢ Stars and banners

Procedures

- From the menu bar, click on insert
- Click on the shape option to display the shapes gallery
- Click on the desired shape
- Click on the desired location and drag the shape across to an enlarged size or from of your choice
- To format the shape, right clicks on it and choose the format option or add text

- You can change the line colour, fill options, weight of the line depending on your choice.

4. Grouping and ungrouping data

Grouping objects helps independent inserted objects to be dragged together or moved together from one location to another.

Procedure

- Select the first object by clicking on it to display its sizing handles
- While holding down the control button, select the remaining subsequent (following) objects.
- Note that each object's sizing handles are displayed when selected
- Right click on the selected objects
- Choose the "Grouping "option and then from the arrow,
- Choose "group"
- The sizing handles for the group are shown

MAIL MERGING AND DOCUMENT REFERENCING

MAIL MERGE

Mail merging is combining two documents into a single one. It is a common word processing feature for mass production of documents.

Mail merge consists of two documents namely;

- Main document
- Data source document

Main document; Is a document that contains a message to be sent and the senders address details.

Data source document; Is a document that contains all the particulars of the receiver including the names and the address.

Thus the merged document combines the main document and the data source document.

Examples of mail merge

Consider the ministry of education inviting all heads of schools for a sensitization work shop. It should be noted that;

- The same message will be sent to different heads of schools
- Only the name of the recipient (heads) and their address have to change on each particular letter.
- The words that will have to change are called fields i.e. names, districts, telephone numbers etc.

Creating the main document

- Start a new Microsoft word document and type the message content/letter, save it as "Urgent notice"
- From the menu bar, click on mailings
- From the mailings tool bar, click on start mail merge option
- Choose either letters or email messages etc.

Creating Data source document

- From the menu bar, click on mailings
- From the mailings tool bar, click on "selected recipients" option
- Choose "type new list" or "use existing list" option
- From the new address list dialog box that appears, click on customise columns to specify the field names of interest such as title, company name, address line 1, address line 2, city etc
- Delete the fields not of your interest and then click ok
- Click on the first check box
- Create the data source list by typing the company name, city etc
- To create a new entry, click on "New entry" tab
- After all the recipients details, click ok

- Save the data source file with the name of your choice

Merging the main with data source document

(a) Place the cursor where you want the merge fields to appear
(b) From the menu bar, click on mailings
(c) From the mailings tool bar, click on insert merge fields option.

A drop down list appears

- Select the merge field you want to merge such as name, city etc
- Press enter key or space bar

(d) To insert other merge fields, repeat steps (a) to (c)
(e) Save the file by pressing ctrl + s or click on the save icon.
(f) Click on finish and merge if you are ready to print out letters or send emails or if you want to edit individual letters.

Assignment

You are required to create a letter to the parents of S.5, Plus Two High School/Light SS inviting them for a carrier's day. Consider the following information

Name of Parent	District	Telephone No
Agaba Ronald	Bushenyi	0702697428
Abaho Rodgers	Sheema	0775662030
Atuha Ian	Kampala	0775817784
Mugema Jobson	Wakiso	0775157209

DOCUMENT REFERENCING

Document referencing is a land mark feature that is inserted in a document to identify parts of the document.

A foot note is a comment or additional text found at the bottom of the page that helps to explain a phrase or word in the document e.g. in the Bible.

An end note is a comment or additional text found at the end of the document that helps to explain a word or phrase in a document

Foot notes and end notes are automatically numbered when they are created.

Inserting foot notes and end notes

- Position the cursor at the end of word or phrase (select the word or phrase)
- From the menu bar, click on references then choose the "insert end nte" or "insert foot note" option
- The specified foot note or end note is inserted

You can customise or format a foot note or end note depending on what you want using a drop down arrow besides the foot notes menu.

If a custom mark is selected, click on a symbol button and select a symbol of your choice and then click ok.

PRINTING A DOCUMENT

Printing is the process of changing a soft copy on a computer to a hard copy on a paper.

Procedure

- Click on the office button, then point to print option
- The print menu dialog box opens
- Select and specify the print option e.g. number of copies, paper size etc
- Click ok

OR

- Place CTRL + P on the keyboard

ELECTRONIC PRESENTATION

A presentation software is an application software package used to present information using simple texts, graphics, pictures, sounds and video.

Examples

- Microsoft power point
- Harvard graphics
- Free less
- Corel Draw
- Google Docs
- Adobe Persuasions

Features of the presentation software

These include;

- Animation
- Transitions
- Hyper links
- Sounds
- Videos
- Slides
- Charts
- Designs etc

Advantages/Users of presentation software

- ✓ It reduces boredom because of the interesting graphics
- ✓ It eases interpretation because of the graphs and charts
- ✓ It can be linked to the World Wide Web (WWW)

Disadvantages of presentation software

- ✓ Light control might not be possible in some rooms
- ✓ Technology may break down in the middle of the presentation
- ✓ The goodness of the presentation depends on the creativity and the skill of the presenter

Qualities of a good presentation

- It should not be too long otherwise it causes boredom
- Graphics should be relevant
- Uniform colours should be maintained unless otherwise stated
- The back ground colours should not clash with the font colours
- Transitions should not be slow neither should they be too fast

TERMS USED

1. **Presenter:** this is a person who delivers a presentation. The presenter can be called a speaker.
2. **Presentation:** This is the entire work referring to a particular topic
3. **Slide:** This is a single page in a presentation or power point window. It is the working area equivalent to a page in Microsoft word.
4. **Audience:** This is a group of individuals who have interest in the presentation.
5. **Transition:** This is how slides appear and disappear from the screen. It means moving or switching from one slide to another. This can be done automatically or on mouse click.
6. **Animation:** This is putting motion or sound to different objects in a slide.
7. **Slide master:** This is a template used to make uniform changes in all slides in a presentation. It allows to maintain consistency/ uniformity in formatting. This is because all changes made in the master slide will occur in all the slides in a presentation.
8. **Sizing handles:** These are six or 4 boxes that enclose a selected object. They are used in resizing objects.

9. **Place holder:** This is an object that reserves a place for text in a slide.

Presentation layouts in Microsoft power point

A layout is how slides are arranged on the display window in a presentation.

There are two types of layouts namely;

- Normal view
- Slide sorter view

1. **Normal view**

   This is where one slide is displayed on the screen at a time it has 3 mjor sections;

- ✓ Outline pane
- ✓ Slide pane
- ✓ Notes pane

Outline pane displays the entire contents of a particular presentation.

Slide pane displays the current slide in details with all the objects in it.

Notes pane is used to add and display speaker's notes of the current slide.

2. **Slide sorter view**

   This is where all the slides are viewed at ago. All slides in a presentation are viewed on a single window.

Ways of presenting or delivering a presentation

There are various ways in which a presentation can be delivered to the audience. These include;

- On screen presentation
- Web presentation
- Paper print outs
- Notes, hand outs and outlines
- Over head projector transparencies

1. **On screen presentation**

   This is a presentation that is viewed on the computer screen

2. **Web presentation**

   These are presentations that are viewed using the internet browser. The presentation is saved as a webpage.

3. **Paper print outs**

   This where slides are printed on a paper in either colour or black and white.